Tomas Bata University in Zlín

Science Activity Annual Report

2022

CONTENT

1 DEFENDED DOCTORAL THESES

In 2022, a total of 48 theses were defended: 10 at the Faculty of Technology, 13 at the Faculty of Management and Economics, 7 at the Faculty of Applied Informatics, 1 at the Faculty of Humanities, 13 at the Faculty of Multimedia Communications, and 4 at the University Institute.

1.1 Faculty of Technology

Degree Programme: CHEMISTRY AND MATERIALS TECHNOLOGY

Degree Course: Technology of Macromolecular Compounds

Ing. Miroslava Dušánková, Ph.D.

Date of defence: 24. 2. 2022

Supervisor: prof. Ing. Vladimír Sedlařík, Ph.D.

Preparation and Characterization of Polymer Systems for Special Application Utilizing Natural Biologically Active Compounds

Abstract

The doctoral thesis deals with the research of biologically active polymer systems based on synthetic polymers, which were modified with components of essential oils. The main attention was paid to the study and description of aspects leading to the extension of processing window of the investigated systems, and thus to their practical application. The experimental part is primarily focused on the study of the process of immobilization of essential oil components on a solid carrier for the subsequent thermoplastic preparation of composite systems. The next part of the thesis describes the possibilities of using encapsulation techniques for the formation of polymer microspheres. As a part of the research, the methods for the quantitative determination of active substances in polymer systems were defined using the advanced analytical techniques. An integral part of the thesis comprises the study of the release kinetics of active substances from the developed systems, including the determination of their antibacterial activity. The obtained results show a significant potential of the developed systems for their application in practice.

Ing. Marek Gořalík , Ph.D.

Date of defence: 21. 10. 2022

Supervisor: prof. Ing. Jarmila Vilčáková, Ph.D.

Electromagnetic wave absorbing properties of polymer composites

Abstract

This work is focused on the optimization of electromagnetic and mechanical properties of magnetic polymer composites for electromagnetic interference (EMI) applications as radio absorbers (RAs). Polymer composites with a dual-phase polymer matrix, vinyl-terminated polydimethylsiloxane (PDMS) in epoxy resin (ER), acrylonitrile-butadiene rubber (NBR), and a propylene-based thermoplastic elastomer (TPE) matrix were investigated for the fabricating of highly filled manganese-zinc ferrite (MnZn), carbonyl iron (CI), carbon black (CB) and carbon nanotube (CNT) composites with the goals of enhanced radio-absorption and mechanical properties. The dielectric and magnetic properties of the composites were determined by the type, concentration, and polymer matrix composition. Increasing the filler and PDMS concentration leads to an increase in magnetic losses due to a decrease in the demagnetizing field. The electromagnetic properties of the composites were investigated in the radio-frequency (RF) band using the impedance method (1 MHz - 3 GHz). Based on the complex permittivity (epsilon*) and complex permeability (mí*), the reflection loss RL (dB) of single-layer RAs was calculated. The RAs with a MnZn ferrite and CI demonstrated better bandwidth performance in comparison with RAs based on carbon fillers, due to a proper ratio between (epsilon*) and (mí*). According to the dynamic-mechanical analysis (DMA) and Charpy impact strength, the significant increase of stiffness up to 125% and the impact strength up to 150% was achieved due to the optimal composition of the polymer matrix and the filler. The results obtained in the study indicate the possibilities of the preparation of ER and elastomeric magnetic composites able to shield an electromagnetic field by absorption mechanisms.

Ing. Markéta Kadlečková, Ph.D.

Date of defence: 1. 6. 2022

Supervisor: doc. Ing. Antonín Minařík, Ph.D.

Preparation of polymer material systems for 3D printing in biological applications

Abstract

This work is focused on modification of material systems on a synthetic or natural basis in the form of hierarchically structured scaffolds and thin layers. For this purpose, the methods of additive manufacturing, electrospinning, phase separation, etching were used. The materials treated were photocurable resins, polycaprolactone, poly (vinylidene fluoride-trifluoroethylene-chlorotrifluoroethylene), fibroin, polystyrene and aluminum. Not only the material properties, but also the cytocompatibility was evaluated. The results of showed a fundamental impact of surface topography on cell proliferation and, in the case of hierarchically structured surfaces, on the change in stem cell morphology. A new type of bioreactor was developed to test the prepared structured surfaces with respect to study of cell behavior under simulated in vivo conditions. The results confirmed the fundamental influence of flow irregularities on cell adhesion, on the basis of which a study of the influence of different types of flow on the stability of polymer surfaces was performed.

Ing. Ludmila Vaňharová, Ph.D.

Date of defence: 27. 1. 2022

Supervisor: doc. Ing. Markéta Julinová, Ph.D.

Biodegradation of polymer systems containing PVP and synthetic zeolites

Abstract

This thesis deals with the biodegradability of polymer systems containing polyvinylpyrrolidone (PVP), synthetic zeolite and fillers from renewable sources. PVP is a widely used polymer in many areas. However, several studies have already highlighted the possibility of its resistance to microbial biodegradation and thus the potential threat of its accumulation in the environment. First, potential degraders of PVP from various environments were studied. To monitor biodegradation experiments laboratory respirometres were used. In this part of study, obtained results pointed at the possibility of the disruption of PVP structure by Pleurotus ostreatus mycelia. However, the important factor was the presence of another

substrate, which could be lignin or lignocellulose, initiating the formation of necessary enzymes. The main subject of this study was to prepare PVP-based polymer systems using suitable plasticizer and fillers in an effort to promote the biodegradability of the materials. The influence of the presence of Fe3+ ions in the polymer system on their photooxidation and subsequent biodegradation was also studied. Based on the results of the experiments of the first part of the dissertations, economically available sources of lignocellulose and calcium lignosulphonate were chosen as fillers. According to the literature review, the effect of biochar as filler was also studied. Biodegradation of prepared materials was also observed using the laboratory respirometers. The prepared polymer systems were also subjected to several analyzes (FTIR, optical microscopy, DSC, tensile tests, water absorption, solubility) for a basic characterization of their properties. Polymer systems with satisfactory properties for practical use have been obtained. The final experiment monitored the influence of polymer composites on the growth of Sinapis alba seeds during their potential usage in the agrochemical industry. It was found that the materials with biochar content as the filler had the best mechanical properties. Regarding the biodegradation of polymer systems, it has been found that fillers can have a slightly positive effect. However, it has been shown that polymer systems have no negative effect on plant growth and the selected fillers can promote plant growth.

Degree Programme: FOOD CHEMISTRY AND TECHNOLOGY

Degree Course: Food Technology

Mgr. Richard Adámek, Ph.D.

Date of defence: 14. 9. 2022

Supervisor: doc. Ing. Vendula Pachlová, Ph.D.

Possibilities of influencing the decarboxylase activity in the nature cheese system

Abstract

The aim of the presented work is to study the possibilities influencing decarboxylase activity in the real system of natural cheese. High concentrations of biogenic amines in food pose a health risk to consumers that should be avoided. To fulfil the goal, selected microbiological

strains with decarboxylation activity were used as a technological trend, which was confirmed in previous in vitro studies. In addition to the microorganisms used, the effect of the packaging material used (shrink film, Plasticoat copolymer coating and food wax) on the accumulation of biogenic amines during ripening was also monitored. Samples of model natural cheeses were continuously taken during the entire ripening period and subjected to chemical (determination of dry matter content, fat content, salt content, pH values, assessment of development of proteolysis and quantification of biogenic amines), physical (measurement of textural development) and microbiological analysis (determination of total number microorganisms, fungi, yeasts, lactic acid bacteria, Enterobacteriaceae and Enterococcus). The adjunct microbial strains used did not affect the basic chemical parameters and the hardness of the natural cheeses, while the use of different packaging materials had a significant effect on the dry matter content and the textural profile. The selected adjunct strains significantly influenced the course of biogenic amine accumulation during ripening of natural cheeses. The microbial strain with the most intense degradation activity was Lacticaseibacillus casei CCDM 198 which showed the most effective degradation activity against phenylethylamine, cadaverine and putrescine.

M.Sc. Vikendra Dabash, Ph.D.

Date of defence: 7. 4. 2022

Supervisor: doc. RNDr. Burešová Iva, Ph.D.

The Effect of Enzyme Addition on the rheological Characteristics of the Gluten-free Dough and Bread

Abstract

The Doctoral Thesis deals with the issue of rheological propertiesof Gluten- free different types of rice flour and effect of the "alfa"- amylase enzyme on the rheological characteristics of the gluten-free flour dough and bread. The purpose of this study is to discuss the significant role of the "alfa"-amylase enzyme in the production and rheological characteristics of gluten-free rice dough and baked bread. There were different types of gluten-free rice flours tested in this study, including rice fine flour, semi-coarse, red rice flour, rice flour with 0.5S, extra- fine rice flour, white sticky rice flour, and black rice flour. We performed small and large deformation methods to evaluate how the addition of the "alfa"-amylase enzyme

affected the rheological characteristics of dough and the final product (bread). The "alfa"-amylase enzyme has been used as an additive and the rheology (small-deformation oscillation and long deformation) properties have been determined. Specific volume, baking loss, and Texture profile analysis (TPA) parameters were used to evaluate the baking properties of bread. Microstructural changes were also observed following the addition of enzymes to doughs. In the course of small deformation studies of doughs, the doughs containing 0.5S and extra-fine flour showed the most significant changes after enzyme addition. 0.5S flour dough was less resistant to extension, area, and extensibility after the addition of "alfa"-amylase. There was no significant difference in extensibility for dough made with extra-fine flour. As a function of "alfa"-amylase, significant changes were observed in the flour doughs' properties during the heating process. The G' (storage modulus), G" (loss modulus), and "éta"' (viscosity) values of the 0.5S and extra-fine doughs decreased with the addition of "alfa"-amylase. Following the enzyme addition, G'

Ing. Martina Mrázková, Ph.D.

Date of defence: 19. 5. 2022

Supervisor: doc. Ing. Daniela Sumczynski, Ph.D.

The Assessment of the Soft Targets Security

Abstract

The dissertation describes a proposal of methodology for the assessment of objects belonging to the group of soft targets. At present, several methodologies are published that formulate procedures for designing measures in the soft target objects, but there is no comprehensive approach linking the relevant design with the evaluation of these objects based on their properties and numerically expressing the resulting security status. The dissertation thesis, therefore, represents a comprehensive and complex way of solution. The purpose of the dissertation thesis is to develop and present a complex way for soft targets assessment that respects and is in line with currently available and published methodologies. The methodology for soft targets assessment was confronted during the study and presented to several national as well as international experts at international conferences to gain feedback from the professional community. The methodology for assessing the security of soft targets

evaluates the security status of an object based on an assessment of the condition and fulfillment of selected (security) properties of the assessed object.

MVDr. Zdeněk Polášek, Ph.D.

Date of defence: 14. 9. 2022

Supervisor: prof. Ing. František Buňka, Ph.D.

Effect of phosphate application on texture parameters of selected types of hams

Abstract

The aim of the current dissertation thesis was to evaluate the influence of hydration of muscle tissue and the possibilities of influencing the latter process with NaCl and phosphatebased salts addition. It is known that the above-mentioned food additives can affect these processes and a secondary aim of the work was to further investigate and define these processes. During the processing of the lean muscle, many complex processes are taking place the influence of which has a fundamental effect on the properties of the final product and on the economy of the production itself. Using dynamic oscillating rheology, we tried to assess the effect of selected food additives on the processes of proteolysis and solubilization of proteins and the subsequent formation of sol and gel matrix with divergent properties, especially different textural and viscoelastic characteristics. Based on rheological measurements of pregel formations and their thermally induced changes, we tried to predict the properties of the formed gel, the resulting quality of which was expressed in terms of hardness, cohesiveness, elasticity, chewiness and guminess which have a decisive influence on ham quality and production economy. Information on pH changes, especially at the start of operations before heat treatment, is useful information about the state of the raw material and its development. A very important part of our work was the monitoring of viscoelastic changes during heat treatment, which was enabled by the original technique of product sample preparation for the use of a rheometer. The results obtained, confirmed a significant effect of phosphates addition (with more hydrogen ions) on decreasing the pH of the analyzed samples, which negatively affected the course of gel formation both from the rheological point of view during temperature changes and the properties of the final product from the point

of view of textural analysis. Moreover, the influence of increasing concentration of utilized phosphates on the monitored parameters was also proved. However, the influence of the increasing number of phosphorus ions in the phosphate molecule on the monitored properties of the sample was not unambiguously confirmed. On the one hand, the obtained results confirmed previous studies and conclusions, enriching the information about the influence of some phosphates on the observed properties of heat-induced muscular tissue gels.

Ing. Jana Rudolfová, Ph.D.

Date of defence: 23. 9. 2022

Supervisor: doc. Mgr. Robert Vícha, Ph.D.

Synthesis and Study of Biological Activity of Purine Nucleosides Substituted with 1-Adamantyl

Abstract

Purine ribonucleosides represent one of the most extensive groups of nitrogen heterocycles in the nature. In the medicine, these compounds are very often used mainly for a wide range of interesting biological effects, such as inhibition of nucleoside transport in the organisms or antifungal, antiviral and antitumor activities. Submitted work deals with a preparation of eries of novel purine 2,6-disubstituted ribonucleosides bearing unique adamantylated amines. Assembled multi-step synthesis contains a sequence of several one by one reactions, namely a glycosylation of sellected, or prepared purine derivatives at the position N9 with a protected ribose as a glycosyl donor, a nucleophilic aromatic substitution in the position 6 of formed nucleosides' purine ring, followed by a deprotection of ribofuranose units at nucleosides. If the molecule of prepared compounds enabled, they were modified in next reactions as a reduction or a nucleophilic aromatic substitution in the position C2 of the purine core. All prepared compounds were obtained in good yields and purity. Their structures were confirmed using common methods of spectral analysis. For possibility of medical use, final nucleosides were subjected to tests for biological activity (antiproliferative effects and enzyme ihnibition) including complexation of tested nucleosides with (Beta)-cyclodextrin.

Ing. Tomáš Šopík, Ph.D.

Date of defence: 1. 4 2022

Supervisor: prof. Ing. František Buňka, Ph.D.

