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CONFERENCE COMMITTEE

The conference is aimed at dissemination of scientific research results, sharing of experience, improvement of foreign language and cross-cultural communication skills, and establishing of international contacts.

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AGRICULTURE

DEVELOPMENT OF TAN SPOT DEPENDING ON CROP ROTATION

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Wheat is one of the most profitable and most widely produced crops in Latvia. This fact is the reason of steady wheat proportion increase in crop rotation and, accordingly, also increasing the risk of wheat diseases, including tan spot. Tan spot, caused by *Pyrenophora tritici-repentis*, is one of the most important wheat leaf diseases all over the world, especially in the regions of intensive wheat growing. Tan spot reduces total yield, kernel weight, number of grains per head, total biomass and/or grain quality because of red-smudge symptoms [3]. In Latvia and Lithuania, tan spot was noticed and identified in the first half of the 1990s. The spread of the disease increased rapidly along with the increase in wheat percentage in a crop rotation structure [1]. The causal agent of tan spot survives in wheat residues, and therefore continuous wheat sowings promote development of this disease [4].

The aim of this investigation was to characterise the development of tan spot, depending on crop rotation under typical wheat growing conditions in the central region of Latvia.

A long-term field experiment was established at the Pēterlauki Study and Research Farm of Latvia University of Agriculture. The obtained results (2012-2014) were categorized according to crop rotation (A – continuous wheat; B – wheat after other pre-crop). Altogether, 12 plots of wheat were surveyed each year. The incidence and severity of diseases were assessed every week. The total impact of the diseases during the vegetation period was estimated by calculating the area under the disease progress curve (AUDPC) [3].

The first symptoms of tan spot were observed at the time of the stem booting, crop rotation influenced the severity of disease symptoms. In the fields, where wheat was sown after wheat, the average severity of disease was 4.11%, compared to other fields where the disease average severity was about 0.27% where wheat followed other crops. A similar situation was observed at the time of ripening – the severity of tan spot achieved 18.26% and 8.75% accordingly. AUDPC described the development of disease during whole vegetation period. The value of AUDPC was significantly ($p< 0.01$) higher in the fields, where wheat was sown after wheat. Where pre-crop was wheat, the difference was almost five times greater compared to the field where other pre-crops were sown. The progress of tan spot has been influenced also by pre-pre crop, if wheat was used as pre-pre-crop AUDPC value was essentially higher ($p<0.05$) than in occasions where other pre- crops were sown. The obtained results confirmed the importance of agro-technical measures. The lack of crop rotation is a substantial risk factor that can promote critical development of tan spot.

References

1. Bankina B., Priekule I. A review of tan spot research in the Baltic countries: occurrence, biology and possibilities of control: *Žemdirbystė,* 2011, Vol. 98(1), pp. 3-10.
2. Bankina B., Turka I. Sampling methods of plant diseases and pests, Latvia University of Agriculture, Jelgava, 2013, 24 pp., (*In latvian*).
3. Moreno M. V., Stenglein S. A., Perelló A. E. Pyrenophora tritici-repentis, Causal Agent of Tan Spot: A Review of Intraspecific Genetic Diversity, *The Molecular Basis of Plant Genetic Diversity*, 2012, pp. 297-330.
4. Ronis A., Semaškienė R., Dabkevičius Z., Liatukas Ž. Influence of leaf diseases on grain yield and yield components in winter wheat, *Journal of Plant Protection Research*, 2009, Vol. 49, No. 2, pp. 151–157.

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EFFECT OF DIFFERENT TYPES OF BIODEGRADABLE WASTE COMPOST ON SPRING BARLEY YIELD AND QUALITY

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Many countries (including Lithuania) practice composting of biodegradable waste. Composts are used for fertilisation in agriculture for many years, yet there is still a need for more research on relationships between the different quality characteristics, quality characteristics as totality, and especially contamination of different types of biodegradable waste compost. Compost is obtained from different types of biodegradable waste (including biogas production waste and sewage sludge) during the process of aerobic degradation of organic matter by microorganisms, therefore it should be regarded as a complex of various matters and elements [1]. Organic fertiliser is an essential source of replenishing the energetic potential of soil [2].

The aim of this study was to assess the effect of different types of biodegradable waste compost on the spring barley yield and quality.

Methods. The experiment was carried out at the Elmininkai Experimental Station in Anykščiai district, Lithuania. The total size of experimental plot was 72 m^2 (12×6), and the accounting area was 24 m^2. Design of the experiment: 1. Not treated; 2. Treated with green waste compost (leaves, grass, plant parts); 3. Treated with green waste compost and mineral fertilisers; 4. Treated with farm manure; 5. Treated with farmyard manure and mineral fertilisers; 6. Treated with biogas production waste compost; 7. Treated with biogas production waste compost and mineral fertilisers; 8. Treated with mineral fertilisers; 9. Treated with sewage sludge compost (matured using straw or leaves) and mineral fertilisers; 10. Treated with sewage sludge compost. The rates of mineral fertilisers applied (kg ha^{-1} of active matter): nitrogen – 60, phosphorus – 40, potassium – 60. The rates of organic fertilisers were calculated based on the maximal permitted nitrogen rate of 170 kg ha^{-1}, as it was indicated in the EC Directive 91/676/EEC. Spring barley grain yield (t ha^{-1}) was re-calculated and expressed as the yield of 15% moisture content absolutely clean grain. Concentration of different elements was determined using the following analytical methods: Kjeldahl method (total nitrogen), vanadate/molybdate method (total phosphorus), flame emission spectrometry method (total potassium) and plasma atomic emission spectrometry method (heavy metals).

Research results. The largest statistically significant differences between the not treated experimental plots (grain yield 2.99 t ha^{-1}) and the plots treated only with organic fertilisers were recorded in the plots fertilised with green waste compost and digestate (73 % and 68 % yield increase, respectively). The plots treated only with mineral fertilisers (grain yield 4.42 t ha^{-1}) were compared with the plots treated with both organic and mineral fertilisers; the largest yield increase (11%) was determined in the plots fertilised with green waste compost and digestate. The determined nitrogen concentrations in grains were within the limits of 2.01–2.35 %, phosphorus –0.46–0.55 %, potassium – 0.49–0.58 %. The highest concentration of copper (5.65 mg kg^{-1}) in grains was determined in plots treated with green waste compost, the lowest (3.27 mg kg^{-1}) – in plots treated with digestate; the highest concentrations of zinc in grains were determined in plots treated with green waste compost (25.25 mg kg^{-1}).

References

1. Larney F. J., Olson A. F., Miller J. J., DeMaere P. R., Zvomuya F. & McAllister T.A. Physical and chemical changes during composting of wood chip–bedded andstraw–bedded beef cattle feedlot manure, *Journal of Environmental Quality*, 2008, Vol. 37, pp. 725–735.
2. Repšienė R., Skuodienė R. The influence of liming and organic fertilisation on the changes of some agrochemical indicators and their relationship with crop weed incidence, *Žemdirbystė=Agriculture*, 2010, Vol. 97 (4), pp. 3–14.

OCCURRENCE OF MAIZE (*Zea mays L.)* DISEASES IN LATVIA

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Maize (*Zea mays L.*) is widely grown in Latvia, with contemporary uses mainly being forage and biogas production. There is not much research about maize diseases in Latvia, but this problem is very important in Europe and the United States of America. The most important diseases of maize are grey leaf spot caused by *Cerospora zeae - maydis*, Northern maize leaf blights caused by *Helminthosporium turcicum*, common rusts caused by *Puccinia sorghi* and Southern rusts caused by *Puccinia polysora* [2]. The aim of this study was to identify and clarify development peculiarities of the most important maize leaf diseases.

The field trial was conducted at the Study and Research Farm "Vecauce" of the Latvia University of Agriculture in 2014. It was established as a one-factor trial with 26 hybrids in four replicates. The total impact of leaf diseases was determined during the whole vegetation season by calculation of the area under disease progress curve (AUDPC) [1] [3]. Causal agents of diseases were identified in the Laboratory of Plant Pathology of the Latvia University of Agriculture. The first symptoms of the maize leaf diseases were noticed around 33 to 46 days after the maize flowering started. Long elliptical greyish green lesions ranging in size from 2.5 cm to 15.0 cm were observed on the lower leaves. These symptoms were unspecific and for accurate identification pure cultures of pathogens were obtained. Characteristic grey woolly mycelium and typical multi-cellular conidia of genus *Helminthosporium* developed on the artificial medium, this observation confirmed the causal agent of the disease – *Helminthosporium* spp., and further investigations are necessary to precisely identify species of pathogen.

Till the end of the vegetation season, diseases progressed slowly; the average value of AUDPC reached only 16.3 units. The severity of the leaf diseases fluctuated depending on the cultivar, the values of AUDPC differed significantly ($F_{fact}>F_{crit}$) from 7.8 to 30.1. Early flowering hybrids were more susceptible than medium early flowering and late flowering cultivars.

Further investigations are necessary for identification of maize diseases causal agents, evaluation of diseases harmfulness and biological peculiarities of diseases development under conditions of Latvia.

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References

1. Bankina, B., Turka. I., Sampling methods of plant diseases and pests, Latvia University of Agriculture, Jelgava, 2013, 11 pp.
2. Sweets. E., Corn diseases. University of Missouri Extension, 2008, 8 -9 pp.
3. Wise., K., Northern corn leaf blights, Purdue University, 2012, 1 – 2 pp.

THE DISEASES OF FABA BEAN (*VICIA FABA* L. VAR. *MINOR*) AND THEIR CAUSAL AGENTS IN LATVIA

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High occurrence of faba bean leaf diseases is observed in production fields of Latvia, but investigations of the disease have not been done yet. The most important leaf diseases of faba beans are leaf blotch (chocolate spot), caused by *Botrytis* spp., and rust, caused by *Uromyces viciae-fabae*. Broad bean chocolate spot (BCS) has been recorded as one of the most important foliar diseases on this legume since it was first described in 1849. Under humid and cool weather conditions, BCS can severely limit plant growth and seed development. The seed yield loss, caused by BCS, can reach 50–100%. Previous studies have identified three species of *Botrytis*, namely *B. cinerea*, *B. fabae* and *B. fabiopsis*, it is impossible to distinguish chocolate-spot symptoms caused by *B. fabae* and *B. fabiopsis* on broad bean leaves based on spot size and spot colour under indoor and field conditions [2-4].

The aim of this research study is to determine the development of faba bean diseases depending on the cultivar, as well as to identify the causal agents of leaf diseases.

The field trials were carried out at the Study and Research Farm ”Pēterlauki” of the Latvia University of Agriculture in 2014. It was a one-factor trial with three variants in four replications. Three faba bean varieties were compared: ‘Laura’, ‘Isabell’ and ‘Boxer’. The incidence and severity of faba bean diseases were assessed every week, as soon as first symptoms of diseases occurred. To evaluate the severity of the disease, 9 – point scale was used, where **1** no disease symptoms were found and **9** more than 80% of leafs are covered in blotch. The area under the disease progress curve (AUDPC) was calculated to describe the impact of diseases during the whole vegetation season. The significance of faba bean diseases was statistically analysed (one-factor ANOVA) to evaluate difference between varieties. Identification of pathogen pure cultures from symptomatic plants was carried out. Causal agents were determined according to morphological features in the pure cultures [1].

The most common disease during vegetation period was leaf blotch, caused by *Botrytis* spp. and *Alternaria* spp. *Alternaria* spp. was identified in the pure cultures – typical multi-cellular spores of pathogen are the most important feature. *Botrytis* spp. formed white mycelium and black sclerotia in the medium, but this feature did not allow identifying species of pathogen. Severity of each disease separately, under field conditions, was hard to determine, therefore diseases were assessed together as leaf blight. At the end of vegetation season of 2014, faba bean rust (causal agent *Uromyces viciae-fabae*) was observed, however, the level of rust infection was not significant. Development of diseases on all three varieties were similar, however, ‘Laura’ was significantly more affected by leaf diseases then other two varieties.

Further investigations are necessary to classify possible faba bean diseases and their development as well as their causal agents in Latvia.

References

1. Bankina, B., Turka, I., Sampling methods of plant diseases and pests, LLU Jelgava, 2013, 24 pp. (in Latvian).
2. Emeran, A.A., Sillero, J.C., Fernandez-Aparicio, M., Rubiales, D., Chemical control of faba bean rust (*Uromyces viciae-fabae*), *Crop protection*, 2011, 30, pp. 907-912.
3. Sahile, S., Ahmed, S., Fininsa, C., Abang, M.M., Sakhuja, K., Survey of chocolate spot (*Botrytis fabae*) diseases of faba bean (*Vicia faba L.*) and assessment of factors influencing disease epidemics in northern Ethiopia, *Crop protection*, 2008, 27, pp. 1457-1463.
4. Zhang, J., Wu, M.D., Li, G.Q., Yu, L., Jiang, D.H., *Botrytis fabiopsis*, a new species causing chocolate spot of broad bean in central China. *Mycologia*, 2010, 102(5), pp. 114-126.

CONDITION AND PROSPECTS OF USE OF DRAINED LANDS OF THE WESTERN REGION OF UKRAINE

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The area of drained land in western part of Ukraine is 2.2 million ha or 29% of the total area of agricultural land. The largest area of it is located in Lviv region (23.5% of total area of region), Volyn region (20.7%), Rivne region (19.5%) and Chernivtsi region (15.0%). Most part of drained agricultural land take up arable land (55.0%), meadows (17.2%) and pastures (16.7%) [1, 2]. Draining is the main method to transform wetland for agricultural use. Tile drainage has been mostly used. It is arranged on the area about 1.4 million ha [1]. A significant disadvantage of the arranged drainage systems was a lack of systems with duplex control mode of the water-air soil regime, which account only for 20.4% of the total drainage area. Furthermore, agro-draining land improvement measures, deep ploughing and liming of acid soils were not implemented on the drained land [2].

From the nineties of the 20th century, due to economic crisis in Ukraine, construction of new drainage systems was discontinued, proper maintenance and modernization of existing ones were not carried out. It resulted in declining of physical and chemical characteristics of the soils. A large area of the drained land in Polessya (about 10%) was exposed to radionuclide contamination, for 105 thousand hectares increased area for peat extraction. Less than 50% of the total area of the drained land in the region is in good ecological condition, 33.5% – in satisfactory and 12% in poor condition.

Drainage systems nowadays belong to two legal entities: that part which is on the land of common use belongs to the state authority, an internal part of agricultural enterprises belongs to the local municipality [3]. There is a lack of funds necessary for operation of internal drainage network, because the source of their funding is not defined. The expenses for the inter-enterprise network have to be allocated by the state budget, which is insufficient for fulfillment of repair and maintenance work.

As a result of the land reform in Ukraine, agricultural land and the inter-enterprise drainage network were divided into shares. That caused the loss of technological and territorial integrity of the drainage systems. An integrated use of land and water resources within the drainage systems became impossible. Today the drainage and hydraulic constructions on large drained areas have been damaged, they suffer from land waterlogging and ecological deterioration of the environment.

Landowners and land users of drained areas should join in unions and exploit the land together on the basis of an agreement. The consolidation of reclaimed land plots (shares) should be carried out by the following methods: exchange of land plots; integration of adjacent plots for commercial agricultural production with the consent of the owners; land development projects to organize the newly formed households.

References

1. Козловський Б. І., Меліоративний стан осушуваних земель західних областей України / Б. І. Козловський., Львів, Євросвіт, 2005, 420 pp.
2. Ващик С. М., Меліоративний стан осушуваних земель Львівської області в сучасних умовах, С. М. Ващик // Вісник Львів. нац. аграрн. ун-ту : Економіка АПК, №18 (2), 27 – 31 pp.
3. Про меліорацію земель: Закон України від 09.12.2012.: http://zakon4.rada.gov.ua/laws/show/1389-14 (14.03.2015)

VETERINARY MEDICINE

BACTERIAL CONTAMINATION OF FRESHWATER FISH CAUGHT IN DRIKSNA RIVER

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Freshwater fish is a valuable food for people, thus, an evaluation of microbiological quality of fish is important to make a decision on fitness of fish for human consumption [1]. Microbiological safety of fish is affected by the quality of surrounding water, and fish may be a vehicle of the transmission of foodborn pathogens to consumers [2]. Angling is very common in Latvia, but assessment of microbiological quality of fish caught by fishermen had been not done before. Therefore the aim for the present study was to detect bacterial contamination of freshly caught freshwater fish and evaluate the contamination rates with microorganisms in different locations – skin, gills and gut.

Altogether 14 freshly caught freshwater fish were obtained from fishermen. All the fish samples were caught in Driksna River from February to March, 2015. The tested fish species were roach (*Rutilus rutilus*) and bream (*Abramis brama*). After sampling, fish were placed on ice and transported to the laboratory. Before the initiation of testing, fish were measured and weighted. For the detection of bacteriological contamination total bacterial count (TBC), *Enterobacteriaceae* and coliform counts on skin, in gills and gut were detected. Pooled skin, muscles and gut samples were used for testing of zoonotic pathogens – *Salmonella* spp., *Listeria* spp. and *Yersinia* spp. Microbiological testing conducted according to ISO standard requirements.

The highest TBC, *Enterobactericeae* and coliform counts were identified in gut, followed by gut and skin. TBC, *Enterobacteriaceae* and coliform counts were in line with previously reported on the contamination rates with microorganisms for wild and aquacultured fish in clean and cold waters [2, 3]. Pathogenic bacteria in fish samples were not detected. The microbiological quality of all tested fish was good and fish were acceptable for human consumption.

References

1. European Molecular Biology Organization (EMBO), Fish as food: aquaculture's contribution, *EMBO reports*, 2001, Vol. 2 (11), pp. 958-963.
2. González C.J., López-Díaz M.T., García-López M.L., Prieto M., Otero A. Bacterial microflora of wild brown trout (*Salmo trutta*), wild pike (*Esox lucius*), and aquacultured rainbow trout (*Oncorhynchus mykiss*), *Journal of Food Protection*, 1999, Vol. 62(11), pp. 1270-1277.
3. Pullela S., Fernandes C.F., Flick G.J., Libey G.S., Smith S.A., Coale C.W. Indicative and pathogenic microbiological quality of aquacultured finfish grown in different production systems, *Journal of Food Prot*ection, 1998, Vol. 61(2), pp. 205-210.

BLATEM GENES PREVALENCE IN *ESCHERICHIA COLI* ISOLATES OF POULTRY ORIGIN

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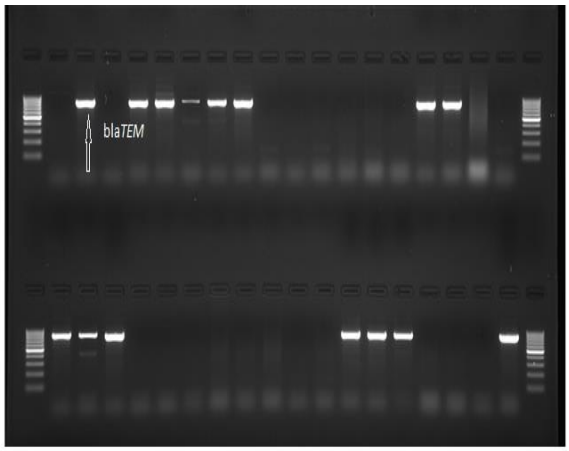
Nowadays, infections with drug-resistance bacteria have dramatically increased. *E.coli* is one of the most drug-resistant microorganisms. It is Gram - negative bacteria and one of the most common in the large bacterial family, *Enterobacteriaceae. E.coli* can cause various forms of diseases in poultry and some of them can be transferred to humans as well. The increase of drug-resistant *E.coli* bacteria has been caused mainly by an increased prevalence of extended-spectrum β-lactamase (ESBL) - producing *Enterobacteriaceae* and increased use of last-resort antimicrobial drugs [1]. ESBL producing bacteria are resistant to many groups of antibiotics (broad spectrum penicillin and cephalosporins) and mainly cause gastrointestinal infections in poultry. The antimicrobial-resistance is a result of mutation of normal cellular genes. There are some genes encoding ESBL. One of them is bla_{TEM} gene [2].

The **aim** of this study was to determine the presence of bla_{TEM} gene in extended-spectrum β-lactamase (ESBL) producing *E. coli* isolated from poultry meat.

Materials and methods: A total of 109 *E. coli* isolates were obtained during the period between October and December, in 2014. Kirby-Bauer disk diffusion method was performed to determine the antibiotic resistance pattern. Phenotypic confirmatory tests for ESBL production were performed using Colorex ESBL (E & O Laboratories limited, Scotland) agar. Each of the initial ESBL screening test isolate was investigated for the presence of bla_{TEM} genes by polymerase chain reaction (PCR), using gene-specific primers (5'-GAGTATTCAACATTTTCGT-3'- F AND 5'ACCAATGCTTAATCAGTGA-3' - R).



Results: Phenotypic confirmatory test detected ESBL production in 54.12 % of all tested E**.**coli isolates.16.9% phenotypic ESBL produced isolates were positive for bla_{TEM}genes.

Conclusion: This study constituted the first report on high prevalence of bla_{TEM} genes amongst ESBL producing isolates ofE. coli and required more extensive studies on these antibiotic resistant genes in purpose to determine the problem of antibiotic resistance.

References

1. Overdevest I., Willemsen I., Rijnsburger M., Extended-Spectrum β-Lactamase Genes of Escherichia coli in Chicken Meat and Humans, the Netherlands, *Emerging Infectious Diseases*,2011, Vol. 17(7), pp. 1216–1222.
2. Colom K., Pérez J., Alonso R., Fernández-Aranguiz A., Lariño E., Cisterna R., Simple and reliable multiplex PCR assay for detection of blaTEM, blaSHV and blaOXA–1 genes in Enterobacteriaceae, *Microbiology letters Fems*, 2003, N. 1, pp. 147-151.

BMP-2 AND BMP-4 PROTEINS IN EARLY DEVELOPMENT OF SPINAL CORD IN RAT AND HUMAN EMBRYOS

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Experimental data from mice and chickens have provided evidence that BMP-s are implicated in the patterning of developing CNS [1, 2], in particular; BMP-s have been shown to regulate dorsal – ventral patterning of the vertebrate spinal cord [3]. In order to see, if this BMP-2 and BMP-4 expression pattern, found in the developing nervous system of human embryos, is equally similar to the situation of the other mammalians we aimed in this study to compare the BMP-s expression in the developing spinal cord of human and rat embryos.

22 Sprague Dawley strain rat and 20 human embryos of Carnegie stages (CS) 14, 18 and 20 were used in this study. The rat and human embryos were fixed in the 4% paraformaldehyde and embedded in paraffin according to standard methods. Tissue blocks were serially cut in transversal direction, mounted on glass slides and stained with haematoxylin and eosin. For immunohistochemistry the sections were incubated with polyclonal antibody to BMP-2 and BMP-4. The next day, sections were incubated with the secondary antibody (VECTASTAIN ABC Universal Kit). In negative controls the primary antibody was omitted. A subjective scale ranging from 0 to 3 was applied to express the labelling of BMP-s. The results were estimated by two independent observers.

BMP-2 signal in the developing spinal cord was found to be stronger compared to BMP-4 both in rat and human embryos. BMP-2 and BMP-4 exhibited similar expression patterns – there was slight tendency for expression to decline at later stages of development. However, the developing spinal cord of rat embryos showed weaker expression of BMP-s compared to human embryos. A comparison of differences between dorsal and ventral parts in the spinal cord showed that both rat and human embryos expression of BMP-s was more extensive in three layers of the alar plates than basal plates. Also expression of BMP-2 and BMP-4 in the roof plate and non-neural ectoderm was detected in both rat and human embryos at all studied CS.

It can be concluded that expressions of BMP-2 and BMP-4 in the developing spinal cords of human embryos during the studied CS have similar spatial and temporal patterns to the corresponding stages of rat embryos.

References:

1. Faure S., de Santa Barbara P., Roberts DJ., Whitman M., Endogenous patterns of BMP signaling during early chick development. Dev Biol, 2002, 244(1): pp.44-65.
2. Hu Q., Ueno N., Behringer RR., Restriction of BMP-4 activity domains in the developing neural tube of the mouse embryo. EMBO, 2004, Vol. 5, pp. 734-739.
3. Wilson L., Maden M., The mechanisms of dorsoventral patterning in the vertebrate neural tube. Dev Biol, 2005, 282, pp. 1-13.

DAIRY COW REPRODUCTIVE PERFORMANCE BEFORE AND AFTER INTRODUCTION OF HERD NAVIGATOR SYSTEM

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One of the main causes of declined fertility of high yield cows is the difficulty in finding cows in heat [1]. DeLaval, in corporation with FOSS, has developed Herd Navigator (HN), which is a management programme that measures progesterone in milk. The concentration of this hormone indicates where the cow is in heat [2].

The objective of this study was to evaluate how fertility was affected after installation of the Herd Navigator by comparing fertility parameters one year before (2011) and one year after (2014) the installation. Herd Navigator was installed in September 2012 on a commercial farm with a loose housing system and milking in the parlour. The herd size of the experimental farm was 400 Latvian Braun cows; the average milk yield was about 9,051 kg of milk per cow per year. Before the Herd Navigator implementation, the farm had a tie-stall system with milking in the barn, and average milk yield was about 5872 kg per cow.

The data for reproductive performance were obtained from official monthly milk recording lists. The number of **days from calving to first insemination** was significantly increased after HN installation (on average 66 ± 2.9 days to 83 ± 5.0 days), **open days** tended to increase after HN was installed (on average 118 ± 9.3 days to 123 ± 3.0 days), respectively. **Inseminations per pregnancy** were the same – 2.6 times. **Conception rate** after first insemination tended to increase after HN was installed (on average 31 ± 4.8 to 37 ± 5.1). The average calving interval before HN installation was 398 ± 2.3 days and after HN installation it was a shorter - 388 ± 9.0 days.

The Herd Navigator has not improved the dairy cow reproductive performance as the data obtained from monthly milk recording lists show. Perhaps that could be attributed to the rapid increase in milk yield from 6,000 to 9,000 kg per cow per year. Further studies must be performed based on the results obtained from management programme where farmers register events such as inseminations, pregnancies, calving and reproductive pathologies.

References

1. Boer, H. M. T., Veerkamp, R. F., Beerda, B., Woelers, H., Estrous behavior in dairy cows: identification of underlying mechanisms and gene functions. Animal 4:3, 2010, 446-453 pp.
2. Delaval and FOSS, Herd navigator™ and reproduction management. Brochure from DeLaval., 2011.

DEVELOPMENT OF THE MACROSCOPIC POST MORTEM CHANGES OF DOMESTIC CATS

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The aim of the research was to establish macroscopic *post mortem* changes of the domestic cat bodies to determine the time of their death by certain signs – *algor mortis*, *livor mortis*, *rigor mortis* and corneal clouding. The experiment was carried out in constant environmental conditions and the measurements were obtained for 5 days in a row in a certain period of time.

Algor mortis refers to the cooling of the body after death from normal internal body temperature until the temperature of the environment. [3] The body temperature during the experiment decreased by 1.7 ±0.12 (SD)°C per hour until it was equal with the temperature of the environment.

Livor mortis is accumulation of blood in the lower parts of the body or organs under the influence of gravity. As it occurs after death it is most useful in determining the body position at the time of death and whether the body was moved. [2] In the experiment the gums and eyes were examined for the *livor mortis*. The first signs of it occurred for different cats from 3 to 8 hours after the death.

Rigor mortis – post mortem muscle contraction, which immobilizes the joints in the body [1]. It was set to examine stiffness in the jaws, front and hind legs. The first signs of stiffness were seen in jaws 2.3 ±0.52 hours, but in hind legs 2.5 ±0.55 hours after the death. The maximum stiffness in the jaws was reached 5 ±2 hours after the death, but in hind legs after 6 ±1.47 hours. Stiffness in hind legs was present for 72 ±9.8 hours, but in some cases the jaws remained stiff until the end of experiment. The front legs became stiff as the last ones – only 3.3 ±1.51 hours after the death, and complete lack of flexibility was reached 7.5 ±1.47 hours after death. Stiffness disappeared 65.5 ±12.04 hours after the death.

The corneal clouding does not appear to be a symmetric process; it depends on various factors like eyelid state after the death, the body posture. In this case the average time for the corneal area to become partly cloudy was 16.5 ±17.9 hours. The cloudiness reached its maximum 68 ±17.2 hours after death.

Conclusions: *algor mortis*, *rigor mortis*, *livor mortis* and corneal clouding can be useful signs for determining approximate time of death. Research is going to be continued with analysing microscopic *post mortem* findings.

References

1. Cooper John E., Cooper Margaret E. Introduction to Veterinary and Comparative Forensic Medicine, Blackwell Publishing, Oxford, 182 pp.
2. Merck M. Veterinary Forensics, Animal cruelty investigations, Blackwell Publishing, Oxford, 2007, 241-265 pp.
3. Sinclair L., Merck M., Lockwood R. Forensic Investigation of Animal cruelty, Washington, 2006, 71-81 pp.

EVALUATION OF DIFFERENT METHODS FOR IDENTIFICATION OF *STAPHYLOCOCCUS* SPP.

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Although staphylococci are well investigated, their identification up to the species level sometimes is still complicated. *Staphylococcus* spp. are divided according to their ability to produce plasma coagulasis, haemolysis and some other properties. However, exact species identification is important from the clinical, epidemiological, zoonotical and biological point of view. Most often, biochemical properties are investigated with the aim to identify staphylococci up to the species level. Polymarase chain reaction (PCR) is used as well. The aim of this study was to evaluate different methods for the identification of *Staphylococcus* spp. isolated from human and animal origin. Presumptive *Staphylococcus* genus isolates from humans (n=69) and animals (n=13) were identified up to the species level using different methods. Biochemical identification was performed using Microgen Staph ID (Microgen) system with software provided by the manufacturer. PCR was performed using protocols and primers described in different sources [1,2,4]. Sequencing of 16S rRNA was performed using universal primers described previously [3]. In 88.8% cases biochemical testing was able to identify species with ≥90% reliability according to the manufacturer's software. PCR was a reliable method for the identification of *S. aureus, S. pseudintermedius, S. epidermidis, S. saprophyticus* and *S. haemolyticus*. However, this reaction was not sensitive enough for *S. hominis.* Sequencing of 16S rRNA in 96.3% cases gave clear results for species identification, using BLAST tool from the National Center for Biotechnology Information. It also revealed that biochemical testing was not able to identify species in 18.3% of the isolates tested. In two cases other genera (*Aerococcus* and *Microbacterium*) were detected instead of presumptive *Staphylococcus* identification. Biochemical tests were unable to identify *Staphylococcus pasteurii* as well. According to the results obtained it could be outlined that all methods used for *Staphylococcus* species identification are suitable, however, the most powerful tool is 16S rRNA sequencing which is able to identify species that not included into biochemical testing systems. This tool is also very suitable in cases where bacteria from different systematic categories are presented.

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References

1. Anonymous (2009): Protocol for PCR for *mecA*, *nuc* and 16S. Community Reference Laboratory – Antimicrobial Resistance. CRL course Copenhagen 20-22 April 2009.
2. Hirotaki S., Sasaki T., Kuwahara-Arai K., Hiramatsu K. Rapid and accurate identification of human-associated staphylococci by use of multiplex PCR, *Journal of Clinical Microbiology*, 2011, Vol. 49, P. 2629-3631.
3. Kim J.H, Lee J.Y., Kim H.R., Heo K.W., Park S.K., Lee J.N., Yu S.M., Shin J.H. Acute lymphadenitis with cellulitis caused by *Staphylococcus lugdunensis*, *Korean Journal of laboratory Medicine*, 2008, Vol. 28, P. 196-200.
4. Sasaki T., Tsubakishita S., Tanaka Y., Ohtsuka M., Hirotaki S., Kawakami T., Fukata T., Hiramatsu K: Multiplex-PCR method for species identification of coagulase positive staphylococci *Journal of Clinical Microbiology,* 2010, Vol. 66, P. 765-769.

HISTOPATHOLOGICAL CHANGES IN GILLS OF EUROPEAN EEL (*ANGUILLA ANGUILLA)* IN LAKES OF LATVIA

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For a long time European eel *(Anguilla Anguilla)* has been considered a mysterious creature because of its still not fully solved spawning migration, and in recent decades its existence has been endangered. According to the International Council for Exploration of the Seas (ICES), until 2011, the recruitment level of glass eels (the number of baby produced each year) was only 1 % of what it was before the 1980s [3].
The main causes of the declining recruitment rates are barriers to migration (dams, hydropower plants), body condition, climate change and/or changes in oceanic currents, exploitation and trade of glass, yellow and silver eels, hydrology, habitat loss, pollutants, predation and disease and parasites [1].
The main functions of gills are: respiration, osmoregulation and excretion; therefore it is one of the most sensitive organs, that responds first to the environmental changes by structural alterations [4]. Moreover, there are relatively few ways in which the gills can respond to damage and there are no changes that are specific to one particular type of causative agent [2]. Therefore the aim of the research is to histologically compare European eel gills in three Latvian lakes and look for possible pathologies and parasites and their correlation, if found.
Altogether 31 European eels were caught in 24 – 29, April, 2014 from Alūksne (n=9), Usma (n=11) and Sīvere (n=11) lakes. One gill arch of each gill was collected, prepared by standard tissue processing and examined under a light microscope. Every gill filament was checked for parasites and pathological changes. Parasites were counted and pathologies were evaluated in 3 point system, where 0 – no lesions, 1 – mild, 2 – moderate, 3 – severe lesions.
Most frequent pathologies found were filament and lamellar cell hypertrophy and hyperplasia, lamellar fusion, lamellar epithelium lifting, aneurysm, bending of lamellae and increase in numbers of Goblet cells. Parasites were found in 90.3% of fish and they were *Myxidium giardi, Trichodina spp., Apiosoma spp., Nematoda spp., Monogenoidea spp.*
Amounts of parasites and lesions in fish gills from Usma and Sīvere lakes were similar ($p>0.05$), but fish from Alūksne lake had significantly higher amounts of *Monogenoidea spp.* in their gills ($p<0.05$) and it can be correlated with filament and lamellar hypertrophy and hyperplasia in the same gills, which were the most severe of all three lakes (average 1.7 points).

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References

1. Anguilla anguilla: http://www.iucnredlist.org/details/summary/60344/0 (12.03.15.).
2. Ferguson W. H., Lumsden S.J., MacPhee D.D., Ostland E. V. Gill diseases of fish in Ontario farms, Queen's printer for Ontario, 1994, pp. 20.
3. National eel management plans: http://ec.europa.eu/fisheries/marine_species/wild_species/eel/management_plans/index_en.htm (12.03.15.).
4. Raskovic B., Poleksic V., Zivic I., Spasic M., Histology of carp (Cyprinus carpio, L.) gills and pond water quality in semiintensive production, Bulgarian Journal of Agricultural Science, 2010, Vol. 16(3), pp. 253-262.

PREVALENCE OF THE *blaZ* GENE IN ANTIBIOTIC RESISTANT STAPHYLOCOCCUS ISOLATED FROM DOGS

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The resistance to antimicrobial agents is an increasingly global problem [1]. Staphylococcus (staph) bacteria are all around us in an intimate way since it normally lives on the skin and mucous membranes of both people and dogs alike. However, antibiotic resistant Staphylococcus including penicillin-resistant can cause serious health problems.

Two mechanisms confer penicillin resistance in staphylococci. The most important is production of β-lactamase, which inactivates penicillin by hydrolysis of its β-lactam ring. *BlaZ*-encoded penicillin resistance has been thoroughly investigated. The genes (the structural gene *blaZ*, its repressor gene *blaI*, and a signal transducer-sensor protein, encoded by *blaR1*) are clustered together. Four types of *blaZ* product (A, B, C, D) have been distinguished by serotyping and differences in hydrolysis of selected b-lactam substrates. Types A, C and D are usually located on plasmids, whereas type B typically resides in the chromosome. The results of previous research studies suggest that *blaZ* is the main mechanism of penicillin resistance in staphylococci [2].

The aim of this study was to investigate the presence and frequency of the *blaZ* gene in penicilin-resistant Staphylococcus isolated from healthy dogs. We chose dogs from animal shelters to assess whether there is a danger to the working staff and people who adopt animals. Samples were collected from nasal mucosa of 18 healthy dogs. Detection of *blaZ* gene was performed by PCR. 13 (72,22%) isolates revealed positive results. The bacteria genus Staphylococcus is one of the most prevalent in animals and humans [3]. *BlaZ* gene is only one of many other genes (mecA, ermA, ermC, tetK, tetM etc.) that are responsible for resistance to different antibiotics. Due to the zoonotic potential of resistant bacteria and the close contact of pets with their owners, investigations on the presumptive transmission and infection routes of different bacterial species should be performed.

