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Contents

Research Articles

The Ambiguous Awareness of Approaching Squeeze-out – Czech Case Study in the EU Perspective	7
JUDr. Ing. Eva Daniela Cvik; JUDr. Radka MacGregor Pelikánová, Ph.D., LL.M., MBA	
Czech Republic in the Context of International Tourism: Its Position and Competitiveness	19
Ing. Lenka Červová, Ph.D.	
Single Colour Trademarks not Only on the Current Czech Market.....	36
Anastasiia Dmitrieva, M.A.; JUDr. Radka MacGregor Pelikánová, Ph.D., LL.M., MBA	
Performance of the Textile Industry Companies in the Liberec Region.....	50
doc. Dr. Ing. Olga Hasprová; Ing. Zdeněk Brabec, Ph.D.	
Debt Characteristics Knowledge of Entrepreneurs in the SME Sector of the Czech Republic.....	62
Ing. Ludmila Kozubíková, Ph.D.; Bc. Robin Klička; Bc. Darek Maňák	
An Innovative Approach to Human Resource Management in Small and Medium Enterprises: The SHARPEN Project	78
Ing. Ondřej Moš, M.Sc.	
Inter-Sectoral Mobility in the Context of the European Research Area.....	88
Ing. Radka Pittnerová; Doc. Ing. Petra Rydvalová, Ph.D.	
Internationalization of Czech Companies in Brazil	103
Renan Stefanutti	
Comparative Analysis Study of Selected Alternative Finance	120
Ing. Petra Taušl Procházková, Ph.D.; Ing. David Musil	

Miscellanea

Application of Spare Parts Management Methods in the Companies in the Czech Republic.....	136
Marcio Rodrigues; Ing. Eva Šírová, Ph.D.	
Master Production Scheduling and the Relevance of Included Social Criteria	146
Dipl. Wirtsch.-Ing. (FH) Marco Trost, M.A.; Prof. Dr. habil. Thorsten Claus; Prof. Dr.-Ing. Frank Herrmann	
Can Aggregate Production Planning (APP) Be Modified to Be as Good as Master Production Scheduling (MPS)?	155
Thorsten Vitzthum, M.Sc.; Prof. Dr. habil. Thorsten Claus; Prof. Dr.-Ing. Frank Herrmann	

List of Authors	163
List of Reviewers of ACC JOURNAL	164
Guidelines for Contributors	169
Editorial Board	170

Research Articles

THE AMBIGUOUS AWARENESS OF APPROACHING SQUEEZE-OUT – CZECH CASE STUDY IN THE EU PERSPECTIVE

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Abstract

A forced transfer of participating securities, squeeze-out, is an animadverted legal method used by shareholders in the EU, which was significantly changed by the recent Czech re-codification. A new duty was imposed upon the majority shareholders for the squeeze-out scenario – to proceed vis-à-vis all minority shareholders in the same manner. They all should get the same compensation, and even the same evening-up. To make this new rule effectively and efficiently applicable, minority shareholders need to be aware of it. The trio of goals of this paper is to describe and explain this duty and to provide a deep, critical and comparative analysis of the awareness of the approaching squeeze-out generating it, while using a set of interrelated hypotheses and relying on primary as well secondary multidisciplinary data in the Czech Republic as well as in the EU. The yield results with comments suggest the insufficient awareness impairing the application of the newly imposed duty in the Czech Republic and the squeeze-outs in general in the EU.

Keywords

Shareholder companies; Minority share; Shareholder; Squeeze-out.

Introduction

In our global, post-modern, and highly competitive society there re-occur constantly complex prima facie contradictory values and priorities; and both the society [23] and its reflection, the law, need to address and balance them. Naturally, the modern European integration faces these issues [19]. Undoubtedly, the more than one-decade long harmonization of shareholders and shareholder companies relationships, such as via Directive 2004/24/EC on takeover bids (“Takeover Directive”), belongs to them and touches, among other items, the hot squeeze-out matter, business sustainable prosperity v. failure in the economic process of “creative destruction” [24], leading to the total devaluation of investment and elimination of participation [26]. It is highly legitimate because stricter takeover laws increase the protection and wealth gains to shareholders, they do not hurt the bidder and contribute to the efficiency of the market [28]. Squeeze-out is a legal method allowing a shareholder with an at least 90% share in the shareholder company to become the only, a 100% shareholder. Generally, a squeeze-out means that the majority shareholder initiates proceedings leading to the transfer of all remaining shares to this shareholder. The majority shareholder has the duty to provide minority shareholders with a financial compensation. The main purpose of the squeeze-out is to allow the majority shareholder to become the only shareholder. The transfer of the