Development of the content of selected biologically active substances in food during storage

Abstract

This doctoral thesis deals with the issue of quality changes of durable foods during long-term storage experiments. The aim of the work was to study the effect of four different storage temperatures (-18°C, 6°C, 23°C and 40°C), simulating Arctic, mild and tropical temperatures on microbiological, chemical, sensory, physical changes of stored foods during the experiment. The foods that have been analyzed in this doctoral thesis are commonly available through a network of different retailers. Chemical (pH value, content of: dry matter, ammonia, secondary oxidation products, carbohydrates, amino acids, crude protein and fats), microbiological (cultivation methods), textural, rheological and sensory methods (scoring) were used for the analyzes. From the results the length of storage together with the increasing temperature significantly influenced the observed characteristics due to degradation changes of substances in foodstuffs ($P<0,05$). Therefore, during the storage, there was a significant decrease in pH values in food samples ($P<0,05$). Likewise, most of the samples showed an increase in the dry matter, ammonia and thiobarbituric values (expressing the degree of lipid oxidation) ($P<0,05$). Moreover, in some samples, the degradation changes adversely affected the organoleptic quality, the color, taste and off-flavor ($P<0,05$). For these reasons, significant undesirable changes have occurred in samples stored at 40°C ($P<0,05$) and it can be unequivocally stated that this temperature has proved completely unsuitable for storage. If there is no avoidance, it is advisable to minimize the time. Conversely, samples stored at 6°C were best evaluated, with minimal worsening of observed parameters. Furthermore, the analysis results of samples stored at -18°C and 23°C were also satisfactory.

1.2 Faculty of Management and Economics

Degree Programme: ECONOMICS AND MANAGEMENT

Degree Course: Management and Economics

Edmond Çera, Ph.D.

Date of defence: 3. 11. 2022

Supervisor: prof. Ing. Jaroslav Belás, Ph.D.

The role of institutional, educational and family context for engagement in entrepreneurship: evidence from Albania, Kosovo and North Macedonia

Abstract

Although scholars have studied the effects of individual attitude, subjective norms and perceived behavior control on entrepreneurial intention, there is a need to shed light on the role of contextual factors on entrepreneurial engagement. To fill this gap and address this need, this thesis aims to investigate the role of institutional, educational, and family context on the relationships between the antecedents of an individual's behavior and engagement in entrepreneurship. The role of contextual factors will be incorporated in the research as potential moderators of the relationship between attitude, subjective norms and perceived behavior control and the individual's involvement in starting a business. Hence, institutional environment is expected to moderate the influence of attitude on engagement in entrepreneurship; educational context is supposed to govern the relationship between attitude and perceived behavior control and one's motivation to start a business; family background is assumed to influence the linkages between antecedents of one's motivation to start a business. The research is administered on an individual-level face-to-face data collection approach through a survey in three Western Balkan countries: Albania, Kosovo, and North Macedonia. The relationships are examined by using Partial Least Square within a Structural Equation Modelling per each country separately.

Hoang Hung Cuong, Ph.D.

Date of defence: 19. 12. 2022

Supervisor: doc. Ing. Miloslava Chovancová, CSc.

The Moderation of Income and Environmental Concern and Organic Food of Millennials in Vietnam

Abstract

The study follows the positivism paradigm and has used primary data to examine the theory of planned behavior extension and organic food of millennials in Vietnam. The main aim of this research is to investigate millennials' income and environmental concern for organic food purchase intention by applying the theory of planned behavior. The cluster and snowball technique were applied to collect data from southern, central, and northern Vietnam. Data were analyzed with the help of structural equation modeling (SEM) from the Smart-PLS tool and moderation analysis with the SPSS tool. The results show the positive effect of attitude, subjective norms, and perceived behavioral control on Vietnamese millennials' purchase intention toward organic food. Moreover, income was found to be the moderator of the relationship between subjective norms and purchase intention, attitude and purchase intention. Income did not moderate the relationship between perceived behavioral control and purchase intention. Environmental concern was the moderator of the relationship between perceived behavioral control and purchase intention, subjective norms and purchase intention, attitude and purchase intention. Last but not least, there was a three-way interactive effect of environmental concern, income, and attitude on purchase intention. The three strongest influences of attitude on purchase intention toward organic food are the condition of the high value of environmental concern and income level from 10 million to 20 million VND (the strongest influence); income level of more than 40 million VND (the second strongest influence); income level from 20 to 30 million VND (the third strongest influence). Under the condition of income of less than 30 million VND and low value of environmental concern, attitude did not predict purchase intention.

Ing. Mgr. Bc. Gabriela Končitíková, Ph.D.

Date of defence: 24. 2. 2022

Supervisor: doc. Ing. Pavla Staňková, Ph.D.

Use of Bata Management System for Formation of Culture in Organizations

Abstract

The presented dissertation deals with the topic of using the principles of the Bata Management System to shape the culture of organizations. The Bata Management System is the collective name for the principles of management and development of the company Bata, up until 1939. These principles were mainly developed by the company´s founder, Tomas Bata, and his co-workers. In general, the Bata Management System is considered a phenomenon of its time and even some contemporary experts, scientists and entrepreneurs talk about its transcendence to the present and its timelessness. The topic of the dissertation was chosen based on monitoring the long-term trend of companies seeking to apply individual elements of the Bata´s corporate culture to their business activities. The work is divided into two research levels. Based on these areas, a survey was conducted in current companies to see if they are ready to transform their corporate culture according to the Bata philosophy. Readiness was tested on the basis of a questionnaire survey, which was divided into the three parts mentioned above, namely - the personality of the leader, the employee-employer relationship, the influence of the triangulation model. Those company leaders who showed interest in the transformation of corporate culture took part in the questionnaire survey. Subsequently, a questionnaire survey was conducted among the employees of selected companies. Attention was paid to the fact whether leaders and their employees consider the individual parts of the Bata corporate culture model important, whether there is a consensus between the perception of the leader and employees and how the emotional stability which was the goal of the Bata´s corporate culture is viewed. A total of 7 companies and 295 employees participated in the research. Based on the research, a resulting model was created to test the readiness of current companies for the transformation of the Bata´s corporate culture. The resulting model evaluates the perception of the position of the importance of the leader in corporate culture and corporate values, the position of employee-employer relationship and the importance of the triangulation model for strengthening the emotional stability of employees. The contribution of the work is the creation of the first model, according to which it is possible to apply the principles of the Bata Management System to current Czech companies.

Ing. Filip Kučera, Ph.D.

Date of defence: 19. 12. 2022

Supervisor: doc. PhDr. Ing. Aleš Gregar, CSc.

Implementation of smart governance concept using findings from behavioral economics

Abstract

The doctoral thesis deals with the implementation of the findings of behavioral economics at the level of local governments. The research connects the topics of behavioral economics and the concept of smart governance, especially the part focused on the quality of decision-making is approached in an original way with an emphasis on the application of the knowledge of behavioral economics. The topic of the thesis responds to the obvious deficit in behavioral economics research at the level of local governments. The literature review presents the most important theoretical findings in connection with the issue of behavioral economics, behavioral public policy and smart governance. The research part uses a multi-method approach. The results of experimental surveys and semi-structured interviews were used to answer the research questions. The evaluation of the experimental investigations confirmed that the decision-making of local government employees is influenced by cognitive biases of anchoring and framing. To assess the degree of impact of biases on respondents' decision-making, effect size was also assessed. The evaluation of semi-structured interviews described the problems and challenges of local governments, which were placed in the context of behavioral economics. Subsequently, specific behavioral interventions were identified in accordance with the MINDSPACE framework. The results of the dissertation contribute to the discussion on the current topic of applying the findings of behavioral economics in improving the functioning of local governments. They present concrete evidence of the impact of cognitive distortions on the decision-making of local government employees as well as a proposal for behavioral interventions responding to the identified challenges and problems.

Nguyen Thi Ngoc Diep, Ph.D.

Date of defence: 4. 11. 2022

Supervisor: doc. Ing. Miloslava Chovancová, Ph.D.

A Customer Retention in Supermarkets – An Evidence from Retail Market in Vietnam

Abstract

In a world with enormous opportunities and challenges from the technology revolution and the lingering COVID-19 pandemic, customer retention is more important than ever for retailers. While marketing and advertising are limited in the tough time, retail operations become the salvage and dominance with the increasing sales recovered in 2021 thanks to food and essential business. Currently, many researchers and reporters demonstrate that shopping behaviour has changed from offline to online and a combination of online and offline for the consumption of food and essential goods due to the ease of access to the Internet and the ownership of mobile devices, which has stimulated them to shop in modern retail channels more than ever. However, in recent years, minimal attention has been paid to the effects of store operations on changes in shopping behaviour in retail. In particular, the contribution of store operations to customer benefits and customer retention is often less known by shoppers and is hardly measured accurately and adequately by management. Furthermore, the psychological effect on customer retention in supermarkets does not seem to be thoroughly discussed in existing studies.

Nguyen Thi Nhu Thuan, Ph.D.

Date of defence: 4. 11. 2022

Supervisor: doc. Ing. Miloslava Chovancová, Ph.D.

Factors Affecting Customer Satisfaction: Evidence from Beauty and Cosmetic Online Shopping in Vietnam

Abstract

In the context of Beauty and Cosmetic Online Shopping (BCOS) in Vietnam, this thesis investigates key variables that affect customer satisfaction while also evaluating the effects of gender and marital status on such relationships. First, it offers a reliable questionnaire that accurately captures the five constructs of the self-constructed theoretical model: Online Shopping Experience (OSE), External Incentives (EI), Seller Service (SS), Security/Privacy (SP), and Personal Characteristics (PC). The thesis also looks at how gender disparities

in these factors affect customers' satisfaction with their online beauty and cosmetics purchases. The findings of the t-tests indicate that male clients are much more satisfied with their purchases than their female counterparts. Additionally, it reveals that male clients are more content with their online buying, customer service, and outside incentives provided by online vendors than their female counterparts. According to the regression analysis, there is a significant and positive correlation between customer satisfaction and the OSE, SS, and EI. Males are more likely to experience this good customer service effect, whereas security and privacy have a greater positive impact on female happiness. Third, the thesis looks into how marital status affects the levels of customer happiness and discovers that married and divorced/separated online buyers have significantly different levels of satisfaction. These findings add to the body of knowledge on customer satisfaction, especially in BCOS. They have repercussions for current internet firms as well as new or future competitors.

Mohamed Omran Emad Attia, Ph.D.

Date of defence: 11. 7. 2022

Supervisor: prof. Yuriy Bilan, Ph.D.

Key factors influencing the buying decision-making process of the Generation Y consumers on the wine market

Abstract

The current economic overview has become extremely uncertain. Uncertainty about how individuals and firms react to the future evolution of the economy is considered one of the most critical phenomena facing policymakers in developed and developing countries. It appears after significant shocks such as revolutions, natural disasters, terror attacks, elections, and economic crises. Since the financial crisis of 2008, the Egyptian economy has faced many unanticipated adverse shocks due to political, security, and economic instability on the one hand and the government's decisions to re-stabilize the economy on the other hand. These incidents have forced households and companies to become more "uncertain" about the current and future economic conditions. Moreover, the current high uncertainty about the financial and health situation due to the COVID-19 pandemic encourages researchers to investigate its implications on the global economy and the Labour market. It has been

argued that the implications of uncertainty shocks seem to be stronger in developing than the developed countries. The main objective of this doctoral thesis is to investigate the impact of uncertainty shocks, measured by the volatility of the Egyptian stock market index, EGX30, on the labour market in Egypt. The author employed quarterly time series data from 2003Q4 to 2021Q2. The vector autoregressive model (VAR), the impulse function (IRF) tool, and the Granger causality test have been used to capture the effect of uncertainty shocks on the weekly average wage, labour productivity, and unemployment rate. The results showed that uncertainty shocks, measured by the stock market index, EGX30, cause a sharp drop in employment, GDP, and labour productivity growth in the short-run. At the same time, it increases weakly average wages, consumer price index, and interest rate. It happens because uncertainty forces firms to pause or postpone their hiring and investment decisions, decreasing labour productivity by mismatching skills to jobs. Thus, uncertainty shocks generate temporary sharp recessions and then recoveries. Nevertheless, since the confidence intervals contain zero, the results of impulse response functions are statistically insignificant.

Tran Van Hai Trieu, Ph.D.

Date of defence: 2. 11. 2022

Supervisor: prof. Dr. Ing. Drahomíra Pavelková

Digital Transformation and Its Influence on Performance of Creative Industry Companies: The case of Vietnam

Abstract

Digital transformation has recently become a popular concept globally, along with the development of high technologies following the trend of Industry 4.0. It has brought much creativity and innovation for growth in different industries. Especially technology innovation based on digital platforms is vital for creative companies to compete in the market. Creative industries are the term used for fields where goods and services depend on periods of creation, production, and distribution originating from the input of creative and intellectual capital (UNCTAD, 2008). Creative industries are now pioneering and helping to promote brands and exploit markets for other industries. They focus on critical fields with high competitiveness and dynamics and advance the direction of diversifying and linking multidisci-

plinary; as a result, there are many opportunities to expand creative industries based on inbound and outbound cooperation. Furthermore, creative industries contribute significantly to GDP growth and influence other macroeconomic indicators, including employment, interest rates, and associated social programs (Martinaityt? & Kregždait?, 2015).

Najam Ul Zia, Ph.D.

Date of defence: 20. 10. 2022

Supervisor: prof. Ing. Ladislav Buřita, CSc.