References:

1. Nizami Duran, Burcin Ozer, Gulay Gulbol Duran, Yusuf Onlen & Cemil Demir Antibiotic resistance genes & susceptibility patterns in staphylococci Indian J Med Res 135, March 2012, pp 389-396.
2. John Elmerdahl Olsen, Henrik Christensen and Frank Møller Aarestrup. Diversity and evolution of blaZ from Staphylococcus aureus and coagulase-negative staphylococci Journal of Antimicrobial Chemotherapy, 2006, 57, 450–460 doi:10.1093/jac/dki492
3. Modestas Ruzauskas, Rita Siugzdiniene, Irena Klimiene, Marius Virgailis, Raimundas Mockeliunas, Lina Vaskeviciute and Dainius Zienius. Prevalence of methicillin-resistant Staphylococcus haemolyticus in companion animals: a cross-sectional study. Annals of Clinical Microbiology and Antimicrobials 2014, 13:56 doi:10.1186/s12941-014-0056-y

SHORT-TERM STRESS EFFECTS ON URINE COMPOSITION IN DOGS LIVING IN DIFFERENT ENVIROMENTAL CIRCUMSTANCES

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Stress is our body's general adaptation syndrome or the series of reactions which can be affected by a lot of interior and exterior factors, mental health and emotional experiences – stressors. The body's response to the stressors is closely related to the function of the endocrine glands to produce stress hormones. These are adrenocorticotropic hormone (ACTH), adrenaline and noradrenaline, corticoids and neurohormones produced in the hypothalamus. Neurohormones promote the production of ACTH in the pituitary gland [2, 3]. ACTH promotes the adrenal glands. This hormone is released by the pituitary gland at stress time; it activates glicococorticoid secretion in the cortex part of adrenal glands. Glycocorticoids, especially cortisol, act on intermedial metabolism by affecting protein, carbohydrate, lipid and nucleic acid exchange. Glycocorticoids also have the ability to affect the lymphoid tissue by reducing the amount of eosinophilic leukocytes in the circulating blood. They also affect the distribution of water in the body, sodium re-absorption and potassium excretion in the renal tubules, increasing urine sodium and decreasing urine potassium concentration in result [1, 4]. There are a lot of studies where sodium and potassium concentration changes in the blood samples, affected by various factors, were compared, but the information about these in urine is limited.

The aim of our research is to investigate the stress response of home and shelter dogs based on the observations of the mental reaction and changes in urine composition.

The study took place in the shelter of experimental dogs at the Faculty of Veterinary Medicine, in Jelgava, and in private houses in Riga and the district of Riga. Six clinically healthy beagle dogs and six different breed domestic dogs participated in the study. As a stressor, New Year's firework was chosen. The dogs were observed during the firework and their response was recorded. Urine samples were obtained to determine the concentration of cortisol, Na and K. Urine samples (four milliliters) were taken in the evening before the stressor, early in the morning after the stressor and the control sample in the morning without any stress. All animals were fed 2 hours before the evening sampling and were not fed until the morning analysis obtaining. The animals were grouped by belonging to particularly higher nervous activity type.

Analyzing the results of the study, we can conclude that each animal's response to the short-term stress situation is very individual. This fact may be inconsistent with the description of the scientific literature about cortisol fluctuations in urine composition, because, according to our data, only one out of the twelve dogs (8%) fits to the description. In the situations where we can see higher stress evaluation scale and suggest that the dog is affected by a short-term stress, animal body cannot always response to this situation with a significant stress by indicated increase of cortisol and the corresponding changes in the urine. Changes induced by hormones were dependent on and associated with the animal belonging to the higher nervous activity type.

References

1. Galviņš A., Helds A., Ligere R., Klīniskā endokrinoloģija, Zvaigzne, Rīga, 1983, 200 pp.
2. Garančs A, Cilvēka un dzīvnieka fizioloģija jautājumi un atbildes, Rīga, 2006, 340 pp.
3. Selje H., Mana mūža stress, Zinātne, Rīga, 1983, 256 pp.
4. Valtners A. u.c., Cilvēka fizioloģija, Zveigsne, Rīga, 1986, 456 pp.

THE IMPACT OF ROOM AERATION ON THE OUTER SHELL TEMPERATURE OF CHINCHILLA KITS IN DIFFERENT AGE GROUPS

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The long-tailed chinchilla *(Chinchilla lanigera)* is a small, grey rodent formerly inhabiting only the sparse and rocky regions of the Andes mountain range, 3000 – 5000 metres above the sea level [1.]. However, nowadays this animal is bred mostly in captivity for the silky fur coat. Chinchilla fur is unique due to its density which is the highest among all the terrestrial animals – more than 20 000 hairs per cm^2. The thick fur effectively prevents heat loss, therefore the relatively furless ears are considered the main thermoregulatory body part [2.]. A newly born chinchilla kit weighs about 35 – 60 grams and is reared till the age of 7 months (weighing about 300 – 500 grams) for its fur coat to fully develop. It is strongly recommended not to wean the kits from the lactating female for the first 6 – 8 weeks [1.]. It is also widely known that thermoregulatory centre in neonates is not yet fully developed thus making the animal subjected to the environmental temperature [3.]. Therefore our **aim** was to continue the last year research of determining the thermoregulation ability of chinchillas and to do the second stage with verification of growing chinchilla kits by using the method of thermography - detection of the emitted infrared radiation.

Materials and methods. In a chinchilla farm "Cranberry" 20 chinchillas (n=20) of different age were selected. The animals were divided into 5 different age groups (neonates, 1.5 months, 3 – 4 months, 4 – 6 months and older than 6 months of age). Room aeration was performed for 10 minutes. Afterwards thermal images of the animals were taken every 2 minutes as soon as the aeration was complete and until no visual changes in the thermal images were observed. Thermal imaging camera "Flir i3" was used, and the animals were not being touched. The thermography was performed 6 times after the room aeration in different environmental temperatures ranging from -10 ºC to + 7 ºC. The animals were thermographed repeatedly. In total 120 thermal images were obtained and in each of them 3 regions were analysed (*reg. auricularis*, *reg. frontalis* and *reg. orbitalis*) using *Flir Quick Report* program thus 360 measurements were involved into calculations.

Results and discussion. The strongest positive linear correlation between the environmental and the outer shell temperature was observed in *reg. auricularis* (r=0.73 in neonate and r=0.98 in kits older than 6 months) confirming the thermoregulatory importance of ears. In *reg. frontalis* the correlation was also strongly positive. The correlation in *reg. orbitalis* changed from weak positive linear (r=0.45) in neonates to moderate positive (r=0.67) in kits older than 6 months. The biggest correlation coefficient changes were observed in neonate and 1.5 months chinchilla kit groups suggesting thermoregulatory stabilization around 1.5 to 3 months of age. Further research examining the changes in fur density and length during growth is needed.

Conclusions. Ears are the main thermoregulatory body part of a chinchilla. The emission of infrared light becomes more controlled during growth, therefore chinchilla kits should not be weaned before they have reached at least 2 months of age due to thermoregulatory instability.

References

1. Brown S. A., Rosenthal K. L., Small Mammals, Manson Publishing, London, 1997, 192 pp.
2. Fur types in Brief: http://www.furcommission.com/farming/mink-biology/furtypes/ (21.02.15)
3. Thomas K., Thermoregulation in Neonates, Neonatal Network, 1994; 13: 15-25

PATHOLOGIES OF BITCHES' UTERUS AND OVARY

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Pathologies of uterus and ovary in bitches are quite common. Therefore for research and practical purposes, an investigation of these pathologies was of crucial importance. The objectives of this research study were: to identify and analyze uterus and ovarian pathologies of bitches, using histopathological examination; and to perform statistical analysis of the data.

Samples were collected from bitches during OHE at health care facilities and were investigated at the Pathology Center of the Veterinary Academy of the Lithuanian University of Health Sciences.

In total, uterus of 63 bitches and 126 samples of their ovaries were examined. They were stained by hematoxylin and eosin. Histologically, uterus and ovarian pathologies were diagnosed in 32 dogs (50.8 %). Uterine pathology was identified in 30 (47.6 %), and ovarian pathology – in 13 bitches (20.6 %). The most common pathology in uterus were cystic endometrial hyperplasia (31.7 %) and pyometra (22.2 %). In ovaries cysts were diagnosed (15.9 %).

It was found that uterine pathology usually develops at the age of 5-10 years (72.7 %) and in dogs that weigh more than 25 kg (75 %). And ovarian pathology develops in dogs that are older than 10 years (33.3 %), and in bitches that weigh 15-25 kg (40.0 %).
Most often, uterine pathologies were found in mongreal (30.0 %), the golden retriever, German shepherd and rottweiler breed dogs (under 10,0 %), and in the ovaries of shar-pei breed and mongreal bitches, 30.8 and 15.3 % respectively.

Pyometra and cystic endometrial hyperplasia (CEH) generally was found in mongreal and golden retriever bitches, and accounted for 21.4 % all pyometra and 25.0 and 15.0 % CEH cases. The average age of morbidity was 7 years and 3 months. Ovarian cysts were found most frequently in mongreal (40.0 %) and shar-pei breed bitches (20.0 %), and the average age of dogs with onset pathologies was 7 years and 8 months. No statistically significant relationship between the occurrence of these pathologies, depending on breed ($p > 0.05$) was found. Significant age dependency was found for pyometra ($r = 0.210$, $p < 0.05$) and CEH ($r = 0.312$, $p < 0.05$).

Usually, pyometra and CEH were found in bitches that were over 25 kg, and ovarian cysts – in bitches that were over 5 kg. Significant weight dependence was found only on CEH manifestation ($r=0.395$, $p < 0.001$). Increase of uterine pathologies and ovarian pathologies tend to rise ($r=0.378$, $p<0.01$).The calculated correlation coefficient of CEH and pyometra showed that cases of CEH tend to increase the manifestation of pyometra ($r=0.891$, $p<0.001$).

Established CEH- pyometra complex, 77.0 % of bitches were detected pathologies in their ovaries, but the dependence of these pathologies was not found ($r = 0.520$, $p > 0.05$).

THE USE OF HOMEOPATHIC PREPARATIONS IN VETERINARY MEDICINE. SUMMARY OF A QUESTIONNAIRE SURVEY

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Homeopathy is controversial and hotly debated. The conclusions of systematic reviews of randomised controlled trials of homeopathy vary from 'comparable to conventional medicine' to 'no evidence of effects beyond placebo'. It is claimed that homeopathy conflicts with scientific laws and that homoeopaths reject the naturalistic outlook, but no evidence has been cited [1]. From the point of view of academic medicine, homeopathy is considered as pseudoscience [2]. However, homeopathy usage in English-speaking countries remains high [3]. This article is an attempt to learn more about the usage of homeopathic remedies in veterinary field, since there are no publications: neither in the UK and the USA, nor in Lithuania. The survey questionnaire was created and sent to 436 Lithuanian, UK and USA veterinarians. 101 of them have been answered.

Results:

	Lithuania	**UK**	**USA**
Appreciation of homeopathy:			
positive	64.5%	79.2%	69.6%
negative	19.3%	4.2%	13.0%
ambiguously	16.1%	16.7%	17.4%
Prefer:			
homeopathic treatment	0.0%	8.3%	4.4%
allopathic treatment	100.0%	91.7%	95.6%
Use of homeopathic remedies	77.4%	83.3%	80.4%
Most common groups of diseases treated by homeopathic remedies	Respiratory (16.2%) Digestive system (16.0%) Genitourinary (12.5%)	Digestive system (18.5%) Respiratory (12.0%) Cardiovascular (8.2%)	Respiratory (21.5%) Musculoskeletal (14.2%) Digestive system (13.5%)
Most commonly used homeopathic remedies	Solidago com. (16.6%) Belladona (16.6%) Traumeel (12.5%)	Digitalis (20.0%) Belladona (15.0%) Allium cepa (10.0%)	Chamomilla (16.2%) Bryonia (10.8%) Ignatia (13.5%)
Warns owner about homeopathic treatment	20.8%	50.1%	48.6%
Percentage of income from homeopathic treatment	3.7%	8.1%	7.5%
Continuing Education (average annual hours)	3.2 h.	7.3 h.	5.5 h.

References:

1. Lex Rr., Robert T. M., Plausibility and evidence: the case of homeopathy, Medicine, Health Care and Philosophy, 2013, Vol. 16 (3), pp. 525-532.
2. Smith K., Homeopathy is Unscientific and Unethical, Bioethics, 2012, 26 (9). pp. 508-512.
3. Samarasekera U. Pressure grows against homeopathy in the UK, The Lancet, 2007, Vol. 370 (9600), pp. 1677.

USE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS FOR ANALGESIC EFFECTS ON DOGS AFTER OVARIOHYSTERECTOMY

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Pain is a special psychic condition which is caused by too strong or damaging irritant complex in the nervous system. At its simplest, pain is classified as either acute or chronic. Acute pain is the result of a traumatic, surgical, medical or infectious event [1]. Postoperative pain may cause tachycardia, arterial hypertension, vomiting, and inability to eat, decrease of insulin as well as other organ and organ systems disorders [2]. Ovariohysterectomy performed in dogs is associated with pain of varying severity and is influenced by the degree of surgical trauma. So, general anaesthesia and analgesia techniques are strongly recommended. For postoperative analgesia we can use non-steroidal anti-inflammatory drugs (NSAID)[3].
The aim of this research is to clarify the necessity of analgesic drugs after ovariohysterectomy examining dogs of different age and weight.
The research took place in practical classes of operative surgery where students of the Faculty of Veterinary Medicine, Latvia University of Agriculture performed ovariohysterectomy to female dogs (n=27). Degree of the pain in premedication time was judged by finger pinch test. During the surgery the efficiency of anaesthetic medication was judged by changes in breathing frequency and by respiratory depth. Postoperative pain assessment was performed during 24 h after ovariohysterectomy by using a Canine Acute Pain Scale [4] where the number 0 indicates that the animal does not feel any pain, but the number 4 indicates the highest point of the pain. We assessed the pain in the 1st, 6th, 12th and 24th hour after the surgery. For analgesia we used NSAIDs where of the oxicam class we chose meloxicam (n=7) and ketoprofen (n=20) of the propionic acid class.
We found out that during premedication there was no analgesic effect on animals, because the finger pinch test was positive for all dogs. During the surgery the efficiency of inhalation anesthesia was measured by watching breath. In some cases when the anesthesia was not deep enough the breathing frequency increased, and the breath got deeper. We discovered that postoperative pain grade did not depend on dog's age or weight. Also neither a breed, neither housing conditions affected the grade of pain. But there were some differences between drug types. Meloxicam reaches the efficiency in the 6th h and works longer, but ketoprofen starts to work faster, but its activity ends after 12 hours.
In conclusion, it has been confirmed that dogs after ovariohysterectomy feel pain, causing discomfort. This refers also to the dogs, which have got pain medication, so we suppose that postoperative analgesia is important to help them recover faster.

References

1. Mathews K., Kronen P.W., Lascelles D., Nolan A., Robertson S., Steagall P., Wright B., Yamashita K Guidelines for recognition, assessment and treatment of pain, JSAP, SECTION 1, 2014, p. 5-29.
2. Hellter P., Rodan I., Brunt J., Downing R., Hagedorn J. E., Robertson S. A. AAHA/AAFP Pain Management Guidelines for Dogs and Cats, 2007, Vol.43, pp. 235-248.
3. Mark E.Epstein, Adjunctive, Pain-Modifying, Analgesic Drugs, 2014, pp.30–34
4. Colorado State University Veterinary Medical Center Canine Acute Pain Scale: http://www.biomedcentral.com/content/supplementary/s12917-015-0338-4-s2.pdf , 2006 (7.02.2015)

FOOD SCIENCE

COMPARATIVE STUDY OF TOTAL PHENOLS AND ANTIRADICAL ACTIVITY IN VARIOUS TYPES OF COFFEE BEFORE AND AFTER PROCESSING

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Coffee is one of the most popular beverages in the world, prepared and consumed in many different ways. In coffee bioactive compounds are found, which can protect the body from cellular damage and diseases involving the cardiovascular system and cancer [1]. The aim of this research study was to evaluate the content of the total phenolic content (TPC) and antiradical activity in different varieties of coffee before and after processing.

In cooperation with the coffee production company "Emerald Baltic", Ltd. different green and roasted coffee samples of C. Arabica (Arabica coffee) and C. canephora (Robusta coffee) were analyzed: "Vietnam" (green, roasted at 210 °C, 14 min), "Peru" (green, roasted at 216 °C, 15 min) and "Exclusive" (green, roasted at 220 °C, 16 min). Coffee samples were grounded by the "Foss Knifetec 1095"; 5 g of grounded coffee were extracted with 50 ml of distilled water at 100 °C for 15 min with occasional stirring. The extracts were cooled and centrifuged for 15 min at 3500 rpm [2]. The obtained supernatant was used for all analytical procedures. The TPC of the extracts was determined according to the Folin-Ciocalteu spectral-photometric method [3] and were expressed as gallic acid equivalents (GAE) mg 100 g-1 FW of coffee. Antiradical activity of the coffee extracts was measured on the basis of scavenging activities of the stable 2.2-diphenyl-1-picrylhydraziyl ($DPPH^{\cdot}$) radical as outlined by researchers [4] and expressed as TroloxmM equivalents (TE) 100 g-1 FW of the coffee.

The highest TPC was determined in the coffee sample "Vietnam" (green: 72.79 mg GEA g-1; roasted: 73.62 mg GEA g-1) while the lowest: in "Peru" (green: 62.37 mg GEA g-1; roasted: 63.93 mg GEA g-1). The antiradical activity characterizes the ability of compounds to react with free radicals. The highest antiradical activity was determined in coffee sample "Exclusive" (green: 105.01µmol Trolox g-1; roasted: 103.43 µmol Trolox g-1).

A significant decrease in TPC after roasting was found ($p<0.05$); the highest decrease was determined in the coffee "Exclusive" (14%) while the lowest in "Peru" (0,16%).

References:

1. Pandey K.B., Rizvi S.I., Plant polyphenols as dietary antioxidants in human health and disease, Oxidative *Medicine* and *Cellular Longevity*, 2(5), 2009, pp. 270-278.
2. Hecimovic I., Belščak-Cvitanovic A., Horzic D., Komes D., Comparative study of polyphenols and caffeine in different coffee varieties affected by the degree of roasting, Food Chemistry, 129, 2011, pp. 991-1000.
3. Singleton V.L., Orthofer R., Lamuela-Raventós R.M., Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin-Ciocalteu reagent. Methods in Enzymology, 299, 1999, pp. 152-178.
4. Yu L., Haley S., Perret J., Harris M., Wilson J., Haley S., Antioxidant properties of bran extracts from Akron wheat grown at different locations, Journal of Agriculture and Food Chemistry, 51, 2003, pp. 1566-1570.

DETERMINATION OF AMOUNT OF NITRATES IN VEGETABLES IMPORTED TO KAZAKHSTAN

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Maintaining the health of the nation today is a top priority of the state and society. According to the UN, in the world today, up to 1 million previously existing products are available per year, including up to 100 thousand of chemical compounds, of which about 15 thousand are potential toxicants. Up to 80% of all the chemical compounds, entering the external environment, sooner or later fall into the natural water with industrial, domestic and storm water into the soil, and later into raw food and food products. As a result, food can simultaneously contain dozens, and sometimes hundreds, of toxic chemicals that can affect human health [1].

The following trend is evident in the territories of agrarian countries, in particular, in the Republic of Kazakhstan: the usage of organic nitrates in xenobiotic-science-based quantities leads to accelerated maturation and increased yields of crops. However, an excessive amount of nitrates leads to the decline in yields [2].

When consuming fruits and vegetables, the human body receives from 50% to 80% of the nitrates intake. By themselves, they do not pose a health risk. However, excessive content of nitrates in the gastrointestinal tract turn into nitrites and nitrosamines, which have a high level of toxicity and are carcinogenicity oriented [3].

After examining the above mentioned data, we performed a series of studies for the determination of nitrates in vegetables by a potentiometric method, which is one of the standard methods. To determine the nitrate levels, more than 20 samples were taken, different kinds of vegetables: potatoes, carrots, peppers and cantaloupe were used.

The results of the research study are the following: the amount of nitrates in certain potato varieties from Kyrgyzstan - 20 mg/kg, in the Israel red pepper - 5,0mg/kg, Kazakhstan green peppers - 4.0 mg/kg, carrots from Uzbekistan - 12.0 mg/kg, colour peppers from China /red - 16.0 mg/kg, green - 11.0 mg/kg, yellow - 0.9 mg/kg, melon (Kolhoz) - 60.0 mg/kg, in a green melon fromTadzhikistan - 45.0 mg/kg of nitrate.

As the results of this research study indicate, vegetables, imported to our country in the summer season, meet the safety requirements, and the maximum permissible concentration of nitrates does not exceed the required standard, and the imported vegetables are safe for consumption.

This study of nitrate pollution of crop products, imported into the territory of Kazakhstan, will make a significant contribution to ensure safety standards of food products.

References

1.Г.Г.Лаухина, О.В.Бондарь./Статья «Загрязнение продовольственного сырья и пищевой продукции ксенобиотиками химического происхождения» Журнал Общая гигиена,здоровье. Медицинская экология. Наука 3 (38) 2009, 44 pp.
2. Т.Т.Рашитова /Гигиеническая оценка уровня загрязнения растениеводческой продукции нитратами и пестицидами, разработка нормативных уровней содержания нитратов для сушеных овощей и фруктов/автореферат к диссертации/ 2009, 6-7 pp.
3.Дергачева У., Бульбан А.П./Статья - Оценка поступления нитратов в организм человека в зимний период/ 2009.

FORMATION OF QUALITATIVE INDICATORS OF TURKEY MEAT PRODUCTS

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One of the main directions of the state policy in the field of healthy eating is to develop high-quality and safe food. The most necessary preconditions of manufacturing meat products and improvement of their quality are: a more efficient use of natural resources, reducing waste and expanding the product range. Turkey, as a popular and common domestic species of poultry, is perfect for deep processing of meat. The shortage of beef and its partial replacement by turkey is a promising direction in the meat industry.

Turkey meat has a very high quality due to its low cholesterol level. Turkey hips contain many trace elements. All kinds of turkey meat are excellent because they do not cause allergies in humans.

Today poultry keeping establishments face a task to supply the domestic market with meat products. Turkey meat is considered the most useful of the poultry. Turkey meat is rich in proteins, vitamins and minerals which are necessary to people. Turkey is an excellent source of phosphorus.

So, to increase the range of products made from turkey meat, and observing safety of the new product development, this experimental work was developed. Our goal was to develop a new product of turkey meat and to evaluate consumer satisfaction with the new product. The new product was made with the help of herbal additives, and its nutritional and biological value was examined, and the quality was assessed. In this study, indicators of turkey meat quality were determined, and it was concluded that turkey meat can be successfully used in the meat processing industry. For the formation of functional properties of semi-finished products, in the recipe vegetable ingredients were included. As a result of this research study, the new product showed very high quality, and it was recommended to the population of Kazakhstan to use it as a functional food.

References

1. Индейка, каксолдат, шагает по стране, «Құс феникс» Республиканский информационно-аналитический и науно-популярный журнал по птицеводсту, №9, 2013, 21-23 pp.
2. Тағаев М., Отандық сапалы өнім: теңдесі жоқ жоба ,Экономика, 2011, 17-23 pp.
3. Позняковский В.М., Экспертиза мяса и мясных продуктов. Качество и безопасность: учеб.-справ. Пособие, 4-е издание, испр и доп., Новосибирск: Сиб. унив. изд-во, 2007, 528 pp.
4. Качество и безопасность сельскохозяйственной пищевой продукции, Под редакции А.К.Смагулова, КазНАУ, Алматы, 2002.

HERBAL COMPOSITIONS OF SPICY AROMATIC WILD-GROWING PLANTS FOR APPLE CIDERS

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Cider (fr. Cidre) is fermented apple juice with a volume fraction of ethyl alcohol from 1.5% to 6.0%, made from apple juice, directly extracted, or from restored apple juice. The popularity of fermented low-alcohol drinks, including ciders, in Western Europe is growing due to the possibility to use cider for tonic and its availability for different population groups [1].

According to the research study conducted by USDA Nutrient Database low calorie ciders (up to 1 kcal) have composition: water – 99.7%, carbohydrates – 0.3%, ashes – 0.1% [2].

In addition, cider contains pectins and tannins, polyhydric alcohols, malic, citric, and acetic acids and microelements (Fe, Cu and Zn). Vitamin C content in apple ciders is 25 mg/100 g. The composition of biologically active substances in apple ciders determines their functional status in different food rations.

The purpose of this work was to research and develop BAS (bioactive substances) herbal compositions of wild-growing spicy, aromatic plants for the enrichment of apple ciders biologically active phytomicronutrients.

As objects of this study dried aerial parts of oregano (*Oríganum vulgáre L.*) and peppermint (*Méntha piperíta, L.*) and also non-carbonated dry (no sugar added) apple cider were used.

We have developed herbal compositions based on hydro-alcoholic extracts of oregano and peppermint with an ethyl alcohol content of up to 50%.

The biological value of phytoextracts was determined by their content of natural phenolic compounds and organic acids. For the research studies of BAS of oregano and peppermint extracts we used conventional methods [3].

The following results of the research of phyto-extracts were found: the flavonol content is 25.4 ± 1,5 mg/100g, hydroxybenzoic acids – 13.4 ± 0,8 mg/100 g, a total organic acids content is 0.35 ± 0.03%, extractives content – 18.2 ± 0.5%. The extracts are characterized by a spicy, minty and sweet aroma and have a liquid form from yellow-green to light green color and harmoniously combined with organoleptic characteristics of apple cider. The results of the research of antioxidant activity of the phytoextracts showed that the antioxidant activity of the oregano extract is 170 μg/ml and of the peppermint extract - 165 μg/ml, which is in good agreement with the results of the phenolic composition of extracts.

The obtained results allow us to recommend the use of herbal compositions, based on extracts of peppermint and oregano, as flavorings and sources of bioactive phytomicronutrients for fermented drinks. The use of additives of extracts of wild-growing spicy aromatic plants in low-alcohol fermented drinks, including apple ciders, allows to create new flavor profiles of beverages, and to enrich their BAS.

References

1. European Cider and Fruit Wine Association European Cider Trends 2014 // CANADEAN. – 2014.
2. United States Department of Agriculture – Agricultural Research Service – National Nutrient Database for Standard Reference – Release 27: http://ndb.nal.usda.gov. (14.02.2015)
3. Кацерикова Л. В. Природные пищевые красители / Л. В. Кацерикова, В. М. Позняковский. — Новосибирск : ЭКОВ, 1999, 58 pp.

INTEGRATED EVALUATION OF FAVA BEAN (*VICIA FABA* VAR. *MINOR* L.) SPREADS

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Legumes offer a rich source of proteins as well as benefit the soil fertility by fixing nitrogen. Fava beans are a minor arable pulse crop with historical importance as a food crop for humans and animals throughout Europe, Africa and Asia. *Vicia faba* var. *minor*, or fava (faba) beans, as they are commonly called, are a legume species that are mainly used for animal feed and as a break crop to disrupt disease cycles, typically in small grain cereal monoculture [2]; they are rarely found in food products.

The problem of sufficient protein supply is very acute for humans around the world as growing population requires more quantities and improved quality of protein. The need for dietary fibre is also raising due to the numerous health benefits. Although mostly used as animal feed, local legume growing in Europe – fava beans (*Vicia faba* var. *minor* L.) – could be used for innovative product development to satisfy the daily needs for protein and fibre and increase legume consumption. Nutritionally, fava beans are characterised by high protein content (about 24–30%), a very high proportion of carbohydrate (about 50–65%) and a very low fat content (about 1%). They are a significant source of many nutrients including fibre, protein and iron, as well as B group vitamins [1].

As non-dairy and reduced fat/calorie spreads are becoming popular for health conscious people, commercially available legume spreads as an innovative product and an alternative to traditional animal–derived spreads or pates have the potential to contribute to overall public health, as well as increasing the consumer choice. Therefore, the aim of this research was to develop plant based spreads using fava beans (*Vicia faba* var. *minor* L.) and complete integrated evaluation of the spreads to find the most suitable spread for shelf-life investigation.

Six spreads were made of ground re-hydrated cooked seeds of fava beans 'Lielplatone', to which salt, citric acid, oil and different spices were added. Standard analytical methods were employed to determine overall preference and physicochemical composition (protein, fibre, ash, pH, etc.) of spread samples. Principles of integrated evaluation were used to select the most suitable spread for bean spread shelf-life investigation.

The overall preference of fava bean samples ranged from 2.5 to 3.5 with significant differences among spreads ($P<0.05$). Physicochemical evaluation was completed with only sensory satisfactory samples: fava bean spread without spices, with onion and bruschetta spices and with roasted sesame seeds.

Bean spreads were good sources of protein (9.21 to 9.59 g 100 g^{-1}). There were no significant differences in pH (5.49 ± 0.01), total dietary fibre (14.23 ± 0.26 g 100 g^{-1}) and ash (2.19 ± 0.02 g 100 g^{-1}) content among spread samples ($p>0.05$). Addition of spices had a significant impact on the lightness (L*), total phenolics and firmness of bean spreads ($P<0.05$). Fava bean spread with roasted sesame seeds (14.65) had the lowest integrated evaluation value and is the most suitable for shelf-life investigation.

It was concluded that the shelf-life investigation should be completed with the most suitable spread (the lowest integrated evaluation value) and control sample, i.e., fava bean spread with roasted sesame seeds and without spices.

References

1. Mudryj A.N., Yu N., Hartman T.J., Mitchell D.C., Lawrence F.R., Aukema H.M., Pulse consumption in Canadian adults influences nutrient intakes, *British Journal of Nutrition*, 2012, Vol. 108, pp. 27–36.
2. Smith J., Hardacre A., Development of an extruded snack product from the legume *Vicia faba minor*, *Procedia Food Science*, 2011, Vol. 1, pp. 1573 – 1580.

IRON-CONTAINING DIET AIMED AT ANEMIA TREATMENT

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Anemia is a condition in which there is a deficiency of erythrocytes, hemoglobin, or both. Causes include poor diet, loss of blood, industrial poisons, and oncology diseases. Signs and symptoms of anemia vary according to its severity. Mild cases are marked by the lack of energy. In more severe cases, exertion leads to serious medical problems. The cases of anemia are connected with iron metabolism. Iron metabolism in the body consists of absorption into the gastrointestinal tract; transporting; intracellular metabolism; depositing; recycling; reutilization; and excretion out of the body [1].

In this paper iron-deficiency anemia is studied. The easiest pathogenesis of anemia is associated with lower levels of iron in a human body. Up to a certain condition, the body copes with the reduction of iron due to the deposited iron of the body. But the amount of deposited iron can decrease, resulting in reduced activity of iron and iron-dependant enzymes. The diet is only able to give a daily amount of iron, not restoring the loss of iron in a body. Severe cases of anemia can be suspended with the right diet and taking iron containing medication. The risk of anemia can be reduced by the food containing proper amounts of iron [2].

The research study was conducted to find out the first year students' awareness of iron-deficiency anemia and its relation to the quality of food and food culture. The survey was held in a group of 40 students. 35 percent of them had no idea about iron-deficiency anemia. 15 percent pointed out that iron-deficiency anemia did not depend on food. 40 percent had meals only once or twice a day. 40 percent of the group mentioned a high intake of sugar, chocolate, rolls and pastries made of white flour. 40 percent expressed dissatisfaction with the food they had eaten. They explained it mainly by the lack of food variety. When asked about the products which could lead to a reduction of the risk of iron-deficiency anemia, 10 percent of students mentioned meat and fruit. 15 percent of students indicated fatigue, which, in their opinion, affected the efficiency in studies.

The research study revealed the students' lack of attention to healthy food and food culture. A lot of them are not aware of the causes of iron-deficiency anemia. They underestimate the dangers of highly refined products, such as sugar and white flour, malnutrition, occasional meals for the risk of iron-deficiency anemia development. They are unaware of the list of food with high iron content. Educational programs are required to teach students proper nutrition. Detailed research is needed to determine whether the cases of fatigue are associated with a low content of iron in the diet of students.

References

1. Wroble E.M. Terminology for the Health Professions. J.B.Lippincott Company, 1982, p.53.
2. Общенациональная Ассоциация Генетической Безопасности//Питание и здоровье// Железодефицитная анемия-мировая проблема //URL: http://www.oagb.ru/lib.php?txt_id=950 (9.03.2015)

LEGAL REGULATION OF FOOD WASTE: EXAMPLES OF USA, JAPAN AND EU

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Food consumption varies widely among countries and different cultures. But, in general, thousands of people in the world suffer from hunger every day, meanwhile there are also lots of people who are oversupplied and just throw their food away. All around the world about one-third of food that was meant for the human consumption was rather lost or wasted [1]. The key drivers behind unsustainable food consumption patterns are the growing population, increasing urbanization and rising incomes [2]. The rise of extreme discrepancy between countries provides new and unique challenges to households and governments as they strive to provide sustainable dietary sustenance to citizens.

One of the countries that seriously thinks about food waste influence's graveness is Japan. That is why in 2001 Japan's government came up with the The Food Recycling Law to facilitate efforts made by food-related businesses toward recycling recyclable food resources [3]. Food Recycling Law promotes a "recycling loop" that requires food industries to purchase farm products that are grown using food waste-derived compost/animal feed [4]. Japanese households are also forced to sort their waste and also need to store the waste for the actual day of waste disposal, which mostly happens 2 times a week. However, food donating is not acceptable, due to health safety measures. The success of the law allowed the Japanese food industry to reduce, reuse, and recycle an average of 82% of its food waste in 2010.

USA citizens tossed out more than 36 million tons of food in 2012 (115 kg per capita), but less than 5% got recycled [5]. Currently, all states have different legislation regardless food waste, but there are few that took more drastic measures, like Massachusetts state whose officials have announced the statewide commercial food waste disposal ban regulation. Currently, such states as Vermont and Connecticut, and also cities like New York, San Francisco, also have similar rules, but they are not as aggressive as the one in Massachusetts. There are also state and federal laws (such as the Bill Emerson Good Samaritan Food Donation Act, The US Federal Food Donation Act of 2008, Ohio Good Samaritan Food Law) and general EPA guidelines on Food Donation, that protect both the donating organization and recipient organization from liability. To encourage food donation, there is a federal tax law enhancing tax donations to businesses that do so.

The fight against food wastage in Europe is based on EU Landfill Directive and Waste Framework Directive. The directive places an obligation on Member States to handle waste in a way that does not negatively impact human health and the environment, and that including the collection, transportation, treatment of storage and disposal of waste.

References

1. Gustavsson J., Cederberg C., Otterdijk R., Alexandre Meybeck A. Global food losses and food waste. Study conducted for the International Congress. FAO: Food and Agriculture Organization of the United Nations, Rome, Italy, 2011, 38 pp.
2. Moomaw W., Griffin T., Kurczak K., Lomax J. The Critical Role of Global Food Consumption Patterns in Achieving Sustainable Food Systems and Food for All, A UNEP Discussion Paper. United Nations Environment Programme, Division of Technology, Industry and Economics, Paris, France, 2012, 44 pp.
3. Global Environment Centre Foundation. Law for Promotion to Recover and Utilize Recyclable Food Resources, 2011. http://nett21.gec.jp/Ecotowns/data/et_c-08.html (16.03.2015).
4. Takata M., Fukushima K., Kino-Kimata N., Nagao N., Niwa C., Toda T. The effects of recycling loops in food waste management in Japan: based on the environmental and economic evaluation of food recycling. *Science of the Total Environment*, 2012, Vol. 432, 309-317.
5. US environmental protection agency. Municipal Solid Waste, 2014. http://www.epa.gov/epawaste/nonhaz/municipal/index.htm (15.03.2015)

THE STRUCTURE OF *CHAENOMELES JAPONICA* FRUIT

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In recent years, Japanese quince *(Chaenomeles japonica)* is widely used in food production in Northern Europe. The plants are mostly used as ornamental bushes, but the fruits are considered to be a source of fibre and pectin. The aim of the study is to analyse the effect of ripening on the structure of *Chaenomeles japonica* fruit.

Japanese quince (*Chaenomeles japonica*) fruit attracted interest because of its qualities: juiciness, aroma, high contents of vitamin C, organic acids, pectin and fiber. The annual production of this fruit increases every year. The fruits of Japanese quince are yellow to green, apple-shaped. The major fractions of fresh Japanese quince fruit are pulp and juice, constituting 88–92% of total contents, whereas seed fraction is 5–9%. Fruits are mainly used for the production of juice, candied fruits and jams [1]. Fruit ripening is a complex process involving ultra-structural modifications of the cell wall due to concerted activities of cell wall enzymes. Fruit cell walls generally consist of pectins, hemicelluloses and cellulose polysaccharide polymers. The content and structural features of the fruit cell wall polymers vary depending on the species, developmental stage and the tissue type [2].