ownership rights from minority shareholders to majority shareholders occurs after the expiration of one-month period after the publication of the transcript from the general meeting in the Commercial Register. At that moment, minority shareholders lose their participation in the company and their ownership rights to their shares pass, without the will of these minority shareholders, to the majority shareholder. The squeeze-out has often been a subject matter of criticism and while considering “Constitutional” human rights and fundamental freedoms as well as public order and even *bonnes mores* – good manners [20]. The re-codification of the Private Law with the new Act No. 90/2012 Coll., on Business Corporation (“BCA”), brought about not only terminological changes, but a duty imposed upon the majority shareholder to proceed in the same manner vis-à-vis all majority shareholders as well. This change was linked to the European harmonization. Therefore, Czech minority shareholders should benefit en bloc by individual compensation settlements and judgments entered vis-à-vis the majority shareholder, who went ahead with the squeeze-out and provided insufficient compensation required to be “even up”.

1 Statement of a Problem and Aims of Research

Pursuant to EU harmonization, the Czech Republic changed its legislation in order to make the operation of business companies more effective and efficient, while observing the legitimate interests of all stakeholders. This includes minority shareholders who are going to be “expropriated” by the 90% or more majority shareholder desiring to become the only shareholder and thus administratively simplifying the operation of the given shareholder company. This is endorsed by the BCA, its official explanatory notes [22] and academic commentaries [12]. The squeeze-out in its entirety and its individual aspects, e.g. the calculation of the compensation, are relevant problems basically in all jurisdictions on both sides of the Atlantic. In order to address them, a holistically simplistic requirement needs to be met - the ultimate beneficiary, the minority shareholders to be squeezed-out, they must know that one shareholder is aspiring to reach the legal threshold to launch a squeeze-out, 90% pursuant to BCA, and that this shareholder intends to really proceed thereafter with the squeeze-out. The knowledge about the squeeze-out method and regime is not fully sufficient if the ultimate beneficiary knows about its theoretic features, but does not note that they are getting themselves to it. The authors of this paper are deeply convinced that the genuine, effective and efficient interpretation and application of the squeeze-out regime in the Czech Republic, as well as in other jurisdictions in the EU, demand awareness of the questions of law related to squeeze-out regulation and, even more, about the questions of fact about its approaching. So far, there have been published only a few studies about the awareness of minority shareholders of the squeeze-out legal regime [5] and no study about the awareness of minority shareholders that the squeeze-out is approaching in their case. *Vigilantibus iura scripta sunt*. The issue is – do Czech minority shareholders know that squeeze-out is approaching and in general, whether the minority shareholders are effectively and efficiently protected? If not, what can be done about it?

2 Sources and Methods

This paper is the result of an extensive research of primary and secondary sources and has three fundamental and intra-related goals. Regarding primary sources, a field observation and an original questionnaire search was performed and assessed. Regarding secondary sources, an abundance of Czech, as well as foreign academic and scientific literature focusing on legal or business aspects was explored.

The first goal of this paper is the analytic description of the squeeze-out, both from the perspective of the formal regulation by the Act No. 513/1991 Coll., Commercial Code, and by

the new regulation by the BCA. The second goal is to assess the data generated by the questionnaire inquiry by the categorical data analysis. The performed questionnaire inquiry and set hypotheses are related to the awareness of minority shareholders of the squeeze-out, i.e. several aspects linked to or generated by the squeeze-out. For purposes of the questionnaire inquiry and its following assessment, the respondents were split into two groups. The first group consisted of respondents having shares of a total value not exceeding CZK 100 000. The second group consisted of respondents having shares of a total value exceeding CZK 100 000. The value of shares was determined based on the registered capital of the company. The following two hypotheses were set based on the questionnaire: H_1 – *The minority shareholder is aware of the aspiration of the purchasing shareholder's to acquire the majority share* and H_2 – *The minority shareholder is aware that, after the purchasing shareholder acquires 90% of the shares on the company, he or she will proceed with a squeeze-out.* The yield data from the completed questionnaires were assessed by the categorical data analysis while using the Czech software program Statistica with the employment of the method of the quantitative signs dependency of the Pearson's Chi-squared Test. The third goal is to compare the squeeze-out issues in the Czech Republic to those in other EU jurisdictions. The critical and comparative studies centered on these goals were processed with the employment of a battery of appropriate methods in order to generate information offering a potential to present original conclusions and valuable suggestions in this field. To achieve the first goal, the descriptive and comparative literature research regarding the old and new regulation of the squeeze-out in the Czech Republic was used. The implied analytic assessment had a deductive nature and was closely linked to the preceding literate research. The second goal was very closely linked to H_1 and H_2 , which were set based on the experimental investigation and the assessment of the questionnaire's investigation and categorical data analysis and Pearson's Chi-squared Test [18]. The preference was given to the scenario method over econometric and mathematical methods because the combination of a real direct data mining via a questionnaire, complemented by published academic data, seems highly suitable to address H_1 and H_2 [3] and ultimately satisfy the second goal. Further, the pertinence of the legal and economic perspectives cannot be overlooked, so it must include both deductive and inductive aspects [15]. In contrast, the third goal had heterogeneous features and thus demanded a more dynamic and multi-disciplinary comparative approach with both qualitative and quantitative aspects since their juxtaposition should not be overlapped [25]. Indeed, the statistical approach is useful, but still impaired by many inherent deficiencies [13]. Due to the nature of H_1 and H_2 , as well as of this paper, the qualitative shade had to prevail. In addition, the paper is basically concerned with the perception of certain legislation and its application, the argumentative legal reasoning [17], reduced axiomatic formula and thoughts. Boldly, the suggestions offered by the literature from various EU member states needs to be confronted with the Czech setting – legislative, academic and, most importantly, practical. In sum, the umbrella method going across the entire paper is the Meta-Analysis able to contrast, combine and reconcile heterogeneous data and results from various sources, fields and studies. Despite the more than one-decade long European harmonization of takeover rules, the national jurisdiction keeps particular features and issues.