Social capital and industry 4.0 readiness: Role of innovative capability, industry 4.0 efficacy, and knowledge based dynamic capabilities

Abstract

In this digital age, organizations are confronting the cusp of the fourth industrial revolution. Developed economies have already created new strategic options for the industry 4.0 (i4.0) strategy, however, due to institutional voids, firms in developing economies still rely on developed economies to extract knowledge and buy new technology. Firms in developing economies must use social capital (SC) to obtain knowledge, information, trust, and support from developed economies to show industry 4.0 readiness. Research on industry 4.0 mainly focuses on technical aspects, however, there is less scholarly attention on the management issues of industry 4.0, and most of the studies emphasise developed economies. Particularly, how the firms of developing economies become ready to face the fourth industrial revolution, and how developing economies get industry 4.0 competencies is still scarce in the existing literature. The presented thesis seeks to establish the role of social capital dimensions to enhance industry 4.0 readiness in selected manufacturing firms in Pakistan. It also fills the missing gap of the mediating roles of innovative capability, knowledge-based dynamic capabilities, and industry 4.0 efficacy between the relationship of social capital and industry 4.0 readiness. The goal of the study is achieved by using a mixed-method research design. The study first uses the quantitative approach and empirically examines the association of three dimensions of social capital and industry 4.0 readiness of manufacturing firms with the mediating roles of innovative capability, knowledge-based dynamic capabilities, and industry 4.0 efficacy. For the quantitative study, data collection was performed through survey strategy, questionnaire design and cross-sectional technique. Quantitative data analysis is

conducted by employing structural equation modelling. There are a total of 320 valid responses that represent 81 manufacturing firms in Pakistan. These responses are analysed through SmartPLS and SPSS. The findings of the quantitative approach are then explained through interviews with top industry specialists. The results of the study are analysed and discussed in detail. The results show that structural social capital, relational social capital, and cognitive social capital are positively related with industry 4.0 readiness, and innovative capability, knowledge-based dynamic capabilities (KBDCs), and industry 4.0 efficacy mediate this relationship. The thesis theoretically contributes to the existing knowledge of understanding industry 4.0 readiness and offers valuable insights for firms in developing economies to improve their social capital with the firms in developed economies during the industry 4.0 era. This study likewise reveals the significance of industry 4.0 efficacy, KBDCs, and innovative capability to facilitate the relationship of social capital and industry 4.0 readiness between the firms of developing economies and developed economies. Practical implications, limitations and future research directions are also emphasised.

Degree Programme: ECONOMIC POLICY AND ADMINISTRATION

Degree Course: Finance

Gentjan Çera, Ph.D.

Date of defence: 29. 6. 2022

Supervisor: prof. Ing. Jaroslav Belás, PhD.

The Effects of Institutions, Internal Resources and External Knowledge Acquisition on Competitive Advantage

Abstract

The dissertation titled "Predicting the occurrence of misstatements in financial statements" deals with the quality of accounting information, which is presented to its users in the form of the financial statements. The thesis's main aim is to propose an approach for prediction of misstatement occurrence in financial statements presented by companies to maximise the usefulness of this information for the decision-making process of its users. This approach

should help all types of possible users evaluate the reliability of information presented in financial statements and help them avoid incorrect decisions made based on unreliable data. This work should contribute to existing approaches focusing on the occurrence of the misstatements with a completely new approach to measurement, which is not purely dependent on financial variables. The information obtained during a detailed literature review of existing literature, which is further enhanced by the results of qualitative research conducted with individual users, is used to propose quantitative research between pro-profit organisations operating in the Czech Republic. Data obtained through quantitative research is analysed using statistical methods. The results of the analysis are used to construct a predictive model, which enables the prediction of misstatements' occurrence for companies operating in the Czech Republic.

Khan Khurram Ajaz, Ph.D.

Date of defence: 19. 12. 2022

Supervisor: prof. Ing. Jaroslav Belás, PhD.

Determinants of financial capability and financial satisfaction among low-income individuals: A case study of India

Abstract

Increasing financial market complexities, a highly volatile and unpredictable environment, economic ups and downs, and unexpected trauma like a pandemic of COVID-19, and many others, are giving substantial challenges to individuals to achieve and maintain their financial stability and well-being in recent times. Experts around the globe are soliciting financial literacy improvement, and indeed a lot has been done too. However, people still lack, and merely financial literacy may not be enough alone. Recently, researchers have been putting forward the concept of financial capability, which is not much research yet. Based on the capability theory, experts advocate that financial capability building is crucial for financial stability and asset building. Financial literacy deals only with the individual's internal ability and does not cover what is needed beyond individual internal abilities that capability fills. Here comes the concept of financial capability. Since the field of financial capability is still not researched much, it needs more studies and research to extend and find what else can contribute apart from the existing factors affecting financial capability building and financial

satisfaction. Therefore, the present thesis investigates the key determinants that can affect financial capability building under the scope of capability theory given by Amartya Sen and Nussbaum and the concept of financial capability by Johnson and Sherraden. Limited studies have measured a few factors on financial capability in different studies. Moreover, most of the studies on financial capability are limited to the developed nations.

Ing. et Ing. Vojtěch Sadil, LL.M., Ph.D.

Date of defence: 2. 11. 2022

Supervisor: prof. Ing. Juraj Sipko, PhD., MBA

Reform of the International Monetary System: Transposition to Multipolar Currency Arrangement

Abstract

The doctoral thesis is aimed at the actual problems of the international monetary system and its transposition toward multipolar currency arrangement. The main aim of this thesis is to verify the existence of a trend of transition to monetary multipolarity within the international monetary system. In the second section, the research subject is defined and there also presented key concepts of currency concentration and currency internationalization. In the third section, the international monetary system is presented from a historical point of view. The fourth section deals with current trends at the level of the global economy, which leads to the inevitability of the transition to currency multipolarity. Currency polarity is evaluated by using the functional approach with the employment of the currency concentration concept. The perspective of selected currencies for reaching the status of reserve currencies is evaluated by using the approach of political economy with the application of fuzzy-logic model for measuring the potential of currency internationalization. These two approaches are extended by case studies that evaluate the perspectives of key currencies in the future international monetary system, namely the US Dollar, Euro, and Chinese renminbi. Systematic methodology, elements of quantitative and qualitative research, and also soft computing methods, are used in the presented thesis.

Ing. Elina Stocker, Ph.D.

Date of defence: 4. 11. 2022

Supervisor: doc. Ing. Michal Pilík, Ph.D.

Digital Channels and B2B Customer Experience

Abstract

In the digital era, companies can get lost in the variety of available tools and tactics now at their disposal. Industry 4.0. and digital transformation change B2B industrial buyer-seller relationships, making them customer-centric. To deliver a good customer experience, companies must understand the values of their buyers and develop an effective communication strategy with a clear and consistent value proposition. The study uses primary data collected from 143 B2B industrial companies in Germany to identify which customer values create a positive B2B buyer's experience. This exploratory, descriptive study builds a theoretical model upon the existing technology adoption theories, literature review, and expert interviews. The study offers some important insights into the theory of technology adoption applied to B2B customer experience. The online survey analysis conducted with PLS-SEM highlights the importance of information quality, perceived ease of use, perceived usefulness, and service quality for B2B communication. The study contributes to both theory and practice and partially confirms previous observations from the technology adoption models. In line with previous research, the results reveal the importance of perceived ease of use, perceived enjoyment and service quality for perceived usefulness, service quality and information quality for satisfaction and information quality for perceived ease of use. However, contrary to expectations, the study did not confirm a positive relationship between satisfaction and customer loyalty, which were used to operationalise customer experience. At the same time, the study provides the first comprehensive assessment of customer engagement from two points of view -end-user-to-buyer and buyer-to-customer. Herewith, it attempts to assess the complexity of a communication process in B2B buyer-seller relationships. Furthermore, the study reveals the importance of entertaining and easy-structured information, which indirectly influences the perception of information quality. The growth of multichannel and omnipresent marketing makes it challenging to provide qualitative and consistent information throughout the whole range of communication channels. The analysis of communication channels at different customer journey stages demonstrates that industrial

buyers use WOM and recommendations in the pre-purchase stage and prefer highly customised and direct communication when business relationships are established. The study contributes to the literature by expanding the current understanding of ease of use and customer engagement and revealing new insight about tools and values customers prize the most in buyer-seller communication.

1.3 Faculty of Applied Informatics

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Automatic Control and Informatics

Ing. Jan Skovajsa, Ph.D.

Date of defence: 7. 12. 2022
Supervisor: prof. Ing. Dagmar Janáčová, Ph.D.

Integration of Phase Change Materials in Cooling Ceiling and Ventilation Systems

Abstract

The doctoral thesis is focused on the issue of the efficient use of energy in environmental technology systems, especially in the field of space cooling and ventilation. It describes the current state of knowledge about energy consumption in buildings, thermal stability, heat accumulation, and the application of modern heat storage materials, especially phase change materials. One of the main parts is developing the technical design of the cooling ceiling and ventilation system in combination with heat storage materials. This part also describes the preparation of laboratory test methodologies. Subsequently, the realization of the system prototype and the experiment results are presented. In addition, complex simulation models of various building structures are prepared. Finally, an evaluation of the effect of the proposed system application on thermal comfort and the final energy consumption is carried out.

Ing. Jiří Zátopek, Ph.D.

Date of defence: 8. 12. 2022

Supervisor: doc. RNDr. Ing. Zdeněk Úředníček, CSc.

Modern Motion Control Methods of an Industrial Robot Mechanical System through Electromechanical Actuators

Abstract

This doctoral thesis primarily focuses on comparing modern non-autonomous motion control methods with a standard, years-proven autonomous control structure on a real-build mechatronic/robotic system with dynamics appropriate to the industrial serial robot behaviour of an anthropomorphic type. In the first part of the work, the possible kinematic structures of the system are analyzed, a complete structural CAD model is created, and the electrical equipment is selected. Next, the prototype fabrication is introduced, and the final solution is presented, which includes the construction, assembly and commissioning of the entire system. The following section is devoted to the software application, which includes a presentation of its structure with a description of classes and functions, the method of mutual communication between the control and power parts of the device, and a graphical user interface. A comprehensive part of the work contains camera image processing, where the entire image evaluation process is described in detail, including source code samples. Camera evaluation uses complex kinematic transformations covered in the next chapter. These transformations use, among others, a CAD model to derive the general transformation matrix, parts of which are used essentially throughout the work, and the results are applied both to image evaluation and to the design of the control law. Before the controllers' derivation, a mathematical and physical model was created. The first mentioned is for the design of the controllers and the fundamental demeanour analysis. The second is for behaviour simulations of the existing system, the mathematical model correctness verification, tuning of the controller, and, for example, the selection of actuators. Both models are part of the most significant chapter dealing with motion control. This chapter describes the inclined plane and ball position regulation, from the current loop setup, through the P(I)(D) cascade regulation design, to the derivation and implementation of one of the modern motion control methods - the computed torques. All measured control processes are statistically evaluated and presented in clear graphs. In the last part of the thesis, five criteria assessing the quality

of regulation are established, based on which both motion control approaches are compared. Particular attention is placed on verifying all sub-goals on a real-build robotic system.

Degree Programme: ENGINEERING INFORMATICS

Degree Course: Engineering Informatics

Ing. Martin Ficek, Ph.D.

Date of defence: 13. 12. 2022

Supervisor: prof. Ing. Ludvík Juříček, Ph.D.

Influence of Shooting Distance on the Wounding Potential of an Air Weapon

Abstract

This work deals with the influence of the firing distance on the level of the wounding potential of the air weapon. The main goal of this work is to determine the effect of firing distance on the wounding potential of an air weapon. Standard methods such as analysis, synthesis, induction, and deduction were used during the research. The practical research used the method of experiment, in the form of ballistic experiments focused on determining the velocity of missiles and their courses, impact kinetic energy, momentum, density of impact kinetic energy the depth of the shot and the maximum diameter of the temporary cavity. A total of four types of 4.5 mm diabolo missiles and two gas weapons (air rifle and windbreaker) were evaluated. All missiles have approximately the same weight, differing mainly in the shapes of the heads. By evaluating the data from the performed experiments, it was found that the monitored parameters have a similar trend for all missiles used, and thus. It was possible to create a general linear model of missile velocity decrease. The knowledge gained from research can be used in science and practice. A search of the literature and sources shows that similar research has not yet been conducted to a greater extent. This work can thus be considered the initial, more comprehensive study and its conclusions as to the first hypotheses, which must be further experimentally verified by more detailed research and studies.

Ho Le Thi Kim Nhung, Ph.D.

Date of defence: 16. 11. 2022

Supervisor: doc. Ing. Zdenka Prokopová, CSc.

Engineering Requirements in System Engineering Project Estimation

Abstract

In the presented doctoral thesis, proposals for new methods of estimating the complexity of projects based on the Use Case Points method, which is used in the early stages of software development, are presented. The proposed methods are developed to handle estimation inaccuracies and incorporate expert judgments to produce accurate and reliable effort estimates. Each approach has its advantages, and they complement each other. The goal is for them to create a complete process and support the efficiency of effort estimation, i.e., to minimize estimation error more effectively in all situations. The results show that the proposed Software Development Effort Estimation (SDEE) methods are competitive compared to other alternatives, based on seven evaluation criteria and statistical pairwise t-test comparisons.

Ing. Anežka Kazíková, Ph.D.

Date of defence: 26. 10. 2022

Supervisor: prof. Ing. Roman Šenkeřík, Ph.D.

Development and Modification of Modern Bio-Inspired Swarm Algorithms

Abstract

Swarm algorithms have become standard tools of modern optimization. However, the advent of new metaheuristics brought a wave of criticism against the quantity, quality, and novelty of these optimization techniques. This dissertation describes the current trends in development and modification of swarm algorithms, as well as the challenges it includes. For several decades metaheuristic algorithms have fought the very same optimization problems. The issues of stagnation, premature convergence, or low diversity of the solutions are dealt with today as well as in the beginning. The development of new algorithms does not state a change. Rather than genuinely advancing the field, new algorithms raise malpractice awareness in benchmarking. Due to the common low standard of their proposal studies, novel metaheuristics face a significant stigma of general distrust and disrespect. Although the good

practice in benchmarking is a very recent topic, most current guidelines stay strictly in theory, i.e., are not applied. This work aims to start a change in this regard. The Author proposes a set of recommendations for new metaheuristic development and implements them in a new swarm algorithm, which was developed with an escape mechanism out of the local optimum containment challenge. The Bison Algorithm showcases problem-oriented development and models current trends and modifications. The connection between theory and practice opens a way toward a new generation of challenges.

Ing. Jiří Ševčík, Ph.D.

Date of defence: 13. 12. 2022

Supervisor: prof. Mgr. Milan Adámek, Ph.D.