Studies were conducted in laboratories of LLU, Faculty of Food Technology. The research study used fresh and whole quince fruit *Chaenomeles japonica*, grown in Latvia and collected at the end of September, 2014. Texture analyser TA.HD.plus (Stable Micro Systems, UK) was used to evaluate the texture of fruit penetrating 4 mm into them, avoiding vascular tissue, with a needle of 2 mm in diameter, test speed 1 mm s^{-1}[3]. In addition, a microstructure analysis was conducted using a classical microscoping technique and analysing the structure of fruit, using the processing software Leica Application Suite. The average and standard deviation were calculated. Data interpretation using a single factor analysis of variance (ANOVA) was performed, using MS Excel for Windows 2010.

During primary texture analysis, hardening of unripe fruit in the depth of about 4 mm was detected, which lead to a hypothesis of possible stone cells in the*Chaenomeles japonica* fruit, and this theory was further checked during the analysis of fruit microstructure. The analysis of quince fruit microstructure showed that ripe fruit cells in the middle of fruit flesh were as small as those of immature fruits by the skin (68.34–71.48 μm), also the cell walls were thicker in these cells. For ripe quince the cell wall thickness was approximately 0.02–0.04 μm, but for unripe: between 0.04–0.09 μm, and no significant difference ($p > 0.05$) was established.

The research study revealed that: 1. Firmness of ripe *Chaenomeles japonica* fruits was 14.67±3.39 N, but that of unripe fruits - 8.16±3.92 N. There was no significant difference found between the fruit, depending on their degree of maturity ($p > 0.05$). 2. No significant difference was found between the cell size depending on their location in the fruit and the degree of ripeness.3. The changes of fruit firmness in their flesh can be explained by a reduction in cell size and increase in cell wall thickness during fruit maturation.

References

1. Górnaś P., Siger A., SegliņaD., Physicochemical characteristics of the cold-pressed Japanese quince seed oil: New promising unconventional bio-oil from by-products for the pharmaceutical and cosmetic industry. *Industrial Crops and Prod*ucts, 2013, 48, pp. 178–182.
2. Owino W.O., Nakano R., Kubo Y., Inaba A., Alterations in cell wall polysaccharides during rippening in distinct anatomical tissue regions og the fi (Ficus carica L.) fruit. *Postharvest Biology and Technology*, 2004, 32, pp. 67–77.
3. Varela P., Salvador A., Fiszman S., Shelf-life estimation of 'Fuji' apples II. The behavior of recently harvested fruit during storage at ambient conditions. *Postharvest Biology and Technology*, 2008, 50, pp. 64–69.

USE OF PESTICIDES IN AGRICULTURE

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Pesticides (from the Latin pestis - plague and caedo - killing) are chemical means to combat malicious or unwanted microorganisms, plants and insects. Pesticides include repellents and antifidanties- substances which may deter pests; attractants - substances that are used to disorient, control or dispose of certain types of animals; hormonal insecticides and chemosterilants that interfere with normal development and reproduction, etc.[1].

Many pesticides are toxic for humans and warm-blooded animals. On the basis of acute oral toxicity (measured mostly on rats), pesticides are classified into the following groups: extremely hazardous -LD50 to 15 mg / kg, highly dangerous 15-150 mg / kg, moderately dangerous- 150-5000 mg / kg, slightly dangerous- St. 5000 mg / kg. Pesticides, used to protect plants, are distinguished as contact pesticides and system pesticides that are absorbed and can reach different parts of the plant through the vascular system. The use of pesticides in agriculture can contribute to farming productivity and reduce losses, but risks of contamination of food and environmental hazards, such as accumulation of pesticides in the soil, getting into the groundwater and surface water, violation of nature, biocenosis, harmful effects on the fauna and human health, exist. Therefore, for a wide range of pesticides and technologies of application strict control is necessary. Most pesticides are applied with low application rates (5-50 g / ha); and synthetic pheromones are widely used as safe. The global demand for pesticides is increasing annually by 2.9%. By 2014, the turnover of crop protection market will reach USA $ 52 billion. The main groups of pesticides on the market are the herbicides and insecticides which are the basis of any national market. This is due to their wide use in the cultivation of major crops worldwide. However, in the coming years the main production growth is expected in the market of fungicides and other pesticides, because it is in these areas currently under development [2].

Now in Kazakhstan 123 pesticides registered by the Ministry of Agriculture are used. According to recent data, 23 active ingredients of those pesticides are dangerous, and they have been removed from production. Therefore, the Ministry of Agriculture should review the whole list of pesticides because of their detrimental effects. Currently, farms in Kazakhstan use them less than in the Soviet Union time, and new types are produced, however, any pesticide is dangerous [3].

References

1.Мельников Н. Н., Справочник по пестицидам, М., 1985;
2.New Agrarian Journal: (in Russian) www.newagro.info. (12.03.2015)
3.Today.kz: news site: today.kz/news/life. (12.03.2015)

THE MAIN FACTORS OF CHOOSING MILK DRINKS IN MARKET

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Currently, the food industry is attracting consumer attention through functional foods and beverages that, besides being highly nutritious and healthy, are easy to prepare and consume [1]. This research main task is get information from consumers, if packaging plays a role in purchasing product.

Food packaging is a broad concept that includes the diversity of shape, structure, material, colour, design and information [2]. Packaging communicates with consumers through a number of its elements – it can be the visual design or the amount of information printed on packaging. Visual elements have a decisive role in the selection of product [3].

Packaging is an essential element of the market, affecting almost every industry. A suitable type of packaging is necessary for every product, including organically grown [4]. In response to society's increasing demand, the packaging industry is constantly developing and improving [5].

Packaging shape, colour and material are the first to be assessed by consumers when choosing food products, thus drawing the appropriate conclusions about their content [6].

To find out reasons why consumers purchase products, we surveyed people from 16 to 57 years of age, who had to answer nine questions about their choice of food products in the market.

According to the results of the questionnaire, consumers ranged the reasons in the following way: product price, packaging, taste and content of this product. Answering the question about product packaging, they responded that they give more attention to the colour and material of packaging, but give much less attention to its size and shape.

References

1. Wootton-Beard P.C., Ryan L., A beetroot juice shot as a significant and convenient source of bioaccessible antioxidants, Journal of Functional Foods, 2010, 3 (4), pp. 329–334
2. Lee T.K., Quality and safety aspects of meat products as affected by various physical manipulations of packaging material, Meat Science, 2010, Vol. 83, no. 1, pp. 138-150.
3. Makanjuola S.A., Enujiugha V.N., How consumers estimate the size and appeal of flexible packaging, Food Quality and Preference, 2015, Vol. 39, pp. 236-240.
4. Restuccia D., Spizzirri U.G., Parisi I.O., Cirillo G., Curcio M., Iemma F., Puoci F., Vinci G., Picci N., New EU regulation aspects and global market of active and intelligent packaging for food industry applications, Food Control, 2010, Vol. 21, no.11, pp. 1425 – 1435.
5. Realini C.R., Marcos B., Active and intelligent packaging systems for a modern society, Meat Science, 2014, Vol. 98, no. 3, pp. 404-419.
6. Becker L., Rompay T.J.L., Schifferstein H.N.J., Galetzka M., Tough package, strong taste: the influence of packaging design on taste impressions and product evaluations, Food Quality and Preference, 2011, Vol. 22, pp. 17-23.

POSSIBILITY OF USING MILLET IN THE PRODUCTION OF FUNCTIONAL PRODUCTS

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The technologies of food products of functional and specialized purpose are the priority area of research in Russia, which is most significant for the economic development of the country and for strengthening its competitive position in the global food market.

A functional food product is defined as the food product with the purpose of systematic consumption within food allowance of all the age categories of healthy population, having scientifically determined and certified properties, decreasing the risk of development of diet related diseases, preventing or compensating the deficit of nutritional substances in the organism, protecting and improving health due to the content of physiologically functional food ingredients [1].

The search for functional products, helping to control some problems, such as stomach disorder, adiposity and diabetes, as well as prevent a few diseases, increased the interest in secondary cereal crops.

When we turn to the statistics of cereal crops production, we see that millet does not have the best position in terms of consumption. However, we would like to draw your attention to this crop and consider the opportunity of its use for creating products of functional purpose.

Millet is known by people since ancient times. The grain was found on the territory of a lot of European countries at archaeological excavations in the layers related to the neolith époque. Millet was widely spread among ancient Slavs. They made porridge out of it, baked bread and used it as food for cattle. Millet and the products of its refining had more value on the market than any other bread (in XVII – the beginning of XVIII century). Millet saved people from starvation in the years, harvestless for other crops. In XIX-XX centuries it was replaced by wheat and corn [2]. The most ancient cultivation of millet was noticed in China; however the motherland of the crop is also considered Egypt, India and Arabian Peninsula. At present millet crops are widespread in the South-East of Russia, in the North of China, in India, Japan, Korea, Turkey, Poland, Hungary and other countries, they can be seen in North Africa and America. In Asia the most important manufacturers of millet crops are India and China. At present in Russia and the Commonwealth of Independent States about 45% of global planting of sowing millet (Panicum miliaceum L.) is concentrated [3].

The possibility of using millet in the production of functional foods is determined as millet is gluten free, it contains vitamins, carotenoids and dietary fibers (especially, if the grain is used with the seed coat). The common use of millet is cooking porridges, baked puddings, collops. The perspective areas of millet grain's use can be considered its application in cooking of types of dough, which do not require high quality of gluten, as well as combining grain and flour of millet and other kinds of cereal crops. This will allow to create wide assortment of dishes and products of functional purpose.

References:

1. ГОСТ Р 52349-2005 Продукты пищевые. Продукты пищевые функциональные. Термины и определения.
2. Лысов В.Н. Просо. - Л., Изд-во «Колос», 1968, 224 pp.
3. Справка о научно-практическом применении результатов научной деятельности по просу посевному (Panicum miliaceum L.). - Орел, ФГБНУ «Всероссийский научно-исследовательский институт зернобобовых и крупяных культур», 2014.

RHEOLOGICAL PARAMETERS OF YOGHURT AS AMENDED BY THE FILLERS

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Yoghurt is becoming an increasingly popular product. Its unique nutritional properties with a wide variety of flavors, handy and attractive packaging, low costs comparing with other types of dairy products contribute to real success with a consumer [1]. Knowing the rheology characteristics of yoghurts is important for designing the equipment, controlling of product quality as well as predicting stability of a product during storage [2]. In recent years there is a trend to create dairy products combined with herbal supplements. This paper investigates the influence of a filler on viscosity properties of celery yoghurt. It was shown that the introduction of a filler in an amount of 1.5% enhances the improvement of the structure, but the further increase of concentration characteristics of the system does not affect recoverability. In this study yogurt was prepared by ripening of UHT milk with a protein content of 3% and 3.2% fat. Milk was heated to 90 °C, kept to maturate for 5 minutes and poured into containers. Then sour dough was added as a mixture of Streptococcus thermophilus and Lactobacillus bulgaricus (Bacillus bulgaricus, Massol's bacillus). A process of souring was carried out at 40° C up to pH 4.6 – 4.7. The resulting samples were cooled to 25° C. Then some fillers were added: sugar syrup, honey, cereals. Next the mixture was stirred up. The viscosity of the obtained samples was investigated in a rotary viscometer "Reotest 4" for 30 seconds. A spindle was used to reach the shear gradient of 100 s-1. The data obtained were analyzed in the programmes «RHEO-42» and "Excel". By adding sugar syrup in concentrations of 10%, 20% or 30%, viscosity test samples were 39.8. 33.6 and 27.1 mPas. Thus the addition of sugar syrup reduced the viscosity of yoghurt. When adding honey in concentrations of 10%. 20%, 30%, viscosity test samples were 240. 144 and 120 mPa * s., respectively. Adding honey also helps to reduce the viscosity of yogurt. Such a decrease in viscosity by addition of sugar syrup and honey can be explained by the effect of dilution, since both syrup and honey are solutions of carbohydrates in the water. When adding grains (herbs) in concentrations of 0.5%, 10%, 20%, the viscosity of the test samples were 183, 387 and 590 mPa * s., respectively. The addition of grains (herbs) helps to increase the viscosity of clots. The stabilizing effect of cereals is explained by the presence of starch in their composition, which binds water in clots. Thus it is necessary to select the correct concentration of a filler to achieve the desired viscosity of the resulting yogurt.

References

1. Kalinin J., Ganin V., Dunchenko N., “Technology of Whole-milk Products: Manual.” - СПб.: ГИОРД, 2008. 248 pp.
2. Mansurov V., Prokopev N., Marshak V., “Reological property of yoghurt with various stabilizers.” The Minsk international forum on heat and mass exchange. Minsk, 2004.

ENGINEERING

APPLICATION OF INFORMATICS KNOWLEDGE FOR WORK ON PHYWE COMPUTERISED STANDS AT THE LESSONS OF PHYSICS

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The ability to use, create and perceive ICT in the present century is as important as the ability to read, write and calculate earlier. The importance of ICT in all areas of professional activities, personal life, business, economics, public life as well as for the state development is growing, education experts envisage the need of individuals to use software in different activities [1].

Recently essential changes have happened in ICT area: social networks have flourished, capacity, mobility and permanent access of communication channels have increased, cloud services have become cheaper or even free of charge, possibilities of their integration and application for personal needs have accelerated, possibilities of mobile telephone usage have developed and specialised ICT programmes have multiplied. These and other innovations determine wide application of ICT, allow transferring information in images and animation, which speeds perception and enforces to review and change the educational process in higher education [2].

Applying IT for the laboratory experiment of physics, it is possible to automate this experiment, process big amounts of information and execute exact measurements [3]. In this specific case Phywe computerised teaching stands managed by module Cobra3 Basic Unit were used. Students worked on applied Measure programme with module Cobra 3. Already in the laboratory of physics the scientific experiment started the application which was innovative because during the laboratory experiments students conducted not only certain measurements proving a certain law of physics but also carried out the research similar to that conducted in the research laboratories using large amount of data, selecting the most necessary ones. With the help of the software Measure it was possible to programme additional virtual devices, to calculate other physical values from the received data and to look for their average applying formulas of physics or approximate them by simpler dependences. Students learned how to apply various means of finding physical values working on separate Measure programme parts such as PowerGraph, Universal Writer, Timer/Counter, Translation/Rotation, Ideal gas law.

References

1. Valstybinės švietimo 2013–2022 metų strategijos projektas, 2012 [interaktyvus], (lietuvių kalba: http://www.smm.lt/strategija/docs/VSS%202013%20metmenys%202012-05-16.pdf. (05.03.2015).
2. Pečiuliauskienė P., Vidinis ir tarpdalykinis fizikos turinio integravimas: http://www.biblioteka.vpu.lt/elvpu/35633.pdf. (05.03.2015).
3. Keras E., Kozič A., Lučun A., Mačerauskas E., Mokslinio eksperimento taikymas mokomojoje laboratorijoje: Vilniaus kolegija Elektronikos ir informatikos fakultetas:
http://eif.viko.lt/uploads/file/eif_konf_2011/Visi_sudeti_rev1_2011_final_rev9%28STR10%29.pdf . (05.03.2015).
4. PHYWE, Physics Laboratory Experiments 4-edition, PHYWE Systeme GmbH. 2010.

ECOLOGY AND ROAD SAFETY

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The temperature of the Earth's surface would be by about 30 degrees cooler, if not greenhouse gases. The increase of emissions means more frequent natural disasters, social and economic shocks of mankind [1]. One way to reduce the effects of climate change is the appropriate policy and citizens' participation.
Since 2010 the transportation sector has increased carbon dioxide emissions into the environment. In Lithuania trucks, tractors and so on account for about 14 percent, passenger cars account for 86 percent. In order to reduce the effects of global warming, it is very important to pay attention to private cars and their influence on pollution. Passenger cars across Europe emit about 12% CO2 emissions (transportation sector in general – 26%). Transportation sector is one of the biggest polluters, but it is necessary to try to reduce environmental pollution. Therefore the main task of the Lithuanian transport sector is the implementation of energy efficiency measures promoting cycling, using more public transport and railway transport, increasing the use of clean fuels and developing alternative energy sources (e.g., natural gas, hydrogen) in the transportation sector [2]. In addition, greater traffic and road safety will be ensured.
It is important to increase the number of paved roads because driving along paved roads consumes up to 20% less fuel than driving along gravel roads. It would decrease the amount of emissions. In Lithuania transport fuel accounts for 65%, diesel fuel accounts for about 21% and liquefied petroleum gas accounts for 14%. Driving a new car which is in technically good condition can reduce emissions by few times. In Lithuania the bicycle path network is not successfully developed, and people are hesitant to ride bicycles due to various inconveniences and road safety. In Lithuania electric cars are becoming increasingly popular [3]. If an electric vehicle could drive at least 500 kilometers in one single charge and it were not so expensive, more people would choose electric cars. It is necessary to develop a network of charging stations of EV batteries, which would reduce the pollution. People should be more aware of environmental problems and use public transport, trains, ride bicycles or walk short distances on foot. It is necessary to develop the network of electric battery charging stations, which in longer period would reduce pollution.

References

1. EU Transport Policy: http://europa.eu/pol/trans/index_lt.htm (04.02.2015.).
2. Europoje – nesutarimai dėl automobilių taršos mažinim: http://www.balsas.lt/naujiena/747337/europoje-nesutarimai-del-automobiliu-tarsos-mazinimo (04.02.2015.).
3. Alternatyvių degalų privalumai ir trūkumai: http://komtrans.lt/transporto-politika-99/alternatyvi-degal-privalumai-ir-trkumai-72 (04.02.2015.).

LED LIGHTING

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Nowadays our life cannot be imagined without electricity and electrical lighting. It is a part of our daily life. Since Thomas Edison in 1879 invented an incandescent light bulb, more than 130 years have passed. Due to an increasing electricity consumption in the world as well as electricity prices, scientists look for new, economical sources of light. The most innovative lighting products are LED (light emitting diodes) lamps, which are economic, long-lasting, and more environmentally friendly than the so-called ”economic” lamps.

LED lamp is a light-emitting diode (LED) product that is assembled into a lamp (or light bulb) for use in lighting fixtures. LEDs, or light–emitting diodes, are semiconductor devices that produce visible light when an electrical current passes through them [1].

As regards the history of LEDs, the first light emitting diode was developed in the early 1960s, however, they were low-powered and only produced light in the low, red frequencies of the spectrum. The first high-brightness blue LED was demonstrated by Shuji Nakamura of Nichia Corporation in 1994. The existence of blue LEDs and high-efficiency LEDs quickly led to the development of the first white LED, which employed a phosphor coating to mix down-converted yellow light with blue to produce light that appears white. Isamu Akasaki, Hiroshi Amano and Nakamura were later awarded the 2014 Nobel prize in physics for the invention of the blue LED [2].

LED bulbs stand out with their high durability and economy. They consume 8-10 times less electricity than incandescent bulbs and 2 times less electricity than "economic" bulbs. Their lifespan is impressive: about 25,000 hours. Some bulbs reaches 50,000 hours of lifespan. To compare – incandescent bulb lifespan is 1,000 hours, but ”economic” bulbs – about 15,000 hours. A big advantage is that LED bulbs do not contain mercury like Compact fluorescent lamps (”economic”lamps) [3].

On the other hand, LED lamps have their own disadvantages. For example, LED lamps have a low color rendering index (CRI), which is the reason why they are rarely installed in shop windows, galleries and other spaces that require accurate color reproduction.

But the technology is going forward. New ways are being searched to improve the color rendering and reproduction of LED diodes, so there is no doubt that LED bulbs are a product with a future.

References

1. LED lamp: http://en.wikipedia.org/wiki/LED_lamp (27.03.15).
2. LED spuldzes: http://dkenergy.lv/led-spuldzes/ (28.03.15).
3. What is LED lighting? https://www.beaconlighting.com.au/led/what-is-led-lighting (25.03.15)

MOTORWAY USER CHARGE SYSTEMS IN EUROPE AND THEIR INFLUENCE ON INTERNATIONAL CARRIAGE BY ROAD

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Motorway user charge systems in organising international carriage by road in European countries as well as the assessment of their comparative rate in the total estimate of the cargo carriage are analysed in the article.
The EU directives and other acts of law suggest that expenses of road infrastructure should be covered by users of the road network. Different road user charge systems exist in different countries but all the charges have many similar features, therefore three main groups can be distinguished as follows: motorway user charge (hereinafter – motorway), vehicle owner charge and excise duty.
From the comparative analysis of the motorway user charge systems of Maut (Germany), ”viaTOLL“ (Poland), electronic vignettes (Latvia, Holland, Belgium) and ”Ecotax“ (France) [1] one can see that most often the charge depends on the vehicle type, pollution rate, number of axes, maximum permissible weight and length. Some means of toll collecting service, i.e. paying in terminals or electronic and vignette purchasing differ from country to country. Electronic pay systems have been spreading recently; Germany is one of the first countries that started using this system [2]. The advantages of this system are as follows: exact accounting, time and fuel saving, ecology, but the disadvantage is that it is not universal in all European countries. Cargo carriers by road must be well aware of the motorway user charge systems of different countries, have special accounting systems, and know how to calculate their rates, which is very labour consuming.
Two cargo carriage routes Latvia – France were chosen to evaluate the expenses of the motorway user charge. The first route was chosen on the bases of the aspect of traffic safety and convenience, the second route on the basis of reduction of expenses on the motorway user charge which means that the most often road category will be lower than that of the first one.
The comparative analysis and calculations of the motorway user charge and the total expenses of the routes I and II allow drawing the following conclusions:

- the amounts of the motorway user charge on the routes fluctuate marginally, i.e. 9% and 12%; the time of driving stretches even up to 8 hours. Consequently, it is necessary to pay more attention not to the avoidance of the motorway user charge but to the carriage safety assurance and delivery time optimisation when choosing a cargo carriage route;
- motorway user charge systems in the EU countries have been constantly improved to achieve efficient toll collecting service and to reduce inconveniences for transportation companies. But different systems require additional expenses from the carriers and cause many inconveniences to them. Therefore in future more active discussions among the countries should be held in order to introduce the common motorway user charge system.

References:

1. Baublys A., Transporto ekonomika, Vilnius: Technika, 2011, ISBN 9789955288657.146-152 p.
2. The Law on road user charge: https://www.lvvignette.eu/documents/autocelu_nodeva_EN_ final.pdf/ (25.02.2015)
3. Maut-tarife: https://www.tollcollect.de/de/web/public/toll_collect/rund_um_die_maut/maut tarife/maut_tarife_neu.html/ (12.02.2015)

PLUGS AND SOCKETS

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Today, in the 21st century, it is difficult to imagine our lives without electricity or electrical equipment, since it has become a part of our daily lives. When we use electrical equipment, at first we take a power plug and then we plug it in the socket. It is natural. We do not think about where it comes from or what kinds of power plugs and sockets are used in other countries. We do not deliberate about why a universal standard electric plug does not exist in the world or about other things connected with electric plugs and sockets. In the authors' opinion, it is a very interesting theme, which is worth exploring.

The origins of the plug and socket can be traced back to the late 19th century. 'Plugs and sockets for portable appliances originated in Britain in the 1880s and were initially two pin designs. These were usually sold as a mating pair, but gradually de facto and then official standards arose to enable the interchange of compatible devices. British standards have proliferated throughout large parts of the former British Empire' [1].

In total, there are 15 different kinds of power plugs and sockets. An interesting question arises why there is not a universal standard electric plug. What could be the possible answer to it? One of the explanations why there exist so many different styles of plugs and wall sockets, 'is because many countries preferred to develop a plug of their own, instead of adopting the US standard' [2]. From one point of view, those countries have done the right choice, because 'American plugs and their uninsulated prongs are almost prehistoric in terms of design and they are notoriously unsafe' [2]. Another explanation is the existing political and economical issues that have hindered the development and establishment of the universal electric plug [2].

As mentioned above, there are 15 different power plugs and sockets, each of which has been assigned a letter by the US Department of Commerce International Trade Administration (ITA), starting with letter A and moving through the alphabet. These letters are entirely arbitrary, because they do not actually mandate anything [3].

The authors of this paper think that this issue is worth a more detailed study because we use plugs and sockets every day but we almost never think about where they come from or why there are so many different types of them. We would like to point out that it is useful to explore simple things like these ones.

References

1. Power plugs and sockets: http://en.wikipedia.org/wiki/AC_power_plugs_and_sockets_-_British_and_related_types [10.03.2015]
2. Why no universal plug: http://www.worldstandards.eu/electricity/why-no-universal-plug/ [15.03.2015]
3. Plug and socket types: http://www.worldstandards.eu/electricity/plugs-and-sockets/ [12.03.2015]

THE INFLUENCE OF CAMSHAFT ON POWERBAND: A REVIEW

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It is important to understand that more aggressive camshaft gives more power due to increased mixture filling and scavenging effect for normally aspirated engines. However, a wilder camshaft is not always better because too much camshaft overlap in turbocharged or supercharged engines also increases the chance of more fresh intake boost going into the exhaust manifold instead of going into the combustion chamber (over scavenging) or a loss of cylinder pressure or intake reversion in naturally aspirated engines. Everything depends on the kind of engine that is going to be built. There is no one single law for both – naturally aspirated and forced induction engines.

There are several factors which may affect power band location in revolution range, peak wheel horsepower and maximum torque location. Such factors as camshaft lift, duration, overlap or lobe separation angle, flank steepness angle are worth to consider when choosing a performance camshaft. Every change in camshaft geometry can lead to change in power and torque [3].

Camshaft duration shifts the peak torque and the peak horsepower location to higher revolutions. The maximum peak torque and peak power numbers also increase but with a greater duration low end power is sacrificed. Increased camshaft lift gives a higher absolute peak torque and peak horsepower number. Lobe separation angle is the angle between the peaks of intake and exhaust camshaft lobe, expressed as camshaft degrees. This angle dictates two important events – the valve overlap around top dead centre and how much intake or exhaust valve closure delay there is. Increasing the degrees of overlap tends to move the power band up the revolution range [1]. Increasing the overlap can increase peak power, but only if the exhaust system is properly designed and sized to scavenge the cylinder. If the overlap is greater than 25 degrees there might be some issues with low end power and driveability. These problems are solvable by using a valve timing mechanism. Decreasing the overlap tends to improve lower rpm range performance, but in higher revolution range engine will be less responding. Flank steepness angle shows how fast or aggressive the valve opens [2]. The problem lies within valve closing flank angle because when valve is shut close at great speed and force, damage on valve seats as well as valve bouncing might occur.

Camshafts are one of those modifications which are the easiest to execute. The correct modification gives more power compared to changing throttle body size, using low impedance filters or running bigger plenum intake manifold with shorter runners.

Some modifications in fuel and ignition map of electrical control unit must be carried out after camshaft change, otherwise there is a great chance that engine will run too lean and eventually break down. Valve springs must be taken into account as well, because new camshafts will have greater lift thus they will compress the spring even more and this can cause valve spring failure.

There is not one secret ingredient or formula that will make a stock engine into a rubber burning performance motor. Nevertheless, there are many factors and variations which must be considered before building an engine.

References

1. Beginners One Stop Turbo http://www.team-integra.net/forum/blogs/danny50/336-beginners-one-stop-turbo-faq.html (16.03.15).
2. How Camshafts Work: http://www.howstuffworks.com/camshaft.htm (16.03.15).
3. VTEC Cams Specs Comparison for B series Engines http://www.team-integra.net/forum/blogs/michaeldelaney/28-vtec-cams-specs-comparison-bseries-engines.html (16.03.15)

THE LARGE HADRON COLLIDER AND POSSIBLE DANGERS IT MAY POSE

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The Large Hadron Collider is the world`s largest and most famous particle collider built by the European Organization For Nuclear Research (CERN). The collider lies in a circular tunnel with a circumference of 27 kilometres underground beneath Franco-Swiss Border. The LHC`s main aim is to answer some of the fundamental open questions in physics concerning the basic laws that govern the interactions and forces among the elementary objects, the deep structure of space-time, etc. The major tool is used for discovery is particle collision, usually among protons. It happens when two beams that travel in parallel beam lines in opposite directions around the ring intersect. The particles collide at the greatest energy on the Earth – the world-record 3.5 TeV per beam which is expected to be 6.5 per beam next year. Mankind has no experience in dealing with such great energy so both practical and theoretical material seem not enough to predict the result of collisions and other the LHC experiments. Therefore, although by now the LHC has been working for six years, there is still an extreme number of hot arguments about the scientific research taking place in the middle of Europe.

Radiation, microscopic black holes, vacuum bubbles, strangelets – these are the main issues which seem to cause the biggest amount of disagreements. According to some scientists, there is a scary possibility that any of them or all of them would literally appear in the LHC. For example, the strangelets –small formations of the strange matter – are thought to be able to change all of the matter in the Universe into the matter like this once it becomes stable. But according to "the safety of the LHC"[1] there are several reasons why the possibility of it is very little, one of them is that no one has observed this matter so there is no evidence it does exist at all, moreover, there is no data to make conclusions about its properties.

Myths about all of problems mentioned above that have been created by mass fear of ordinary people are successfully destroyed in the [1] and [4] and there is also an explanation why the many problems discussed by scientists are just non-issues for now. For instance, many people are afraid that a micro black hole can be generated in the LHC. It cannot, according to General Relativity, because the gravitational forces among fundamental particles are too weak for that. Even though some other theories that accept the existence of extra dimensions allow micro black hole to appear in the LHC, this is still hardly possible for it to become stable enough to destroy the world as its expected lifetime would be really short [4]. So most likely there is nothing to worry about at this point.

To sum up, the LHC is one of the greatest experimental tools people have ever had a chance to invent and it gives us maybe the only real opportunity to discover the secrets of the world and nature. The questions of safety have been discussed by the scientific society and every experiment has been ensured to be secure. Many widely-known scientists find nothing endangering our lives in the LHC experiments. So we can be sure that the LHC will continue its work and will hold a lot of experiments.

References

1. CERN: The safety of the LHC http://press.web.cern.ch/backgrounders/safety-lhc (01.11.14)
2. How the Large Hadron Collider Works: http://science.howstuffworks.com/science-vs-myth/everyday-myths/large-hadron-collider7.htm (30.10.14).
3. Large Hadron Collider: https://en.wikipedia.org/wiki/Large_Hadron_Collider (23.10.14)
4. Review of the Safety of LHC Collisions: http://lsag.web.cern.ch/lsag/LSAG-Report.pdf (31.10.14)

INFORMATION TECHNOLOGIES

COMPARISON OF FACIAL RECOGNITION ALGORITHMS

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Nowadays, technology plays an increasing role, large part of everyday events is carried out digitally. Information technology evolution allows quick and accurate identification of person in images and video streams. This is widely used all over the world in searching for lost persons or security systems, also for commercial use.

Biometrics has become very popular in the world of information technologies. A biometric system is fundamentally a pattern recognition system that recognizes a person by determining the authentification by using his/her different biological features. Recent world events have lead to an increase of interest in security that will impel biometrics into majority use. The most recognized biometric technologies are fingerprinting, retinal scanning, hand geometry, signature verification, voice recognition, iris scanning and facial recognition [2].

Many researchers work in this field and conduct scientific research. However, there are still problems which need to be addressed. As one of problems facial recognition speed could be mentioned, which decreases as the amount of data increases. Everyday people are wearing various accessories, such as hats and glasses, for women also a make-up can alter their appearance.

Image degradations are manifested by the property of capture devices and conditions, irrespective of the biometrics being captured: blurring, illumination, noise and compression, optical distortions [1].

Often used face recognition algorithms are Principal Component Analysis (PCA) and Independent Component Analysis (ICA). PCA is probably the most widely used subspace projection technique for face recognition. PCA basis vectors are computed from a set of training images. While PCA decorrelates the input data using second-order statistics and thereby generates compressed data with minimal mean-squred reprojection error, ICA minimizes both second-order and higher-order dependencies in the input [3].

During research the author has worked with all most popular face-recognition algorithms, which are created in Microsoft Visual Studio environment. The author has compared them and afterwards made analysis of the data gathered.

References

1. Bharadwaj S., Vatsa M., Singh R., Biometric quality: a review of fingerprint, iris and face, *EURASIP Journal on Image and Video Processing*, 2014, 2014:34, pp. 1-28.
2. Bhatia R., Biometrics and Face Recognition Techniques, *International Journal of Advanced Research in Computer Science and Software Engineering*, 2013, Vol. 3(5), pp. 93-99.
3. Draper B., Baek K., Bartlett M., Beveridge J., Recognizing faces with PCA and ICA, *Coputer Vision and Image Understanding 91*, 2003, pp. 115-137.

ConTEST – A NEW COMPUTER-BASED STEP FORWARD IN SELF-EDUCATION AND STUDENTS' COMPETENCE ASSESSMENT

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Nowadays, with fast development of software technology, we have wide opportunities to make education interactive and introduce both self-assessment technology and quick students' assessment in the classroom. Unfortunately the approach is not still widespread as most educational software programs have the following features, which can stop the teacher from introducing computer-based testing into the classrooms:

- require Internet-connection to work properly,
- have high system requirements,
- do not have a free version for students,
- work only on special configurations of personal computers,
- take a lot of space on a hard drive,
- require some additional software for proper work.

We can conclude that the development of easy to use interactive and self-assessment educational program should not be defined with the statement given above, so then we have set the target to build our own solution that would provide both a student and a lecturer with a tool stimulating individual students testing and self-study. That is why we have developed our own solutions – ConTest, which demonstrates a list of features required for a comfortable educational process in the classroom:

- ConTest is supported by all actual versions of MS Windows.
- Our solution comes out with a modern UI that fits the design of Microsoft's new operating systems[1].
- Due to the chosen programming language, ConTest continues the standards of its ancestor (ConsoleTest) in the way of speed, simplicity and high-productivity[2].
- ConTest does not require Internet connection and installation for proper work.

As a result, our software provides a variety of usage scenarios: you can choose from a simple test with the questions in the text-view to a great-looking tests with the audio-recordings etc. Moreover, our solution has a special starter-pack – we have included English acknowledge tests that were specially designed for a better testing statistics [3]. The program has been introduced into the English for special purposes classroom and according to the poll has increased students' motivation to study.

References

1. Design apps for the Windows desktop: https://msdn.microsoft.com/en-us/windows/desktop/aa511258.aspx [03.02.2015]
2. Programming languages comparison: https://msdn.microsoft.com/en-us/library/aa292164(v=vs.71).aspx [15.01.2015]
3. Writing good multiple choice test questions (Vanderbilt University articles): http://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/ [12.12.2014]

DIGITAL ELEVATION MODEL DEVELOPMENT FOR SURFACE WATER HYDROLOGICAL RESEARCH

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Digital elevation model (DEM) is a model that represents territories with elevation data. These models are used to create different kinds of relief maps, they are used to analyse terrains, road construction etc. DEMs are also very important hydrological researches for considering effects of spatial distribution on watershed land surface in hydrological cycle [1]. The aim of the work is to make a high quality DEM from digitalized isolines of topographic map. For development of the model a student licensed software ArcGIS has been used.

Latvia University of Agriculture researchers use DEMs for working on water erosion risk assessment. One of the research territories is the teaching and research farm "Vecauce" and four main catchment areas – Berze, Vienziemīte, Auce and Mellupīte. Latvia's territory has expressed a relief that may contribute to water erosions and other related water quality problems [2]. For now, there are some digital models for these territories, but the resolution and cell size for models now is 20 m, so the goal is to make more detailed model with a more precise resolution.

There are more than one techniques from which it is possible to get the necessary data for the development of digital elevation model – Lidar data, photogrammetry, orto-photos and topographic maps. The best techniques are Lidar data and photogrammetry. These methods are similar and it is possible to get a very precise and qualitative result, but they are also expensive and time-consuming [3]. Also for getting necessary data a special technical equipment is required. Commonly topographic maps are readily available and therefore they are an accessible base for the development of a model.

Geographic information systems offer free software for DEM development, for example, QGIS, IlwisGIS, but with free software it is complicated to get high quality results. One of the best softwares for researches working with GIS is ArcGIS. The first version of this software was developed in 1974. This software now offers different functions, also for the digital elevation model development [4].

A scanned topographic map is actually a photo without any elevation data and it is necessary to align it to appropriate coordinate system (georeferencing) and convert it to vector data type (vectorization). These actions are time-consuming, but ArcGIS has special tools for completing these tasks. ArcGis offers three ways to make a DEM – only from isolines, only from elevation points and combined. Each way will make a slightly different model. In the combined version the elevation data are taken in two ways (from points and isolines), so this version should give the most precise model for the surface area.

References

1. About Esri http://www.esri.com/about-esri/history (10.01.2015)
2. Beasy C. Mapping today. Lidar and Photogramethry. How do I choose, The Link, December 2007.
3. Lagzdiņš A. Hidroloģisko apstākļu zinātniskā izpēte lauksaimniecības noteces radītā piesārņojuma samazināšanas pasākumu vietās. Atskaite par zinātniskā pētījuma izpildi „Meatball" projekta ietvaros. 2013.
4. Li Deng L., Liang Y. Zhang C. (2011) Research on Acquisition Methods of High-Precision DEM for Distributed Hydrological Model. Computer and Computing Technologies in Agriculture IV. IFIP Advances in Information and Communication Technology. Vol. 346, 2011, pp 390-402

MULTI-APPLICATION SMARTCARD IMPLEMENTATION SOLUTION FOR CITY PUBLIC TRANSPORTATION

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It is possible to pay for public transport in various ways: by paying in cash, by using an electronic ticket and payment card. Application of multiplication smartcards in transportation and logistics becomes more and more popular in the world. Multi-application smartcard can be used in various types of payment transactions: as mass services card, as payment solution for public transport services, etc. [1]. There are almost non-existent multiplication smartcard applications in Latvia logistics and transportation field.

Multi-application smartcard as transport service payment solution implementation in Latvia could replace the existing payment methods, as well as serve as a method for tracking public transport remissions. Today in Latvia and in other countries two approaches to manage remissions are used: remissions can be administered by the seller, or remissions, the recipient submits a transaction documents to privilege employer. In both cases it happens after or before the transaction, not in real time. Existing options can lead to an inefficient use of remission funds, and it can be difficult, or sometimes even impossible to verify the transaction exemption cases and realize independent and reliable control of remission receipt. To improve remission administration procedures in the transportation field, we propose to introduce a smartcard, which is intended for the payment operations, including public transport subsidies administration and other logistic operations [2]. Using multiplication smartcards, remissions are calculated during the transaction event, thus improving transportation logistics.

The aim of the research is to develop a conceptual solution for multiplication smartcard implementation in public transportation system of Latvia. The aim is reached with an analysis of the multiplication smartcard application in other countries' transportation systems, revision of monetary flow and remission calculations and proposition of multiplication smartcard implementation in Jelgava city buses.

Norvik A-card is created using a general multi-application card approach and adapted for Latvia needs.

References

1. Robinson, S., Narayanan, B., Toh, N., Pereira, F. Methods for pre-processing smartcard data to improve data quality, *Transportation Research Part C: Emerging Technologies*, 2014, Vol. 49, pp. 43–58.
2. Zacepins A., Bumanis N., Arhipova I., Administration of government subsidies using contactless bank cards, *ICEIS 2014 - Proceedings of the 16th International Conference on Enterprise Information Systems*, 2014, Vol. 3, pp. 128–132.

RURAL ENGINEERING AND ENVIRONMENT

ANALYSIS OF INTER–AREA OF REAL PROPERTY IN LAIDZE COUNTY

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Because of the process of land reform when land was returned to its previous owners or their heirs and also when it was allocated to other demanders in exchange for payment, a situation has developed when farms often consist of many land plots – called inter–areas. In accordance with the Land survey law, inter–area is an isolated land unit which is separated from main land plot with the land that belongs to another owner.
Rural farms with many inter–areas create land fragmentation.
Land fragmentation is one of the reasons that affect production costs of agriculture. It encumbers processing, cultivation and management, complicates building and construction maintenance, as because of that trucking, transportation costs increase, it makes it more difficult to access small land units and thus total production costs increase which leaves a negative effect on earnings of country folk (Platonova, Jankava, 2013).
Other authors have also made an analysis of inter–area (Jankava, Jankava, 2013).
The goal of this research is to analyze inter–area of real property in the county of Laidze.
Main tasks are to group real property of Laidze county by the number of land units in them, calculate the share of the area of inter–area from total area and also to calculate coefficients of inter-area to assess distribution and magnitude of inter–area in the rural territory.
Research was carried out by using the data from Latvia State Land Service Cadastre Information System.
43% from total area of land are land real properties which do not have inter–area, but the rest of the area makes land real properties that consist of 2 or more land units, even 9 land units.

References

1. Jankava A., Jankava I. (2013) The problem of land inter-area in Latvia / Baltic Surveying 2013: Proceedings of the International Scientific Methodical Conference. Kaunas, Akademija, p. 76 – 82.
2. Platonova D., Jankava A. (2013) Description of Land Fragmentation in Latvia and its Prevention Opportunities / Proceedings of Latvia University of Agriculture, Volume 28, Issue 1, (Feb 2013) Pages 1-8, ISSN (Online), ISSN (Print) 2255-8535, DOI: 10.2478/v10236-012-0009-y, February 2013.

APPLICATION OPPORTUNITIES OF NON-METALLIC COMPOSITE MATERIAL REINFORCEMENT

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Reinforcement is used in building construction, in order to increase the strength of concrete against cracking, tension and impact to the dynamic forces to reduce deformation of concrete hardening time, promote stress distribution in the construction of the applied load, etc. Reinforcement is one of the most important components of any structure, it provides the required constructional strength.

Traditionally, in concrete constructions for reinforcing steel reinforcement is used, but it has disadvantages - a large weight, susceptibility to corrosion, high thermal conductivity and magnetism, this have contributed to a new building material development, emergence and development of technological processes in the construction industry, which so far, in the European Union is not widely known and used - non-metallic composite reinforcement.

Non-metallic composite reinforcement compared with steel reinforcement, possesses an electromagnetic "translucency" and high resistance to corrosion, in addition, non-metallic composite reinforcement is lighter, its weight is made up a quarter of the analogue steel reinforcement weight, and composite reinforcing thermal insulation properties should be emphasized, because reinforcing thermal insulation properties of building structures do not allow quick construction accelerated outflows of heat [1].

The structures which are reinforced with composite reinforcement have a longer service life. This is due to the thermal expansion coefficient - non-metallic composite reinforcement and concrete have equivalent, or approximately the same thermal expansion coefficient values and this value equivalence at the temperature fluctuations in the construction of concrete reduces cracks [2].

Nowadays in construction work it is very important to save resources, reduce costs, as well as abide the design criterion of longevity. Using a non-metallic composite reinforcement for concrete structures can contribute construction, repair and operating costs reduction.

The purpose of the research is to identify non-metallic composite reinforcement using options for concrete structures. To do the research it is necessary to study the theoretical basis - explore non-metallic composite reinforcing technological characteristics, applied fields, manufacturing process and integration technology. The main part of this research is to design non-metallic reinforced concrete elements for the experimental samples, perform experimental studies for strength properties (compression and flexural strength) of concrete elements reinforced with a non-metallic composite reinforcement and steel reinforcement, and analyze the results of the experimental data comparing non-metallic composite reinforced concrete elements with steel-reinforced concrete elements.

References

1. Matthys Stijn., IABSE congress report, Comparison of concrete slabs reinforced or prestressed with non-metallic and steel bars, Ein Dienst der ETH-Bibliothek, 2014, Vol., pp.1-3.
2. Научно производство центр СПЕЦПОЛИМЕР. История применения композитной арматуры и иностранный опыт. свойств композитной арматуры с металлической представлено в таблице ниже. http://www.specpolymer.com/arm/uslugi/spec/imagesКомпозит арм Спецполимер.pdf (20.02.15).

BIOECONOMY AND SUSTAINABLE BUILDING IN LATVIA

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Bioeconomy is one of the oldest economic forms of civilization and can be transformed into one of the most modern economy by using life science and biotechnology. Bioeconomy is largely based on agriculture, fishery, food production, forestry, timber industry, cellulose and paper production, and few chemical factories, biotechnology and energy industry.

The European Union developed strategy *The Europe 2020* and it suggests that bioeconomy is a key element for smart and green growth in Europe. Bioeconomy based on advanced knowledge is the main focus for Latvian Smart Specialization Strategy that was introduced in 2013. The goal is to create high-added value products and invent new materials and technologies that could be used in traditional sectors of economy.

Sustainable development is economic growth that satisfies the needs of today and does not create threat for the future generations and satisfaction of their needs. Basis of sustainability is balance of environmental, economic and social factors.

The basic unit of bioeconomy is an individual with his/her needs, desires, understanding, skills and ability to change existing tendencies - to input all the resources into achieving results that usually are set as profit, prosperity and material values and to use minimal resources in order to preserve surrounding environment as it is.

Bioeconomy is based on three sustainable development principles – environment, economy and society, and stands for transition to complete, closed-loop cycle economy where residual of one cycle's stage becomes raw material for another stage. Sustainable building and bioeconomy share the same basic idea, the goal is to create energy efficient materials for consumption in buildings in the construction stage, whilst using high quality and efficient materials in the whole exploitation stage of the building, especially paying attention to protecting environment and saving nature's resources.

Sustainable building means complex solutions and practises that increase buildings' efficiency, reduce energy, water and other nature's resource usage, save material input in building and management processes, decreases a negative impact on people's health and the surrounding environment. It can be achieved by choosing best architectural and structural solutions, right placement of buildings. To optimize resources that are needed for planning, construction, exploitation and demolition, it is necessary to consider a full cycle perspective (construction, management and demolition).

Construction is one of the main indicator of the bioeconomic system because none of the sectors like agriculture, fishery, forestry, food production can exist without manufacturing and community buildings, technology and equipment that increase functionality and performance of those buildings, makes production more efficient and gives opportunities of development in the future.

References

1. Izveidota bioekonomikas stratēģiskā apvienība. http://www.llu.lv/print_pdf.php?article=11303 (25.03.2015.)
2. Zināšanu ietilpīga bioekonomika. https://www.zm.gov.lv/lauksaimnieciba/statiskas-lapas/zinasanu-ietilpiga-bioekonomika?id=4356#jump (01.04.2015.)
3. Ilgtspējīga būvniecība. http://www.zalasmajas.lv/storie/editor/File/Ilgtspejiga_buvnieciba.pdf (10.04.2015.)
4. Towards a bio-based society. http://www.forskningsradet.no/prognett-naturognaering/Nyheter/Towards_a_biobased_society/1253970635106/p1222932066595 (18.03.2015.)

CADASTRAL SYSTEMS IN BALTIC COUNTRIES

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In the East coast of the Baltic Sea three Baltic states - Estonia, Latvia and Lithuania are located. The three states have similar geographical position, climate and history. Despite of a similar history, in each country there is a slightly different system of Cadastre.

In relation to Real Property in Estonia there are three registers - Land Cadastre, Land Register and National Register of Construction Works. The main aim of the maintenance of Cadastre is to register information about the value of land and the use of land. The authorised processor of the cadastre is Land Board [1].

In Latvia also exists dual registration system of Real Property - Cadastre information system and Land Book. Cadastre information system is State information system, where textual and spatial cadastral data are maintained. The holder and manager of the information system is the State Land Service. The main purpose of the State Cadastre in Latvia is to provide society with actual cadastral data [3].

In Lithuania, unlike Estonia and Latvia, a single, multi-purpose system of Real Property Cadastre and Real Property rights has been created where data are stored in the central database. This system began to operate in 1992. Since 1997 land parcels, buildings, flats and premises have been registered in one Real Property Register. The holder and manager is the State Enterprise - Centre of Registers [2].

The main differences in Cadastre systems of the three Baltic countries is that in Latvia and Estonia there is a dual Real property registration system, but in Lithuania there is a single registration system for fiscal and legal purposes. In contrast to the Lithuanian and Latvian cadastral registration, in Estonian cadastre buildings are not recorded. In Estonia there is no such type of real property as building property. There are differences in the quantity of data in the information systems – in Latvia all land parcels, all buildings and apartments are registered in the Cadastre information system, but not all of them are registered in the Land Book. The registration of land properties and land assigned for use in the National Real Property Cadastre is completed and it covers 100% of the total area of Latvia and it makes Latvia a leader in this case. In Estonia over 632 000 cadastral parcels, i.e. 93% of Estonian total area are registered in the Cadastre, but in Lithuania the Real Property Register contains more than 2 million registered land parcels, but it does not cover all the territory of Lithuania, but all registered land parcels have corroborated property rights already, because there is a single Real Property registration system.

In the research the amount of recorded data in Cadastre, retrieval of cadastral data, real property formation, identification system of real property objects, cooperation between state and municipal institutions, comparison of principle of “One-stop shop”, cadastral data availability and dissemination, comparison of software and digital archive and international collaboration are analysed and evaluated.

References

1. Gurskiene V., Real propery cadastre in Lithuania: Real propery cadastre in Baltic countries,2012 Jelgava, pp. 90.-135.
2. Juss A., Goba I., Mikūta B. Review of Real Estate in Baltic states, 2004, pp.17.
3. Paršova V., Real propery cadastre in Latvia: Real propery cadastre in Baltic countries, 2012 Jelgava, pp. 31.-87.

DEFORMATION MONITORING AND ANALYSIS OF BUILDINGS

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The movements of an engineering structure, which serves the human life of today's modern world, are exhibiting safe behaviours. Building structures have moved to high-rise, large span and massive scale in the last few decades. Monitoring and analyzing deformations of these engineering structures, such as high-rise buildings, dams, bridges, industrial complexes are one of the main research fields in geodesy. Deformation analysis process comprises measurements and analysis phases. Global Navigation Satellite System plays an incomparable role in the deformation monitoring during the servicing stage for its advantages of high precision, fast speed and easy operation [1].

The purpose of the deformation survey is to determine whether or not movement is taking place and subsequently whether the structure is stable and safe. Movement can be further analyzed to see if it is due to seasonal factors, daily variances, etc. and then more importantly use the information to determine future movements of the structure. Accuracies required for deformation surveys depend on many factors but generally accuracy up to a millimetre or better may be required. There are structural deformations, concrete structures, earthen embankment structures and long-term deformation monitoring. Structural Deformation Surveying includes structural deformations, concrete structures, earthen or embankment structures and long-term deformation monitoring [2].

Deformation monitoring techniques that are accomplished by several methods such as conventional geodetic surveying methods, or by the use of electronic sensors, have been used successfully in monitoring of the buildings. The Global Positioning (GP) technology has been widely used in bridges, dams, buildings etc. GP offers many advantages over traditional surveying techniques that it does not require lines-of-sight between points so they can be located almost anywhere [3].

The analysis of deformations of any type of deformable body includes geometrical analysis and physical interpretation. Geometrical analysis describes the change in shape and dimensions of the monitored object, as well as its rigid body movements (translations and rotations) [4].

References

1. Deformation monitoring surveys – old problems and new solutions, http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-article-PWAB-0003-0010 (16.03.2015.)
2. Deformation monitoring with geodetic and geotechnical methods: a case study in Ambarili region, http://www.fig.net/com_3_istanbul/PDF/Y.Kalkan.pdf (16.03.2015.)
3. Deformation Surveys, http://www.scribd.com/doc/249406885/Deformation Surveys#scribd (16.03.2015.)
4. Using Total Station for monitoring the deformation of high strength concrete beams, http://www.researchgate.net/profile/Mosbeh_Kaloop/publication/200463090_Using_Total_Station_for_monitoring_the_deformation_of_high_strength_concrete_beams/links/0fcfd5137f4822697b000000.pdf (16.03.2015.)

DRAINED LAKES IN THE TERRITORY OF LATVIA

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Humans always tried to change environment around them to increase the arable land. Lakes also have been affected by human activities. Lakes are used not only for fishing and recreation, but also as reservoirs for water and even as a place where to expand agricultural land. In Latvia lakes cover 1.5% of the territory. Land reclamation from lakes was implemented by just partly lowering water level or fully draining it. Altogether there are 44 lakes classified as drained. Six of them are artificial. Five are now included into protected nature areas.

The Netherlands in the 17th and 18th century has carried out lake drainage favourable economy, stimulated by releasing land owners from taxes. However, it was supported by the government, still expenses exceeded incomes, also the lake as a natural water reservoir often became flooded again and owners gave up on reclaiming these lakes [2]. Another example is Homborg Lake located in Sweden. In last two centuries its water level was lowered five times and in 1932 – 1933 it was fully drained. In summer period the lake bed was obtained dry, but still it was soft and not suitable for cultivation. This case is also known as successful lake recovery by rising water level. It has maintained its ornithology value and it is still stabilising as a natural ecosystem [3]. Lakes on the Latvian territory were drained mostly in the beginning and middle of 20th century.

The studies about this topic were carried out by Glazačeva [1], where the most of them were indicated along with lakes which were lowered or elevated. There is a lack of studies about ecological condition of these lakes. The largest amount of them now is peat lands or wetlands left without a water surface area. Natural succession of lakes was destroyed by intensifying their ageing, because if the level is lowered, inshore vegetation is comprehensive.

Drained lakes are mostly located in the district of Rezekne and in Lubana zemiene. That could be explained by lake concentration in the area of Latgale where there are 40% of them. Successful drained lake cases are rare. The result obtained is never as expected. The maintenance is hard and economically not profitable, because lakes are mostly situated in the lowest point of the area where all water is accumulated. There is a potential of restoration of lakes where sapropel which is stored in them has economical value, but digging it out helps to renew the lake bed to kick starting lakes' regeneration.

References

1. Glazčeva L., Latvijas ezeri un ūdenskrātuves, Latvijas Lauksaimniecibas universitātes Ūdenssaimniecības un zemes zinātnes institūts, Jelgava, 2004, 217 pp.
2. Pehrsson O., The History of Lake Hornborga: A Lesson in Wetland Function and Management from Sweden. Environmental Conservation, 1990, Vol.17: 245 – 255 pp.
3. Thurkow A. J., Reclaiming and development of agricultural economy. The draining of lakes in Netherlands (18th – 19th centuries), Éditions de la Maison des sciences de l'homme. Université d'Amsterdam., 2004, 248 pp.

FREEZING INDEX AND ITS AFFECTING FACTORS

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An essential tool for protection against frost penetration in soil during the design of the building is the freezing index. When designing the foundation of a building, it is important to consider not only composition of soil, but also it is very important to take the geographical location of the building into account. Necessary thermal insulation depends on duration of winter which is expressed through the freezing index and average annual air temperature.

The freezing index F at certain location represents the amount of frost hours occurring over a year and, is expressed as the product of the degrees Celsius below 0°C and the number of hours of frost conditions (taking into account positive and negative differences of temperatures).

The study analyses an effect of freezing index value on the foundation depth in different regions of the territory of Latvia. The aim of the study is to identify the factors affecting the freezing index and how freezing index values depend on them.

The objectives of the study are 1) to define values of the freezing index in the territory of Latvia – Kurzeme, Vidzeme, Zemgale and Latgale; 2) to identify the factors affecting the freezing index; 3) to find out how the values of the freezing index are affected by the identified factors.

The methodology of the research is the following: 1) meteorological data from the Internet is processed and used for freezing index calculation [1]; 2) the Latvian Standard LVS EN ISO 13793:2003 "Thermal performance of buildings - Thermal design of foundations to avoid frost heave" is used to calculate warmed foundation. The method in LVS EN ISO 13793:2003 describes how to find necessary thickness, depth, heat conduction and constructive placement of thermal insulation [2], [3]; 3) The theory described in "European foundation designs for seasonally frozen ground" is used to identify the factors affecting the freezing index [2].

It is possible to define economic effect and constructive decisions of the building foundation on the basis on the received values of freezing index, so that to reduce the risk of frost penetration in soil to an insignificant level.

References

1. State Ltd "Latvian Environment, Geology and Meteorology Centre: http://www.meteo.lv/meteorologija-datu-meklesana/?nid=46 (08.12.2013).
2. Latvian Standard LVS EN ISO 13793:2003 "Thermal performance of buildings - Thermal design of foundations to avoid frost heave".
3. Farouki, O., European foundation designs for seasonally frozen ground. Monograph 92-1, U.S. Army Corps of Engineers, Cold Regions Res. & Engrg. Lab., Hanover, N.H., 1992, 113 p.

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) APPLICATIONS FOR HIGH DEFINITION

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Modern society, increasingly using Global Navigation Satellite System (GNSS) offers opportunities. This system supplies a number of industries: automotive, medical, agricultural, and surveying. The aim of this paper is to establish precision of GNSS system when the height is measured and find out if these data meet the requirements of the normative. Paper topic is actual because of increasing use of GNSS offered opportunities.

To evaluate the RTK GPS and GPS/GLONASS repeatability, three independent RTK surveys using three different reference points were carried out, each time occupying all of the test points. Receivers capable of using both GPS and GLONASS satellite signals reduce the time required at each station in a RTK GPS survey due to the increased number of visible satellites, and the improved satellite geometry. Another consequence of satellite availability is that centimetre accuracy is possible, and the time required achieving accuracy decreases as the number of satellites increases [1].

This experiment demonstrates that if it is used by all GNSS, measurement results can be obtained in large volumes quickly and accurately, thereby improving the accuracy of a specific point that well serves the purpose of providing high precision and a certain reference point.

Geometric levelling and sophisticated GPS observations were performed among five benchmarks. It was concluded that the ellipsoidal height differences between adjacent benchmarks, as obtained from geometric-astronomical levelling, are accurate to about 1-2 mm, allowing here a mutual validation with GPS height measurements. The comparison with GPS derived height differences showed a good agreement with residuals at the level of few millimetres [2].

This article is a way to verify and validate GNSS heights, which gives very good accuracy around 1-2 mm, so that allows to accurately calibrate the GPS.

The height difference is seen in the border connection points. At the border of Latvia – Estonia the height difference in the European Vertical Reference system in both countries is 32 to 33.9 millimetres, but at the border of Latvia – Lithuania the connection point heights in Latvia and Lithuania in the European Vertical Reference System are -0.5 mm to 19.6 mm. So the same point height at the border will be different in each country in the European Vertical Reference System. There is no more height connection between the Baltic countries [3].

The introduction of the new height system EVRS no longer links the total height of the system, which degrades further action that may affect further activities such as project implementation in construction, where the height is to be linked.

Research is to be continued by measurements in different weather conditions, which will show the accuracy of GNSS receivers. In the height systems maintenance more precise geometric levelling and GNSS measurements should be used.

References

1. Atinc Pirti, Mehmet Ali Yucel, Kutalmis Gumus Testing Real Time Kinematic GNSS (GPS AND GPS/GLONASS) Methods in Obstructed and Unobstructed Sites. Geodetski vestnik 57/3, 2013, p 498-512
2. Celms A., Bimane I., Reke I. (2014) European Vertical Reference System in Baltic Countries. In: Baltic Surveying. - Vol.1, 2014, p. 49–55. ISSN 2255–999X.
3. Hirt C., Schmitz M., Feldmann-Westendorff U., Wübbena G., Jahn C.-H., and Seeber G. Mutual validation of GNSS height measurements from high-precision geometric-astronomical levelling, GPS Solutions, Volume 15, Issue 2, 2011, p. 149-159.

GROUNDWATER REMEDIATION OF OIL PRODUCTS BY USING THE PHYTOREMEDIATION METHOD

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Human activities and growing economy have led to increased pollution of soil, water and air, for example, there are 238 contaminated sites in Latvia [1]. There are inorganic or organic pollutants including various oil products. Science and technologies have let human beings to use natural resources for a long period. Human activities, industries, transport, use of chemicals have affected human health as well as whole ecosystem in general.

Phytoremediation is a process that uses various types of plants to remove, transfer, stabilize, and/or destroy contaminants in the soil and groundwater [1; 5]. Creation of vegetation helps to prevent soil erosion and pollution runoff. Local hydrology is affected by plants with deep root system. Plants may be used to control the flow of pollution [4]. Absorbing ability of the surface soil layer and transpiration through the root system can limit vertical water flow from surface water. Horizontal groundwater flow can be controlled by plants with deep root system and high transpiration rates [6]. One of the tree species which can be used for horizontal groundwater flow control is willows, because the root system of a willow can survive when the root zone is saturated with water [2].

Groundwater naturally migrates from higher to lower elevations in the subsurface, typically along the path of least resistance. Pollution can migrate via groundwater too, however many contaminants can interact with the subsurface environment through adsorption and electrostatic forces. Cone of depression which perceives pollution and prevents it from flowing groundwater flow direction is created by using trees for groundwater control behind the pollution plume. Groundwater flow is reduced and limited in the pollution plume direction by using trees before pollution plume [3].

Phytoremediation research field for contaminated groundwater flow control by trees is developed. Further research will be focused on the tree ability to remediate the contaminated groundwater from oil products.

References

1. Ashraf M., Ozturk, M., Ahmad, M. S. A., Plant Adaptation and Phytoremediation, 2010, Dordrecht: Springer, pp. 481.
2. Gatliff, E. G., Vegetative Remediation Process Offers Advantages over Traditional Pumpand - Treat Technologies, 1994, Remediation 4(3): 343–52.
3. Interstate Technology & Regulatory Council (ITRC), Phytotechnology Technical and Regulatory Guidance and Decision Trees, Revised. Technical/ Regulatory Guidance, 2009, pp. 204.
4. Latvijas Vides, ģeoloģijas un meteoroloģijas centrs, Piesārņotu un potenciāli piesārņotu vietu reģistrs: http://meteo.lv/lapas/vide/piesarnoto-un-potenciali-piesarnoto-vietu-registrs/piesarnoto-un-potenciali-piesarnoto-vietu-registrs?id=1527&nid=373 (11.03.15.)
5. U.S. Environmental Protection Agency (USEPA), Brownfields Technology Primer: Selecting and Using Phytoremediation for Site Cleanup, 2001, Office of Solid Waste and Emergency Response, Washington, DC.
6. U.S. Environmental Protection Agency (USEPA), Introduction to Phytoremediation, 2000, EPA/600/R-99/107. Cincinnati: Office of Research and Development.

HISTORICAL RUINS – GREAT PLACES FOR PUBLIC RECREATION

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One of the principles of Latvia's landscape policy is to respect landscape's cultural heritage values that encourage preservation of place identity. Currently, not enough is being done to preserve and protect cultural heritage landscapes and features they are composed of – limited funds, lack of experts, insufficient co-operation among various institutions and land owners, etc [1]. Historical places of local importance are especially badly affected.

Historical ruins are important features in a landscape. Ruins along their green surroundings create a unique place that can be efficiently used for educational and recreational purposes [2, 3]. Nevertheless, historical ruins and their surroundings often have become degraded and hazardous territories.

By assessing historical ruins one can notice that majority of them are in scenically beautiful places (distinct terrain, close water features, visual link with other man-made or naturally created objects). For all that, even in ruins that are often visited by tourists and well kept up there is not enough attention paid to enhancement of surrounding landscape – no vistas from and to the object, overgrown vegetation covering up valuable features of the landscape or, quite the opposite, visible nearby degrading objects, no uniform or harmonized style in the territory. Historic ruins must be evaluated together with their natural landscape.

According to the results of the survey, most people think that historical ruins are interesting objects to visit and they are made especially attractive by well-kept surrounding green recreational areas. People are willing to include in their tours newly created but still little-known places of cultural heritage and, while visiting them, to learn new things about history of the settlement. Likewise, people think that historical ruins must be preserved in territories inside towns, villages and other populated areas because proximity of similar objects contributes to recognition of the place and enhances people's pride and sense of belonging to their place of residence.

One has to be flexible when making decision concerning the future of historical ruins and its surroundings, every object's unique features must be taken into account. It is important to strike a balance between creating public outdoor areas up to modern quality standards and preservation of an authenticity, a special aura of ruins [3].

References

1. Ainavu politikas pamatnostādnes 2013. - 2019.gadam. Vides aizsardzības un reģionālās attīstības ministrija, Rīga, 2013.
2. Nasser. N., Planning for Urban Heritage Places: Reconciling Conservation, Tourism, and Sustainable Development, *Journal of Planning Literature*, 2003, Vol. 17, No. 4, pp. 467-479.
3. Royo-Vela M., Rural-cultural excursion conceptualization: A local tourism marketing management model based on tourist destination image measurement, *Tourism Management*, 2009, Vol. 30, pp. 419–428.

IMPACT OF THE TOWPATHS ON MANAGEMENT OF COASTAL TERRITORIES OF WATER BODIES

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Currently in Latvia in force there is a number of legislative documents, whose main task is to organize and regulate public and private property rights. In many cases it is very important to know regulations, mainly if it relates to the ownership of the land and water bodies, because each citizen of Latvia can have a desire and rights for staying close to nature and enjoying recreational facilities provided by water. For this reason, it is especially important to be aware of ownership rights of every water body and existence of towpaths and specific restrictions.

By the Civil Law of Latvia the towpath is determined just regarding public waters (rivers and lakes). Names of public waters are included in a special list, which is the annex of the Civil law. According to the Civil Law and Fishery Law fishermen and anglers have rights not only to use the public water, but to use the towpath [1;2].

Towpath, according to the Fishery Law, is a land strip (band) along the water shore for fishing or navigation or related activities and movement of pedestrians, too.

In land boundary plans towpaths are represented as encumbrance, i.e. restriction on the right of use, so landowner must take into account that every person there has rights to walk along water body, also this band can be used for monitoring of water and fish resources, border control, fire protection, environmental protection or rescue activities without permission of the landowner [2].

Over the time meaning, the role and intended use of towpaths has changed. In previous century towpath was used for navigation and raft of pieces of timber, but in 21st century in Latvia it has lost actuality and historical significance.

Currently landowners are tended to restrict the movement of pedestrians along rivers or lakes, to arrange fences on adjacent land plots, so there from the point of law in towpath freedom of movement, fishing and angler rights and rights to use the water as natural resource is denied. This problem is very actual for the municipalities and environmental authorities. On the other hand, inhabitants (not landowners), understand towpath only as a place for rest near water. At the same time for landowners these areas very often become polluted with waste and rubbish. Ownership rights there are violated, tourists disturb the peace of landowners. It requires clarity about towpath – what people and property owners may or may not do there.

Research made by I.Čepāne and S.Meiere ”The legal status of towpath” confirms that state institutions and local municipalities have great power to ensure legal regime of towpath, and their realization is necessary to fulfil legal aspects of the towpath [2].

It should be mentioned that issues on legal status of towpath are investigated relatively poor in Latvia, it creates a need to analyse impact of towpath on management of water body coast territories.

References

1. Civillikums. http://likumi.lv. (14.01.2015)
2. Zvejniecības likums. http://likumi.lv (14.01.2015)
3. Meiere S., Čepāne I., Par tauvas joslas tiesisko statusu. Jurista vārds, 2001, No..30 (223).

IMPACT OF WINDOW THERMAL PROPERTIES ON THE OVERALL ENERGY EFFICIENCY OF BUILDINGS

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The impact of glazing on the thermal performance of a building is complex. There are several things that should be considered: climatic conditions in the location (temperature, humidity, sunshine and wind), the design of the building (the orientation, the shape and the layout), building materials — the amount of mass and insulation, the size and location of windows and shading, thermal properties of glazing systems. The impact of glazing is the result of the interaction of all of these aspects.

Nowadays, when the energy efficiency should be increased, many buildings are getting renovated. There are several concerns whether windows should be changed or not. In this research the author searches for the answer by collecting information about window thermal properties earlier and now, conducting experiments using different window constructions both for the frame and the glass, comparing the obtained results with the values given from manufacturers. The influence of the area of glazed and frame part to windows thermal properties is considered, too.

Regarding the decision whether to replace windows, not only the increase of overall energy efficiency should be taken into account, but also the time in which the costs will pay off, therefore average costs are also compared.

References

1. Steven Winter Associates, Ed. by Michael J. Crosbie, The Passive solar design and construction handbook, 1998, 283 pp.
2. Günther S., Das energieoptimierte Haus: Planungshandbuch mit Projektbeispielen, 2009, 256 pp.
3. Königstein T., Ratgeber energiesparendes Bauen: auf den Punkt gebracht: neutrale Fachinformationen für mehr Energieeffizienz, 2011, 206 pp.
4. Brown G.Z., DeKay M., Sun, wind & light: architectural design strategies, 2001, 382 pp.
5. Štrausa S., Ziemeļniece A., Brencis R., Vulāns A., Ēku energoefektivitāte klimata maiņas apstākļos, 2011, Jelgava, 90 pp.

ISSUES OF LANDSCAPE SPACE OF THE SOUTHERN PART OF KULDĪGA

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Alongside with continuous development of the urban environment there is a growing public demand for higher quality of the urban space both functionally and visually. One of these factors refers to the green recreational areas. Through the ravages of the war, Kuldīga has kept the historic building of the 18th -19th century where its expression is complemented by the Alekšupīte River, spots of the gardens of detached houses and the urban green plantations. The new building of the city's southern part upstream the Alekšupīte River is planned to provide solutions of the synthesis of the high-rise residential building and the public outdoor space. This includes not only high-quality architecture, but also the creation of green areas, where one of the key solutions is to evaluate the view points or the view lines. This applies both to the visibility of the spires of the churches of the Old Town and revealing of the historic landscape with tile roofs.

References:

1. Krastiņš J., Jākabsone J., Asaris J. u.c., „Kuldīga: Arhitektūra un pilsētbūvniecība/Architecture and urbanism", Kuldīgas novada pašvaldība, 2013, 536 pp.
2. Urban Green 1.daļa, Rokasgrāmata: Zaļas pilsētvides plānošana, informatīvi izglītojošs materiāls pašvaldību attīstības plānotājiem, Zemgales plānošanas reģions, 33 pp.
3. Jākabsone J., Kultūrvēsturiskais mantojums Kuldīgas pilsētvidē (Cultural heritage in the Kuldīga city), RTU promocijas darbs, 2012.

LAND CONSOLIDATION IN CONNECTION WITH RECONSTRUCTION OF THE ROAD E67 "VIA BALTIC"

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Motorway E67 or "Via Baltic" is one of the most important roads in Europe and Latvia, which forms a transport corridor from Prague to Helsinki. "Via Baltic" was developed with the aim to integrate the transport system throughout the European Union in order to improve quality of the road, reduce the number of accidents, gain economic effect and improve infrastructure network.

Road track of "Via Baltic" on the territory of Latvia is divided into three sections - A1, A4 and A7. Section A4 is planned to reconstruct. Reconstruction of several such roads can create new and improve existing infrastructure network, which should be sufficient to ensure a good location to any desired location. This strategy also supports the development of transport infrastructure in some of the countries, and as a result it may help resolve various flaws and shortcomings, as, for example, to prevent excessive road duty [1].

Reconstruction of the road section A4 is based on Regulations No. 683 (27 December, 2013) of Cabinet of Ministers "Guidelines for Transport development in 2014-2020", which determine the direction of activities concerning the target, set out in the "White Book" – to create a road system that supports the development of the European economy, raising competitiveness and ensure high quality mobility services, more efficient use resources [2].

Reconstruction of section A4 of "Via Baltic" on the territory of Latvia provides construction of a motorway which is with good permeability and transparency, comfortable and safe for drivers and cargo carriers. It also gives possibility to create the network of infrastructure, which enables get any chosen destination.

Considering mentioned, environmental impact assessment data show that existing road track is not able to fulfil its functions, because the traffic is too busy - in a day there move more than 6 thousand cars, 29% of which is heavy transport [3]. Data of the company "Latvijas valsts ceļi" show, that motorway E67 is one of the busiest in Latvia. It is associated with increasing economic activity.

In period when road was designed and constructed, there was low volume of traffic and it is one of the reasons why reconstruction of the road is necessary. Therefore, the proposed reconstruction would create a modern motorway with four lanes instead of existing two, with sufficient number of ramps and exits. In the framework of reconstruction the motorway will be built using newest standards, regulations and specifications.

References

1. Hedegaadr L., Lindstram B., The Nebi Yearbook 1998: North European and Baltic Sea integration, Germany, 1998, pp. 210-211.
2. Par Transporta attīstības pamatnostādnēm 2014.-2020.gadam: Ministru kabineta 2013.gada 27.decembra rīkojums No. 683. Latvijas Vēstnesis, No. 253 (5059), 2013, 1 – 3 pp.
3. Atzinums par valsts galvenā autoceļa E67 būvniecības ietekmes uz vidi darba ziņojumu, Vides pārraudzības valsts birojs, 2008: http://old.vpvb.gov.lv/ivn/projekti/ atzinumi/celsE67.htm (18.02.2015)

LATVIA POSITIONING SYSTEM BASE STATION NETWORK SUPPORT IN ZIEMELVIDZEME

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A very important process of science is to make data storage over a period of time and make the movement of the Earth`s crust research. In order to achieve a measurement accuracy of 2 centimetres – it was decided to install LatPos base station in Valka. The optimal base line between base stations is 30 kilometers [1]. The nearest base station to Valka is station Palsmane – 43 kilometers away.

To make sure that Valka region needs this station, 5 measurements on 5 National Geodetic points were done, using National Geodetic point Class 1 (G2) and Class 2 (G3). Measurements were done using Trimble R8-Model 3 with real-time kinematic method (RTK) [2]. The measurements were made at one point with repeated GPS receiver initialization in 5 different locations. After each 20-second session the receiver was removed and hidden. During network processing process, standard deviation, the coordinate differences from the National Geodetic network points coordinates, connection of the instrument fixation indicators and instrument initialization parameters were found, also the factors affecting the accuracy of measurement - ionosphere, a satellite location, the accuracy of measurement outside LatPos network were analyzed. The majority of point initialization and connection of the instrument fixation took place very slowly. During some of the measurements, initialization had to wait more than 5 minutes. Also, on some points the instrument indicated the lack of satellite positioning (Poor PDOP). So before going out it is advised to follow and plan the location of the satellites during the measurements in order to avoid encumbrances.