Crime Scene Reconstruction within Virtual Reality

Abstract

This thesis discusses the potentials of synthesis of several scientific and technical fields, with the intention of designing and validating a workflow for the preparation of a crime scene reconstruction within virtual reality. In essence, it is a modernized version of a special method of proof included in criminalistics-tactical methods. Contactless reflective scanning methods followed by 3D reconstruction of the polygonal network and texture were utilized to create a spatial digital replica of the crime scene. The resulting crime scene complex 3D model is subsequently simplified to meet the requirements of display in virtual reality. Modified ways of solving selected processes of the crime scenario reconstruction workflow in virtual reality are proposed with regard to the limited amount of time and resources available to criminalists in practice. The practical feasibility and parameters of important processes are verified through case experiments. An uncertainty reduction within the crime proving process represents fundamental mission of the method proposed.

Vo Van Hai, Ph.D.

Date of defence: 16. 11. 2022

Supervisor: doc. Ing. Zdenka Prokopová, CSc.

Optimisation of Software Effort Estimation by Improving Functional Points Analysis

Abstract

The doctoral thesis proposes a new method of software effort estimation using machine learning techniques. The main idea of the work was to present a new weighting system of calibration complexity applied in the Function Points Analysis (FPA) method and to propose an optimization framework for the calculation of effort estimation results. The selection of a suitable machine learning algorithm is necessary for the implementation of this proposal. In addition, other attributes were investigated. Data clustering has been shown to have a large effect on the accuracy of estimation results. For that reason, experiments were made to find the most suitable clustering mechanism. The results obtained in this dissertation were evaluated according to unbiased evaluation criteria and achieved a much better result than the original FPA method and other compared methods.

1.4 Faculty of Multimedia Communications

Degree Programme: MULTIMEDIA AND DESIGN

Degree Course: Fine Arts, Visual Arts

Ersin Ertan, MSc., Ph.D.

Date of defence: 12. 12. 2022

Supervisor: prof. ak. mal. ArtD. Ondrej Slivka

Visualization of Music: Comparison of Theories, Artworks and a Proposal

Abstract

This research´s primary objective is to seek, find, analyze, and compare the notable or underrated artistic videos on music visualization in the light of relevant and propose an experimental artwork. After providing a brief introduction about the terms, history, along with the background, which is composed of categorization and revision for previous academic research, this thesis starts analysing notable short or feature films, animations, and interactive media chronologically that offer high artistic values regarding music visualization. The analyze methodology is mostly based on Zbikowski?s Leitmotif, Eisenstein?s diagrams, Kandinsky?s colour theories, and Michel Chion?s audiovisual analysis. The reason why these factors have been chosen is that they are indeed the core of music visualization theories that have been created by artists, directors, and scholars over a century. Additionally, the

music visualization here is limited by classical music due to its high artistic values comparing to other genres and also the intense use of classical music by the theoreticians and artists above. The blockbuster or highly artistic movies and videos regarding music visualization, such as Stanley Kubrick´s Clockwork Orange, will be considered as a point of reference along with the important scholars´ theories such as Gorbman, Cook, and Adorno. These analyses may enable us to see not only the improvements but also the deficiencies in this field. In this way, the creation of a new artistic concept in the light of related artworks and theories can be possible and more aesthetic in the framework of music visualization. Moreover, the findings of comparison and analysis will be converged altogether, and a new artistic concept, in conjunction with the relevant computer graphics-based animation artworks with video game aesthetics, will be offered as the ultimate results of this study.

MgA. Daniel Krcha, Ph.D.
Date of defence: 20. 6. 2022
Supervisor: doc. MgA. Libor Nemeškal, Ph.D.

Cooperation of Multiple Film Editors

Abstract

This thesis discusses the collaboration of multiple editors on one audiovisual production. The goal of the thesis is to verify the effectivity of a team of editors when it comes to time and quality of the work. The thesis is divided into four chapters. In the first chapter, the author analyzes collaborations of multiple editors in a historical context, where we discover that this practice is not as uncommon as expected. This practice hasn´t been studied enough, therefore in the analytical part we can find the schematic of the collaboration of multiple editors according to Krcha, which is a system for deciding whether it is a good idea to add more than one editor to the editing process. The project part describes the usage of this system in a real example, where groups of editors and solo editors work on the same audiovisual production. The goal of the project part is to confirm the functionality of the system. The final parts describe creative activities, which is a continuation of the theoretical part.

MgA. Leona Kubišová, DiS., Ph.D.
Date of defence: 20. 6. 2022

Supervisor: doc. PaedDr. Jiří Eliška

Graphic Design, Visual Communication and Literacy

Abstract

PhD thesis is concentrated on research of visual literacy competencies description. This thesis inquires and proves the necessity of education and support of competencies to strenghten visualliteracy. The objective of this thesis is to design a questionaire based on established competency categories and evaluate it with descriptive and discursive methods. The outcome is the concept of educational Visual laboratory, where students should improve their skills and competencies in interpretation and producing visual information.

MgA. Aliksandra Laurova, Ph.D.

Date of defence: 13. 12. 2022

Supervisor: doc. ak. mal. Michal Zeman

Creative coding and generative algorithms as tools for creating interactive visual art

Abstract

The dissertation is devoted to programming as an artistic tool and a modern form of self-expression. It covers the topic of creative coding, generative algorithms, data visualization, analyzes the history and development of this art form. The dissertation includes samples of the author's original projects, including instructions for the application of creative coding methods in the field of data visualization, the aim of which is to prove that creative coding is an available tool that can enrich the practice of every artist and designer.

Le Hoang Anh Trieu, Ph.D.

Date of defence: 20. 6. 2022

Supervisor: prof. ak. mal. ArtD. Ondrej Slivka

A design framework for Vietnamese modern propaganda

Abstract

Since the Renovation, the Vietnamese government has been leveraging propaganda posters and their procedures to inform and influence communities' self-health awareness for many

years. However, those posters do not boost communities' behaviors as intended. Through examining a hypothetical drawback to refusing to be fearful, this examination attempts to analyze whether tense/fear appeals in modern graphic propaganda can not increase and eventually decimate Vietnamese emotions. The authors indicate that visuals constructed to be often frightened threats produce negative emotions regardless of frightening.The paper evaluates the connection between awareness of apprehension, adverse emotional reactions, and citizens' attitudes using observations from the suggested media campaign. The results found that perceptions towards a graphic rely less on how frightened the image appears and how the graphic activates destructive negative emotions. These results indicate an accessible Vietnamese health-care promoting system to the digital communications phenomenon that has remained consistent since the Doi Moi. The findings of this study suggest that the Vietnamese government could adjust promptly to different media approaches to attain the majority of the anticipated health-care campaign's efficiency. Thus, whether or not the digital approach enhances or injures the people's perception depending on whether visuals minimize or elevate the audience's negative emotions regardless of generalized apprehension.This research analyzed the chain of activities that constitutes the exchange of messages (conventional vs. new media platforms) to assess the efficiency of digitalized propaganda posters aimed at young Vietnamese audiences. Knowledge, propaganda, or persuasion may be conveyed in various ways, depending on the context. The ability to express themselves and start communicating through a systemof symbols, signs, sounds, and graphic elements is a characteristic of human beings that allows them to be understood by their fellows and to recognize that they are members of a specific group; people who speak the same language follow the same set of grammatical rules. The findings show that technological advancement and globalization positively affect propaganda.

MgA. Juraj Ondruš, Ph.D.

Date of defence: 20. 6. 2022

Supervisor: doc. MgA. Libor Nemeškal, Ph.D.

Ethical Dilemmas of Film Editing in Contemporary Slovak Documentary Film

Abstract

Ethical dilemmas in video editing may sound like a broad topic. It is in any case a topic of great importance. On a theoretical level, ethics is the study of the principles in decision making. Video editing involves a kind of subconscious decision making on a daily basis. This is why the author connects and contrasts these two terms in this dissertation. This theme is worth dwelling upon precisely because the video editor frequently edits videos without a retrospective analysis of the decisions made. Decisions made in editing are based to a greater extent on the internal stance of the individual film editor than on the technical aspects of the craft of editing.The aim, therefore, is to show that composition in video editing is an ethical process and that subconscious and automatic decision making can become a conscious automatic process on the side of the video editor.

MgA. Pham Quynh Giao Ngoc, Ph.D.

Date of defence: 20. 6. 2022

Supervisor: prof. MgA. Petr Stanický, MFA

Exhibition of Dong Ho paintings in a virtual reality environment at a Fine Art Museum, Vietnam

Abstract

This thesis aims to find a solution that is suitable for the modern trend of preserving the world's art and applying it to the preservation of Vietnamese folk paintings. In addition, the thesis also wants to perform the experiences in two traditional folk painting environments and folk painting in the form of VR environments and collect data comparing the effectiveness of these two experiences. Finally, this thesis aims to create new inspiration for the popularization and enjoyment of Vietnamese folk painting by the country's young generation.

MgA. Miroslava Ptáčková, Ph.D.

Date of defence: 20. 6. 2022

Supervisor: prof. MgA. Petr Stanický, MFA

Glass as a Reflection of External and Internal space -Development and Analysis of Contemporary Tendencies in Glass Art

Abstract

The dissertation Glass as a Reflection of External and Internal space ?Development andAnalysis of Contemporary Tendencies in Glass Artdeals with the subjective approach in the work of ten Czech glass artists under 35 years. The thesis examines statements about the approach, creative activities, and aspects influencing the work of glass artists. It also presents the authentic views of glass artists on the current trends in Czech glass art. The part of the theoretical work is also an analysis based on the practical part of the dissertation the publication. The book Glass in the Leading Role is acollection of ten interviews with Czech glass artists up to the age of 35, who are activein thefield of free creation. 4Dagmar Petrovická (Sázava), Zdeňka Fusková (Hladké Životice), Tomáš Prokop (Brno), Adam Hejduk (Brno), Barbora Štefánková (Desná), Zuzana Kubelková (Smiradice), Vendulka Prchalová (Prague), Jakub Petr (Jesenný), Irena Czepcová (Počátky) and Tomáš Krejčí (Zlín). The material glass is the main means of expression for all selected artists. The interviews contained in the publication serve as the primary source of information.

MgA. Lucie Trejtnarová, Ph.D.
Date of defence: 12. 12. 2022
Supervisor: doc. M. A. Vladimír Kovařík

Traditional Materials vs. Contemporary Technologies

Abstract

The contemporary landscape of product design, manufacture, marketing and distribution is characterised by rapid changes, manifested through the shifting dynamics between the physical and digital prototyping, material innovations and product manufacturing. In turn, these processes are looking towards reen- gaging the customer/consumer in an active and individualized role. Yet a further role is played by the designer, or a producer in general, as a respon- sible participant within the wider context of sustainability and other ecological sensibilities. The key research aim is the theoretical and practical synthesis of the physical manufacturing and the virtual digital processes in the footwear industry. Thus, this dissertation´s engagement with the rise of the contemporary technologies and materials is accompanied by the goal of achieving sustainable product design, with particular emphasis on shoemaking.

MgA. Vendula Tůmová, Ph.D.

Date of defence: 13. 12. 2022

Supervisor: doc. MgA. Jaroslav Prokop

Photographic presentation of contemporary architecture

Abstract

Despite the increasing presence of photographs of architecture, there is a lack of a platform for the reflection of commissioned photography of architecture in the Czech (and Slovak) environment. Its influence on the image of contemporary architecture is crucial, because photographs created at the initiative of the architect are the predominant and almost the only source of visual material in the presentation of contemporary architecture. The images through which architecture is re-presented reflect the ways in which we think about architecture. Since the photography of architecture does not operate between photographers and their theorists, but in the environment of architecture, one must ask to what extent it is considered a substitute for physical encounter and to what extent it is understood as sharing an idea. The informative value of photographs is usually assessed according to fidelity to lived reality (use of the building) and fidelity to the architectural design (author's idea). The intention of this study is not to confirm or refute the truth of one or other photographic representation of architecture, but to look at the ways in which pictorial reality is constructed through visual language from different perspectives, i.e. how photographs of architecture shape the sense and meaning of objects. The case studies represent different ways of thinking about architecture through its image. They draw attention to different author's concepts, reveal the presentational needs and assignments that are a prerequisite for every visual report on architecture. Reflecting on the principles of custom architecture photography allows us to view this field as a communication tool whose task is to communicate the essence visually. Commissioned photography of architecture is therefore not identified only with perfect images of an apparently perfect work, but is a conscious image construction of architecture that responds to the presentation intention of a specific client.

MgA. Pavel Vrtěl, Ph.D.

Date of defence: 12. 12. 2022

Supervisor: prof. Ing. Ján Grečnár, ArtD.

Ambiances in audiovisual work, ways and options of their capturing, creation of movie space. Interaction with space corrections of dialogs

Abstract

Ambiances are one of the main pillars of film sound dramaturgy. Even if the subjective judgment of the creator (sound master) plays a big role in their recording and application, the the thesis aims to find objective foundation for the definition of ambiance suitable for film use. By analyzing selected theories of acoustic ecology and experience of specialists from the field, the work tries to define qualities that a „good“ film ambiance should have because these criteria play a key role in the recording process itself. Part of this doctoral thesis is field recording of ambiances which represents the practical output of this thesis. However, it also represents a valuable source of information expanding the theoretical basis of the work. The final part of the thesis is devoted to the question of how ambiances and reverberation of the spoken word can mutually affect each other, which is examined on specific model cases.

MgA. Jana Vyoralová, Ph.D.

Date of defence: 12. 12. 2022

Supervisor: doc. Mgr. A. Pavel Noga, ArtD.

Ambiances in audiovisual work, ways and options of their capturing, creation of movie space. Interaction with space corrections of dialogs

Abstract

This dissertation focuses on the development of thinking of children with autism with the help of digital technologies, such as tablets and applications designed for them, and points to the issue of visual and communication strategies in in matters related to autism. The choice of the work topic is linked to the general interest of individuals with autism in computer and multimedia devices. The thesis examines how this technology can be beneficial in their education and development and whether current applications for this group are designed with user needs in mind. As part of the research, the author draws on her own experience of working with children with ASD and their relationship to technology, relies on interviews with the children's parents and special educators, and analyzes current applications. On the basis of research and a theoretical basis, the author specifies the issue and presents proposals for possible solutions.

MgA. Rostislav Zapletal, Ph.D.

Date of defence: 12. 12. 2022

Supervisor: doc. MgA. Martin Surman, ArtD.