In order to evaluate the accumulated post-processed data for the entire network, *Trimble Business Center Version 2.81* was used. After that the display data vectors were imported to the Trimble Business Center. only vectors from each starting point on the nearest base station, forming triangles were used. At the end of the research statistical data processing and analysis with MS Excel program was performed.

The research results show that Latvia is experiencing Earth's crust plates vertical and horizontal movements, therefore the magnitude of both horizontal and vertical movement, tide and solar activity influences were studied. Concluding reports of measurements: 80% of measurements in LatPos system fit in one centimeter range. G2 point results are more precise than precision of G3 points as was expected. Summarizing the estimated standard deviations of the measurements, it is concluded that almost all measurements were performed within the legally prescribed accuracy [3].

References

1. Cook Jeff R., Control Networks Using RTK. Trimble User Conference, 1999.
2. Regulations of Cabinet of Ministers No. 497 „Regulations for the local geodetic network": http://likumi.lv/doc.php?id=250460 (04.03.15)
3. Zvirgzds J., LatPos Base station system stability, Riga Technical University scientific articles No.5, Department of Geomatics, 2009, 35 pp.

MODERN TRAINING FOR LAND USE PLANNING INDUSTRY OF RUSSIA AND BELARUS

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In modern conditions to train highly qualified staff for the land use planning continues to be relevant, it is important to the improvement of training programs study. The purpose of the research: to identify opportunities for further cooperation in the field of higher education, orienting for a "double degree" callable in land use planning activities. A similar approach is being tested at two universities: State University of Land Use Planning (GUZ - Moscow) and the Belarusian State Agricultural Academy (BSAA - Gorki). Participation in joint educational projects of students and teachers of these two institutions, and international cooperation are aimed at improving mutual training for land use planning sector; take into account the differences in the laws and regulations on land relations; methodological approaches, particularly predictive performance, pre-planning and design studies. At both universities the partners celebrated the manifestation of the increased interest of applicants and students, a unique opportunity to participate in the international program of academic mobility of students, as well as the budget got by some of them. Training based on the use of modern teaching methods, advanced domestic and foreign experience, the use of distance learning centres of the two universities, testing, providing assignments and course projects in electronic form, chat on skype between students and teachers, comparing the results of theoretical and practical training of bachelors and masters in Russia with the ongoing training of specialists and masters in the Republic of Belarus let expect that training, orienting for a "double degree" will enhance the prestige of collaborating universities, their attractiveness to applicants [1].

In other words, for two universities testing of new approach to train staff for the land surveying industry is scheduled with the intent to further comparison of the results possibly also in the Republic of Kazakhstan (Astana). In November 2013 a similar proposal was perceived favorably in Kiev, the National University of Life and Environmental Sciences. However, force majeure does not allow Ukrainian colleagues to implement that plan. It is expected that training, oriented on a "double degree", will also enhance the prestige of all the collaborating universities, their attractiveness to students. We are sure that these are universities and faculties will be able to continue to convincingly confirm and prove not only their uniqueness and irreplaceability, but leadership, ability to deal with the need for states and industry challenges, high demand and efficiency in Russia, Belarus and other countries [2].

References

1. Isachenko A.P., Kolmykov A.V., Papaskiri T.V., Golubenko V.A., A new approach to the preparation of land management staff on the basis of international cooperation, Bulletin of the Belarusian State Academy of Agriculture, scientific and methodological magazine, Gorki, 2014, Vol. 4, pp.172-176.
2. Kolmykov A.V., Isachenko A.P., Golubenko V.A., Training for the land surveying industry: new approaches in terms of international cooperation, Planning, cadastre and land monitoring, scientific-methodical journal, Moscow, 2015, Vol.1, pp. 55-59.

THE ABANDONED BLOCK-CUT PEAT EXTRACTION FIELD IMPACT ON THE NATURALLY RAISED BOG HYDROLOGICAL REGIME

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Hydrological regime of naturally raised bog has been impacted by peat extraction. Peat extraction changes water level and affects processes in naturally raised bog even 50 years after peat extraction is finished [2]. Zalais bog is located in Kemeri national park. Almost 60 years ago peat was extracted in this territory and hydrological regime has not been returned to its natural state [1].

This research analyses groundwater level fluctuations in 6 monitoring wells, which are located in direction from the peat extraction field to the natural bog. One water level well is located in the quarry (fig.1).

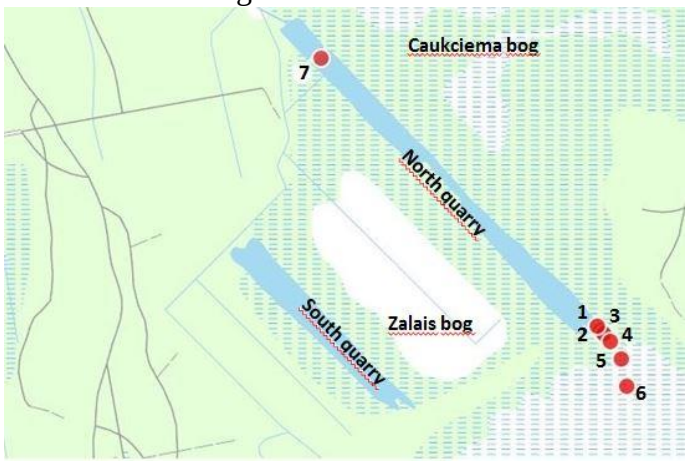

Fig.1. Location of observation wells.

The sixth monitoring well is located in the natural bog territory and this monitoring well has been selected as the control well. The water level is measured each 30 min. using Mini-Diver data loggers. The result shows that the quarry's impact on the hydrological regime of the naturally raised bog decreases starting with the distance of 120 m.

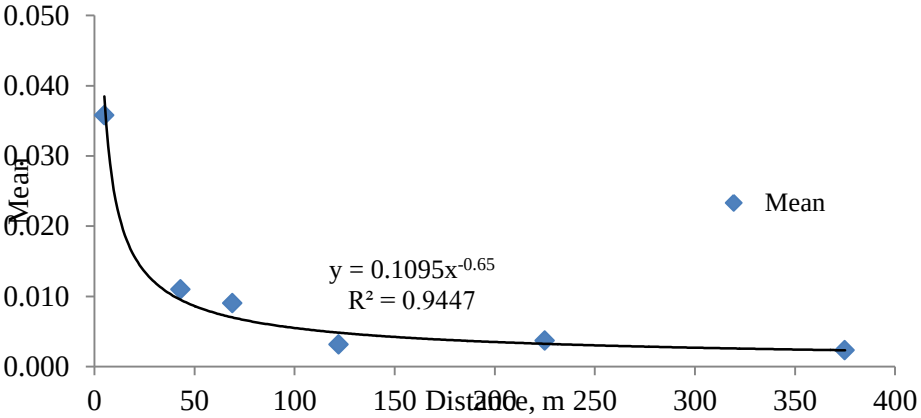

Fig.1. Average difference between monitoring wells per meter depending on the distance to the quarry.

References

1. LIFE+ projekts „Ķemeru nacionālā parka hidroloģiskā režīma atjaunošana". Augstā purva biotopa atjaunošana Zaļā purva teritorijā, Vides risinājumu institūts, 2014, 58 lpp.
2. Holden J., Wallage Z.E., Lane S.N., McDonald A.T., Water table Dynamics in undisturbed, drained and restored blanket peat. Journal of Hydrology, 2011, 402:1-2, pp. 103-114.

THE IMPACT OF SMALL HYDROENERGETIC TO THE LAKES' HYDROLOGICAL REGIME

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Lakes have the quality to reflect humidity conditions in the lake's water catchment area and its variability and the long term changes of lake's hydrological cycle points to the water levels regime variability in time. In the lakes' water levels variability, as well as the rivers' runoff volume variability rhythmical, periodical changes through centuries, which depend on the solar radiation and the atmospheric circulation and determine the amount of precipitation have been observed [1].

The most important renewable energy resources in the Baltic Sea basin are hydropower [2]. The most important fact is that the climate changes and the anthropogenic impacts on the natural processes can change and affect the lakes' hydrological cycle [1].

On the territory of Latvia 2084 natural origin lakes are located and the most significant impact from anthropogenic factors on these lakes' hydrological regime are land reclamation and hydroenergetic factor [1].

In Latvia hydropower stations are located on inflow or outflow rivers from the lakes Lubana, Razna, Liepaja, and Usma.

For the main study object the lake Usma has been selected and the Gravas and Vecdzirnavu HPS on the only outflow river from the lake – Engure.

The water level fluctuation in Vecdzirnavu and Gravas HPS reservoir at monthly level is shown in Figure 1. With green line a HPS allowed operating range is shown. However there is strong evidence that HPS operates at higher water level. For further research, there is a need to investigate the HPS water level fluctuation impact on the Usma Lake water level changes during wet and dry periods.

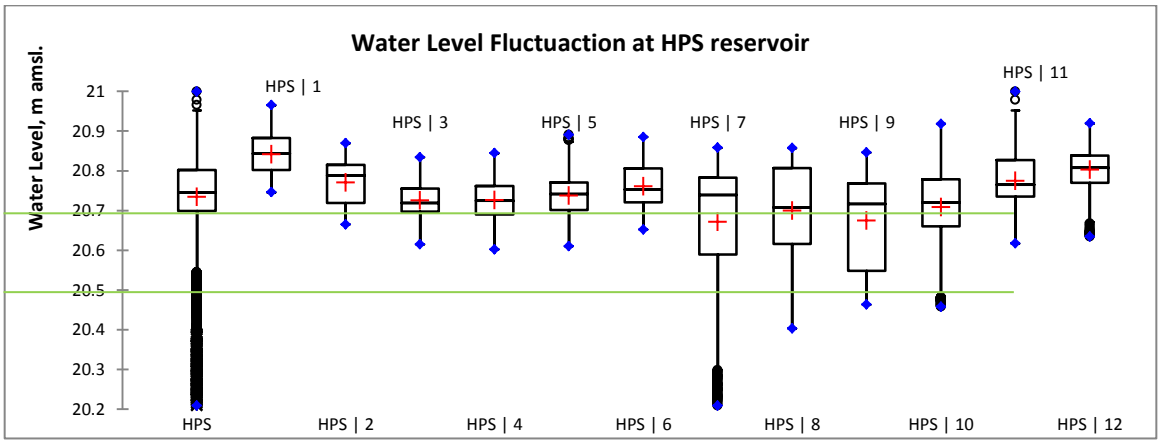

Figure 1. Water level fluctuation by months in 2012-2014 in the Gravas and Vecdzirnavu HPS reservoir.

References

1. Glazačeva L., *Latvijas ezeri un ūdenskrātuves, Ūdenssaimniecības un zemes zinātniskais institūts*, 2004, pp 217
2. Ryden L., Migula P. and Andersson M., *Enviromental Science, The Baltic University Press, Uppsala,* 2003, pp. 56; 318-319.

THE CULTURAL AND HISTORICAL RESEARCH OF THE LANDSCAPE SPACE OF PĀRLIELUPE

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The right bank of the Lielupe River in the context of Jelgava from the 20s of the 20th century to the present day has experienced a very rapid effect of the anthropogenic stress that has contributed to the decrease of natural sites and the increase of the industrial zones. It is based on the pace of the development of the infrastructure of the post-war year city, which is an important indicator of the growth of the economic policy. Consequently, it is particularly important to look for the balance between the ratio of the building and the green areas, which is an important indicator of the urban space based on sustainable development. The research includes a detailed study of separate building areas and solution proposals, which form the basis for further planning of the strategic development of the city in order to facilitate attraction of the international funding.

References

1.Grosmane E., Senā Jelgava, Rīga, Neputns, 2010, 336 pp.
2. Ziemeļnieces A., Landscape architecture and art, LLU, 2014, 110 pp.
3.Tomašūns A., Mana Jelgava, 2014, Internet resource, pdf
4.Briņķis J., Buka O., Pilsētu un lauku apdzīvoto vietu kompleksu arhitektoniski telpiskā plānošana. RTU, 2006., 194 pp.
5.Brille. J., Zemgales galvas pilsēta Jelgava, H. Allunana gramatu tirgotavas izdevums, 1928.

PIEJŪRA REGIONS POPULATION'S FOOD WASTE REDUCTION OPPORTUNITIES

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Human activities on daily basis create a large amount of household waste. 57% percent of household waste composition consists of biodegradable waste, which in turn is an undetectable amount of food waste. The waste not only creates a variety of odors, pests and promotes loaded landfills, but also creates methane gas, which is one of the most dangerous gases triggering greenhouse effect.

There is no food waste amount counting in Piejūra region, also there is no technology that would make it possible to separate food waste from household waste.

The main aim of this research was to find opportunities which can help to reduce Piejūra region population's food waste. The study analyzed information on how other countries reduce food waste, data from VSIA Latvijas vides, ģeoloģijas un meteoroloģijas centrs was summarized and analysed, population survey was carried out and an interview with waste management professional was made.

Available data and information were summarized and approximate volumes of waste were calculated. Data analysis did not determine the regularities of changes in the volume of waste generated.

Results of this research show that lack of finances and lack of the popularity of different useful biodegradable waste processing methods allow Piejūra region to use the following methods for food waste reduction – waste prevention, waste reuse and composting. These methods do not require great efforts or spending, these are the most potent methods for food waste reduction.

The information obtained from the public and from waste management professional allows an objective assessment of the current problems, which are yet to be resolved.

Factors affecting the amount of waste occurring and suggested methods for the reduction of food waste, if the primary methods have been exhausted, have been given in the research.

References

1. Bioloģiski sadalāmo atkritumu apsaimniekošana. Latvijas Atkritumu saimniecības asociācijas izdotā rokasgrāmata, lpp. 8 – 31
2. Graham-Rowe, E., Jessop, D.C., Sparks, P. Identifying motivations and barriers to minimising household food waste, 2013.

POST-SOVIET TYPICAL MULTY-STOREY APARTMENT BUILDINGS' ENERGY EFFICIENCY IMPROVEMENT METHOD BY USING INSULATED TIMBER FRAME ELEMENTS

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In winter time most expenses are for the heating due to the buildings bad construction quality and energy efficiency. Therefore these buildings do not meet modern energy efficiency standard requirements.
The insulation installation method, which is often used today, is quite expensive and takes a lot of time to do the works properly, therefore it is strictly necessary to develop a unique and new conception regarding the energy efficiency improvement of the buildings. Nowadays the typical multi-storey apartment buildings which were built in post-soviet time look bad visually and are not relevant to modern requirements [1].
The method where prefabricated timber frame elements are used is not familiar so far in Latvia, therefore the master thesis' aim is to clarify whether the method described is suitable for the post-soviet buildings which were built in 1970 – 1990.
In this master thesis the possibility to adjust this method to the post-Soviet buildings is analized, the sample conception details and fixings have been made as well. The author has collected information about the buildings project types which were quite often used and therefore created a technical – economical comparison with different insulation installation methods [3].
The main benefit of using this technology is that the prefabricated insulated timber frame elements can be produced all the time in a fully controlled environment instead of installing the insulation materials in a traditional way on site where the whole work process depends on the weather conditions. The prefabricated element system helps totally decrease the installation process on site.
The master thesis shows that the prefabricated insulation element system is much cheaper than the traditional one. The author has compared the I beam studs with the traditional wooden studs. The analysis shows that I beam stud system due the stud geometrical parameter allows to use a much thinner layer of insulation material than in the traditional stud situation.
By inventing and developing this technology the speed and quality for the post-Soviet and old building external insulation work can be totally increased, so that later most people can save their money on the heating expenses. This is a global issue which must be solved as soon as possible.

References

1. SIA „Baltijas Konsultācijas", 1. Pārskats par industriālo energoefektivitāti Latvijā, Rīga, 2013, 73 pp. (14.03.2015)
2. TES ENERGYFACADE (01/2008-12/2009) TES Energy Facade- prefabricated timber based building system for improving the energy efficiency of the building envelope. Research project. Gemany, p. 120-128. (05.06.2014)
3. Vides aizsardzības un reģionālās attīstības ministrijas Būvniecības departamenta speciālisti, Ēku siltumefektivitātes paaugstināšana, Rīga, 2000, 23-39 pp. (7.03.2015)

PROBLEMS OF DEGRADED AND LOW PRODUCTIVE LAND IN UKRAINE

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Degradation of land is a negative phenomenon of modern nature management and a sufficient reason for appearance of social-economic and ecological problems in the sphere of agricultural land utilization. For the last 20 years in Ukraine the average content of humus has decreased by 0.22% [3]. Area of degraded and low-yielding land makes almost 16 million ha, including 12.9 million ha of arable land [2].

Observation of ecology concerning the use of the land is an important direction of interaction of a society and nature in the context of a balanced development of nature management, aimed to decrease the impact of destabilizing factors on environmental conditions by means of introduction of ecological measures. One of the measures is to carry conservation of the land that is widely applied abroad [5].

The existing mechanism of land conservation in Ukraine is ineffective, because the required processes made it very slow. In fact, in 1991-2009 0.96 million ha of degraded and low-yielding land disappeared from agricultural production, which makes 6% of the total area of Ukraine [2].

The issue of land protection against degradation is complicated because of ineffective system of management of land resources, absence of institutional support for balanced land use, low level of economic development and poor ecological culture [1, 4].

Lack of sources and mechanisms of financing of the measures on land protection is an important aspect of the investigated issue. Such situation is forced by decrease of the amount of expenses on nature-protective measures, made by the state and lack of wish or financial incapability to secure protection of land by landowners and landusers.

To solve the problem of land degradation in Ukraine, it is necessary to develop organizational and economic measures for improvement of the structure of land farms and directions of economic activity. At the same time, it is required to apply for the principle of potential “expenses and benefits” for landowners and landusers for the introduction of such measures. To secure implementation of the measures on land protection, it is important to improve the system of state land administration of land management, introducing effective economic means of influence on landowners and landusers.

References

1. Другак В. Земельна політики щодо створення системи еколого-економічного адміністрування землекористування в Україні / В. Другак // Землевпоряд. вісн. – 2013. – № 6. – С. 29-32.
2. Національна доповідь про стан родючості ґрунтів України. – К.: ТОВ «ВИК-ПРИНТ», 2010. – 111 с.
3. Про схвалення Концепції боротьби з деградацією земель та опустелюванням : Розпорядження Кабінету Міністрів України від 22 жовтня 2014 р. № 1024-р // Землевпоряд. вісн. – 2014. – № 11. – С. 53-55.
4. Солов’яненко Н. Державна політика екологобезпечного природокористування в Україні / Н. Солов’яненко // Землевпоряд. вісн. – 2013. – № 5. – С. 48-51.
5. Стойко Н.Є. Зарубіжний досвід консервації земель / Н. Є. Стойко // Вісник Львівського національного аграрного університету : економіка АПК. – 2014, № 21 (2). – С. 149-156.

PROJECT OF TERRITORY ORGANIZATION OF THE FARM "MEZARES"

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To organize any manufacturing process or other tasks, we need land (territory). The base of agriculture is to produce and develop viable holdings – farms. Farm – sustainable development and effective production could contribute to developing the project of territory organization of farm.
The project of territory organization will be developed at the farm "Mezares", which is located in Rubene municipality rural territory, Jekabpils municipality.
The farm area of "Mezares" was selected for the development of the project, because this farm in recent years is rapidly evolving and the the establishment and implementation of the project could contribute to the effective development of the farm to improve the operation of the farm, as well as to increase their income and reduce expenditure. With this project, we can find more efficient economic activities, as well as to design or improve farm yard area. To develop the project of territory organization of the farm ”Mezares” it is necessary to comply with various laws and regulations, governing land use and protection, because right now there is no set of laws to govern the development of the project of territory organization.
Most of the land of the farm ”Mezares” is located in the territory of the natural park ”Dvietes paliene”. This means that through this land, landlords must comply with permitted and prohibited activities in the area, because they need to preserve the natural characteristics in this field. The permitted and prohibited activities in the territory of the natural park ”Dvietes paliene” are regulated by ”Personal protection and terms of use in natural park Dvietes paliene”[1].
Agricultural land use, conditions and principles for the protection and prevention of land degradation, monitoring the implementation of the land are governed by laws: "Land management law", and "The privatization of land in rural areas", as well as "Agricultural and rural development Act".
The land management law stipulates that land users take steps to save the earth and soil quality and prevent its degradation, land use, according to the local government areas of development programming documents established or lawfully on the territory of the use undertaken, as well as imposing restrictions on land fragmentation and change the category of land-use[2].
In the law “The privatization of land in rural areas” the persons who can buy agricultural land and how much agricultural land they can buy are determined. This law also contains the objective of the Land Fund in Latvia - promoting the protection of agricultural land resources and availability on the national level, as well as agricultural land conservation, rational, efficient and sustainable resources exploitation, as well as agricultural land preservation. The conditions specified in the law, make the use of agricultural land and its protection more efficient [3].

References

1. Dabas parka "Dvietes paliene" individuālie aizsardzības un izmantošanas noteikumi (2007): Ministru kabineta 2007. gada 24. aprīļa noteikumi Nr.274. Latvijas Vēstnesis Nr.68 (3644), 2007.gada 26.aprīlī, 1.- 4.lpp.
2. Par zemes privatizāciju lauku apvidos: LR likums (1992) [skatīts 2015. g. 14. februārī]. Pieejams: http://likumi.lv/doc.php?id=74241.
3. Zemes pārvaldības likums: LR likums (2015), Latvijas Vēstnesis, Nr.228 (5288), 2014.gada 15. novembrī, 1-3.lpp.

REALIZATION OF EUROPEAN VERTICAL REFERENCE SYSTEM IN LATVIA

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Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) defines the use of the European Vertical Reference System as a national height system in all European Union member states [1].
Till 1st of December, 2014 in Latvia the heights were determined in Baltic Normal Height System 1977. The national height system is determined by Cabinet of Ministers and state laws. Now for the change of a national height system there are developed amendments in laws and regulations, but just the amendment for the Law of Geospatial Information is in force, amendment in regulation of Cabinet of Ministers is still not valid.
From 1st of December the European Vertical Reference System realization in Latvia – Latvia Height System LAS-2000,5 is determined as a national height system.
For transformation from the Baltic Normal Height System 1977 to the European Vertical Reference System, Federal Agency for Cartography and Geodesy *(BKG – Bundesamt fűr Kartographie und Geodesie)* in Germany and Reference Frame Sub-Commission for Europe (EUREF) have made a transformation formula for EVRF2007 realization on the territory of Latvia [2].
Amendment of regulations by Cabinet of Ministers determines the Latvia Height System LAS-2000,5 and the parameters for it, which are different from parameters for EVRF2007 for the territory of Latvia. Height differences between the Baltic Normal Height System 1977 and the European Vertical Reference System are not a constant value on the whole territory of Latvia but differs from 135 mm to 165 mm and depends on point location on the territory (coordinates). The height differences between the Baltic Normal Height System 1977 and the Latvia Height System LAS-2000,5 are from 125 mm to 173 mm. The differences make 48 mm, which is higher than primarily determined by EVRF2007 [3].

References

1. Amendment of regulation: *"Grozījumi Ministru kabineta 2011.gada 15.novembra noteikumos Nr.879 "Ģeodēziskās atskaites sistēmas un topogrāfisko karšu sistēmas noteikumi"* http://tap.mk.gov.lv/mk/tap/?pid=40335465 (12.03.15).
2. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (26.02.14).
3. RTU Ģeomātikas katedra, Valsts augstumu izejas līmeņa noteikšana. Zinātniski pētnieciskais projekts, 2009, 63 pp.

PERSPECTIVE DEVELOPMENT OF THE GAJOKS NEIGHBOURHOOD IN DAUGAVPILS

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Urban landscape is a dynamic fabric, which transforms all the time, resulting in development or degradation of the particular areas.

To some extent degradation helps preserve historical value, because in that case there is no removal of historical buildings or their substitution with new buildings. As a result these areas stay as visually unchanged monuments of the particular era of the city development, thus contributing a lot to both, visual and cultural aspects of the image of the city. However if degradation is not be suspended at some point, it can result in a complete loss of the important historical objects. That is why revitalization of such areas in that context is of vital importance.

The research focuses on the Gajoks neighbourhood and on the preservation of its industrial heritage, affirming that it is an important part of Daugavpils cultural heritage. As a basis for the research a careful study of the neighbourhood's history and current situation was performed focusing on aesthetic and architectural value of buildings in order to prove unique cultural value of Gajoks and its important place in the history of Daugavpils development. The potential for the future development of Gajoks was substantiated with similar development practices around the world, such as Landscape Park Duisburg Nord *(Landschaftspark Duisburg-Nord)* in Duisburg, Germany; "Heidelberg Project" in Detroit, Michigan, USA; „The Steel Yard" in Providence, Rhode Island, USA; Pearl District neighbourhood in Portland, Oregon, USA.

References

1. Alward Sarah, Foen Fai, Petit Dana, Runge Christian, Urban Revitalization through Art, Community and Ecology: The Heidelberg Project, 2011: http://deepblue.lib.umich.edu/handle/2027.42/84207 (12.01.15).
2. Farbstein Jay, Lubenau Anne-Marie, Shibley Robert, Wener Richard, Inspiring Change. The 2013 Rudy Bruner Award for Urban Excellence, 2014: http://www.brunerfoundation.org/rba/pdfs/2013/2013_Inspiring%20Change.pdf (12.01.15).
3. Hampton J., Jeske B. Bandel, The Pearl District, 2010: https://courses.washington.edu/gehlstud/gehl-studio/wp-content/themes/gehl-studio/downloads/Winter2010/PearlDistrict.pdf (12.01.15)
4. Labelle Judith M., Emscher Park, Germany — expanding the definition of a "park", 2011: http://www.georgewright.org/37labell.pdf (12.01.15).
5. Якуб, Залман, Даугавпилс в прошлом : публикации краеведа. А.К.А., Даугавпилс, 1998, 303 pp.

ROOF SANDWICH PANEL THEORETICAL AND EXPERIMENTAL TESTING

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Nowadays lightweight three-layer sandwich panels are widely used as a bearing construction in industrial and public buildings. Thereby the light and large-sized panels make it easy to assemble the building exterior walls and roof structure. The biggest sandwich panel manufacturers offer maximum allowable loads or maximum allowable span tables (schedules) for smooth and profiled covers [1].
The main load acting on the roof sandwich panels is the snow and wind load. Sandwich panel manufacturers offer ultimate loads tables (schedules) panels with smooth and profiled coverings.
The Master thesis' aim is to clarify the panels with profiled coverings load-bearing properties using theoretical relationships and experimental results.
The tasks of the research are:

- analyse the literature data on the cover sheet and profiled roof panels theoretical calculations and previous research;
- develop a calculation algorithm of profiled sheets and panels according to EN 14509 [2];
- test roof sandwich panels with profiled cover and process the results, and compare the experimental results with the calculated results.

Master thesis novelty*:*
The obtained theoretical and experimental results allow assessment of the panel cover sheet driven efficiency, compared to the smooth cover sheet option.
Master thesis hypothesis*:*
Using roof sandwich panels with profiled cover sheet, the bearing capacity increases, compared to analogue panel with smooth cover.

References

1. Davies JM.. Light weight sandwich construction. UK: Blackwell Science; 2001, 384 pp.
2. European Standard EN 14509. Self-supporting double skin metal faced insulating panels — factory made products — specifications; 2006

SOIL EROSION RISK EVALUATION IN MPS ”VECAUCE” AGRICULTURAL AREAS

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Soil erosion includes the processes of detachment of soil particles from the soil mass as a function of driving force such as water, wind, and lack of vegetation or any other natural or anthropogenic activities [1]. In MPS ”Vecauce” main reason for soil erosion is surface runoff.

Soil erosion can be considered as environmental problem in MPS ”Vecauce” agricultural land as well as in other hilly regions around Latvia, because it causes loss of soil fertile particles which leads to soil degradation and fertility loss. This issue is important in MPS „Vecauce” as this area is situated in nitrate vulnerable zones, according to Regulations issued by the Cabinet of Ministers No. 33 „Regulation Regarding Protection of Water and Soil from Pollution with Nitrates Caused by Agricultural Activity” [2].

The results and methodology of this research can be used in another soil erosion risk studies especially in areas where the topographic and land use conditions are similar to “Vecauce” study site.

The main objective of this research is to evaluate risk of soil erosion in 12 monitoring catchments situated in MPS „Vecauce” area.

Tasks of the work:

- To study the theoretical aspects of surface runoff formation processes;
- To define catchments of 12 study sites by using digital drainage cadastral data of ZMNI (Agricultural department of immovable property);
- To define high risk areas of surface runoff and soil erosion by using digital evaluation model information on topographic conditions in Latvia.

The digital drainage cadastral data of ZMNI, e.g. drainage, collector and ditches systems, was used to manually delineate catchment areas of monitoring points.

The evaluation of soil erosion risk in study catchments and the erosion risk mapping were done according to criteria defined in Universal Soil Loss Equation (USLE). After the delineation of catchment areas in ESRI company software ArcGis 9.3.1., the soil erosion risk maps were created. At this stage of research the analysis of land surface slopes, length and directions of slopes was performed. The results of similar investigations were used to select the crop/vegetation and management factor (C) and the soil erodibility factor (K) for each study site.

The main results of this research are soil erosion risk maps for 12 study catchments.

References

1. Šķiņķis C. (1986) Soil drainage, Riga: Avots. 331 lpp.
2. Regulation Regarding Protection of Water and Soil from Pollution with Nitrates Caused by Agricultural Activity (2014): Republic of Latvia Regulations issued by the Cabinet Nr. 33 [on-line] [Seen 25. 02. 2014.]. Acessibles: http://www.likumi.lv/doc.php?id=224753

THE GRAVAS AND VECDZIRNAVU HYDROPOWER STATION IMPACT ON USMA LAKE WATER LEVEL FLUCTUATION

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Human activities make certain impact on natural ecosystems. One of activities is hydropower production which requires to raise the water level and to accumulate water in the reservoir before the hydropower station's (HPS) construction. In case of Gravas and Vecdzirnavu hydropower station, Usma Lake is used as a reservoir [1], [2]. To investigate the impact of the hydropower station on Usma Lake's hydrological regime, a monitoring station was built to monitor hydro power station reservoir water level using Mini-Diver data loggers. The Usma lake water level data were collected from the data base of State Limited Liability Company "Latvian Environment, Geology and Meteorology Centre".
The lake water level and HPS reservoir water level fluctuations are shown in Figure 1.

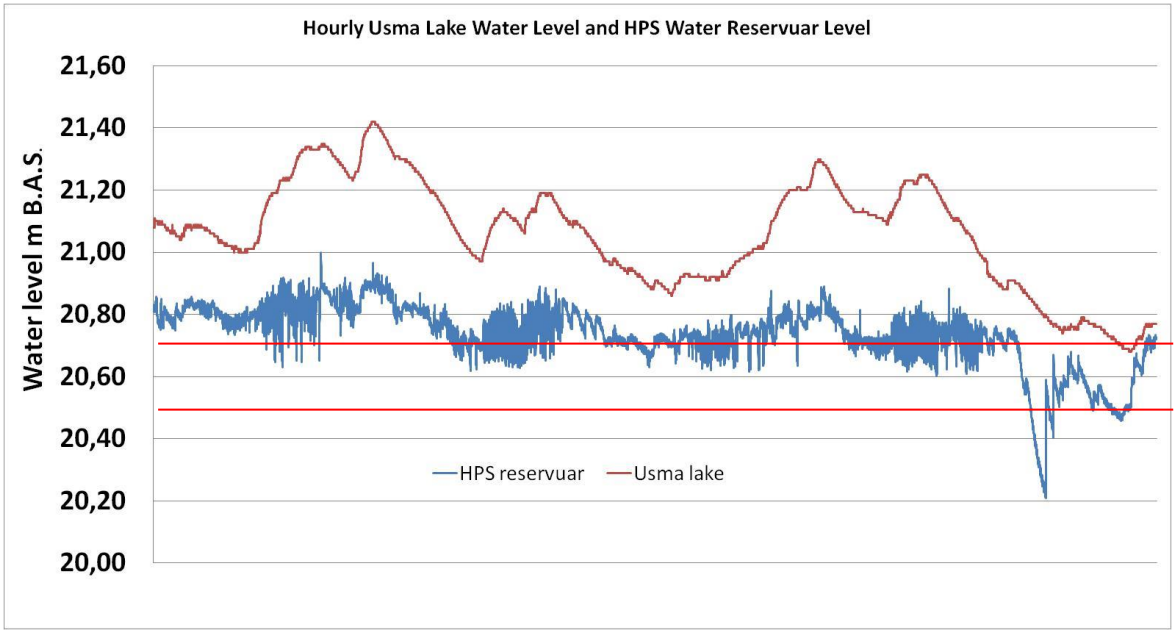

Figure 1. Hourly Usma Lake and HPS water level fluctuation for time period from July 2012 till October 2014

It is clear that HPS does not operate at a proper level which according to technical documentation, is from 20.50 till 20.70 m B.A.S, see red lines in the graph. To analyze a correlation between HPS and the lake water level fluctuations Pearson correlation coefficient was used. The Pearson correlation is 0.71 with p-value < 0.00001. According to Pearson correlation results, there is a strong evidence that HPS affects water level fluctuation in Usma Lake.
To understand how the hydropower station influences Usma Lake water level, future research is necessary using time series analytical methods.

1) Medina, C., Gomez-Enri, J., Alonso, J.J., Villares, P., Water volume variations in Lake Izabal (Guatemala) from in situ measurements and ENVISAT Radar Altimeter (RA-2) and Advanced Synthetic Aperture radar (ASAR) data products, *Journal of Hydrology*, 2010, Volume 382, Issues 1-4, pp. 34 – 48.
2) Glazačeva, L., Latvijas ezeri un ūdens krātuves, Jelgava, 2004, Jelgava, pp. 103-106.

INTEGRATION OF THE INDUSTRIAL HERITAGE OF RIGA IN THE TRENDS OF THE 21 ST CENTURY

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With the increasing load of Riga agglomeration at the beginning of the 21st century, the former production areas of its eastern part in the neighbourhood of Jugla form a unique zone of the industrial heritage, which is based on a layer of the cultural and historical building of the beginning of the 19th century. Nowadays, with the emergence of the post-industrial stage of development, modernization of the globalization and digitization process of the industrial structures is intensifying, which gives a new impulse to the nature of the transformation of the urban space. Consequently, in the areas of industrial heritage, with ceasing of the production processes, the green areas are being recovered, which raises the possibility of the green recreation of the residential areas and the public outdoor space. The specific areas – the expression of the natural site of water bodies give a unique opportunity to include the sustainable development of the above mentioned functional areas in the development plan of Riga.

References

1. Grupa 93, Degradēto teritoriju izpēte Rīgas pilsētā, 2004.
2. Rīgas ilgtspējīgas attīstības stratēģija līdz 2030.gadam: www.sus.lv (25.03.15).
3. Миц Г. В, Архитектурно-ландшафтная конверсия хозяйственно-промышленных территорий, Москва, 2006.
4. Ходырева А.К., Стратегии существования индустриальных образований крупных городов: теоретиеская база: «Архитектон: известия вузов» № 38 - Приложение Июль 2012 (Avots http://archvuz.ru/2012_22/1).
5. Шолнерчика И. Ю., Исторические предпосылки возникновения процесса рефункциолизации: «Архитектон: известия вузов» № 6 Апрель 2004 (Avots http://archvuz.ru/2004_1/16) (25.03.15).

THE LONG-TERM CHANGES OF LAKE USMA HYDROLOGICAL REGIME

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Lake level fluctuations are characterized by rhythmic, periodic changes over the centuries [1]. Climate change and human impact on natural processes are able to influence and change lake hydrological regime. To find sustainable management solution of the Lake Usma there is a need to understand causes of hydrological regime changes.

In this research, to test the impact of anthropogenic factors the lake water level data are divided into three separated periods: the first time period (1927-1956) before a significant anthropogenic impact, the second period (1957-1998, 2000-2001) after amelioration and while eel weir was constructed (1966) and the third period (2002-2003, 2011-2014) after the hydroelectric station started its work. Fig.1. shows a comparison of these three periods of monthly water level data. In the first period monthly lake level data show normal North Europe lake hydrological regime, with the highest level in the end of April or in the beginning of May. Mean water level reaches about 20.70 m B.S. and minimum monthly water level – 20.20 m B.S. The second time period shows the rise of water level. The highest water level is observed in the beginning and in the end of the year, because of high precipitation in this time. Mean monthly water level reaches about 21.10 m B.S. and minimum water level about 20.60 m B.S. In the third period there is observed the highest water level in March and in summer the gap between maximum, mean, minimum and quartiles is limited, which shows a very small level amplitude. It shows that hydrological regime is changed. Mean water level is still about 21,10 m B.S., but minimum monthly water level reaches 20,80 m B.S. The result shows significant impact of anthropogenic and natural factors.

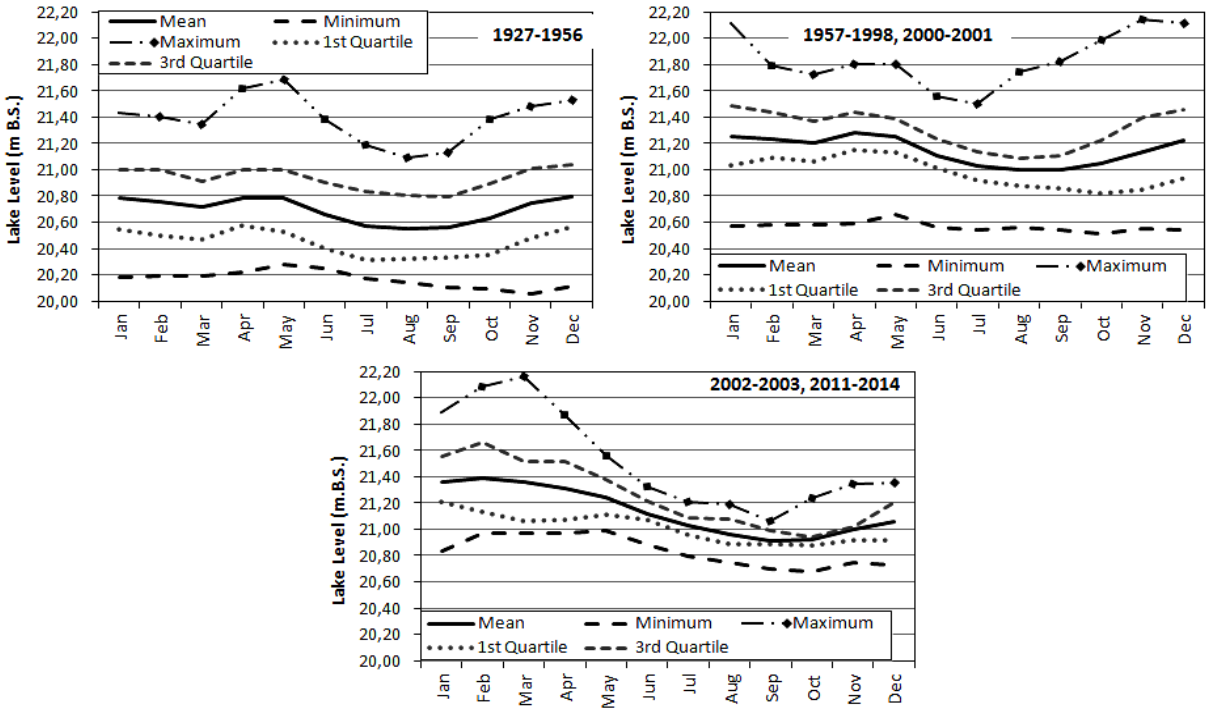

Fig.1. The comparison of the Lake Usma three time periods' (1927-1956; 1957-1998, 2000-2001; 2002-2003, 2011-2014) water level data.

References

1. Montanari A., Hydrology of the Po River: looking for changing patterns in river discharge, *Hydrology and Earth System Sciences*, 2012, 16, pp. 3739–3747.

THE HISTORICAL LANDSCAPE SPACE OF GAUJIENA MANOR PARK

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The research on the Gaujiena manor park clearly demonstrates the need to recover the cultural and historical landscape, its expression, the park's layout and its spatial structure. Historically, the Gaujiena landscape park has been mainly shaped by a picturesque natural site – relief, climate, tree growth and the nature of water bodies. In turn, under the influence of the experience of the owners of the land – the von Wulf baronial family and the gardener, the functional form of individual sites of the landscape space has overlaid.
Despite the change of the economic - political power, the war and the post-war years and the current trends in the management - the park, its cultural and historical values and the layout have retained a breath of centuries. This is reflected in the graphical part of the research where historical and modern cartographic materials are compared.
For the preservation of these values, it is required to educate the society at all the levels to promote understanding and the ability to appreciate the significance of the cultural and historical heritage.

References

1. Gaujienas pagasta teritorijas plānojuma 2007 – 2014 Stratēģiskais ietekmes uz vidi novērtējums (IV daļa) Vides pārskats. 2007, 34 lpp. http://www.gaujiena.lv/vparsk.pdf (20.11.14).
2. Grāvis, H., Adzele - Gaujiena 1111-2011 Senatne un mūsdienas. SIA Preses Nams Baltic, 2010, 415 lpp.
3. Janelis, I.M., Latvijas muižu dārzi un parki. Rīga: SIA „Neputns", 2010, 302 lpp.

THE RATIONAL USE AND PROTECTION OF LAND RESOURCES IN THE REPUBLIC OF KAZAKHSTAN

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The Republic of Kazakhstan has a large territory – 272.5 million hectares which include forest-steppe, steppe, semi-desert and desert zones. Agricultural area takes up to 222.7 million hectares, including 34,8 million hectares of arable land and 32,2 million hectares of pastures.
The area of agricultural land takes up to 74% of total area of Kazakhstan.81% of agricultural land and 98% of arable land is owned or used by citizens, agricultural enterprises, organizations and institutions.
Land resources which are at disposal of the state can ensure the production of various agricultural products in volumes that meet domestic and export needs, if they are managed in proper and rational way. But investigations and survey show that there are 121.8 million hectares of agricultural land having tendency to soil deflation. 27.8 million hectares of this agricultural land is arable land and more than 63 million hectares are salt marshes. 6.9 million hectares of them are used for cultivation of cereal crops. The use of such land requires a careful attitude and constant concern about its protection and increasing of productivity [1,2].
Solving problems of rational use and protection of land resources it is necessary to carry out its natural and micro zoning. On this basis it is necessary to carry out measures against wind and water erosion, reclamation of saline and salt marsh land, improvement of natural grassland by:

- completion of inventory of land resources and assessment of their quality for rational use and organization of the territory of agricultural enterprises;
- implementation of soil conservation crop rotations and pasture rotations for restoration of soil fertility with the optimal use of chemical and biological methods;
- ensuring of internal organization of the farm territories and improvement of the structure of agricultural land and cornfields;
- implementation of reclamation activities for elimination of salt marshspots on arable land on area of 2.3 million hectares, and erosion control measures on area of 27.8 million ha;
- implementation of soil conservation technologies for cultivation of agricultural crops;
- increase of volume of protective forestations and pasture protective forest plantations on area of 85,5 million hectares [3].

The main task of state control is to ensure that all land owners and land users observe demands of land legislation of Kazakhstan in aspect of use and protection of the land [4].

References

1. Сейфуллин Ж.Т., Есполов Т.И. Управление земельными ресурсами - Алматы: «Агроуниверситет», 2004. – 212 с.
2. Сейтхамзина Г.Ж. Механизмы государственного регулирования рыночного оборота сельскохозяйственных угодий /Журнал «Исследования и результаты», №4, 2009, 23-27с
3. Концепция рационального использования и охраны земельных ресурсов Республики Казахстан (постановление Кабинета Министров РК от 11 октября 1994 г. N 1149)
4. Постановление Правительства Республики Казахстан от 1 марта 2011 года № 208 «Стратегический план Агентства Республики Казахстан по управлению земельными ресурсами на 2011-2015 годы»

IDENTITY OF THE CULTURAL AND HISTORICAL LANDSCAPE SPACE OF CESVAINE

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The building complex of Cesvaine Manor and its location in the picturesque winding of the Sūla River has favored the expansion of the urban space, which visually and functionally has degraded the cultural and historical landscape space. This is attributable to the period of time from 1925 to 1990, which marks both the Latvian Agrarian Land Reform and the post-socialism period with the expansion of new building and tree planting areas, without taking into account the key view points and protection zones. Hence, the expression of the manor ensemble is suppressed and the tourist infrastructure is not growing. The research gives an insight into the nature of the conflict zones and presents a comparison of the present situation with the archival materials.

References

1. Holste I., Cesvaines grāmata, Cesvaine, SIA “Madonas poligrāfists”, 2001, 292 lpp.
2. Liepiņa Ā., Holste I, Cesvaine laiku laikos, Madona typography, 1993, 41 pp.
3. Cesvaine district website [online]. 2014 http://www.cesvaine.lv/turisms/apskates-objekti-cesvaines-novada/cesvaines-luteranu-baznica.html (27.12.14).
4. Cesvaine Castle Museum. Material from the new Cesvaines city information center booklet of materials in MS Word format, and the museum's archives.
5. Cesvaine Castle Museum. Material from Cesvaine palace tour archive.

REVITALIZATION OF THE LIELUPE RIGHT RIVER BANK INDUSTRIAL LANDSCAPE IN THE URBAN CONTEXT OF JELGAVA

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The fusion of several industrial areas in Pārlielupe in the middle of the 20th century created a wedge-shaped urban space character, concentrated mainly along the transport transit areas [1]. One of the main criteria for the development of these territories is based on prosperous strategic geographic location, which creates a convenient link with other important industrial hubs such as Rīga, Liepāja, Daugavpils, Klaipeda (Lithuania), Warsaw (Poland). However, due to various economic and political reasons at the end of the 20th century the industrial areas in Pārlielupe partly started to degrade to brownfields [2]. The study includes the examination of the existing condition of the industrial sites as well the future development opportunities of the territory referred to in the research. Assessing and collecting research materials, a vision of Pārlielupe industrial sites' future development was created, which could reinforce the industrial character and also integrate it into the Pārlielupe urban tissue.

References

1. Ziemeļniece A., Pārlielupes kultūrvēsturiskā ainavtelpa Jelgavā. Latvijas Lauksaimniecības universitāte, 2014.
2. Tomašūns A., Mana Jelgava. 2014:http://www.jelgavniekiem.lv/pict/res/mana_ jelgava.pdf (11.01.15).

INFLUENCE OF TOURIST OBJECTS ON THE WATER QUALITY IN USMA LAKE

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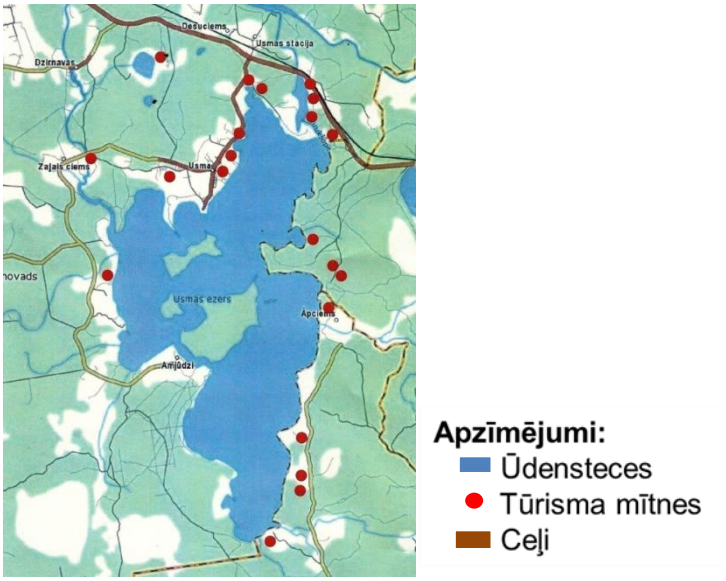
The tourism is one of leading economic activities in Kurzeme region. Especially nature tourism, leisure activities and city tourism are developed.
Around Usma Lake there are several camps and SPA hotels. However, tourism activities can be harmful for natural environment. Usma Lake is unique by synthesis of nature protection and leisure activities. A growing anthropogenic impact on natural environment by developing tourism industry is a challenges for Usma Lake. The aim of this research is to investigate tourism industry impact on Usma lake water quality and pressure on natural environment. The research is focused on water quality analysis and a potential load of tourism objects on Usma Lake environment [1].
The research results show a positive tendency of tourism industry development around Usma Lake. However, it gives larger nitrogen and phosphorus loads in Usma Lake ecosystem. To keep natural resources in present quality it is necessary to develop innovative water treatment technologies for each tourism object and for larger urbanized territories and intensive agricultural areas. The potential point source pollutants are shown in Figure 1.

Figure 1.The point source pollution tourism objects around Usma Lake [2]



References:

1. Dokulil, M.T., Enviromental impacts of tourism on lakes, 2014, 10 pp.
2. Valujeva K., Sustainable management proposals for the lake Usma. Scientific research work, The Latvia Agriculture University, Department of Environment Engineering and Water Management, Jelgava, 2013, 31 pp.

THEORETICAL AND EXPERIMENTAL TESTING OF BOLTED CONNECTIONS

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Bolted connections in steel construction are one of the most common connection types. They can be divided into two groups: simple connections and moment connections. Portal frame constructions with rigid bolted joints (moment connection joints) are often distributed in single storey industrial and public buildings. Theoretical calculation of bolted connection accordance with EN 1993-1-8:2005 [1] is complicated; furthermore the connection performance is considerably influenced by the deformation of the frame [2]. For modeling of bolted joints in tension and compression, T-stub elements are used both in theoretical and experimental verification. It is also essential to ensure the connection resistance to shear.
The aim is to get acquainted with calculation methods in the bolted joint and testing of models.
To achieve the aim the following tasks are set:

- study the literature data and previous research in the field of bolted joint calculation methods;
- work out algorithms for calculation resistance of bolted connection;
- execute tests with bolted joints and compare the obtained results with numerical results.

Novelty of the research is: bolted connection in-deep research, both analytical and experimental, importantance to guarantee safety of the whole construction. This is evidenced by many accidents in the world and also in Latvia.
Hypothesis: developed algorithms calculated results are confirmed experimentally.

References

1. Albertyn H., L., Haas T., N., & Dunaiski P., E. Accounting for moment – rotation behavior of connections in portal frames, *Journal of the South African Institution of Civil Engineering*, 2014, Vol. 56, pp. 69-76.
2. Latvian Standard LVS EN 1993-1-8: 2005/AC: 2006 “Eurocode 3: Design of steel structures – Part 1-8: Design of joint”.

THE ANALYSIS OF WASTE MANAGEMENT COMPANIES IN JELGAVA REGION

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In today's commercial society there is a global problem of waste amount increase.The majority (~60%) of municipal solid waste consists of organic matter. In the landfills by biodegrading organic waste, methane (CH_4) is released that could be even more harmful greenhouse gas comparing to carbon dioxide (CO_2). The governmental waste management plan considers the production of environmentally friendly goods and the collection of separate biodegradable waste as well as sets measures for recycling [1], [2].
In order to improve waste management processes, the analysis of legislation concerning organic waste utilization is needed. To identify the biodegradable waste management in Jelgava region the amount and proportion of waste is analysed for the food production and companies of social services.
In this research the statistical data focusing on biodegradable waste amounts and proportions for five year period is obtained from State Limited Liability Company "Latvian Environment, Geology and Meteorology Centre" (LEGMC).
Regarding the EU Waste Directive 1999/31/EK Member states have to decrease the emissions of methane. The alternative of deposition of biological waste is to be aware of composting and correct burning at the waste sorting and recycling sites. This approach is partly implemented in Latvia by developing separate waste collection systems. Still, the waste recycling and energy recovery is an actual problem. There are not enough appropriate facilities for the collection and storage of biological waste [3].
The author has gathered information and analysed the data of municipal solid waste and biodegradable waste amounts not only in Jelgava city and Jelgava region, but also in Ozolnieki, Riga, Daugavpils and Liepaja municipalities which allowed identifying the current situation amongst the largest cities in Latvia. The author concludes that total amount of municipal solid waste as well as the proportion of biodegradable waste in Jelgava region is increasing every year.
In the scientific work there are some recommendations for the improvement of biodegradable waste management system in Jelgava region.

References

1. Pubule J., Cleaner production in biowaste management, Doctoral Thesis, Riga Technical University, Faculty of Power and Electrical Engineering, Institute of Energy Systems and Environment, Riga, 2014, 96 pp.
2. Āriņa D., Pre-Treatment and Energy Recovery of Municipal Solid Waste, Doctoral Thesis, Latvia University of Agriculture, Jelgava, 2014, 71 pp.
3. Atkritumu apsaimniekošanas valsts plāns 2013. - 2020. gadam (Waste management plan 2013-2020). The Ministry of Environmental protection and Regional Development, Riga 2012, 136 pp.

WATER QUALITY IMPROVEMENT MEASURES FOR THE ABAVA RIVER

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The river Abava is situated in the nature park "Abava valley" in the (territory of) village Renda which sets down additional provisions for water protection issues. Based on visual evidence the current "Sewage treatment plant of Renda village" in Renda county does not provide qualitative sewage treatment for the village. Additional pressure is caused by the Ķesteri fish ponds, draining the residential housing sewage elsewhere not the collective system and the agricultural runoff [2]. The aim of the study is to evaluate the current situation of water quality in the Abava river in the territory of Renda county and pose suggestions to improve the water quality.

During the study several water quality measurements were conducted and reviewed, measurements were compared in a time and space perspective; several existing risk objects in the territory were evaluated; in the conclusion of the study suggestions to improve the water quality of the river Abava were posed. In the process of the study samples of the Abava river water were gathered in 7 possible risk territories in Renda county. To evaluate the quality of the river water such physiochemical quality parameters are evaluated as oxygen conditions (O_2, BSP_5) and biogenic substances (N/NH_4, N_{tot}, P_{tot}, N/NO_3, P/PO_4). Measurements were made with US-produced nitrate probe YSI 6920 V2. The variation in physiochemical parameters is affected by the change in confluence area of the river, average rainfall in the surveyed area, affect of various pressures, such as sewage treatment plants, agricultural runoff [1].

Water quality indicators of the river Abava for previous years is available for the years 2006 and 2009. These (measurements) have been obtained using data collection methodology from the above-ground water chemical composition observations conducted by the Latvian Environment, Geology and Meteorology Centre from the following observation stations – the Abava river mouth and the Abava, 0,5 km upstream (from) Kandava.

The results are summarized and conclusions are given about the quality of the water and measures to improve it.

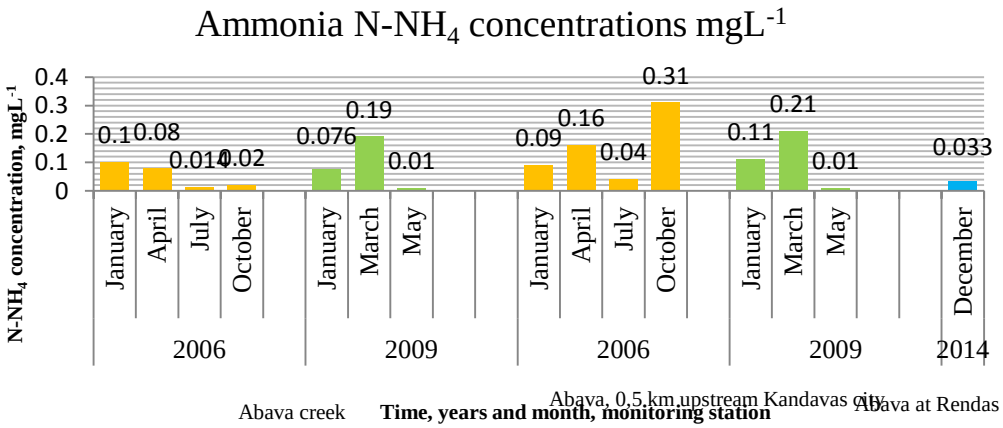

Fig.1. Ammonia N-NH4 concentration at the *Abava creek* and the *Abava, 0,5 km upstream Kandavas city* monitoring stations (2006., 2009.).

References:

1. Kokorīte, I. Latvijas virszemes ūdeņu ķīmiskais sastāvs un to ietekmējošie faktori. Rīga, 2007., 27.lpp.
2. Lagzdiņš, A., Jansons, V., Abramenko, K. Setting of the Water Quality Standarts for Nutrients in Runoff from Agricultural Land. 2008.

FORESTRY AND WOOD PROCESSING

BIRCH SEED ORCHARDS TURNOVER FOR PRODUCTION OF SEEDS - LATVIAN AND FINNISH EXPERIENCE

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Birch seed orchards are completely different from those of conifers. They have been established in large plastic greenhouses where as a result of intensive cultivation conditions two-year-old grafts already produce a big amount of seeds. In Finland there were (in year 1996) 20 plastic-covered birch seed orchards, covering a total of 1.44 ha. 15 of the orchards were producing silver birch *Betula pendula* Roth.seeds, one curly grained birch *B. pendula* var.*carelica* Merckl.Hämet-Aht seed, and 4 downy birch *B. Pubescens* Ehrh. seeds [2].

This technique had been developed in Finland at Haapastensyrjä since 1970s. At that time the organization was Metsänjalostussäätiö, Foundation for Forest Tree Breeding. In year 2000 the Foundation merged with the Finnish Forest Research Institute (METLA). This year it was renamed the Natural Resources Institute Finland (Luke) when all the natural resources institutes amalgamated.

The first birch orchard in plastic greenhouse in the Baltic countries was established on November 6th, 2001, in Kalsnava, and it was based on Finnish technology [1]. Now the same birch orchards are also in other Baltic countries. From the birch seeds of Kalsnava birch orchard, selective forest reproductive material of the category "qualified" was obtained. The benefits of growing birches from these seeds are the following: the average stem volume is higher by 26%, diameter increase by 10%, height increase by 7%, smaller taper, thinner branches and straighter stems [3].

The total area of Kalsnava birch orchard is 1600 m^2, height 9.5 m, equipped with mechanically adjustable vents and with lower and upper irrigation systems. This birch orchard is for a 10-year life cycle. The orchard is divided into 2 sections (Eastern region of Latvia - Liepna, Mālupe surrounding the origin; other Western region - Andumi, Kaive origin), from each of them 55 four-year old grafted birches were planted. The first harvest was in the year 2003. From 5 - 40 kg of silver birch seeds have been harvested annually (that means - 3.5 to 14 million new birch plants can be grown). In the year of 2014, the third round of the clone set for new birch seed orchard was finally completed (Liepiņš, 2013).

References:

1. LVM Sēklas un stādi: http://old.lvm.lv/lat/lvm/lvm_struktura/lvm_seklas_un_stadi/ (01.04.15).
2. Liepiņš K., Daugaviete M., Zālītis P. Bērza plantācijas lauksaimniecības zemēs, Salaspils, 2013, 21-22 pp.
3. Seed from seed orhchards in plastic greenhouses: http://www.metla.fi/metinfo/tietopaketit/treebreeding/slides/edia34.htm (01.04.15).

CARBON CONTENT IN BIOMASS OF THE MOST COMMON TREE SPECIES IN LATVIA

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Reporting of greenhouse gas (GHG) emissions in land use, land use change and forestry (LULUCF) sector is one of the most challenging tasks of the National greenhouse gas inventory in Latvia [1]. LULUCF is the most complex and the most uncertain sector of the inventory, where country specific factors of emissions and expansion factors are elaborated for limited number of parameters. Carbon content in biomass is one of the parameters for which no country specific data exist and the default value – 500 g C kg^{-1} of biomass is applied in the calculation [2].

The scope of the study is to estimate carbon stock in biomass of the most common tree species in Latvia – Scots pine (*Pinus sylvestris* L.), Norway spruce (*Picea abies* (L.) H.Karst.), birch (*Betula pendula* Roth) and common aspen (*Populus tremula* L.). Six fractions of biomass were analysed in the study – stem, fresh branches, dead branches, stump, coarse roots (diameter above 5 cm) and fine roots (diameter above 2 cm). Samples were collected in 2012 and 2013 – above-ground biomass in winter, below-ground biomass – in the following summer. In total samples from 372 trees were used to determine carbon content in biomass, including 359 trees – to analyse above-ground biomass and 195 trees – analyse below-ground biomass. Summary of the results of analyses is provided in table below.

Fraction	Aspen	Birch	Norway spruce	Scots pine
Fine roots	514.4 ± 5.3	548.3 ± 5	537.8 ± 7.3	533.5 ± 6.3
Coarse root	507.7 ± 6.4	517.1 ± 4.8	528.8 ± 5.1	543.8 ± 10.4
Stump	512.3 ± 5.1	521.2 ± 4.9	530.9 ± 7.7	564.1 ± 12.9
Dead branch	525.9 ± 3.9	526.4 ± 4.5	542 ± 5.4	550.6 ± 4.7
Fresh branch	520.5 ± 3.7	532.8 ± 3.3	541.2 ± 4.3	538 ± 3.6
Stem	507.4 ± 5	517.8 ± 5.1	514.9 ± 6	527.9 ± 4.1

The highest carbon content is found in pine, especially, below-ground fractions of biomass. Average deviation from the default value (500 g C kg^{-1}) is 5 %; however, for pine the difference is 8 %. Considering that the gross annual increment of the stem biomass in Latvia in 2012 was about 10 mill tonnes [1] the 5 % difference equals to about 1 mill tonnes of CO_2 removals, which is nearly 20 % of the net GHG emissions in LULUCF sector in Latvia.

In the following studies the data on carbon content will be combined with wood density and stem characteristics (diameter and height) to elaborate allometric equations for estimation of carbon stock in biomass, depending on the species and dimensions of trees.

References

1. Latvian Environment, geology and meteorology centre. *Latvia's National Inventory Report Submitted under United Nations Convention on Climate Change and the Kyoto Protocol Common Reporting Formats (CRF) 1990-2012,* Rīga, 2014.
2. Eggleston, Simon, Buendia, Leandro, Miwa, Kyoko, Ngara, Todd And Kiyoto, Tanabe (eds.). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Agriculture, Forestry and Other Land Use. Japan: Institute for Global Environmental Strategies (IGES), 2006, p. 678.

FOREST FERTILIZATION IMPACT ON THE INCREASE OF FOREST VALUE

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Forest fertilization could possibly be the best way how people in long-term management of their forest and forest plantations could achieve higher productivity, quality and may affect climate change mitigation. So in my bachelor's thesis I want to write about forest fertilization impact on the increase of forest value.

Fertilization helps to achieve some of the main forest management objectives, namely through fertilization we can obtain cost-effective maximum yields, higher product quality, maintain soil fertility, prevent nutrient loss and environmental pollution. Forest fertilization effect is related mainly to the soil, providing an increase in soil fertility microbiological process activation in the soil, which provides a faster release of nutrients to become available to the trees growing there, enriching the soil with the missing micro and macro elements [1].

Options of forest fertilization have been researched in Latvia previously, already from the years 1990 to 2000 research was carried out on the sand and peat pit recultivation, from the years 2000 to 2010 the sewage sludge, wood ash utilization feasibility studies were carried out, in the year 2010 fertilizer research was started on plantations and weakened forest stands. From the years 1967 to 1973 research on additional increments in fertilized pine, spruce and birch stands in different forest site types had been significantly higher [2]. A sufficient amount of nutrients increases the growth, whereas in the stands where nutrients are missing or there is an excessive amount of nutrients, the growth decreases rapidly.

Forest fertilization is one of the ways to improve forestry. Promotion techniques can provide an increase of yield growth in boreal forests in climate zones where the lack of nitrogen in the soil occurs. In experimental plantations in southern Sweden the annual increment increased from 12 m^3 ha^{-1} in the control plots and to 29 m^3 ha^{-1} in the plots with fertilizer. In Latvia the need for fertilizers has also been researched, such as studies in various conifers trees plantations, where usually there is lack of nitrogen, fertilization promotes the formation and release of the resin - that protects trees from pests. Fertilization in spruce plantation hastens blooming, thus ensuring that *Pristophora abietina* (Christ.) cannot lay their eggs [3].

References

1. Brauners I. Seminārs "Mēslošanas projekts", AS Latvijas valsts meži pētījumi un publikācijas, 25.10.2013. http://www.lvm.lv/images/lvm/Petijumi_un_publikacijas/Petijumi/Brauners_seminars_Meslosanas_projekts_25102013.pdf/ (01.04.15).
2. Dr.silv.D.Lazdiņa , seminārs „Meža mēslošanas pieredze kaimiņu republikās un Latvijā", Latvijas Valsts mežzinātnes institūts „Silava" AS „Latvijas valsts meži" pētījumi un publikācijas, 25.10.2013: http://www.lvm.lv/images/lvm/Petijumi_un_publikacijas/Petijumi/Lazdina_seminars_MESLOSANA_25102013.pdf/ (01.04.15).
3. Lazdiņš A., pārskats par „Meža mēslošanas ietekme uz kokaudžu vērtības pieaugumu" http://www.lvm.lv/images/lvm/Petijumi_un_publikacijas/Petijumi/Gala_atskaite_mezaudzu_meslosanas_ietekme.pdf/ (01.04.15).

HYDROLOGICAL REGIME CHANGES IN THE SALA SWAMP

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The Sala swamp is located in the region of Rēzekne, Gaigalava parish It has borders with Bērzpils parish. The Sala swamp is included in the area of nature reserve Lubāna wetland. The swamp area is 3 836.4 ha. Raised and transition bogs cover 2 104 ha or 55% of the total area of the nature reserve. Apart from the small Tīrumnieki swamp and Lubāna wetland, the Sala swamp is the only one in which bog lakes and open water pools are located [2].

In the swamp a 75ha area has remained completely intact natural forests and that can be explained with difficult access to the area. In the middle of the swamp, Leigauni island is located, which is the largest meadow area in the swamp. On the island particularly protected habitat meadows with junipers are found. A typical feature of the area is a significant amount of protected and rare bird species, the total number of which is 34. There are 9 rare birds of prey species, which is the largest amount in Latvia.

At the moment the human impact on the swamp is along the swamp trails which have been made by cranberry pickers when they visit the richest berry places. It is difficult to move on a wet transition bog, so the impact is not so great and does not go deep into the swamp.

The main negative factors on the natural values are unlimited water leaking from the bog by drainage systems and the disturbance during the nesting period of birds. The Sala swamp is one of the most melioration drainage systems affected swamps in Lubāna wetland complex. We can witness unlimited water leaking through melioration drainage systems, which may further lead to undesirable changes in the natural habitat. There are three lakes in the swamp area - Lielais Kiurins, Mazais Kiurins and Gulbītis. These lakes are shallow, with a muddy bottom and low and marshy coasts.

The current study deals with the research of the hydrological regime changes in the swamp and the potential impact on the swamp after the construction of the dams which were made to restore the natural hydrological regime of the swamp [1].

References:

1. Dabas liegums “Salas purvs” DABAS AIZSARDZIBAS PLANS, Latvija: http://www.daba.gov.lv/upload/File/DAPi_apstiprin/DL_Salas_purvs-04.pdf (28.03.15).
2. Lubāna mitrāja kompleksa vides apsaimniekošana, Latvija: http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=LIFE03_NAT_LV_000083_LAYMAN.pdf (28.03.2015).

IMPACT OF EUROPEAN MISTLETOE *VISCUM ALBUM* L. ON HOST TREE

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In Latvia European mistletoe Viscum album L. is found in rare areas. The aim of the study was to research its impact on the host tree. European mistletoe is found on deciduous trees only living as ahemi parasite shrub, and it is recorded in the Red Data Book of Latvia as well as in the Red Data Book of the Baltic Sea region.

Currently Ritvars Rekmanis from Latvia University is the only person in Latvia who has researched this shrub, and in his work "Distribution and ecology of European mistletoe V*iscum album album* (L.) in Latvia" in 2009 and 2010 the author studied and described the distribution of mistletoe in Latvia to define what limits and promotes the spread of this species flies, which pollinate it, and birds, which eat the fruit of mistletoe. The researcher has listed 3 324 trees with about 29 509 white mistletoe bushes growing on them. He has come to the conclusion, that at this moment the species is not disappearing in Latvia, thus there are no threats to its extinction. The author mentions its impact on the host tree, but it is not a significant threat in forestry. *Viscum album* grows on trees and they obtain a part of the energy from the host tree consuming its minerals and water, but the other part of energy is obtained in the process of photosynthesis. European mistletoe could destroy the host tree only if dozens of these hemiparasite shrubs were found [1].

On the other hand in some other studies it has been found that mistletoe impacts the host tree (case of *Abiesalba* Mill.) needle length, size and weight. Many specimens of these species are able to influence and damage the tree crown [2].

The author's observations of European mistletoe will be carried out near Grobiņa where the Nature Reserve "Gaviezes āmuļi" is located. All details about this nature reserve can be found on the Nature Protection Board's website daba.gov.lv. The area has been set up to protect the largest and richest European mistletoe population in Latvia [3].

In different sources of literature, it has been emphasized that *Viscum album* is also a very valuable shrub used in medicine. Its use in medicine is wide because of many different unique chemicals it contains. Elsewhere in Europe this shrub is very common. It can be found in almost every poplar forest stand, but in Latvia European mistletoe is protected because there are only two larger populations[4].

References:

1.Rekmanis R., Kā Latvijā jūtas baltais āmulis, videsvestis.lv: http://www.videsvestis.lv/content.asp?ID=131&what=19/(01.04.15).
2. Barbu O., Impact of White Mistletoe (*Viscum album ssp. abietis*) Infection on Needles and Crown Morphology of Silver Fir (*Abiesalba* Mill.), Not Bot Horti Agrobo, 2012, 40(2), pp 152-158.
3. Dabas aizsardzības plāns dabas liegumam "Gaviezes āmuļi", 2005, daba.gov.: http://www.daba.gov.lv/upload/File/DAPi_apstiprin/DL_Gaviezes amuli-05.pdf/ (01.04.15).
4 Ārstniecības augi Latvijā, 02.02.2011: http://augi.ucoz.lv/load/arstniecibas_augi/a/amulis/2-1-0-18 (01.04.15).

PREDICTING DIAMETER AT BREAST HEIGHT FROM STUMP DIAMETER MEASURED BY FOREST HARVESTER HEAD MEASUREMENT SYSTEM

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The use of machinery in forest harvesting has become a routine in the Baltic and Northern European countries both in the final felling and thinning of young stands. The dominating harvesting system in Fennoscandia and the Baltic region is the cut-to-length method where the tree felling, delimbing and cross-cutting of the stems are performed by forest harvesters. The harvester felling heads are equipped with sensors measuring the girth of the stem and electronic measuring system calculating the volume of processed roundwood. The harvester measuring system cannot be applied in cases when the trees are not cross-cut in sections (assortments) as it is in the thinning of young stands where whole trees are harvested as energy-wood. In such cases the only available measurement for assessing of the tree dimensions is the stem diameter at 0.5 m above the stump height taken after the machine has positioned the head on the stem surface prior to the tree felling. The tree attribute commonly used in equations for the calculation of the stem volume or the total tree biomass is the diameter at breast height (DBH). The stump height diameter is closely correlated with DBH as is approved in previous studies [1; 2]. Our study is aimed at elaborating the function for predicting the DBH using harvester head measurements at 0.5 m above the stump height (DSH) for use in the estimation of the stem volume and the total tree biomass.

Table 1

Summary of fit statistics and parameter estimates of the model

Species	Over the bark			Under the bark		
	R^2	b_1	b_2	R^2	b_1	b_2
Scots pine	0.996	0.951	0.5535	0.998	0.9893	0.3196
Norway spruce	0.997	0.9643	0.8318	0.998	0.9655	0.7326
Silver birch	0.997	0.9538	0.5304	0.996	0.9767	0.5011
Common aspen	0.998	0.9845	0.3263	0.996	0.9695	0.4085

General form of equation - $DBH = b_1 * DSH - b_2$; where: DSH - stem diameter at 0.5 m above the stump height.

The study material consisted of 372 sample trees (81 Norway spruce, 102 Scots pine, 105 silver birch, and 84 common aspen) sampled in three regions of Latvia during the years 2011 – 2014. The stem diameter over and under the bark was measured at the 0.5 m and DBH above the stump height at two perpendicular directions and averaging the two measurements. The tree felling height (stump height) was defined to be 1% of the tree height.

The statistical analysis of the data revealed a tight linear relationship of DBH and DSH (Table 1). The obtained linear equations can be used for the calculation of DBH later applied for the calculation of the stem volume or the total tree biomass.

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References

1. Corral-Rivas, J. J., Barrio-Anta, M., Aguirre-Calderón, O. A., Diéguez-Aranda, U., Use of stump diameter to estimate diameter at breast height and tree volume for major pine species in El Salto, Durango (Mexico), *Forestry*, 2007, Vol. 80(1), pp. 29-40.
2. Westfall, J. A., New models for predicting diameter at breast height from stump dimensions, *Northern Journal of Applied Forestry*, 2010, Vol. 27(1), pp. 21-27.

SCOTS PINE SEED MORPHOLOGICAL PARAMETRS INFLUENCE ON GERMINATION AND FURTHER DEVELOPMENT OF YOUNG TREES

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Scots pine *Pinus sylvestris* L. is a native coniferous tree species in Latvia. It is an economically important species. Pine has large genetic diversity among coniferous trees. Studies have shown that seed parameters really affect the life of a new tree, but it is a very complex issue, having also a lot of side effects such as temperature, moisture and climate can make great difference there.

Little is still known about the effect of seed colour on the germination of pine. The research has shown that dark seeds exhibit high values of mass and viability, whereas all shades of light seeds show lower mass and poorer germination. Younger trees produce more dark seeds than older trees (Mukassabi, 2012).