Design for electromobility

Abstract

The subject of the dissertation is the design and preparation of the realization of a four-seater sports electric car with an emphasis on an innovative design of the front part of the car to ensure increased handling and safety at higher cruising speeds. The new design concept is a parallel branch of the development of the electric car developed within the research Department of Materials and Technologies for Vehicles of the Technical University of Ostrava. The development of this ambitious project is linked to the Faculty of Multimedia Communications through a long-standing cooperation with the Industrial Design Studio. The main part of the thesis is devoted to the design process of designing and testing innovative solutions. A completely new car with its own concept and defined dimensions was designed. Building a technically very advanced electric car from scratch required an above-standard scope of design work. It was necessary to provide a perfectly comprehensive solution for a huge number of parameters moving from visual to technically fully functional solutions. The designed vehicle meets the strict homologation and safety regulations for road traffic. The technical characteristics of this electric car will place it among the top sports models of the Group's brands.

1.5 Faculty of Humanities

Degree Programme: PEDAGOGY

Degree Course: Pedagogy

PhDr. Mgr. Bc. Barbora Plisková, Ph.D.

Date of defence: 19. 8. 2022

Supervisor: prof. PaedDr. Adriana Wiegerová, PhD.

Grandparents in a Parental Role with Grandchildren Preschoolers

Abstract

This dissertation focuses on kinship foster care, which has been on the periphery of interest of professionals in the educational community in the Czech Republic. I focused on the family environment of grandparents who take on the role of parents and the pedagogical assistance of kindergarten teachers towards families. I based my research on Böhnisch´s concept of educational assistance in managing life which concentrates on socially disadvantaged children. This dissertation aims to extend existing research on the topic of grandparents in the role of parents and their parenting by providing a systematic and structured analysis of the family environment in this type of family, which becomes the framework and social reality of the pedagogical assistance and educational support of kindergarten teachers. To accomplish the objective, a qualitative research design was chosen. The first method was in-depth interviews with six grandparents in the role of parents who take care of their preschool grandchildren, specifically those aged 5-6 years. The second method was interviews with a focus group comprising three social workers and a psychologist. In-depth interviews with nine female teachers who wanted to participate in the research in pairs then became the third method of the research project. The research findings show that grandparents are critical participants in the family environment. However, due to the advanced age of grandparents who are two generations older than the children they are raising, due to health problems, trauma, and other aspects, their parenting has its limitations. Here, the role of the kindergarten, especially kindergarten teachers, as other vital participants whose professional competencies enable them to help grandparents and children educationally, emerges as an essential supporting element. However, in order to achieve quality and effective development, upbringing and education, it is crucial to create a learning community whose existence will lead to the empowerment of children and grandparents.

1.6 University Institute

Degree Programme: MATERIAL SCIENCES AND ENGINEERING

Degree Course: Biomaterials and Biocomposites

Ing. Daniela Jasenská, Ph.D.

Date of defence: 24. 6. 2022

Supervisor: doc. Ing. Věra Kašpárková, CSc.

Study of conducting biocompatible systems based on biopolymers

Abstract

Conducting polymers (CPs) are a class of conjugated polymers currently used in a broad range of applications, including electronics and medical devices. The interest in these materials is motivated by their attractive properties, comprising simple straightforward synthesis, mixed electron and ionic conductivity, and environmental stability. However, the application of CP is limited by their difficult processability. This limitation can be removed via the preparation of conducting colloidal dispersions containing suitable steric stabilizers, such as polymers and biopolymers. This attractive stable form of conducting polymer can also serve for the preparation of films and scaffolds. The thesis focuses first on polyaniline colloidal dispersions stabilized by the biocompatible stabilizers sodium hyaluronate and chitosan, their preparation, the investigation of their properties, and possibilities with respect to their application. With regard to the future utilization of these systems, a precise method of preparation was established, this involving the choice of a suitable ratio of reactant and stabilizer. The colloids were characterized by UV?vis spectra, particle-size distributions, and morphology, as well as by their biological properties in terms of cytotoxicity and antibacterial activities. In the second part of the thesis, successfully prepared colloids served as precursors for the formation of conducting composite films combining polyaniline with the abovementioned polysaccharides. In addition to these films? physico-chemical characteristics, their antibacterial activity and mainly cytocompatibility with human-induced pluripotent stem cells were described. The final part of the thesis is devoted to novel, green synthesis routes for conducting polymers utilizing peroxidase enzymes. Enzymatically synthetized polyaniline colloids were described via their physicochemical and biological

properties, including their cytotoxicity to fibroblasts and macrophages, as well as their immunomodulatory effect on macrophages and neutrophils.

Ilkay Karakurt, Ph.D.

Date of defence: 25. 8. 2022

Supervisor: doc. Ing. Marián Lehocký, Ph.D.

Preparation and characterisation of saccharide-based antibacterial coatings

Abstract

This doctoral thesis aimed at development and characterization of saccharide-based bioactive coatings for biomedical applications. As a degradable, environmentally friendly polymer, polylactic acid was the material of choice for studying the effects of the coatings on the materials biocompatibility and antibacterial properties. The first part of the research focuses on preparation, characterization of glucosamine and chondroitin sulfate immobilized surface-activated PLA films, and the second part is dedicated to evaluating the chitosan and chondroitin sulfate coatings. Both experimental parts were also comprised of antibacterial activity and biocompatibility studies. Moreover, the release trend of the antibiotic lomefloxacin loaded chitosan and chitosan-chondroitin sulfate coated films were described.

Nguyen Hau Trung, MSc., Ph.D.

Date of defence: 29. 8. 2022

Supervisor: doc. Nabanita Saha, M.Sc., Ph.D.

Kombucha leather: Preparation and Characterization

Abstract

Kombucha leather is bacterial cellulose-derived leather developed as vegan leather possibly well-respond to consumers' expectations regarding safety, function, aesthetics, social responsibility, reducing pollution emissions of the leather industry, and also transforming the bio-wastes into useful materials. In this doctoral thesis, Kombucha leather was prepared via the combination between polymers and cellulose harvested from kombucha fermentation

using bio-wastes that comprise two basic stages. In Kombucha-derived bacterial cellulose (KBC) production step, three investigated bio-wastes (sour whey waste, waste apple juice, brewer's spent grains) all displayed the brilliant efficiency in cellulose biosynthesis of Komagataeibacter xylinus compared to traditional kombucha and HS standard media, especially, superiority dry weight accumulated in trials containing sour whey waste (12.59 and 12.81 g/L). The fermentation optimization has then achieved an outstanding KBC dry weight (20.14 +- 0.62 g/L) accompanied by maximizing the amount of treatment-required waste with the optimum formulation of 1000 mL/L sour whey waste, 87.39 g/L cane sugar, 6 g/L black tea, and 78.91 mL/L bacteria volume, under 21 cultured days at 30 °C. Applying on the large containers, the most responsible fermentation batch was obtained at the cultured medium depths of 0.5 cm and low residual bacteria suspension volume of only 72.31 +- 8.74 mL. The characteristics of produced cellulose membranes show no significant differences for all samples compared to bacterial cellulose from HS standard medium. In Kombucha leather fabrication phase, leather-like mat based on KBC/PU/PLA exhibited remarkable mechanical properties compared to other components. Compressive temperature and time also directly affect structures and water resistance capacity of the prepared biocomposite. Especially, KBC were treated with dimethyldichlorosilane, hexadecyltrimethoxysilane, vinyltriethoxysilane, and 3- aminopropyltriethoxysilane have spectacular improved their hydrophobicity. This KBC modification also played a vital role in enhancing compatibility or homogenous blending to provide a stable structure for produced silane-treated KBC-based leather mat. Ultimately, the ingredient and condition of kombucha leather preparation were optimized with outstanding values of elastic modulus, biodegradable and water contact angle respectively reached at 44.07+-0.51 N/mm2, 1.31+-0.04 %, and 94.84+-1.590 from optimum leather-like mat containing KBC (13.74 % w/w), polyurethane elastomer (73.89 % w/w), and polylactic acid (12.50 % w/w), compressed at 155 °C for 5 min. Its morphology, chemical structure, thermal stability, mechanical strength, and biodegradability were characterized and compared to existing commercial leathers. Basically, the results show a possible response to the essential requirements of this Kombucha leather that prospective application in footwear, bags, or interior covering products.

Muhammad Yasir, MSc., Ph.D.

Date of defence: 28. 11. 2022

Supervisor: prof. Ing. Vladimír Sedlařík, Ph.D.

Nanofibrous Polymer Systems for Elimination of Estrogenic Hormones from Wastewater

Abstract

Residual estrogenic hormones represent emerging pollutants in the environment. One of the most important aspects of their effective removal is the design and fabrication of an adsorption system with appropriate properties. This thesis reports on the complex research activities aimed at the development, optimized preparation, and characterization of various electrospun nanofibrous polymer systems for simultaneous removal of estrogenic hormones such as estrone, estradiol, ethinylestradiol, and estriol from wastewater. A wide scale of polymers covering polyurethanes, polyamide, cellulose acetate, polysulfone, polyether sulfone, polylactic acid, polyacrylonitrile, and polyvinylidene fluoride was studied as a matrix for nanofibrous sorption materials. A facile method was developed for the simultaneous determination of tested hormones by using a high-performance liquid chromatography technique coupled with a UV-Vis detector. Sorption kinetics modeling and description of the material vs. hormones interaction mechanisms were an integral part of this study.

2 DEFENDED HABILITATION THESES

In 2022, 6 habilitation theses were defended: 2 at the Faculty of Technology, 3 at the Faculty of Management and Economics and 3 at the Faculty of Applied Informatics.

2.1 Faculty of Technology

Course: Technology of Macromolecular Compounds

RNDr. Martin Humeník, PhD.

Appointed with effect from: 1st June 2022

Technology of Chemical and Physical Processing of Proteins for Functional Surfaces

Abstract

The habilitation will present progress in the field of surface treatment of materials using biopolymer systems based on proteins and their conjugates. Procedures for modification of selected macromolecular systems will be solved so that their function, activity and sensitivity are not affected after their controlled deposition on the surface.

The first part of the work will focus on the modification of gold surfaces using protein-DNA conjugates. It will be shown how the parallel treatment of surfaces and enzyme allows the installation of active protein on gold electrodes for electrochemical detection of enzymatically catalyzed reactions. As part of this research, a biochip was developed in collaboration with Siemens for the detection of bacteria in food sources.

The second part of the work will focus on the processing of protein materials based on spider silk, which can be produced recombinantly on a large scale. Methods for preparing nanofibrils, microparticles, coatings, and hydrogels whose surfaces can be further functionalized with biologically active macromolecules such as enzymes or DNA will be discussed.

The final part of the work will be devoted to the combination of conjugates of proteins and DNA with materials based on spider silk, which can be used to prepare microstructured surfaces for controlled capture of biologically active macromolecules in microfluidic and diagnostic devices.

In terms of practical benefits, it will be shown how the progress achieved in the production of protein-modified surfaces can be implemented in high-performance biosensors in biomedical diagnostics. Furthermore, it will be shown that spider silk-based materials represent a sustainable alternative to synthetic polymer coatings. In addition, due to their biocompatibility and biodegradability, they can be advantageously used in the field of tissue engineering.

Course: Tools and Processes

doc. Ing. Martin Ovsík, Ph.D.

Appointed with effect from: 1st November 2022

Mechanical Properties of Injection Molded Polypropylene Products: Influence of Tool and Process

Abstract

This habilitation thesis investigates mechanical properties of injected polypropylene parts and the manner in which they are influenced by tool´s surface, proces parameters and flow lenght. Considering mechanical properties are not uniform over the entire bulk of a product, a research focusing on this non-homogeneity was desidned. Non-homogeneity of injected articles is influenced by numerous factors, for example flow lenght, mould/melt temperature, injection pressure, crystalline structure, cooling rat, surface of the cavity and more.

In this work, typically used surfaces of the cavity (Ra 0.06 – 1.6 μm) and special coatings (TiB_2 and TiCN) were used. These surface treatments can significantly alter polymer flow (flow lenght) and final mechanical properties of injected articles. As can be seen form the results, noticeable differences in flow lenght (up to 13 %) were measured. Similar tendencies were found in replication ability of the cavity´s surface on the surface of product. The surface was copied unevently in various places of the article.

The key area from the view of mechanical properties is the morphology creation (degree of crystallinity and size of skin/core layer) of the entire product, which is significantly affected by polymer flow and proces parameters of injection moulding. It can be said form the measurements that applied indentation method is sufficiently sensitive to capture the changes to polypropylene´s morphology, which is important for final mechanical properties of an injected article. It was demonstrated that mechanical properties are not uniform over the entire

injected product. Contrary to popular belief, mechanical properties can vary along the flow lenght due to uneven cooling, surface quality and proces parameters. The difference in individual spots in injected article was up to 37 %. Furthermore, it can be said that mechanical properties are non-homogenous not only along the flow lenght, but also across the cross section of a sample. Due to the way a polymer flows and cools in the mould, layers with varying fraction of crystalline phasse get created. These layers are usually called skin, shear and core, and they all demostrate differing mechanical properties which can vary by up to 32 %. Besides the traditional surface finishing methods in mould construction, coating laid upon the cavity are encountered with increased frequency in current technical practice. These coating have a positive effect not only on longevity of the mould, but also on polymer flow and subsequently mechanical properties of injected articles. Application of a coating can lead do 35 % increase of mechanical properties of the product in comparison with traditionally manufactured article.

As is evident form aforementioned results, the possibel benefits of this work for injection moulding of polymer products is apparent. Suitably chosen gate location, surface of the cavity and proces parameters can ensure targeted improvement of mechanical properties in stressed parts of a product.

2.2 Faculty of Management and Economics

Course: Management and Business Economics

doc. Ing. Ján Dvorský, PhD.

Appointed with effect from: 1st January 2022

The impact of business risk management of the future of small and medium-sized enterprises in the business environment

Abstract

Small and medium-sized enterprises (SMEs) are an important element of the quality business environment. They are also considered to be a driving force of structural change and economic growth of many economies. Due to the size and financial possibilities of SMEs, they

have to adapt quickly to new conditions or changes in the business environment. The aim of the habilitation thesis is to demonstrate the positive impact of business risk management on the future of small and medium-sized enterprises. Within the defined goal, the intention is also to quantify the consequences of the COVID crisis on the area of business risks. Data collection was carried out by the method of asking owners and top managers in the form of an online questionnaire. The sample of respondents consisted of 454 SMEs before the pandemic in the Czech republic. The formulated statistical hypotheses of quantitative research were evaluated and verified by selected methods of mathematical statistics: structural equations modeling.