Genome size has been suggested to be a fundamental biological attribute in determining life-history traits in many groups of organisms. The strongest correlation is between genome size and seed mass (Castoldi, 2014). Seed mass and its relationships with seed number, dispersal mode, and growth rate contribute greatly to the differences in life-history strategy of pine. Many life-history patterns are therefore indirectly, but consistently associated with genome size (Tonguc, 2013).

The aim of this study is to find how seed parameters, characteristics, including its size (length, width), mass, colour etc. affect germination of the seeds and initial growth of young trees.

References

1. Tonguc, F., Keles, H., and Tasdemyr C., Variation in Cone and Seed Characteristics in Three Populations of Anatolian Black Pine (Pinus nigrasubsp.pallasiana) in Turkey. Research Journal of Forestry, 2013, 7: pp.34-40.
2. Mukassabi, T. A., Polwart, A., Coleshaw, T., Thomas, P. A., Seed Science and Technology, Volume 40, Number 2, July 2012, pp.155-162(8).
3. Castoldi, E., Molina J.A., Effect of seed mass and number of cotyledons on seed germination after heat treatment in Pinus sylvestris L. var. iberica Svob. Forest Systems, vol. 23, no. 3, 2014, p. 483

SOLID TIMBER AND GLUED LAMINATED TIMBER IN CONSTRUCTION

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One of the main problems nowadays is taking care of the environment. An important part of habitat protection is forest preservation. However, wood is still an indispensable material in everyday life. It is used for fuel, furniture and mainly, for construction.

As a construction material wood has a long history. It was used in timber framing dating back to the New Stone Age. Wood has been used in many parts of the world during various periods [3]. Nowadays, wooden constructions are still in use. Care of the environment and the development of engineering have made wooden constructions even stronger and safer.

It became possible with the development of engineered wood products. To reduce the waste of wood off-cuts, glued-laminated beams or "glulam" was invented. Glulam is made from little pieces of wood, which are bonded together with adhesives [4]. Although glulam beams are manufactured in commonly used dimensions, it is also possible to order the required size of beams. The usage of wood off-cuts helps to save forests, and also increases beam stiffness. Furthermore, kilogram to kilogram, glulam is stronger than steel and has greater strength and stiffness than comparably sized dimensional lumber [1]. Timber may have been seen as inferior to steel in the past, but engineered wood like glulam can now compete with it. That makes glulam an ideal choice to build modern and strong buildings. It has a wide range of applications and can be used as span ridge beams, wood house frames, wooden windows framework and material for log houses. Nowadays, timber buildings up to three storeys can completely substitute buildings made of steel and concrete. Glulam costs less than concrete or bricks. With the necessary material available, a wooden building can be built much faster than a brick or concrete building. All these features make log houses cost-competitive. Furthermore, it is made from a renewable material and the manufacturing of glulam generates less CO_2 emissions, which decreases the greenhouse effect [4].

In this paper, the author has attempted to demonstrate that in terms of ecology glulam beams as a construction material are superior to concrete or brick. Firstly, energy consumption in the production of timber construction materials is 50% less than that of cement and 80% less than in the production of bricks. Secondly, timber logs do not emit harmful gases or particles. Lastly, each cubic metre of timber material reduces carbon dioxide in the atmosphere by almost two tons; even a slight increase of timber houses worldwide would cause a considerable reduction of CO_2 in the atmosphere [4]. Consequently, timber and glulam beams are a better choice than concrete or steel.

References

1. Bryan T., Common misconceptions about glulam beams, *APA publication Q710,* 2011,3 pp.
2. Bryan T., Product guide: Glulam, *APA publication X440*,2008,32 pp.
3. Ecology: http://www.dores.lv/en/dores-en/dores-homes/ (13.02.15).
4. History of timber framing: http://en.wikipedia.org/wiki/Timber_framing#History_and_traditions (13.02.15).

SOCIAL SCIENCES: ECONOMICS, MANAGEMENT AND ADMINISTRATION, SOCIOLOGY AND EDUCATION

APPLICATION OF INFORMATION SYSTEMS IN PERSONNEL MANAGEMENT IN THE JSC LATVENERGO

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The JSC Latvenergo is the leading enterprise in the production and trading of electricity and thermal energy in Latvia and one of the largest such enterprises in the Baltics.

There are different approaches to the definitions of personnel management, its functions and tasks among authors. K.Asvathapa focused on relatively specific functions and, in his book, analysed several definitions of personnel management, emphasising both their compliance with and their imperfections regarding the 21st century management standards [2].

The present research study concludes that the extent and form of execution of personnel management functions depend not only on the number of employees, specified in theory, but also on other endogenous and exogenous factors, as well as on the industry represented by the organisation and its affiliation to the public or private sectors.

Human resource planning identifies the current needs for personnel, the usefulness of current personnel and the future needs for it, based on the strategy developed and the abilities of human resources, on forecasting personnel changes and the promotion of personnel and on fully using and retaining necessary employees [1].

This research study found that the personnel management process in the JSC Latvenergo was affected by the legislation of the Republic of Latvia: the Constitution, the Labour Law, the Labour Protection Law, the Personal Data Protection Law and the Law on Trade Unions.

The research gave a general description of personnel management in the JSC Latvenergo, a description of the application of information systems and the opportunities for enhancing the systems in personnel management in the JSC Latvenergo. This research study found and concluded that the information systems introduced in the functional processes of personnel management in the JSC Latvenergo considerably facilitate the process of personnel management both for personnel management professionals and for the enterprise's managers and employees. The research also identified safety vulnerability risks for the information systems used in personnel management, elaborated proposals for significantly improving the process of personnel management as well as suggested a new electronic solution to the current information system in order to increase the extent of execution of personnel management functions.

According to the key values stated by the JSV Latvenergo, human resources are the most important resource of the enterprise, which is reflected in its economic performance reports.

The interest of managers in introducing the employee self-service portal Delta and in enhancement solutions evidences the need for a personnel management system. It results in savings of funds not only for the enterprise but also for every employee individually and provides better working conditions and savings of time, which is a motivator and brings satisfaction with the working environment.

However, the information systems of the JSC Latvenergo have some imperfections: insufficient data security, no centralised user account access management and no safe flow of electronically signed documents.

References

1. Armstrong M. Armstrong's Handbook on Human Resources Management Practice. Kogan Page Publishers, 2012, 800 p.
2. Aswathappa K. Human Resource and personnel Management. 4th edition. Tata McGraw-Hill Education, 2005, 686 p.

BANKRUPTCY PROBABILITY ANALYSIS OF DELAVAL LTD

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The development of the economy and entrepreneurship in Latvia and in the whole world contributed to development of a different models of financial analysis and methods of forecasting an insolvency by scientists from many countries, however, there is only few research about, how exactly these models are used in Latvian enterprises, serving as a source of information on financial indicators and potential investors, creditors and the company's management in making decisions about capital attraction and its effective use. That is why it seemed important to carry out bankruptcy probability analysis.

Te author chose DeLaval Ltd for the analysis, which is the leading company in the latest technologies and solutions in the supply of dairy farms [2]; in the past few years Latvia dairy livestock sector tended to narrow, which led to the author's interest in how it may affect the company's operations.

The author conducted bankruptcy probability calculations for the company DeLaval Ltd on the basis of bankruptcy probability theoretical description, using three bankruptcy prediction models by E. Altman Z", J. Fulmer H [3] and Šorina/Voronovskas Z_{2L} [1].

DeLaval Ltd bankruptcy probability by E. Altman Z " and J. Fulmer H models is very low. During the period from 2010-2013 bankruptcy probability coefficients have increased by 0.041 and 63.259 which indicates the company's financial performance improvement. The major impact on the growth rate of profit before taxes has risen by about 34.67% points in 2013 compared to 2010.

After the Šorina/Voronovskas Z_{2L} model, DeLaval Ltd bankruptcy risk throughout the period considered has been great, only in 2013 there is bankruptcy rate increase by 0.888; compared to the 2010 it rose by 146.85 points that reduced bankruptcy probability from very likely to possible.

In general, DeLaval Ltd may not worry about the possibility of bankruptcy, although according to the Šorina/Voronovskas Z_{2L} model such probability exists, because, as scientists admit - the model is not perfect, because it does not take into account the specific features of sectors, and it has been developed on the basis of a small business random set. However, in order to avoid the threat of bankruptcy, DeLaval Ltd has to perform bankruptcy probability analysis by Altman Z" model regularly, which is designed specially for small businesses in various sectors.

References

1. Šneidere R. (2009) *Finanšu analīzes metodes uzņēmuma maksātnespējas prognozēšanai*. Rīga: Lietišķās informācijas dienests. 88. – 190. lpp.
2. *DeLaval īsumā* [b.g.] [tiešsaiste] [skatīts 08.02.2014.]. Pieejams: http://www.delaval.lv/About-DeLaval/The-Company/History-of-the-company/Delaval-in-brief/.
3. Ms. S. Praveena (2012) *Assessing the Financial Health of Seed industry in India - An Application of Altman's Model* [tiešsaiste] The international Journal's Research Journal of Economics & Business Studies [skatīts 08.05.2014.]. Pieejams: www.theinternationaljournal.org/ojs/index.php%3Fjournal%3Drjebs%26page%3Darticle%26op%3Ddownload%26path%255B%255D%3D1090%26path%255B%255D%3D490+&cd=1&hl=lv&ct=clnk&gl=lv.

BENEFITS OF USING PEAT FUEL

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According to the World Energy Council data, the area of peat in Latvia is 6,600 square kilometers occupying about 10% of the country's territory and by this amount Latvia is in the 30th place in world [3]. Latvia is considered also as one of the most important producers and users of energy peat within the European Union. Energy peat obtained in Latvia takes a significant part in European peat export balance [2].

Latvia scientists have found that peat stocks in Latvian swamps contain about 1.5 billion tons. 0.4% of overall world peat stocks are located in Latvia and Latvia is in 8th place in world by peat quantity per capita. Peat stock in Latvia that can be used for heating and in the energy sector is about 230 million tons or 15% of all Latvian peat stocks that can be expressed as 663 million MWh of energy.

Black energy peat is considered to be fuel with relatively high heat output and much smaller amount of harmful emissions than, for example, coal. Unlike coal energy, peat does not emit corrosive fumes and environmentally harmful emissions. Noteworthy is a fact that heat output of peat is even bigger than of dry firewood: average heat output of peat is about 5.1 MWh/t, dry firewood – 4.8 MWh/t [1].

Import of energy resources, energy dependence, low proportion of local energy resources in the country's total energy balance have become an urgent problem not only in Latvia, but also worldwide. About 1/3 of fuel consumed in Latvia per year is natural gas and since 1995 the price of gas has increased at least 8 times resulting in heat costs increase. Gas prices will increase in the future in the same way as any fossil fuels and it will affect the overall cost of living, because unlike peat, gas has to be imported. Therefore Latvia's economics becomes dangerously dependent on gas suppliers in Russia [1]. Energy sector dependence in Latvia on energy resources from other countries would be significantly reduced by using peat fuel.

Using more and more energy peat for heating would reduce import of energy resources in Latvia, would allow to establish new enterprises, attract investments, create new places of work and would allow to supply consumers with cheaper heat by using energy resource that is abundantly available in our country.

References

1. Gūtmanis Ģ., Kurināmās kūdras atgriešanās. *Ražots Latvijā*, No.4, jūlijs/augusts, 2011, pp. 40-45.
2. Paappanen T., Leinonen A., 2010, Peat Industry in the Six EU Member States. Research report.http://www.epagma.eu/sites/default/files/documents/vtt_summary_report_peat_in_eu_2010.pdf (01.03.2105.)
3. World Energy Council, 2013, World Energy Resources: Peat. http://www.worldenergy.org/wp-content/uploads/2013/10/WER_2013_6_Peat.pdf (01.03.2105.)

BRAND AWARENESS AMONG SCHOOL STUDENTS: IN URBAN AND RURAL CONTEXT

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A successful brand is important for every company that produces and / or sells products or services, because a good brand creates loyal and reliable customers. Students are one of the main target audiences for several producers, because, at this age, students are still developing their shopping habits by tasting new products and making their own conclusions. They are looking for information on the Internet, from friends, seeing advertisements.

A consumer's identity plays an important role in an individual's consumption behaviour. According to the literature sources on marketing, products are consumed not only for their functional properties, but also because of opportunities to express identity through their use [2].

Nowadays, students are surrounded by extensive information on different brands, forming perceptions and brand value in the students' minds, which basically determine whether or not a student will want to buy and use a particular brand.

Brand identity is seen as a unique association which the organization seeks to create and maintain. These associations are important brand characteristics and components, which are leading to the perception of the brand personality and brand relationship with consumers. When consumers explore shops and consumed brands, they are subject to special, brand-related incentives, such as logos, colours, shapes, ciphers, letters, styles, and other elements that make up the face of the brand and identify it [3].

As shown by the results of a questionnaire survey, brand logo signs, which are also made of the above components mentioned in the literature, are most respected by both urban and rural students.

The world's most powerful brands have several common properties: a great brand provides benefits that buyers really want; the brand is always appropriate; the brand is positioned accordingly; the brand uses and coordinates all marketing activities; brand managers understand what the brand means to consumers [1].

The authors agree with the view expressed above that consumers primarily choose the brand with all characteristics and concepts, creating a whole entity. Brand makers should be monitoring consumer sentiment toward the brand, to be able to successfully build further communication with the consumer.

According to the survey results, it is possible to conclude that there is no significant brand recognition differences between rural and urban school students. The main brands that students remember are sporting goods such as Nike, Adidas. It shows that these brands have a strong impact on consumers and their choices between similar products.

References

1. Kellers K.L., Zīmola vērtējums, *Harvard Business Review on Marketing*, 2009, 8-20 pp.
2. Mittal B., Self-concept clarity: Exploring its role in consumer behavior, *Journal of Economic Psychology*, 2015, Vol. 46, pp. 98-110.
3. The Face of the Brand: How Art Directors Understand Visual Brand Identity http://web.b.ebscohost.com.ezproxy.llu.lv/ehost/pdfviewer/pdfviewer?sid=8d3334e0-b932-4862-a101-7ea73c0bc40c%40sessionmgr113&vid=8&hid=106 (06.03.2015)

BUILDING COMPUTER-AIDED INTERNET ENVIRONMENT

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The study focuses on the evaluation of the Internet recourses in relation to the creation of a special environment for self-study. Having assessed numerous free Educational Internet Sites we have put them into different categories according to their educational fields and carried out the survey among students revealing their positive attitude to the new way of self-study.

Nowadays the Internet is becoming one of the most supportive tools in all educational areas. What is more, it helps to build some special environment stimulating students' involvement in the creation of personal learning network [1].

We have assessed the Internet sites which not only cover different fields of scientific study but also back up the English language professional communication competence. Having explored a large number of free English language interactive and educational sites suitable for professional foreign language competence formation and self-study we have subdivided them into the following categories: fun activities with quizzes, crosswords, songs, like Fun &Games, sites providing mass-media resources and science news important to study English for special purposes, providing papers on agriculture, breeding animals, engineering [2]. Of no less importance are numerous sites providing teaching different subjects in English, real life audio resources with videos on Academic English [3] including special topics on nutrition, food, IT, presenting lectures in English with secrets of career success, leadership, team work, free sites providing communication with native speakers, mobile learning through cell-phones, smart-phones and other mobile devices that help students practice and improve their English anytime they want.

Among above mentioned, audio files with the discussions on scientific and professional topics, newspapers and scientific articles appear to be of great importance providing new levels of both professional training and creative self-study. On the other hand, fun study with crosswords and quizzes seem to be an additional possibility to improve English.

We have also carried out the survey among 100 students to find out their attitude to computer-based learning with the use of the above mentioned Internet facilities. The findings revealed that 95% of students support the idea of self-study at home and the practice of special language through the Internet sites. They are enthusiastic about going away from the routine homework and ready to hold English classroom discussions based on information acquired from the Internet. 93% of students surveyed also believe that Internet English language materials on the university subjects can help them both to improve English language skills and go ahead with their professional training.

References

1. Bhattacharya, M. & Richards, C, Innovative Course Design as Action Research: Instructional Technology for Teacher Education, *Society for Information Technology and Teacher Education—2001*, the conference proceedings, Orlando, Florida, 2001, pp. 1052—1057.
2. Free English resources and materials for ESL-EFL learners of all levels: http://www.learn-english-today.com (20.02.2015)
3. Learn English online: http://www.englishcentral.com/videos (20.02.2015)

BUSINESS ASSESSMENT AND EVALUATION IN JELGAVA REGION AND JELGAVA

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Business is the foundation for development of Jelgava and its region. It helps to prevent people from leaving Jelgava and its region and going abroad in search for better life, reduces unemployment and helps to overcome economic crisis and its effect on living standards and future development. Of course, activity and development of business depend on local people and businessmen. It is considered that if a local council is capable of generating better conditions to businesses then greater investments can be expected in economics and that also means new jobs and well-being for people.

Business is a form of industrial relations that is related to production of certain quality goods and services and its realization to customers, and gain of planned results (profits) [1].

The concept and definition of business is discussed by several authors. There are different explanations in publications it is explained differently, but the main essence of business is to supply goods and services and gain profit as a result of it. By summarizing different explanations and definitions about what business is, the author of this paper has created the following definition – business is a systematic economic activity that focuses on the principles of free will and the purpose of producing, and offer customers goods and services with a goal to gain profit.

Business in Jelgava region mostly consists of agriculture and its services, mining and quarrying and woodworking. Existing businesses contribute substantially in the development of Jelgava region. For example, commercial and service companies, various workshops and workers who get involved in the market of tourism products [2].

In the result of the study it can be concluded that the most important sectors considered for development are agriculture, logging and woodworking, and production and trade of food and drinks. Business environment is evaluated as positive in Jelgava region.

Jelgava business includes the following sectors: manufacturing, building, transport and storage, repairs of vehicles, wholesale, retail and others [3].

In the result of the study it can be concluded that the most important business sectors considered for development in Jelgava are metalworking, woodworking, production of food and drinks, building and the transport industry.

There is no typical production in Jelgava region, but businesses and agriculture production develop locally and make region strong and attractive. A positive aspect is that one part of the population already have started or plan to start their own businesses, but a negative aspect is that a part of the population in the region live in unsatisfactory living conditions, are depressed, lack susceptibility and motivation; a low level of education prevents people to start their own business. There are great opportunities to start a business in Jelgava. Enterprising people plan to do so, but one of the factors that prevent them is the lack of financial resources.

References

1. Abeltina A., Innovative Business. Business environment and its development aspects, Riga: Turība University, 2013, 7 pp.
2. Jelgava Region Council. Overview of the development program and its implementation results, 2014, 18 pp.
3. Jelgava Development Program 2014-2020, Characteristics of current situation, 27 pp.

CHOICE OF PRIMARY AND SECONDARY SCHOOLS: CASE STUDY OF LIGATNE MUNICIPALITY

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The main problem was that in 2014 more than 46% of the Ligatne Municipality inhabitants of school age did not attend the Ligatne Municipality School but other schools in other areas. The highest concern was that in the school year 2014 /2015 there were no enough pupils to form the 10th grade. Therefore, the aim of this research study was to explore primary and secondary school choices to attend the Ligatne Municipality School, facilitating the school sustainable development. To reach the aim, the author put forward three research questions: (1)What is sustainable education development? (2) What factors influence the school choice? (3) What are the preconditions for schools sustainable development at the Ligatne Municipality? The author used qualitative research methods and partly structured interviews. In total, there were 22 interviewees – representatives of the town council (2), representatives of education institutes (4), parents (6) and pupils (10). The theoretical background was the sustainable development theory and the rational choice theory.

In order to achieve the objectives of sustainability, there have to be 4 aspects (economic, social, cultural, and ecological), which enable development [1].

In a broader sense, sustainable development in education includes the improvement of the quality of basic education, the reorientation of education to sustainability, the promotion of civic consciousness and education in all groups of society and layers [2], Education is an instrument, which gives people the chance to achieve their goals [3]. In local government framework, a school could be a successful place to render resources and services, to coordinate an educated, economically and socially active and inclusive society development and to give support [4]. For that reason, for parents and pupils the choice of a school is very important, and a rational choice can be defined as a process of possible choice determination, where the best variant is chosen taking into account certain criteria. Each choice is based on the reason why to choose a certain school [5}.

The main conclusions were as follow: (1) Sustainable education development is a process, where children and teachers achieve progress together. Where interaction and communication between generations occur, they have activities together. (2) Qualification and attitudes of teachers, the location of the school, the class size and parents advice are significant. (3) If at the Ligatne Municipality there are job vacancies, there are inhabitants, and then there are new families and children. If there are children, then there is a school.

References

1. Izglītība pārmaiņām: ilgtspējīgas attīstības mācīšanas un mācīšanās rokasgrāmata. Baltijas Universitātes programma, Upsalas Universitāte, red: Gitte Jutvika, Inese Liepiņa, „Gandrs", 71 pp.
2. Ilgtspējīgas attīstības koncepcija:
http://profizgl.lu.lv/mod/book/view.php?id=19966&chapterid=4470 (18.12.2014)
3. Importance of Education In Human Life: http://www.epsaweb.org/importance-of-education-in-human-life.htm, (18.12.2014)
4. Tūna A., Pašu skola pašu valdībā. Iespējamie darbības virzieni skolas ilgtspējīgai attīstībai pašvaldībā, 2011, 43 pp.
5. Levin J., Milgrom P., Introduction to Choice Theory, 2004: http://web.stanford.edu/~jdlevin/Econ%20202/Choice%20Theory.pdf (12.01.2015).

CORPORTAION "VG KVADRA PAK" PROFITABILITY ANALYSIS

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In order to operate financially effectively and to successfully plan the development of a business, it is important for a company to do the analysis of its economic activity [1]. One of the most important types of the analysis is profitability analysis. Profitability is the company's efficiency indicator that shows the relationships between earnings and the company's means [2], thus, based on profitability calculation, the company can make conclusions about its efficiency.

The aim of the research was to analyse the corporation "VG KVADRA PAK" profitability and its influencing factors. The corporation "VG KVADRA PAK" was founded in 1993 and it is the largest manufacturer of the cardboard packaging in the Baltic States. This is the printing company that specializes in high quality technologically sophisticated cardboard packaging production. In 2013 company employed 144 workers. In 2013 the company's profit was 1.4 million euros, which was 3 times higher than in 2011, it was affected by net revenue growth, which in turn increased because of the number of the customers' growth.

The corporation "VG KVADRA PAK" operates with profit because all profitability indicators are positive and with tendency to increase. Commercial profitability (in 2011 – 4.91%; 2012 – 4.72%; 2013 – 9.80%) in the surveyed period increased 2 times because the company was able to maintain the balance between turnover and costs. Return on Assets (in 2011 – 5.77%; 20212 – 6.63%; 2013 – 15.60%) was positive because the company was investing in capital goods to improve the production process. Return on Equity (in 2011 – 11.95%; 2012 – 13.77%; 2013 – 29.80%) was positive because net profit and equity capital increased each year. Profit growth contributed to net revenue growth by almost 2 times compared with 2011, as well as to the equity capital growth, which was influenced by the increase in profits.

Compared to the printing industry commercial profitability indicators (2011 – 0.082%; 2012 – 3.078%; 2013 – -0.525%), the corporation's "VG KVADRA PAK" profitability was very high. It was mainly because of the net revenue growth and consequently also profit growth. In order to continue successful operations, the company should penetrate new markets using a sales manager's successful operations, and also participating in the tenders which means the competition for the production of the certain products. In order to increase turnover and enter new export markets, it is necessary for the company to continue to invest in capital, thus, increasing the production capacity, as well as it is necessary to continue to participate in the above mentioned tenders for gaining new customers.

References

1. Bednarskis L., Paupa V., Vaikulis J.., Finanšu pārskata analīze, Latvijas Universitāte, Rīga, 2005, pp.34-41.
2. Saksonova S., Rentabilitātes rādītāju izmantošanas un interpretācijas aspekti praktiskajā uzņēmējdarbības analīzē. Latvijas Universitātes raksti, Volume 737, Ekonomika, 2012, pp.283-289.

CREATIVITY IN LEARNING ORGANIZATION

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Creativity is an ability to create an innovative and socially significant result that is useful and fulfills a need [1]. Nowadays the tendency of creativity in education is much more widespread, especially when discussing educating adults in their workplaces in order to improve competitiveness of organizations in the global market.

Creativity is the result summed up from many different factors, including personal traits, as well as social, cultural and environmental factors [2]. Creativity consists of interdependent components: intellectual capabilities, knowledge, personality, motivation, style of thinking and environment [5]. Creativity is the result of extended processes of learning, thinking and preparation. Development of creative ideas is influenced by the individual competence, motivation, emotion and environment [3]. Adult creativity is considered to be deliberately guided thinking process with which adults develop in a social context. Therefore, the role of an organization adults work for is to develop their employees by educating them.

One of the most significant academics exploring adult education, M.S. Knowles, points out that there are modern approaches to organizing adult, as an employee, education in organizations. They imply orientation on the process rather than contents of education, ensuring different types of learning environments rather than limiting trainings to the traditional classroom, as well as acknowledging concept of andragogy, not treating adult participants as children in learning process [4]. Therefore, creativity is a necessity in educating adults in learning organization. Creativity is required from both the trainer by adjusting training and process methods, as well as from training participants by being flexible and open for new experience.

An adult can develop creativity in oneself if he/she is open to the change and ready to work with oneself and his/her way of thinking by questioning one's own principles, creating new ones and looking for different solutions of the situation. This kind of approach ensures an organization as a whole to be creative and adjust to the market needs and competition in a creative and effective way. The goal to be reached by the creative approach is to develop creativity in each of employees so that an organization becomes creative itself.

References

1. Amabile T.M, Collins M.A., The Blackwell Encyclopedia of Social Psychology, Blackwell Reference, Newston, 1995, 694 pp.
2. Barron E., Creativity and Psychological health, *Encyclopedia of Psychology*, 2nd ed., Volume1, John Wiley and Sons, New York, 1981, 533 pp.
3. Plesk P. E., Creativity, Innovation and Quality. Milwaukee, Wisconsin. ASQC Quality Press, 1997.
4. Knowles M.S., The Professional Organization as a Learning Community. *Training and Development Journal*, May 1979, pp.36-40.
5. Sternberg R. J., Lubart T. I., The Concept of Creativity: Prospects and Paradigms. Stenberg R.J. (Ed.). *Handbook of Creativity*. New York: Cambridge University Press, 1996, pp. 3-15.
6. Nickerson, R. S. Enhancing creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* New York: Cambridge University Press, 1999, pp. 392-430.

DEVELOPMENT AND IMPLEMENTATION OF AS "LATVENERGO" BUSINESS BRAND IN THE BALTIC COUNTRIES

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Development of a brand is implemented not through declarative advertisements of images, but is proved by the development and introduction of new products and services for customer needs.

The aim of the AS "Latvenergo" is to become a Baltic company, creating trading and production business in Estonia and Lithuania. Since 01 January 2013, the Estonian electricity market is fully open to both businesses and individuals, while in Lithuania - for all business customers.

Undoubtedly, the brand LATVENERGO has an important history and a good reputation in the Latvian market. However, in Estonian and Lithuanian retail markets LATVENERGO has fewer advantages, as evidenced by the company's customer opinion polls carried out in these countries, because:

• Regional affiliation in the name creates a barrier to the customer perception and sense of distance;

• It is difficult to position it as a value for Estonian or Lithuanian customers and for customers to perceive it as "their" company;

• It is more difficult to focus on the selected target customer segment and electricity as the value of the product because it contains broader corporate brand associations.

As LATVENERGO brand recognition in the retail segment in Lithuania and Estonia is still fragile, the promotion of a new brand will not require more resources than creation of the LATVENERGO brand identification, and it will provide better sale results.

One of the cornerstones of the brand's success is the ability to ensure that customers, regardless of their country of residence, perceive it as their own and want to identify themselves with it. Therefore, the Baltic brand Elektrum was created. Creative concept of this brand is based on image of electricity company as a dynamic and open service company that in its centre of activities sees the customer and provides him/her with flexible and friendly approach and solutions.

The study hypothesis, that a new brand will help strengthening AS "Latvenergo" trading position and competitiveness in the Estonian, Lithuanian and the Baltic markets as a whole, is approved. This is demonstrated both in assessing the company's financial performance and analysis of the market shares in the Baltic region [1].

As pointed out by Charles Larson, persuasion campaign is the set of messages created to lead recipients to a special / specific result. AS "Latvenergo" organized the ELEKTRUM product line campaign in Latvia. It invited household users to choose AS "Latvenergo" as their trader, telling about the brand and its products friendliness to the customers and environment [2]. There is a long-term plan to gradually develop the product line ELEKTRUM as trade and possibly also the production brand in Latvia.

References:

1. Latvenergo Group Unaudited Financial Results 2014: http://www.latvenergo.lv/lat/investoriem/pazinojumi/7372-latvenergo-koncerna-nerevidetie-2014-gada-rezultati (09.03.2015)
2. Larson. Ch. U., Persuasion: Reception and Responsibility, 12th edition, Boston, USA, 2010, 277pp.

E-COMMERCE AS A TYPE OF BUSINESS

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The 21st century is the era of modern technology. Information and communication technologies have transformed and created a new form of business. A lot of business transaction, data exchange takes place through technology and Internet connection. One of the most popular and fastest growing businesses is sales via the Internet or e-commerce. Electronic commerce is the paperless exchange of business information using electronic data interchange, e-mail, electronic bulletin boards, fax transmissions and electronic funds transfer. It refers to Internet shopping, online stock and bond transactions, the downloading and business-to-business transactions [1].

E-commerce offers unique opportunities to companies. It allows a shop or an office to be open day and night, what means that the time zone is not a problem. Home page allows to place advertisements and information that directly relate to the point of sale, without involvement of other means. A new information technology, especially e-commerce, provides the results of the company's activities as reducing transaction costs and ensuring closer coordination of economic activities between business partners [2].

On the other hand, there are security threats, called cybercrime. Cybercrime includes important data and information theft of millions of Internet users every year. Cyber criminals are so skillful, penetrating thousands of computers every day that these crimes are a great way for business [3].

In recent years the number of companies who are using information and communication technologies have significantly increased. The statistic data show that since 2008 the number of companies who sell both goods and services, as well as carry out purchases on the Internet have doubled.

There are many retailing companies, having stores, open shops on the Internet and there are those who offer their products online only. Companies choose to invest in e-commerce because it is providing wider range of clients, quicker and more effective communication with customers. It has lower costs than opening a physical store format, accessibility from anywhere in the world, where access to the Internet. But there is also a negative side of selling products in the Internet. You cannot evaluate the product on the site, there can be attempts to defraud the product.

References

1.The Definition of E-Commerce: http://www.businesstown.com/internet/ecomm-definition.asp/ (28.01.15).
2. Kehal S., Singh V., *Digital economy: impacts, influences and challenges*. United States of America: Idea Group Publishing, 2005, 395 pp.
3.Cyber Crime Effecting E-commerce Technology: http://computerscijournal.org/ (30.01.15).

EXPLORING THE CONCEPT OF RESILIENCE: CROSS-CULTURAL ASPECT

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Our research was devoted to the phenomenon of resilience or the capacity to spring back and rebound in the face of significant adversity or risk. Special attention was focused on the cross- cultural aspect of resilience existence. We drew our attention to this aspect because personality's cultural background influences the way he/she communicates, feels and deals with adversity [1]. Resilience has gained currency in the last few decades. It is not a surprise as many disciplines (psychology, social work etc.) move from a deficit, "a glass half empty" view of human nature to a positive, "a glass half full" approach [2].

Some scientists define resilience as a process that is different from the concept of a personal quality. One of the most comprehensive definitions was made by Reid & Stewart: "Resilience is the capability of individuals to cope successfully in the face of adversity. This capability changes over time and is enhanced by protective factors in the individual and environment" [3].

We pointed out several basic constructs of resilience as a part of the study: emotional stability, self-confidence, flexibility, social awareness, social support and value system. More than 180 respondents of a certain age (20-30) took part in our research study. Our attention was focused on the representatives of 3 countries (Australia, Russia, the USA). We made an assumption that people with various cultural backgrounds would demonstrate different resilience levels. A new questionnaire based on the authorized "mini-concept" of resilience was created within this scientific research study. The validity of the practical effects was confirmed with mathematical and statistical methods.

According to the results, the average values of our observations are the following: the USA-3.95; Russia-3.5; Australia-3.27. Interpretation of the test scores shows that the correlation between self-confidence and flexibility is the strongest. The factor analysis revealed that the most significant element is the value system i.e. it makes a lasting impact on the resilience level.

Hereby, the attempt to reveal significant aspects of resilience presented the most important culture orientated points to the resilience field. The research study is expected to be continued.

References

1. Comas-Diaz L., The Road to Resilience, American Psychological Association, 2009.
2. Pooley J., Cohen L., Resilience: A Definition in Context, *Edith Cowan University*, Volume 22 № 1, 2010.
3. Reid G., Sterwart M., Mangham C., McGrath P., Resiliency: Relevance to Health Promotion Discussion, Atlantic Health Promotion Research Centre, Dalhousie University, Volume No. 78, 2002.

FACTORING SERVICES IN LATVIA

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One of the main problems for a company to operate and grow is lack of current assets which is affected by slow turnover of the accounts receivable. Companies can use factorings to improve turnover of the accounts receivable. It means that the accounts receivable are transferred to the bank or factoring company which collects money from the debtor and pay it to supplier. In this way companies can provide faster turnover of the accounts receivable and measured cash flow – that is one of the main preconditions for a company to continue its successful operations.

There are various explanations for factoring definition in economic literature. Krogzeme H. considers that factoring is a financial service that provides the service recipient's cash flow improvement [2]. Factoring service is based on accounts receivable or monetary claims transfer to bank or factoring company.

Klapper L. asserts that factoring is a type of supplier financing in which firms sell their credit – worthy accounts receivable at a discount (generally equal to interest plus service fees) and receive immediate cash. This author draws attention to the fact that factoring is not a loan and there are no additional liabilities on the firm's balance sheet, although it provides working capital financing [1].

Rurāne M. acknowledges that factoring is transaction on commission basis. According to that, the company (supplier) transfers to the bank the rights to receive payment for delivered goods and receives from the bank the largest part of amount (about 80%), which the supplier would get from the buyer in normal circumstances. A very important aspect in this definition is that the supplier who uses factoring services will not receive full payment for goods or services, but only a part of the amount which depends on the factoring company offer [3].

To summarise, factoring is one of the financing possibilities for suppliers when they transfer their accounts receivable with the aim to get immediate payment. In this way companies can improve cash flow by accelerating the maturity period of receivables and reducing the risk in the case when the bills are unpaid.

References

1. Klapper L., The role of factoring for financing small and medium enterprises, 2005: http://siteresources.worldbank.org/INTEXPCOMNET/Resources/Klapper,_The_Role_of_Factoring_for_Financing_Small_and_Medium_Enterprises.pdf (02.02.2015.)
2. Krogzeme H. Finanses un nodokļi. Rīga: RTU, 2010, pp. 171 – 175.
3. Rurāne M. Uzņēmuma finanses. Rīga: Jumava, 2007, pp. 154.

FINANCIAL ANALYSIS OF THE JSC "HAITEK"

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The analysis of financial indicators and financial strategic planning ensure successful operation of companies [2]. The financial indicators' assessment should be conducted constantly to determine financial security and opportunities for development in the future [3]. Therefore the purpose of the research is to perform the financial analysis for the company "HAITEK".

The company was established in 2007 in Lielvarde. It is involved in wholesale of used forestry equipment. "HAITEK" has 3 employees – a manager, an accountant and a customer service manager. The analysis of the company's economic activity shows that it is on the verge of bankruptcy. In 2013 the company had the loss of 9,779 EUR. The profit decreased by 67% from 2011 to 2013 and net sales decreased by 95%. It is explained by the fact that, firstly, goods were sold below cost to enter the equipment market. Secondly, debtors failed to fulfil their obligations in time, which significantly affected the turnover.

The financial analysis shows [1] that the company's financial results from 2011 to 2013 become worse. Total liquidity ratio from 2011 to 2013 decreased by 47% (in 2011 – 0.94; 2013 – 0.5). It is explained by the fact that current assets decreased 3 times because a lot of goods were sold below cost and a large part was not sold for several years and deteriorated physically and morally. This ratio indicates that "HAITEK" could have difficulties in arranging short-term liabilities. The liabilities in the balance were above the optimal range (2.13 in year 2013), which shows that the company failed to pass its liabilities to creditors.

The author calculated also the company's assets turnover ratios, which show how effective net turnover was used in building the company's assets. Credit turnover ratio was low (in 2011 – 1.51, in 2013 – 0.4), which indicates that the company did not pay suppliers in a timely manner. The receivable turnover ratio decreased from 6.25 to 0.40 (by 94%), which means that less receivables were converted to cash or receivables were paid with delays. It means that a big problem for the company was doubtful debtors who did not fulfill their liabilities timely or stopped to operate at all, causing huge losses to the company. It should be mentioned that the company gave too long payment period (claim payment period in 2011 was 58 days, in 2013 – 922 days). The company had to pay more attention to the recovery of receivables in order to accelerate their movement. Applying the Altman model it was estimated that the bankruptcy probability for the company "HAITEK" was very high. This is mainly due to the fact that the company had losses, which significantly reduced the equity.