The results of the research showed a significant positive impact of market, financial, strategic, personnel, legal and operational risk management on the future of SMEs in the business environment of the Czech republic. The correct perception of the company's bankruptcy by the owner or top manager positively influences the future of the SME in the business environment of the Czech Republic. Owners and top managers of SMEs consider financial, market and personnel risk to be one of the three most important business risks, regardless of the period of data collection. Using innovative ways to gain new markets and retain existing customers; the perception of the financial performance of SMEs; the respondent's ability to manage financial risk appropriately; the adequacy of personnel risk in SMEs are key aspects, which have an effect on the future of SMEs. Significant differences in their perception due to the pandemic COVID-19 in the SME segment were also demonstrated. Implementing the proposed risk management methodise can help to improve the current risk management process in SMEs. The efforts of SMEs to risk management have their justification especially in the context of the future position or its possible business bankruptcy in the business environment of the CR. The role of SME owners and top managers in business risk management is an important element of enterprise, as the owner or top manager determines the direction of the whole enterprise.

doc. Ing. Katarína Havierniková, PhD.

Appointed with effect from: 1st December 2022

Risk management of small and medium-sized enterprises and cluster co-operation

Abstract:

The risk management of small and medium-sized enterprises is a current topic, which is at the center of the attention of both professional and scientific communities, mainly due to the inconsistency and fragmentation of the methodologies and standards of risk management. In connection with cluster cooperation, there is a research gap for the development of this issue in a new, little-explored, and partially developed area. The identification of risk sources that small and medium-sized enterprises can anticipate in case of their connection into cluster cooperation, is a significant benefit in terms of both theory and practice.

The presented habilitation thesis presented in a form of a scientific monograph examines the main sources of risks affecting the activities of small and medium-sized enterprises in the economic conditions of the Slovak Republic and in the case of their connection in the cluster cooperation.

The main aim of this habilitation thesis presented in a form of a scientific monograph is to identify the structure of risk factors affecting the interest of small and medium-sized enterprises to participate in cluster cooperation, to which the structure of the scientific monograph corresponds.

At the theoretical level, the habilitation thesis presented in a form of a scientific monograph provides an extension of the discussion of theoretical approaches to the categorization of risks and their sources, which occur in the practice of small and medium-sized enterprises.

The habilitation thesis extends the theoretical, as well as the practical framework, in the field of the phenomenon of clustering with the application in the Slovak Republic and with regard to possible risks related to this cooperation.

At the practical level, the most valuable contribution is the identification of six basic categories of risks and their sources occurring in the common practice of small and medium-sized enterprises and four risk factors influencing the decision of small and medium-sized enterprises to join the cluster. From the identified risks the risk catalog is subsequently compiled.

doc. Mgr. Jan Kramoliš, Ph.D.

Appointed with effect from: 1st June 2022

Design Management as an important part of corporate management

Abstract:

The habilitation thesis deals with Design Management as an important part of corporate management. In developed market economies, markets are already so saturated that only the lowest price is no longer the primary key to success. Therefore, the strategic management of companies must necessarily take into account other factors, with one of the five basic factors according to Roy and Potter (1997) being design. Design according to Sedmerová (2015) is one of the basic tools that help the development of companies and is one of the basic prerequisites to strategically achieving higher competitiveness and business success.

The main goal of this work was to identify important aspects of design management in the context of corporate management in the Czech Republic.

Research in the form of a quantitative questionnaire survey examined how companies perceive design, how they work with it, as well as the relationship with business success. The work also analyzed the perception of the importance of the design factor in relation to business success, differences in design approaches, differences in satisfaction with their own design, expectations of return on investment, and the attitude of managers to verify the performance of design. And finally, the influence of personnel aspects of design on the business success was also analyzed.

It has been proven that there is a connection between the perceived importance of design and the perceived business prosperity. Companies are fully aware of the existence of the relationship between design and business prosperity. The results showed that design plays an important role in corporate management, especially in a highly competitive environment of a market or social market economy. For management may be useful newly innovated management analysis models. To evaluate the performance of design, the results of the work offer a new evaluation model based on three aspects and thus also contributes to the knowledge of design management theory.

2.3 Faculty of Applied Informatics

Course: Machine and Process Control

doc. Ing. Jiří Pecha, Ph.D.

Appointed with effect from: 1st January 2022

Mathematical modelling and simulation of recycling processes

Abstract

Habilitation thesis is aimed at quantitative description of recycling processes which were investigated in order to facilitate processing of waste fats and proteins. Processing of waste input feedstock is usually impeded by its fluctuating composition and presence of wide variety of impurities. While said obstacles usually can be overcome by technological means, it is the economic viability which is to be fulfilled in order to achieve application of recycling processes in praxis, apart from ensuring of their flexibility and robustness in regard to unstable feedstock properties. Consequently, mathematical models of studied systems – recycling processes treated in the thesis – often include determination of basic economic parameters.

From the formal point of view, the habilitation thesis is constituted by a collection of published scientific and engineering papers supplemented by a commentary. A set of recycling processes dealing with refining of waste fats and oils accompanied by a process for utilization of final raffinate to basic oleochemical forms first part of the thesis. Its second part is aimed at mathematical modelling of processes devoted to utilization of protein fraction of the input feedstock. Additionally, this part focused on optimization of application conditions of final products of recycling technology.

Thesis deals with development of deterministic models of studied processes based on first principles which were capable of estimation of system states, simulation of its behaviour, and optimization of processing conditions even without the necessity of exact physical realization of the process under investigation. Selected models were experimentally verified and gained results supported pilot-plant and even plant scale successful testing and scale-up of recycling technologies. Developed models are valuable also in the area of recycling pro-

cesses control. They present an initial point for design of studied processes control; especially models quantifying economic parameters are to present suitable component of higher level of the control system or control algorithm.

3 QUALIFYING LECTURES FOR PROFESSORSHIP

3.1 Faculty of Technology

Course: Food Technology

prof. Ing. Eva Samková, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th June 2022
Appointed with effect from: 29th November 2022

Changes in milk components during the processing of dairy products

Abstract

Milk is a complex staple food, which components are important from a nutritional point of view; however, their technological roles cannot be overlooked. The required composition and properties of milk can be influenced to a large extent in primary production. It is thus possible to obtain targeted raw materials to produce specific dairy products. Nutritionally more valuable composition of milk obtained from organic farming than from conventional production is an example.

Changes in milk components start to occur already in milking, continue in storage and especially during processing. These changes are of enzymatic, microbial or chemical nature due to numerous factors, such as the used heat treatment method or the type of produced dairy product. Knowledge of these factors is vital both for preserving valuable components of the original raw milk and for minimising some technological operation negative impacts. The changes can significantly affect the sensory properties of the milk and dairy products and thus their acceptability for consumers.

The professorship proceeding thesis summarises the current knowledge of the main milk components and their technological significance. At the same time, it addresses some changes related to the selected technological operations and the production of specific dairy products.

3.2 Faculty of Management and Economics

Course: Management and Business Economics

prof. Ing. Yuriy Valentynovych Bilan, PhD.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 8th March 2022
Appointed with effect from: 7th June 2022

Changes in business environment as a driver for enterprises development

Abstract

The functioning and development of an enterprise are always characterized by changes in its internal environment and this occurs in a changing environment, that is the external environment. Moreover, changes in the internal environment of the enterprise are mainly due to changes in environmental factors and are actually a reaction to them. The combination and interaction of such changes can increase the risks in the activities of an enterprise and reduce its efficiency, or vice versa strengthen the competitive position in the case of timely and adequate response to environmental challenges. If the challenge is accepted, entrepreneurs assess the consequences and use the available resources, transforming internal weaknesses into strengths, which creates a solid basis for further development, finding new answers to future inevitable changes. Such changes, which require innovative and urgent business responses, including through the improvement or creation of new management processes and systems, are a much more effective driver of enterprise development, compared to planned changes under the conditions of relative stability and the use of economic growth factors.

These aspects are related to the research dimensions presented by the author as selected problematic issues of enterprise development under the conditions of changes in the environment they function. The author's research focuses on the processes of identification of changes, their classification, systematization and the study of the direction and intensity of the impact on the development of enterprises; formation of strategic responses of the enterprise to changes that allow developing competitive advantages and responding to the challenges

of the external environment through the implementation of innovative solutions and the development of successful business ideas; assessment of the consequences of changes in the environment of the enterprise (with special attention to the development of internal management systems and taking into account the requirements of sustainable development). A special direction of the author's work is the methodology of assessing the reverse impact of enterprise development on the competitiveness of the economy, taking into account the influence of factors of sustainability, human development, economic freedom, business regulations, support for innovation. Part of the author's research, illustrated in this lecture on the basis of current data on the activities of enterprises in the European Union, confirms the importance of innovative changes in entrepreneurship for the development of a competitive economy as a whole. In this area of research, the author pays special attention to the development of social entrepreneurship, green entrepreneurship, creative industries, which are considered as responsible business practices that allow finding answers to changes in the environment, while meeting society's expectations for sustainable development.

A special part of the lecture is a presentation of the importance of the research topic for its further development, the creation of a multidisciplinary platform related to the implementation of sustainability requirements in research of enterprise development in a constantly changing business environment and benefits for teaching and practice.

prof. Ing. Alexander Ključnikov, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th June 2022
Appointed with effect from: 29th November 2022

Digital currencies as a tool of financial investment

Abstract

The rapid development of modern information technologies in recent decades and the worldwide onset of digitization of individual processes intensively affect the relatively conservative financial investment area. Digitization has enabled the emergence of a number of new investment mechanisms that allow investors better and cheaper access to traditional investment instruments. In addition to the investment instruments themselves, modern information technologies have made it possible to generate a number of completely new assets that expand the range of investment opportunities in response to specific market failures. The issue

of digital currencies, which has been the subject of scientific research relatively recently, has seen a rapid increase in interest since 2017, when the value of this digital asset increased significantly for the first time.

This lecture aims to analyze and systematize knowledge about the position of digital currencies from the perspective of financial investment instruments. The first part of the lecture is devoted to the theoretical framework of financial investment in the context of digital currencies. This section discusses the basic characteristics of financial investments and the basic parameters of investment decision-making. The second part is devoted to basic economic and technical terminology and processes in the field of digital currencies, the historical development of this type of assets, and the legal status in the context of the Czech Republic and the EU. This chapter also deals with the issue of negative externalities associated with the functioning of digital currencies. The third chapter is devoted to the critical features of the most important digital currencies, the factors of their development, and the tax aspects of investing in this asset. The final chapter synthetically summarizes the key findings on this issue.

The last chapter summarizes the candidate's contribution to the scientific field's development and the pedagogical field's contribution.

3.3 Faculty of Applied Informatics

Course: Machine and Process Control

prof. Mgr. Milan Adámek, Ph.D.

Qualifying Lecture for Professorship in front of the Scientific Board of TBU in Zlín: 14th June 2022
Appointed with effect from: 29th November 2022

Modern Approaches in Measurement for Industrial Security Applications

Abstract

As a part of the research focused on security applications, the design and implementation of a new glass break detector, the issue of operating cameras in a highly disturbing electromagnetic field, and the issue of evaluating the level of training of physical security staff were addressed. These topics fall into the area of alarm security and emergency systems, and the area of physical security.

Furthermore, the issue of forest seedling sorter was solved especially the classification of container coniferous and deciduous seedlings according to the currently valid standard. The issue of bin picking and virtual reality is also mentioned.

4 IMPORTANT SCIENTIFIC AND SPECIALIZED ASSIGNMENTS

4.1 Projectst financed by the Czech Science Foundation (GACR)

In 2022, 8 projects financed by the Czech Science Foundation were implemented at the TBU in Zlín. Total eligible costs amounted CZK 9,485 thousand for TBU in Zlín in 2022.

4.1.1 Faculty of Technology

Junior grants

GJ20-27735Y Nanotechnologies in flow-through electrochemical sensors apllied in environmental engineering
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Jaroslav Filip
Implementation period: 2020 - 2023

Total project cost (CZK thous.):	3 268
Total project cost – TBU (CZK thous.):	3 268
Project cost of TBU in 2022 (CZK thous.):	0

Standard projects

GA21-09174S Viscoelastic non-isothermal modeling of film extrusion process for membranes production including flow induced crystallization
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Martin Zatloukal
Implementation period: 2021 - 2023

Total project cost (CZK thous.):	7 809
Total project cost – TBU (CZK thous.):	7 809
Project cost of TBU in 2022 (CZK thous.):	2 633

4.1.2 Faculty of Applied Informatics

Junior grants

GJ20-00091Y Development of Sustainable Waste Management: Methods and Operations Research Perspectives
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Dušan Hrabec
Implementation period: 2020 - 2022

Total project cost (CZK thous.):	3 327
Total project cost – TBU (CZK thous.):	3 327
Project cost of TBU in 2022 (CZK thous.):	1 144

LA grants

GF21-45465L Metaheuristic-based parametric optimization of time-delay models and control systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Libor Pekař
Implementation period: 2021 - 2024
Total project cost (CZK thous.): 4 652
Total project cost – TBU (CZK thous.): 4 652
Project cost of TBU in 2022 (CZK thous.): 1 569

4.1.3 University Institute

Standard projects

GA19-17457S Manufacturing and analysis of flexible piezoelectric layers for smart engineering
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Miroslav Mrlík
Implementation period: 2019 - 2022
Total project cost (CZK thous.): 8 641
Total project cost – TBU (CZK thous.): 2 820
Project cost of TBU in 2022 (CZK thous.): 0

GA19-23513S Towards New Electroluminescent Materials: Borane Cluster Compounds in Thin Polymer Films within an Electric Field
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Ivo Kuřitka
Implementation period: 2019 - 2023
Total project cost (CZK thous.): 5 317
Total project cost – TBU (CZK thous.): 5 317
Project cost of TBU in 2022 (CZK thous.): 0

GA20-28732S Colloidal systems for topical formulations. Pickering emulsions and polymer based colloids
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Petr Humpolíček
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 4 978
Total project cost – TBU (CZK thous.): 4 978
Project cost of TBU in 2022 (CZK thous.): 1 607

GA22-33307S Development of new 3D hierarchically structured polysaccharide and protein porous systems
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Antonín Minařík
Implementation period: 2022 - 2024
Total project cost (CZK thous.): 7 692

Total project cost – TBU (CZK thous.):	7 692
Project cost of TBU in 2022 (CZK thous.):	2 532

4.2 Projects financed by the Ministry of Industry and Trade of the Czech Republic

In 2022, 13 projects financed by the Ministry of Industry and Trade of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 27,099 thousand for TBU in Zlín in 2022.

4.2.1 Faculty of Technology

Projects where TBU acts as a co-investigator

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

EG20_321/0024951 Development of an automated calibration process by implementing innovative features

Principal investigator: PRIMA BILAVČÍK, s. r. o.
Project investigator on behalf of TBU: Milena Kubišová / Vladimír Pata
Implementation period: 2021- 2023

Total project cost (CZK thous.):	29 140
Total project cost – TBU (CZK thous.):	3 284
Project cost of TBU in 2022 (CZK thous.):	0

CZ.01.1.02/0.0/0.0/20_324/0023586 Reverse engineering for the development of technology maintenance modules for polymer production

Principal investigator: WORK SYSTEM, s. r. o.
Project investigator on behalf of TBU: Berenika Hausnerová
Implementation period: 2021- 2023

Total project cost (CZK thous.):	6 766
Total project cost – TBU (CZK thous.):	2 449
Project cost of TBU in 2022 (CZK thous.):	802

4.2.2 Faculty of Management and Economics

Projects where TBU acts as a co-investigator

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

EG20_321/0024555 Cost modelling - software for modelling business cost flows using the TD-ABC method
Principal investigator: INEKON SYSTEMS s. r. o.

Project investigator on behalf of TBU: Petr Novák
Implementation period: 2021 - 2022
Total project cost (CZK thous.): 9 617
Total project cost – TBU (CZK thous.): 1 272
Project cost of TBU in 2022 (CZK thous.): 1 272

4.2.3 Faculty of Applied Informatics

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

Projects where TBU acts as a co-investigator

EG19_262/0020111 Navigation and tracking system TEVOGS 3.0
Principal investigator: Techniserv, spol. s. r. o.
Project investigator on behalf of TBU: Tomáš Dulík
Implementation period: 2020 – 2022
Total project cost (CZK thous.): 31 000
Total project cost – TBU (CZK thous.): 5 750
Project cost of TBU in 2022 (CZK thous.): 4 065

EG19_262/0020292 Expert system for custom manufacturing companies with artificial intelligence support
Principal investigator: CATHEDRAL Software, s.r.o.
Project investigator on behalf of TBU: Tomáš Dulík
Implementation period: 2020 – 2023
Total project cost (CZK thous.): 17 521
Total project cost – TBU (CZK thous.): 6 803
Project cost of TBU in 2022 (CZK thous.): 3 410

EG20_321/0023675 Research and Development of an Automatic Emulsification Line of Semi-finished Radial and Diagonal Tires of Large Dimensions
Principal investigator: Prozax Otrokovice s. r. o.
Project investigator on behalf of TBU: Vladimír Vašek
Implementation period: 2020 – 2022
Total project cost (CZK thous.): 57 692
Total project cost – TBU (CZK thous.): 6 069
Project cost of TBU in 2022 (CZK thous.): 6 069

EG20_321/0023805 Robotized Camera Workplace for Measuring and Checking Shape Defects of Forgings and Workpieces Using Artificial Intelligence
Principal investigator: VIVA CV s. r. o.
Project investigator on behalf of TBU: Vladimír Vašek
Implementation period: 2020 – 2023
Total project cost (CZK thous.): 14 302
Total project cost – TBU (CZK thous.): 7 114
Project cost of TBU in 2022 (CZK thous.): 3 264

EG20_321/0023870 Development of a new unmanned system for monitoring and control of environmental management
Principal investigator: AIRMOBIS s. r. o.
Project investigator on behalf of TBU: Zuzana Komínková Oplatková
Implementation period: 2020 – 2023
Total project cost (CZK thous.): 17 518
Total project cost – TBU (CZK thous.): 4 709
Project cost of TBU in 2022 (CZK thous.): 697

EG21_374/0026739 NETDIRECT S.R.O. - BLOCKCHAIN TECHNOLOGIE IN BUSINESS INTELIGENCE (BI) APLICATION
Principal investigator: NetDirect s.r.o.
Project investigator on behalf of TBU: Radek Vala
Implementation period: 2021 – 2023
Total project cost (CZK thous.): 14 918
Total project cost – TBU (CZK thous.): 1 852
Project cost of TBU in 2022 (CZK thous.): 515

TRIO Programme

Projects where TBU acts as a co-investigator

FV40233 Research and development of processes of microbial hydrolysis for the preparation of components with high biological value
Principal investigator: KORTAN spol. s r.o.
Project investigator on behalf of TBU: Karel Kolomazník
Implementation period: 2019 – 2022
Total project cost (CZK thous.): 27 171
Total project cost – TBU (CZK thous.): 2 682
Project cost of TBU in 2022 (CZK thous.): 682

4.2.4 University Institute

The Operational Programme Enterprise and Innovations for Competitiveness (OP PIK)

Projects where TBU acts as a co-investigator

EG20_321/0024533 Design LED luminaire with homogeneous emitting surface
Principal investigator: LAMBERGA s. r. o.
Project investigator on behalf of TBU: Petr Sáha
Implementation period: 2021 - 2023
Total project cost (CZK thous.): 10 493
Total project cost – TBU (CZK thous.): 1 800
Project cost of TBU in 2022 (CZK thous.): 0

EG20_321/0025211 Research and optimization of anticorrosive pigments multiplying the protection of metal surfaces with emphasis on their environmental and rational economic efficiency

Principal investigator: ROKOSPOL, a. s.
Project investigator on behalf of TBU: Michal Machovský
Implementation period: 2021 - 2023
Total project cost (CZK thous.): 45 690
Total project cost – TBU (CZK thous.): 5 588
Project cost of TBU in 2022 (CZK thous.): 5 588

TRIO Programme

Projects where TBU acts as a co-investigator

FV40377 Research and development of a biocompatible material for controlled drug release and transport into the cornea
Principal investigator: GEMINI eye clinic, a. s.
Project investigator on behalf of TBU: Pavel Urbánek
Implementation period: 2019 - 2022
Total project cost (CZK thous.): 10 152
Total project cost – TBU (CZK thous.): 3 095
Project cost of TBU in 2022 (CZK thous.): 735

4.3 Projects financed by the Ministry of Education, Youth and Sports of the Czech Republic

In 2022, 8 projects financed by the Ministry of Education, Youth and Sports of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 5,772 thousand for TBU in Zlín in 2022.

4.3.1 Faculty of Management and Economics

INTER-EXCELLENCE Programme (2016 – 2024)

LTC20047 Regional development and public policy under creative economy: Mapping, knowledge sharing and management of New Working Spaces in the Czech Republic
Project investigator on behalf of TBU: Pavel Bednář
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 3 620
Total project cost – TBU (CZK thous.): 3 620
Project cost of TBU in 2022 (CZK thous.): 1 017

4.3.2 Faculty of Applied Informatics

MOBILITY Programme

8J22AT006 Using Evolutionary Algorithms for Design and Optimization of 3D-Antennas
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Stanislav Kovář
Implementation period: 2022 - 2023
Total project cost (CZK thous.): 110
Total project cost – TBU (CZK thous.): 110
Project cost of TBU in 2022 (CZK thous.): 41

INTER EUREKA Programme

LTE2019003 FERTI-MAIZE foliar fertilizer for maize based on protein by-products
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Karel Kolomazník
Implementation period: 2019 - 2022
Total project cost (CZK thous.): 4 920
Total project cost – TBU (CZK thous.): 1 584
Project cost of TBU in 2022 (CZK thous.): 382

4.3.3 University Institute

MOBILITY Programme

8J20PL026 Biodegradable polymer nanocomposite systems with improved thermal and mechanical properties
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Martina Pummerová
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 120
Total project cost – TBU (CZK thous.): 120
Project cost of TBU in 2022 (CZK thous.): 60

INTER EXCELLENCE - INTER ACTION Programme

LTAUSA19066 A study of polymeric memristors based on methacrylate polymers with pendant carbazole moieties
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Jarmila Vilčáková
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 5 756
Total project cost – TBU (CZK thous.): 2 850
Project cost of TBU in 2022 (CZK thous.): 950
INTER EXCELLENCE - INTER TRANSFER Programme

LTT20005 Collaboration with the EASE association on the development of a hybrid supercapacitor
Principal investigator: TBU in Zlín

Project investigator on behalf of TBU: Petr Sáha
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 4 913
Total project cost – TBU (CZK thous.): 4 913
Project cost of TBU in 2022 (CZK thous.): 1 607

LTT20010 Surface functionalized glass: Concept of heterostructured nanoparticles inspired by arteficial photosynthesis
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Michal Machovský
Implementation period: 2020 - 2024
Total project cost (CZK thous.): 7 765
Total project cost – TBU (CZK thous.): 7 765
Project cost of TBU in 2022 (CZK thous.): 1 610

Programme for Funding Multilateral Scientific and Technological Cooperation in the Danube Region

8X20041 Design and preparation of multifunctional magnetic nanoparticles for cancer cell detection / Development of biocompatible multifunctional magnetic nanoparticles and evaluation of their diagnostic and therapeutic potential for the application in oncology
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Jarmila Vilčáková
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 253
Total project cost – TBU (CZK thous.): 253
Project cost of TBU in 2022 (CZK thous.): 105

4.4 Projects financed by the Ministry of the Interior of the Czech Republic

In 2022, 5 projects financed by the Ministry of the Interior of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 8,583 thousand for TBU in Zlín in 2022.

4.4.1 Faculty of Applied Informatics

Security Research Programme in the Czech Republic 2015 - 2022

VI20192022134 System of more accurate prediction of convective precipitation over the regional territorial unit
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: David Šaur
Implementation period: 2019 - 2022

Total project cost (CZK thous.):	13 273
Total project cost – TBU (CZK thous.):	7 887
Project cost of TBU in 2022 (CZK thous.):	1 281

IMPACT I Programme

VJ02010043 Reconstruction of a security incident scenario in a virtual reality environment

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Milan Adámek
Implementation period: 2022 - 2025

Total project cost (CZK thous.):	14 975
Total project cost – TBU (CZK thous.):	12 142
Project cost of TBU in 2022 (CZK thous.):	2 917

Projects where TBU acts as a co-investigator

VI20192022118 Soft targets protection in the security environment of the Czech Republic

Principal investigator: VUT Brno
Project investigator on behalf of TBU: Martin Hromada
Implementation period: 2019 - 2022

Total project cost (CZK thous.):	16 781
Total project cost – TBU (CZK thous.):	2 989
Project cost of TBU in 2022 (CZK thous.):	889

VB01000008 FLAPRIS - A system to support accurate and timely forecasting of the risk of flash floods and facilitating the activities of the crisis and flood authorities of the region

Principal investigator: T-SOFT a. s.
Project investigator on behalf of TBU: David Šaur
Implementation period: 2022 - 2023

Total project cost (CZK thous.):	11 069
Total project cost – TBU (CZK thous.):	4 367
Project cost of TBU in 2022 (CZK thous.):	2 555

4.4.2 Faculty of Logistic and Crisis Management

Security Research Programme in the Czech Republic 2015 - 2022

VI04000080 Crisis Logistics Information Platform

Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Jakub Rak
Implementation period: 2021 - 2022

Total project cost (CZK thous.):	5 696
Total project cost – TBU (CZK thous.):	1 736
Project cost of TBU in 2022 (CZK thous.):	941

4.5 Projects financed by the Ministry of Agriculture of the Czech Republic

In 2022, 1 project financed by the Ministry of Agriculture of the Czech Republic was implemented at the TBU in Zlín. Total eligible costs amounted CZK 1,417 thousand for TBU in Zlín in 2022.

4.5.1 University Institute

ZEMĚ Programme

QK1910392 Environmentally friendly soil conservation materials for the crop production intensification based on renewable resource
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Vladimír Sedlařík
Implementation period: 2019 - 2023

Total project cost (CZK thous.):	16 511
Total project cost – TBU (CZK thous.):	6 952
Project cost of TBU in 2022 (CZK thous.):	1 417

4.6 Projects financed by the Technology Agency of the Czech Republic

In 2022, 28 projects financed by the Technology Agency of the Czech Republic were implemented at the TBU in Zlín. Total eligible costs amounted CZK 35,874 thousand for TBU in Zlín in 2022.