Although the business direction in which the company operates is profitable, a huge threat for the company is the risk that creditors will request to initiate insolvency process. To solve financial problems the company should offer maintenance services in order to increase sales. Besides, it is important to develop effective accounts receivable recovery policy. The company should enter such markets as Russia and Belarus to increase the number of customers and turnover.

References

1. Rurāne M., Uzņēmuma finanses. Rīga, Jumava, 2007, 266 pp.
2. Saksonova S., Aspects of Using and Interpreting Profitability Indicators in Practical Business Analysis, S*cientific papers of University of Latvia, Economics*, 2008, Vol. 737, pp. 283-290.
3. Šneidere R., Finanšu pārskatu kvalitātes problēmas Latvijā ārējās finanšu analīzes procesā ES kontekstā, LU EVF Starptautiskā zinātniskā konference: *ES paplašināšanās Baltijas jūras reģionā: Sociālekonomiskie izaicinājumi un iespējas*, LU, Rīga, 2004, 266-270 pp.

FINANCIAL ANALYSIS OF MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM IN LATVIA

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The majority of municipal solid waste, generated in Latvia, is still landfilled. According to the EU Directive 1999/31/EK, Directive 2008/98/EK and Directive 94/62/EEK, Latvia, as the member state of the EU till year 2020 has to reduce biodegradable waste landfilling till 35% from total amount of 1995[1], recycle 50% from plastic, glass, paper and metal in municipal solid waste [2] and regenerate 60% from used packing materials [3]. As it will require a very high yearly increase till 2020, a balanced and motivating financial background is highly important for the system. The detailed financial analysis of the full waste management system of Latvia shows that internal monetary flow balance cannot motivate sustainable waste management, some sub-structures accumulate and redirect significant percentage from the total turnover out of the system, at the same time, other structures have to be supported by the EU financing to avoid insolvency. Partners, which are the first receivers of incoming financial stream in the system, are working with the highest profit level. Calculations also show that governmental income from natural resource tax is significantly higher than the back funding of waste management as the main costs for development projects are covered by the EU funding and some costs for sorted waste collection are covered by local municipalities. Results show that the system can be better balanced to get significantly better results and decrease landfilled amounts.

The recent study includes a modelled system of financial flow which integrates 3 alternative scenarios, including redirection of financial accumulation in the waste management service companies and national state budget for covering losses in waste landfill sector (as the high quality of performance is an important aspect to protect environment) and exempt co-financing from municipalities. The main part of changes comes from implementation of national subsidies system for the recycling sector. In addition, nationalization of packing material management can make the system more efficient not only in the financial aspect, but also in transparency and quality. Recommended systems' changes do not have an impact on household expenses, as it is important for Latvia, but at the same time it will be a well-balanced platform for the sustainable development and a significant increase of recovered and recycled waste amounts. As a result, landfilled amount reduced till 20% from the total amount in the period 2011 – 2013, from 20% of the total waste which is low for recycling – a significant amount of solid recovered fuel could be produced for European market, packaging materials recycling level increased by 28%.

References:

1. EU Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste: http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/Landfill_Directive_1999_31_EC.pdf (10.04.2015)
2. EU Council Directive 2008/98/EK November 19, 2008 on Waste: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN (10.04.2015)
3. EU Council Directive 94/62/EK of 20 December 1994 on Packaging and Packaging Waste:http://eur-lex.europa.eu/legal-content/ EN/TXT/PDF/?uri=CELEX:31994L0062&from=EN (10.04.2015)

IMPORTANCE OF MOTIVATION IN ORDER TO IMPROVE THE QUALITY OF LEARNING PROCESS

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One of the education problems nowadays is the quality of learning process. The quality of education determines the characteristics of education as a process. Quality of learning is derived from the teacher's quality of work and the student's motivation. The aim of the paper is to research theories of motivation and determine how student motivation can improve the quality of learning process [3;6;7]. The research methodology is based on theories of pedagogues and psychologists on learning motivation. The survey was conducted among 72 students. The aim of the survey was to find out how student motivation can improve the quality of learning process [2;5;6;8]. Motivation is an encouragement of the initiative, which causes students' activity and determines the direction of the goal. Motivation governs the start and progress of physical and mental activities, which determine the operational choice of activities, reactions and intensity of activities. Learning motivation encourages students to engage in the learning process to their full potential in order to gain knowledge and skills. Learning motivation initiative depends on individual performance of the teacher. There are two principal forms of motivation - external and internal motivation. External motivation is based on encouragement of external conditions, such as other people's behaviour, rewards, punishment and evaluation as well as the reaction to the given situation. The teacher should be a facilitator of creating positive external motivation stimulating students in the learning process. As regards internal motivation, the behaviour is determined by personal interest in the student's own work. Internally motivated students gain more satisfaction in the learning process. To maintain high learning quality, it is very important to keep students' motivation to the optimal activation level. The results of the survey show that students lack self-motivation and that the teacher's creativeness in his/her classes positively influences the student's academic achievements [1;2;4;5;8].

References

1. Dictionary of Psychology, New York: Penguin Book, 1995, 880 p.
2. Gudjons, H., Pedagoģijas pamatatziņas, Rīga, Zvaigzne ABC, 1998, 394 pp.
3. Paniņa L., Izglītības kvalitātes elementi izglītības sistēmā iesaistīto grupu vērtējumā. Izglītība zināšanu sabiedrības attīstībai Latvijā, Rīga: Zinātne, 2007, 52 pp.
4. Raščevska M., Psiholoģija vidusskolai, Rīga: Zvaigzne ABC, 1999, 250 pp.
5. Reņģe V., Mūsdienu organizāciju psiholoģija, Rīga: Zvaigzne ABC, 2007, 215.p.
6. Rudzītis G., Gribas un rakstura veidošana mācību darbā un pašizglītībā, Mācību līdzeklis 8. izdevums, Jelgava: LLU, 2003, 13 pp.
7. Skolēnu mācību sasniegumu vērtēšana vidusskolā, Metodiskais materiāls, Valsts izglītības satura centrs: Rīga, 2009.
8. Ильин.Е.П., Мотивация и мотивы., Санкт – Петербург:Питер,2002, 512 с.

YOUNG PARENTS' POSSIBILITIES IN THE LABOUR MARKET IN LATVIA

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In Latvia, there is a tendency when employers complain about the lack of workforce. At the same time, an indirect discrimination of the employees exists, which makes young parents seriously concerned about returning to work after their parental leave.

The study aims to investigate the young parents' interest in returning to the labour market after parental leave.

The task of the study was to clarify the theory of the employee's non-monetary benefits from the labour market and research the regulatory basis of the Republic of Latvia with regard to young parents, empirically analysing the views provided by young parents.

At the birth of the child young parents have a choice of claiming Statutory Parental Pay, which is available for them till the child reaches the age of 1 or 1.5 years.

In the period of January 2015 till March 2015 an anonymous questionnaire was made in the social network by using a "snow ball" method. The questionnaire was completed by sixty parents aged from 18-39 who have one or more children under the age of two years (this is the age of children when parents have the right to claim statutory allowance which allows parents to stay with their children at home for a longer period of time). The results of the survey were summarised and they showed that half of the parents would like to return to work when their child is almost 2 years old and a third of the parents would like to return back to work only when their child turns 3 years old. More than half of the parents admitted that returning to the work environment was difficult. Also, according to the results of the questionnaire 47% of the parents would send their children to a governmental educational organisation and 12% of the parents would send their children to a private educational organisation.

Employers provide statutory support for young parents according to the law written by the government, which provides such benefits as extra vacation days or vacation during the summer. There are also employers who provide additional support for employees, such as, extra cash bonuses for the birth of the child or/and Christmas activities for the children of employees. However, the young parents would like to receive all the benefits mentioned above and they would like to have more flexible working hours if it is required for the care of the child.

References:

1. Darba likums (LR Likums. Latvijas Vēstnesis, 2014, Nr. 225 (5285), 12. novembrī, pp. 1-43.
2. Diskriminācija Latvijas darba tirgū. http://www.nva.gov.lv/docs/30_53217f16241943.63850296.pdf (30.01.14.)
3. Par valsts sociālo apdrošināšanu: LR Likums. Latvijas Vēstnesis, 2014, No. 257(5317), 30.decembris, pp. 3-15.
4. Valsts sociālo pabalstu likums: LR Likums. Latvijas Vēstnesis, 2014, Nr. 183 (5243), 16.septembrī, pp. 2-7.

OBTAINING RESIDENCE PERMITS IN LATVIA

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Migration has always been and remains a significant and topical issue, characterizing the inhabitants' movement within the country and across its borders. Today, migration is mainly caused by social, economic, military and political causes [1].

A residence permit enables foreign citizens' freedom of movement to the Latvian Republic within the prescribed period or permanently - to work, study, access to health and government services, to apply for invitations for issuing visas to relatives, as well as the residence permit provided for any Schengen country visits without a visa [2]. The aim of research was to analyse the tendencies in obtaining a residence permit in Latvia and the impact on foreign investments in Latvia. The research methods were as follows – monographic, analysis, synthesis methods and descriptive statistics.

The Citizenship and Migration board statistics showed that from 2006 to 2014, the number of residence permits issued by Latvia varies due to various economic and political issues, but it can be argued that it has a tendency to increase. The main reason for a permanent residence permit issuance is former non-citizens who want to live in Latvia. In temporary residence permit issuance changes were observed from 2010, when the Latvian Republic Immigration Law was amended. Amendments allowed obtaining a residence permit for foreigners investing in the equity capital of a certain amount, which purchased property value in certain amount or made financial investments in a certain amount [3].

Residence permits provide an increase in the volume of the investment. In particular, the acquisition of property became one of the most demanded types of accounts for the majority of the investments.

References

1. Apinis R., Baltiņš M., Hirša D., Kļava G., Motivāne K., Valdmanis J., Veisbergs A., Migrācijas ietekme uz valodas vidi Latvijā. Rīga: Zinātne. 2009, 144 lpp.
2. Imigrācijas likums: LR likumi, 2003: http://likumi.lv/ta/id/68522-imigracijas-likums (25.03.15).
3. Statistika: uzturēšanas atļaujas: http://www.pmlp.gov.lv/lv/sakums/statistika/uzturesanas-atlaujas.html.(25.03.15)

ORGANIC DAIRY PRODUCTION AND DEVELOPMENT POSSIBILITIES OF PROCESSING IN LATVIA

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The demand for organic food is increasing every year not only in Latvia, but also in Europe and the USA, so conventional companies (farms) are becoming as organic companies (farms) to provide the supply. The dominant organic livestock sector in Latvia is dairy farming and more than 50% organic farms, which are producing organic cow milk, are located in the statistical region of Latgale, but there are not any organic dairy processors. The main problem of organic dairy farming in Latvia is insufficient organic dairy processing. Organic dairy farming provides an opportunity for smaller conventional farms to remain economically viable [2].

The EU milk quota system was abolished in 1 April 2015 and organic dairy farming is also one of the possibilities for smaller and medium-sized farms in Latvia. These dairy farms cannot compete with large dairy farms but they can meet organic production requirements and produce niche products for consumers.

In 2013 organic dairy farms in Latvia produced 69.6 tonnes of organic milk, only 29.9% of this milk was sold as organic milk and 2.93% was processed as organic dairy products [1].

Four dairy processors in Latvia produce organic dairy products. Three of them are located in the regions of Kurzeme and Zemgale, and one is located in the region of Vidzeme. Organic dairy farms in the region of Latgale have no opportunity to sell organic milk like organic and they are selling organic milk as conventional milk to dairy processors in Latgale. The current organic farming support depends only on the areas, therefore has not sufficiently stimulated an increase of production of organic products in Latvia [3]. The organic farming support is one of the support instruments for organic dairy farms in Latvia but a decision should be made by the legislation of the Republic of Latvia that general education institutions should be provided only with organic dairy products till 2025 that could contribute in organic dairy producing and processing.

Children are the next generation of Latvia, so they must be provided with the best and natural food - organic dairy products. This is confirmed by using expert opinions and the analytic hierarchy process method. Dairy processors will be more interested to have an eco-line and in cooperation with organic dairy farms, if children, who are learning in general education institutions, will be provided only with organic dairy products till 2025. The result of changing national policy can increase production of organic dairy products and it will confirm the goal of Latvia as a "green" country in the Sustainable Development Strategy of Latvia until 2030.

References

1. Ministry of Agriculture, Agriculture of Latvia in 2014: https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/00/45/84/LAUKSAIMNIECIBASZINOJUMS_2014.pdf (02.02.15.)
2. O'Hara J.K., Parsons R.L., The economic value of organic dairy farms in Vermont and Minnesota, *Journal of Dairy Science*, 2013, Vol. 96(9) pp. 6117-6126.
3. Veseris A., Lakovskis P., Benga E., Economic aspects of LFA and organic farming payments in Latvia, *Management Theory & Studies for Rural Business & Infrastructure Development*, 2014, Vol. 36 (2/3), pp. 679-687.

PERCEPTION AND SHAPING OF URBAN WASTELANDS: LA TERENURI IN MĂNĂŞTUR, ROMANIA

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A growing global interest in ruins, ruination and places of decay has been noted in recent years, grounded in the potential of such spaces and processes to offer a critical perspective on the contemporary production of space [1]. It has been argued that similarly to wastelands, such spaces contain potential to "critically question over-programmed urban environments" [3].

The change in the structures of ownership after the fall of socialist regime has significantly influenced urban green spaces in Romania. Surfaces have shrunk and green spaces have been remade into parking lots following the shift in their ownership from public to private sector, thus creating a deficit in urban green spaces in denser urban areas. Unresolved land restitution issues have created circumstances in which many urban green spaces stay in the state between abandonment and use.

The presentation covers a case study of an area informally called Terenuri, located in the most densely populated urban district of Cluj-Napoca, Mănăștur in Romania. Sometimes referred to as a wasteland or no-man's land, Terenuri can be conceptualized as a space with a 'loose-fit' character and a fluid landscape entangled in land ownership relations between private and public interest. It exists in this form due to indeterminate future plans that would probably later work to sanitize and erase its vernacular projects and ways of using it (Qvistrom 2007).

Terenuri is also sometimes described as a village space in the city, mostly, but not only because of its past and present use for urban agriculture. In addition to such already existing informal uses, Terenuri has also been a target of social initiative aiming to activate community involvement with this space and connect the neighbourhood residents and users in thinking about and shaping its future. In this study the author looks at Terenuri as an example of urban wilderness, vernacular and loose space [2] and discuss different perceptions and uses of this space in its present condition, also with references to its transformations in the past. I argue that people's perceptions of such urban green 'wastelands' are built on an ambivalent tension between seeing them as signs of beauty and nature versus abandonment, derelict space and failure. I also discuss different terms and types of landscapes that could be used when refering to Terenuri, considering the tension between these celebratory and deploring attitudes they engender.

References

1. Edensor, T., DeSilvey, C., Reckoning with ruins, *Progress in Human Geography*, 2012, Vol.37 (4), pp. 465–485.
2. Franck, K.A., Stevens, Q., Loose Space: Possibility and Diversity in Urban Life, Routledge: London and New York, 2007, 303 pp.
3. Jorgensen, A., Tylecote, M., Ambivalent Landscapes—Wilderness in the Urban Interstices, *Landscape Research*, 2007, Vol. 32(4), pp. 443 – 462.
4. Qviström, M., Landscapes out of Order: Studying the Inner Urban Fringe beyond the Rural-Urban Divide, *Geografiska Annaler. Series B, Human Geography*, 2007, 89(3), pp. 269-282.

PRODUCTION DIVERSIFICATION OPPORTUNITIES IN THE HOUSEHOLD "GATNIEKI"

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Both in the market and in a broader territory with numerous active marketers, a continuous struggle happens of how to promote one's particular products, how not to lose regular customers and how to attract more customers in order to increase the company's revenues and profit. When manager, following the analysis of the market and evaluation of his/her particular household's position in it, concludes that the situation is deteriorating, there are several possible scenarios of how to react to this. One of the possibilities is to diversify production in order to meet the consumers' needs on a higher level.

In the household "Gatnieki", the production of blackberries has decreased, but the production volume of autumn raspberries has increased; however, in the market, a rapid increase in the supply of autumn raspberries can be observed, thus reducing their price. In order to avoid excess of raspberry production and, accordingly, the reduction of berry fields, instead of increasing the fields, the household plans to diversify their production and commence the production of syrup from the autumn raspberries and blackberries, thus increasing their income. Diversification is defined as a process, which is carried out in order to expand business opportunities using the company's product and increasing its market potential. Usually, the product is either improved or transformed, or new marketing opportunities are developed [1].

Another sign of increasing competition is the information published by the Central Statistical Bureau of Latvia [2] which informs that since 2011 the areas of berry and fruit-tree fields, the joint harvest of berries and fruit as well as their crop capacity have increased in Latvia.

The support provided by both Europe and Latvia has also influenced the activity in this industry, and it also increases competition. The projects accepted by the Rural Support Service of the Republic of Latvia between 2007 and 2013 in their planning stages have been granted 12.3 million euros of public financing. Such various support opportunities as to new household managers, to rural household modernization, the creation of household production's added value, etc., have gained an impressive response [3].

Entrepreneurs select to diversify their production in order to use all raw materials and production byproducts more effectively. Precisely these products, remaining after the production of the basic products in the household "Gatnieki", are going to be used in the process of diversification or in the production of new products, which will contribute to the increase of the household's turnover.

References

1. Augļu koku un ogulāju stādījumi: http://data.csb.gov.lv/pxweb/lv/lauks/lauks__ikgad__03Augk/LA6180.px/?rxid=cdcb978c-22b0-416a-aacc-aa650d3e2ce0 (14.03.2015).
2. Product diversification: http://www.businessdictionary.com/definition/product-diversification.html (15.03.2015).
3. Šteinberga I., Augļkopības nozarē visa par maz, *Dienas Bizness*, 2014, No.157, 12 p.

PROJECT "ESTABLISHMENT OF A SPECIALISED KINDERGARTEN IN REZEKNE FOR CHILDREN WITH SPECIAL NEEDS"

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There has been a greater push to use projects to achieve more strategic goals and filtering the existing major projects to make sure that their objectives support the organisation's strategy and mission. Project management has also been used to accomplish routine tasks that would previously have been handled as a functional effort. This is because lower level management has become aware that projects accomplish their performance objectives within their budget and deadline, and hope to employ this new tool to improve management of their functions [1].

The project plan shows the "why" and the "how" of a project. A good project plan will include the following elements: statement of the goal, benefit analysis, feasibility analysis, listing of the major steps to be taken, timetable for completion, description of the resources required to carry out the project [2]. These considerations were taken into account when initiating a project in Rezekne for children with special needs.

Every year, mothers in Rezekne face a problem: kindergartens are overcrowded, and there is no chance to enrol children in the desired kindergarten for the chosen period. To enrol one's child in a kindergarten, the child has to be registered right after the birth, and the kindergarten queue has to be entered. The situation concerning children with special needs is even more complicated. The city of Rezekne has no specialised kindergarten, and such children do not receive care necessary for them.

Therefore, the research problem of this study is as follows: children with special needs in Rezekne are not looked after properly and are not taught according to an individual programme, as Rezekne city has no kindergarten for children with special needs.

The aim of this project was to initiate the establishment of a kindergarten with specially trained pedagogues and babysitters who will take care of children with special needs as well as to furnish and equip the kindergarten and select the personnel for it.

The hypothesis: the project implementation period will last for 120 days, which is 6 calendars months, and the kindergarten will be opened on 31 August, starting its full operation on 1 September 2015.

The lack of a specialised kindergarten in Rezekne city is a problem to be solved in several ways. Four alternatives were evaluated: 1) to build a new private kindergarten; 2) to rent out the existing premises for the establishment of the above kindergarten; 3) to expand the functions of the kindergarten and to introduce additional programmes for children with special needs; 4) to rent out premises and hire a few babysitters who will care for children for extra pay for a short period.

Among the alternatives, renting out the existing premises for the establishment of the kindergarten involves the lowest costs, as it ensures the opening of the kindergarten earlier and at lower cost. The most attractive, beneficial and profit-generating alternative was to renovate the existing empty buildings and establish the kindergarten there.

The applied project management methods allowed making sure that the kindergarten would be able to start its full operation in the beginning of the academic year 2015/2016, if its implementation were started on 19 March 2015.

References

1. Meredith J.R., Mantel S. J., Project Management. A Managerial Approach, John Wiley & Sons, Inc., Asia, 2010, 587 p.
2. Project Planning in a Nutshell: http://www.projectsmart.co.uk/project-planning-in-a-nutshell.php/ (12.03.2015).

SPORTS INFLUENCE ON THE EU ECONOMIC GROWTH

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An in-depth study has never been carried out about sports influence on the economic growth and employment in Latvia. However, such studies have been carried out in other European Union countries, which prove the economic importance of sport on the whole.

The economic impact of the sports industry is often underestimated. Sport is a growth engine for the EU economy, employing 7.3 million people (3.5% of total EU employment). The sports industry accounts for 2% of the EU GDP which is expected to increase in the future due to consumer popularity. In comparison, the share value is at the same level as agriculture, fisheries and the forestry industries combined. [1]

A recent study shows that the sports industry in 2012 accounted for 1.76% of the European gross value added. Germany has the largest number of sports related jobs employing 1.15 million people. [2]

Sporting events help improve and drive the economy, in particular tourism and local businesses within an area. Consequently, countries and regions are very competitive to capture large scale sports events, like London Olympics 2012. The travel industry is one of the fastest growing sectors as a result of competitive sports and their popularity attracting tourists to new locations and generating an external income for the local economy [3].

The authors conclude that by further exploring and maximising the potential of the sports industry more jobs will be created, manufacturing and services will increase contributing to economic growth, regional development and increase of the GDP.

References

1. European Commission, Sport as a growth engine for EU economy
http://europa.eu/rapid/press-release_MEMO-14-432_en.htm (20.02.2015).
2. European Commission, Study of sport's contribution to economic growth and employment in the EU, 2012, pp. 57-61.
http://ec.europa.eu/sport/library/studies/study-contribution-spors-economic-growth-final-rpt.pdf (14.02.2015)
3. Fourie J., Santana-Gallego M., The impact of mega-events on tourist arrivals, Tourism Management Volume 32, Issue 6, December 2011, pp. 1364–1370
http://www.sciencedirect.com/science/article/pii/S0261517711000148 (10.02.2015)

ORGANIZATION OF LOGISTICS IN "DSG KARJERI" LTD AND OPPORTUNITIES OF ITS DEVELOPMENT

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Logistics plays an important role in our life nowadays, especially for companies dealing with the sale of goods. It is important for a company's director to determine how to create a running system of the logistics process to meet the delivery Just-in-time principle, and to create more efficient use of transport units and also to determine whether to buy transport units for the supply of the goods or to buy the services from other companies. This is a topical issue - the company is trying to achieve customers' satisfaction with received goods and its delivery at the right time. The aim has been stated by the given conditions - to explore the logistic processes of "DSG Karjeri" Ltd, to determine its opportunities of the development.

New planning and management methods have been devised in the last decade of the 20th century where the time factor was very important. Firstly, there is a transition for the production just in time (JIT - Just in Time Production) - a method that is based on the time of delivery by small companies – the suppliers of materials and components – to the main supplier of the product. The aim of this method is to reduce the stocks of materials and components. Secondly, the globalization of production on a global scale made necessary to make such delivery in the shortest possible time, namely to reduce the value of the materials freezing during delivery. As a result, there is a widely used planning process called material supply planning process (MRP - Materials Requirement Planning). AS a result of these changes the relatively small companies - suppliers - are becoming dependent on the requirements of large companies - producers - made against outstanding added value. [1]

"DSG Karjeri" Ltd. was founded in 2005 and it's basic activity is dolomite quarrying."DSG Karjeri" Ltd. supply of the goods to the customer currently provides by attracting transport services provided by other companies - there is no transport unit for the supply of the goods in "DSG Karjeri" Ltd. There are many drawbacks for a cooperation like this. Companies providing logistic services are not enough flexible if we take a time as a factor for the evaluation, as a result, the company buying these services may lose revenue - the customer can find another vendor who can provide a supply in a very short time, perhaps, it may be a company who has own transport units for the supply of goods. It is also possible to have an opposite case – downtime. It occurs if the attracted transport company is losing a time in a process of loading the material in the quarry or for a loading of goods in the customers constructions area. There was around 300.00 EUR paid from "DSG Karjeri" Ltd. to the companies providing logistic services for downtimes in a year 2014. There is a chance to earn an additional income for the company having its own transport units - providing transport services to other companies (not using the transport units just for own goods supply) at a time when the transport units have no work. "DSG Karjeri" Ltd. has all of the chances to be a successful company in this field - in the year 2014, when the company had no own transport units, it has earned about 15000.00 EUR of using attracted transport units to carry the materials for customer from other companies' quarries.

After the research of the logistic processes in the "DSG Karjeri" Ltd., the introducing of their own transport units in the organization of the logistics were found to be useful. The company's new transport units need to be equipped with special equipment that helps to identify the exact arrival times for material loading in quarry, as well to pass the information to customer for the delivering time in his construction area. The company's own transport units might help to maximize the use of the transport units working hours, as well as to become punctual in the delivery of the goods.

References

1. Sprancmanis N., Fundamentals of Business Logistics, 2011, 39 pp.

THE SHEEP FARMING DEVELOPMENT OPPORTUNITIES IN LATVIA

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The sheep farming industry is one of the components of the concept of sustainable development as defined by the European Parliament (EP) on 19 June 2008 Resolution on the sheep and goat industry in Europe. The EP has recognized the sheep and goat farming industry's role in the sustainable rural development, pointing out their significant contribution and importance in social, economic and environmental fields [5].
The analysis of the scientific literature show that various scientist theories emphasized the importance of sustainable development of the sheep farming industry. In addition to consumer products (meat, wool, hides, milk), sheep farming provides ecological security, efficient use of natural resources, preservation of rural environment and local farming traditions [2]. It should be noted that sheep are considered to be an essential part of organic farms, because they are an effective way to use organic plant products, to ensure crop farming with animal production integration and provides natural fertilizers for plant crops [6]. It is important to continue the study of the sheep farming industry to develop sustainable animal breeding strategy, preserving and promoting the adaptation of its biodiversity, which also focuses on extra profitability [3,4].
The sheep farming industry is one of the most relevant industries to be successfully engaged in less-favored agricultural areas and production units with a relatively small area of agricultural land. About 3.4 thousand hectares are used in the sheep farming field in Latvia, i.e. the land involved in production and used in agriculture [1]. The sheep farming in Latvia is on the "way of development". Although after the restoration of independence in Latvia, i.e. from 1991 until 1999, the number of sheep in the country has decreased from 157,000 to 27,000 sheep, there has been a sharp increase in the number of sheep from 2000 until 2014 - the number of sheep has grown to 92,544 sheep. Studies show that the demand for the output increases in both the local and European markets. The research of the Latvian Sheep Farmers' Association show that in 2020 the sheep farming will be one of the leading traditional agricultural industries.
The sheep farming industry in Latvia has steadily developed since joining the European Union, and in recent years it has been experiencing a steady growth, moreover, sheep farming is also very important in the regions of Latvia, because its advantages entitle an efficient use of natural resources and a rational resource management type of manufacturing process.

References

1. Garkalne K., Report on the sheep farming industry: http://www.losp.lv/node/2155 (30.12.13.).
2. The strategy of sheep farming industry's development in Latvia until the year 2023: http://www.latvijasaita.lv/doc/LAAA_Strategija_2023.pdf (09.11.13.).
3. Nielsen H.M., Christensen L.G., Ødegard J. A Method to Define Breeding Goals for Sustainable Dairy Cattle Production. *J. Dairy Sci*. 89, 2006, pp. 3615–3625.
4. Olesen I., Groen A.F., Gjerde B. Definition of Animal Breeding Goals for Sustainable Production Systems. *J. Anim. Sci*. 78, 2000, pp. 570–582.
5. Report on the proposal to the Council's regulation, COM(2008)0306 – C6-0240/2008 – 2008/0103(CNS): http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A6-2008-0402+0+DOC+PDF+V0//LV (08.01.14.).
6. Rāducutā I., Research of the sheep breeding in organic farming system in Romania. Scientific Papers, *Animal Science*, 2012, Series D, vol. LV, 219-222.

THEORETICAL ASPECTS ON BUSINESS MODELS FOR PRIVATE FOREST OWNERS IN LATVIA

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Business model developing in Latvia started when Latvia regained independence and when the term "private ownership" was declared in legislation acts. Entrepreneurs should develop sustainable and innovative business models were forest resources are used.

Business model concept is quite new. Since 1995, there have been more than one thousand peer reviewed articles published in academic journals in which "business model" is mentioned [1]. Still, there is no common definition of the business model concept shared among scholars. At a general level the business model has been referred to as a statement, a description, a representation, architecture, a conceptual tool or business model canvas, a structural template, a method [2]. The business model canvas proposed by Osterwalder and Pigneur has become quite popular among practitioners and in many countries is used as bases for business model developing [3]. Also, for the Latvian case the business model canvas can been used. Especially, because researchers in Finland are using this model for developing business models for entrepreneurs, were forest resources are used, which are showing very good results. The business model canvas consists of nine interrelated building blocks: customer segments; customer relationships; value propositions; channels; key activities; key resources; key partners; cost structure; revenue stream [4]. First attempts in using of the business model canvas for developing business model guidelines for private forest owners in Latvia have showed good results. The size of the average property is 10 ha, therefore cooperatives could raise competitiveness of private forest owners. There are three main customer groups where private forest owners can operate: Producing high quality roundwood for local market and also for export; Growing energy wood for fuel chips; Recreational (building natural parks, adventure parks, educational paths and others recreational places). The innovative and sustainable business model guidelines for private forest owners in Latvia are also needed.

References

1. Zott C., Amit R., The business model: A theoretically anchored robust construct for strategic analysis, *Strategic Organization*, 2013, Vol. 11(4), pp. 403-411.
2. Zott C., Amit R., Massa L., The Business Model: Recent Developments and Future Research, *Journal of Management*, 2011, Vol. 37(4), pp.1019-1042
3. Osterwalder A., Pigneur Y., Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, *Strategyzer series*, 2010, pp. 276
4. Kajanus M.,, Iirea A., Eskelinen T., Heinonenb M., Hansenc E., Business model design: new tools for business systems innovation, *Scandinavian Journal of Forest Research*, 2014, Vol. 29(6), pp. 603-614

TOURISM DEVELOPMENT POSSIBILITIES IN JELGAVA AND OZOLNIEKI DISTRICT

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According to the Latvian Tourism guidelines Latvian Tourism is regarded as one of the country's economic development opportunities and priorities in the service sector, as an important source of export income, which makes a significant contribution to the national gross domestic product. In globalization and the current highly competitive environment it is necessary to identify its competitive advantages to develop tourism products and areas with greater potential for sustainable development. Jelgava and Ozolnieki districts are attractive to both local residents and visitors with its history, cultural heritage, and nature. In future there is a potential for tourism development, which is currently not fully used.

Tourism is one of the social, cultural and economic phenomena which entails the movement of people to countries or places outside their usual environment for personal or business or professional purposes. These people are called visitors, which may be tourists or excursionists, residents or non-residents, and tourism has to do with their activities, some of which imply tourism expenditure [1].

Tourism includes travel and accommodation, as well as tourism in the definition and explanation of it would be important to include travel, which is specific within the country.

Tourism is one of the types of recreation in addition to those types of recreation as hobbies, sports, leisure and other outdoor recreation and entertainment types. Tourism is associated with certain costs, larger or smaller, depending on the type of recreation. People who travel by bicycle or hike through nature walks and bring with them their own food, they do not contribute to a particular region's economy [2].

Comparing the tourism definition of the World Tourism Organization with Holloway's explanation, it can be said that these explanations are similar, but the global organization includes explanation and emphasizes that tourism is also a social, cultural and economic phenomenon related to the movement of people. A better explanation would be by combining these two definitions.

Tourism can be defined as a process, activities and results arising from the relationships and interactions among tourists and the tourism industry service provider's guest state government, the visiting public and the environment, including tourist attraction, transport, accommodation and overnight stays as well as tourist management [3].

Goldner and Richie have defined one of the most comprehensive and universal definitions of tourism.

It can be concluded that it is important to create new interesting offers. One of important aspects is that the young people and students are those who should be attracted to tourism.

References

1. Understanding tourism: http://media.unwto.org/en/content/understanding-tourism-basic-glossary (17.05.14).
2. Holovejs Dz. K., Tourism business, Janis Roze Publishers, Riga, 368 p.
3. Goldner C.R., Ritchie J.R.B., Tourism Principles, Practices, Philosophies, Wiley&Sons Ltd., Canada, 2011, 544 p.

YOUTH UNEMPLOYMENT PROBLEM IN THE EUROPEAN UNION

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In the current context of economic instability, young people are faced with the emergence of the feeling of uncertainty with respect to their own chances of having a good debut in the labour market. The world crisis, the social reality that all societies are faced with, brought again up to the forefront the idea of young individuals' fragility on the labour market [1].

According to the Ministry of Education and Science of the Republic of Latvia, the youth employability is among the European Union priorities. At the end of 2014, youth unemployment varied from 7.2% in Germany and 17% in Latvia up to 51.4% in Spain. In total there are around 5 million unemployed young people under 25 years in Europe [3].

Educational attainment and skills have a strong influence on the labour market outcomes and effective investment in youth skills determines the capacity of countries to face various shocks and to get the most out of globalisation, technological changes and innovations [2].

According to the OECD, the education system has undergone significant reforms during the transition and Latvian students perform relatively well by the international comparison.

The continuous decrease in the number and the ageing of the population makes a negative impact on Latvia's social and economic development. A large number of people in the working age have left the country in search of well-paid jobs.

The decline of population is one of the most important indicators, which shows that there is need to promote the employment of young people in Latvia, with enabling them to learn, live and work in Latvia. The first job experience as well as education, training and practical skills are considered to be a crucial precondition for young people to start their employment career and provide future possibilities for their development and social status in society.

References

1. Balan M., Analysis of Unemployment among Young Individuals from Romania by Econometric Methods. *International Auditing & Risk Management,* 2014, No. 3 (35), pp. 90-97.
2. OECD, OECD Economic Surveys: Latvia 2015, OECD Publishing, 2015, Paris, pp.1-115.
3. To reduce youth unemployment, cross-sectoral cooperation should be enhanced: http://izm.izm.gov.lv/presidency/12334.html (26.02.15).

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VOCATIONAL EDUCATION AND TRAINING SYSTEM IN LATVIA

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There is an increasing necessity for long-term aims and tasks in the educational system in the developing world. With each year the labour market needs more competent and well-educated employees. The educational system in Latvia evolves on the basis of the demand of the labour market and the impact of the global development.

A. Benavot (1983) described some perspectives on the rise of vocational education in the world during the twentieth century. He considered that due to mechanization of processes, jobs became more complex and more specialized, which resulted in the demand for skilled workers [1].

The Parliament of Latvia in the Education Development Guidelines for 2014-2020 identified long-term tasks as the priority: to guarantee the opportunity to acquire the secondary education to everyone, to ensure the quality of higher and vocational education, to develop master's and doctoral study programmes, to improve the education of science subjects at all levels of the education system [4].

The European Parliament and the Council have identified the impact on educational system by giving a strong impetus to the strategic framework for cooperation in education and training involving all stakeholders. This should notably result in the implementation of life-long learning principles including flexible learning pathways between different education and training sectors by reinforcing the attractiveness of vocational education and training [3].

A. Pautler described the proper role of vocational education as the bridge between man and his work. Occupation sets the tone of social relationships, influencing the standard of living, the solidarity of the family, and the quantity and quality of civic participation and responsibility [2].

Today the secondary school students hardly know what they would like to do and what they want to do. Vocational education gives them an opportunity to try some occupations and decide what they would like to do after graduating the secondary school. If teachers tried to show more opportunities to students, they could decide which study programmes to choose to study in higher education institutions. Students could be more determined to choose an occupation in which to work, thus universities could get motivated students, but the labour market - more skilled workers, who love their jobs.

References

1. Benavot A., The rise and decline of vocational education. *Sociology of Education,* 1983, Vol. 56(2), 63-76 pp.
2. Philosophy and Foundations of Vocational Education. Ed. Kazanas H.C., MSS Information Corporation, 1973, 188 pp.
3. The European Parliament and the Council. Communication from the Commission Europe 2020. European Commission, 2010:
http://eur- lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF (20.03.2015.)
4. Parliamentary Statement of Latvia. Education Development Guidelines for 2014-2020: http://m.likumi.lv/doc.php?id=266406 (20.03.2015.)