4.6.1 Faculty of Technology

THÉTA Programme

TK03020129 Rubber sealing materials development for hermetic systems of nuclear power plants
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Simona Mrkvičková
Implementation period: 2020 - 2024

Total project cost (CZK thous.):	17 022
Total project cost – TBU (CZK thous.):	4 526
Project cost of TBU in 2022 (CZK thous.):	1 256

Projects where TBU acts as a co-investigator

TK01030054 Controlled biological methane production in situ
Principal investigator: EPS biotechnology, s. r. o.
Project investigator on behalf of TBU: Marek Koutný

Implementation period: 2018 - 2022
Total project cost (CZK thous.): 15 464
Total project cost – TBU (CZK thous.): 3 490
Project cost of TBU in 2022 (CZK thous.): 756

ZÉTA Programme

Projects where TBU acts as a co-investigator

TJ04000226 Combined procedure of elimination of chloroacetanilide pesticides from contaminated water and soil
Principal investigator: Univerzita Pardubice
Project investigator on behalf of TBU: Štěpán Vinter
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 8 053
Total project cost – TBU (CZK thous.): 2 002
Project cost of TBU in 2022 (CZK thous.): 237

4.6.2 Faculty of Management and Economics

ÉTA Programme

TL03000319 Economics and ethics of foreign investors in the Czech Republic
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Adriana Knápková
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 4 753
Total project cost – TBU (CZK thous.): 4 753
Project cost of TBU in 2022 (CZK thous.): 1 597

TL03000525 Design of a Model of Metropolitan Areas in the Czech Republic affected by depopulation
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Pavel Bednář
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 8 438
Total project cost – TBU (CZK thous.): 1 457
Project cost of TBU in 2022 (CZK thous.): 476

TL03000737 Use of behavioral economics to society activation to achieve financial safety by using banking products
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Lubor Homolka
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 1 009
Total project cost – TBU (CZK thous.): 951
Project cost of TBU in 2022 (CZK thous.): 216

TL05000328 Setting the market price for the financial transactions while using the arm's length principle
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: David Homolka
Implementation period: 2021 - 2023
Total project cost (CZK thous.): 3 460
Total project cost – TBU (CZK thous.): 172
Project cost of TBU in 2022 (CZK thous.): 46

Projects where TBU acts as a co-investigator

TJ01000191 Innovation of tourism management systems by means of process management tools
Principal investigator: ZČU Plzeň
Project investigator on behalf of TBU: Zuzana Tučková
Implementation period: 2018 - 2022
Total project cost (CZK thous.): 11 907
Total project cost – TBU (CZK thous.): 1 387
Project cost of TBU in 2022 (CZK thous.): 46

TREND Programme

Projects where TBU acts as a co-investigator

FW03010562 New software tool for export support of small and medium-sized Czech companies
Principal investigator: NetDirect s.r.o.
Project investigator on behalf of TBU: Jiří Bejtkovský
Implementation period: 2021 - 2023
Total project cost (CZK thous: 14 971
Total project cost – TBU (CZK thous.): 1 799
Project cost of TBU in 2022 (CZK thous.): 625

FW03010194 Development of a system for monitoring and evaluation of selected risk factors of the physical load of work operations in the context of Industry 4.0.
Principal investigator: Incontio Ltd.
Project investigator on behalf of TBU: David Tuček
Implementation period: 2021 - 2024
Total project cost (CZK thous: 18 474
Total project cost – TBU (CZK thous.): 3 084
Project cost of TBU in 2022 (CZK thous.): 1 017

4.6.3 Faculty of Multimedia and Communications

ÉTA Programme

TL03000367 USING VIRTUAL REALITY IN ART: CREATING AN EXPERIENCE IN THE WORLD OF FANTASY AND INSPIRATION OF KAREL ZEMAN
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Peter Štarchoň
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 9 299
Total project cost – TBU (CZK thous.): 2 095
Project cost of TBU in 2022 (CZK thous.): 748

4.6.4 Faculty of Applied Informatics

EPSILON Programme

Projects where TBU acts as a co-investigator

TH04010377 Development of methods of identification and protection of soft targets within transport infrastructure to increase their security and resistance to terrorist threats
Principal investigator: VUT Brno
Project investigator on behalf of TBU: Dora Lapková
Implementation period: 2019 - 2022
Total project cost (CZK thous.): 10 639
Total project cost – TBU (CZK thous.): 5 217
Project cost of TBU in 2022 (CZK thous.): 1 338

TREND Programme

Projects where TBU acts as a co-investigator

FW01010381 Intelligent robotic protection of the health of the hydroponic greenhouse ecosystem
Principal investigator: NWT a. s.
Project investigator on behalf of TBU: Roman Jašek
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 38 006
Total project cost – TBU (CZK thous.): 19 810
Project cost of TBU in 2022 (CZK thous.): 4 968

DELTA 2 Programme

Projects where TBU acts as a co-investigator

TM03000062 Isolation of high-quality proteins for animal feed by complex processing of chromium rods and similar raw materials
Principal investigator: Kovoprojekta Brno a. s.
Project investigator on behalf of TBU: Jiří Pecha
Implementation period: 2022 - 2025
Total project cost (CZK thous.): 9 454

Total project cost – TBU (CZK thous.): 6 130
Project cost of TBU in 2022 (CZK thous.): 1 701

THÉTA Programme

TK04020222 Decentralisation of energy sources in an existing district heating system
Principal investigator: Teplárna Otrokovice a. s.
Project investigator on behalf of TBU: Vladimír Vašek
Implementation period: 2022 - 2024
Total project cost (CZK thous.): 7 721
Total project cost – TBU (CZK thous.): 5 146
Project cost of TBU in 2022 (CZK thous.): 1 202

4.6.5 Faculty of Humanities

ÉTA Programme

TL03000191 Labelling of intellectually gifted children at school environment
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Eva Machů
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 3 645
Total project cost – TBU (CZK thous.): 3 645
Project cost of TBU in 2022 (CZK thous.): 1 336

4.6.6 Faculty of Logistic and Crisis Management

ÉTA Programme

TL03000007 Strengthening rural resilience through the mobilisation of local actors and landowners
Principal investigator: TBU in Zlín
Project investigator on behalf of TBU: Jiří Lehejček
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 9 064
Total project cost – TBU (CZK thous.): 2 359
Project cost of TBU in 2022 (CZK thous.): 622

4.6.7 University Institute

EPSILON Programme

Projects where TBU acts as a co-investigator

TH04020466 REAKTIN - Longfiber composites for serial production
Principal investigator: 5M s. r. o.
Project investigator on behalf of TBU: Tomáš Sedláček

Implementation period: 2019-2022
Total project cost (CZK thous.): 10 074
Total project cost – TBU (CZK thous.): 2 065
Project cost of TBU in 2022 (CZK thous.): 443

GAMA2 Programme

TG03010052 Commercialization at the Tomas Bata University in Zlin II
Project investigator on behalf of TBU: Miroslava Komínková
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 11 032
Total project cost – TBU (CZK thous.): 11 032
Project cost of TBU in 2022 (CZK thous.): 2 454

M-ERA.NET Programme

TH71020006 Li-ion BAttery-SupErcapacitor Hybrid Device
Project investigator on behalf of TBU: Petr Sáha
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 2 036
Total project cost – TBU (CZK thous.): 2 036
Project cost of TBU in 2022 (CZK thous.): 637

TH80020008 Modelling Wear of Intrinsically Self-Healing Elastomers for Reduced Particle Emission and Improved Lifetime Performance in Future e-Mobility Concepts
Project investigator on behalf of TBU: Radek Stoček
Implementation period: 2022 - 2025
Total project cost (CZK thous.): 5 561
Total project cost – TBU (CZK thous.): 5 561
Project cost of TBU in 2022 (CZK thous.): 642

Projects where TBU acts as a co-investigator

TH71020005 Bioactive injectable hydrogels for soft tissue regeneration after reconstructive maxillofacial surgeries INJECT-BIO
Principal investigator: Riga Technical University
Project investigator on behalf of TBU: Nabanita Saha
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 1 519
Total project cost – TBU (CZK thous.): 1 359
Project cost of TBU in 2022 (CZK thous.): 525

THÉTA Programme

TK03030157 Next generation all-solid-state Li-ion batteries
Project investigator on behalf of TBU: Petr Sáha
Implementation period: 2020 - 2025
Total project cost (CZK thous.): 24 534

Total project cost – TBU (CZK thous.): 24 534
Project cost of TBU in 2022 (CZK thous.): 4 771

TREND Programme

Projects where TBU acts as a co-investigator

FW01010588 Filters for removal of biologically active molecules from the drinking water
Principal investigator: Nedform s. r. o.
Project investigator on behalf of TBU: Vladimír Sedlařík
Implementation period: 2020 - 2022
Total project cost (CZK thous.): 11 043
Total project cost – TBU (CZK thous.): 4 418
Project cost of TBU in 2022 (CZK thous.): 1 468

FW01010620 Research and development of materials and technology of small batch production of structural and sealing elements
Principal investigator: G 3, s.r.o.
Project investigator on behalf of TBU: Michal Machovský
Implementation period: 2020 - 2023
Total project cost (CZK thous.): 20 096
Total project cost – TBU (CZK thous.): 5 009
Project cost of TBU in 2022 (CZK thous.): 1 381

FW01010327 Advanced polymer and composite materials for additive manufacturing
Principal investigator: SPA 2000 s. r. o.
Project investigator on behalf of TBU: Jarmila Vilčáková
Implementation period: 2020 - 2024
Total project cost (CZK thous.): 18 134
Total project cost – TBU (CZK thous.): 4 376
Project cost of TBU in 2022 (CZK thous.): 1 094

FW03010006 Permanent protection of touch screens to prevent the deposition of organic pollutants on their surface
Principal investigator: FORTES interactive, s.r.o.
Project investigator on behalf of TBU: Martina Pummerová
Implementation period: 2021 - 2024
Total project cost (CZK thous.): 29 572
Total project cost – TBU (CZK thous.): 5 194
Project cost of TBU in 2022 (CZK thous.): 1 321

FW03010465 Technological production scrap as an innovative material source in a process of production of nonwoven textile
Principal investigator: PFNonwovens Czech s.r.o.
Project investigator on behalf of TBU: Tomáš Sedláček
Implementation period: 2021 - 2024
Total project cost (CZK thous.): 66 383

Total project cost – TBU (CZK thous.): 13 180
Project cost of TBU in 2021 (CZK thous.): 3 250

4.7 Projects financed by the Ministry of Culture

In 2022, 1 project financed by the Ministry of Culture was implemented at the TBU in Zlín.

Total eligible costs amounted CZK 4,017 thousand for TBU in Zlín in 2022.

4.7.1 Faculty of Multimedia Communications

NAKI II Programme

Projects where TBU acts as a co-investigator

DG18P02OVV059 Designers in the Czech Lands and the Czechoslovak Machinery Industry
Principal investigator: National Technical Museum
Project investigator on behalf of TBU: Zdeno Kolesár
Implementation period: 2018 - 2022
Total project cost (CZK thous.): 21 422
Total project cost – TBU (CZK thous.): 11 051
Project cost of TBU in 2022 (CZK thous.): 1 214

4.8 Projects financed by European Commission

In 2022, 6 projects financed by European Commission was implemented at the TBU in Zlín.

Total eligible costs amounted CZK 1,812 thousand for TBU in Zlín in 2022.

4.8.1 Faculty of Technology

Horizon 2020 Programme

Strategies of circular Economy and Advanced bio-based solutions to keep our Lands and seas alIVE from plastics contamination (SEALIVE)
Project investigator on behalf of TBU: Marek Koutný
Implementation period: 2019 – 2023
Total project cost (CZK thous.): 282 111
Total project cost – TBU (CZK thous.): 8 218
Project cost of TBU in 2022 (CZK thous.): 1 644

4.8.2 Faculty of Management and Economics

Horizon Europe Programme

Sustainable Horizons
Project investigator on behalf of TBU: Michaela Blahová
Implementation period: 2022 – 2024
Total project cost – TBU (CZK thous.): 4 619
Project cost of TBU in 2022 (CZK thous.): 1 540

4.8.3 Faculty of Applied Informatics

Horizon Europe Programme

European Doctoral Network for Safe and Sustainable by Design Electromagnetic Shielding Material / PARASOL
Project investigator on behalf of TBU: Stanislav Kovář
Implementation period: 2022 – 2026
Total project cost (CZK thous.): 65 830
Total project cost – TBU (CZK thous.): 0

4.8.4 University Institute

Horizon Europe Programme

Storage Research Infrastructure Eco-System StoRIES
Project investigator on behalf of TBU: Petr Sáha
Implementation period: 2021- 2025
Total project cost – TBU (CZK thous.): 336
Project cost of TBU in 2022 (CZK thous.): 168

TWINNING FOR DEVELOPMENT OF WORLD-CLASS NEXT GENERATION BATTERIES
Project investigator on behalf of TBU: Viera Pechancová
Implementation period: 2022- 2025
Total project cost (CZK thous.): 33 235
Total project cost – TBU (CZK thous.): 9 295
Project cost of TBU in 2022 (CZK thous.): 516

SOLiD - Sustainable manufacturing and optimized materials and interfaces for lithium metal batteries with digital quality control

Project investigator on behalf of TBU: Viera Pechancová
Implementation period: 2022 – 2026
Total project cost (CZK thous.): 171 906
Total project cost – TBU (CZK thous.): 7 482
Project cost of TBU in 2022 (CZK thous.): 715

4.9 PROJECTS – SUMMARY

Number of projects implemented in 2022

Component part / Provider	European Commission	Czech Science Foundation	Ministry of Culture	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
				MIT total	Operational Programme projects	MEYS total	Operational Programme projects				
Faculty of Technology	1	2	0	2	2	3	3	0	0	3	11
Faculty of Management and Economics	1	0	0	1	1	2	1	0	0	7	11
Faculty of Multimedia Communications	0	0	1	0	0	0	0	0	0	1	2
Faculty of Applied Informatics	1	2	0	7	6	4	2	4	0	4	22
Faculty of Humanities	0	0	0	0	0	0	0	0	0	1	1
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	1	0	1	2
TBU Library	0	0	0	0	0	0	0	0	0	0	0
University Institute	3	4	0	3	2	5	0	0	1	11	27
Rectorate	0	0	0	0	0	0	0	0	0	0	0
TBU total	6	8	1	13	11	14	6	5	1	28	76

Total costs acknowledged for TBU in Zlín in 2022 za UTB (in CZK thousands)

Component part / Provider	European Commission	Czech Science Foundation	Ministry of Culture	Ministry of Industry and trade of the Czech Republic		Ministry of Education, Youth and Sports of the Czech Republic		Ministry of the Interior of the Czech Republic	Ministry of Agriculture of the Czech Republic	Technology Agency of the Czech Republic	Total
				MIT total	Operational Programme projects	MIT total	Operational Programme projects				
Faculty of Technology	1 644	2 633	0	802	802	6 549	6 549	0	0	2249	13 877
Faculty of Management and Economics	1 540	0	0	1 272	1 272	4 419	3 402	0	0	4 047	11 278
Faculty of Multimedia Communications	0	0	1 214	0	0	0	0	0	0	748	1 962
Faculty of Applied Informatics	0	2 713	0	18 702	18 020	4 292	3 869	7 642	0	9 209	42 558
Faculty of Humanities	0	0	0	0	0	0	0	0	0	1336	1 336
Faculty of Logistics and Crisis Management	0	0	0	0	0	0	0	941	0	622	1 563
TBU Library	0	0	0	0	0	0	0	0	0	0	0
University Institute	1 399	4 139	0	6 323	5 588	4 332	0	0	1 417	17663	35 273
Rectorate	0	0	0	0	0	0	0	0	0	0	0
TBU total	4 583	9 485	1 214	27 099	25 682	19 592	13 820	8 583	1 417	35 874	107 847

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The publication was not checked for language or editorial.