3 Squeeze-out

The legal foundation of the squeeze-out is the forced transfer of participating securities from minority shareholders when the majority shareholder reaches the threshold of 90% of the registered capital, or of voting rights, in the company and so minority shareholders lose any real possibility to impose and enforce their will, both in and out of general meetings [8]. The squeeze-out is an instrument, wherein shareholder companies, when such changes occur, in

which previously dispersed shareholders structure becomes concentrated and by that the functionality of internal mechanisms of the company extinguishes. The duty to call the general meeting, the information duty and other requirements set by the shareholder companies' law becomes, in such a case, a non-functional and anti-business burden. By the leading opinion stream, this is perceived as a disproportionate encumbrance due to the minimal contribution of minority shareholders to the business conduct of the company and as a cause of losses to be borne by all shareholders, both minority and majority ones [7]. The squeeze-out method is perceived as an effective transaction from the business point of view and hence as well socially beneficial [8]. Companies which have used the squeeze-out of minority shareholders argue that this helps them to better administer the company and that they do not need to face abuses of minority shareholders. In certain cases, it happens that minority shareholders intentionally challenge the majority decision and so tie-up business decisions. In sum, the squeeze-out is supposed to be the protection of majority shareholders against minority shareholders who intentionally abuse their rights and present high demands upon the company, by which they disproportionately encumber the company and cripple its effective progress. Minority shareholders do not agree about the squeeze-out, and this is mainly for the reason that it is more beneficial for them to keep shares of a functioning company than to receive a compensation for the shares, forcibly transferred via a squeeze-out; in addition, this compensation often does match their expectations.

3.1 Czech Legal Regulation of the Squeeze-out before the Private Law Re-codification

Until 2014, i.e. before the Czech Private Law re-codification, the squeeze-out was regulated by provisions § 183i to § 183n of the Act No. 513/1991 Coll., Commercial Code. This regulation transposed the Takeover Directive and was partially inspired by the Austrian legislation. It has turned out to be highly controversial and missing the goal to protect the minority shareholders [16]. Pursuant to § 183m, in the case of the squeeze-out, minority shareholders had a right to monetary compensation for the forcibly transferred shares in the amount set by the majority shareholder. The majority shareholder had to present a special expert opinion confirming the adequacy of such compensation [27]. Unsurprisingly, the determination of the price linked to the expert opinion has often been challenged before the court by minority shareholders. The leading argument was that the expert who determined the price had been hired and paid to make the expert opinion by the majority shareholder, and that the price merely matched the one set by the majority shareholder themselves. Unfortunately, the Czech law did not follow the Austrian model regarding burden of proof, so, unlike Austrian shareholders, Czech shareholders had to prove what the fair price [16] was. They often did not have access to the company's information and, even if they managed to win the case, these legal suits ended with judgments fixing prices for the forcible transferred shares of the minority shareholders and ordering the majority shareholders to pay the difference between the compensation set by them and confirmed by their expert, and the price fixed by the court. However, the order extended only to different payments to ex-minority shareholders, which were plaintiffs in these court proceedings [2], i.e. such a judgment has not effect vis-à-vis third parties, i.e. the majority shareholder duty to pay the difference extended only to minority shareholders suing the majority shareholder.

3.2 Czech Legal Regulation of the Squeeze-out after the Private Law Recodification

After 2014, i.e. after the Czech Private Law re-codification, the squeeze-out has been regulated by provisions § 375 to § 394 of the BCA. Basically, the BCA took over the regulation of the squeeze-out from the Commercial Code and added to it provisions reinforcing the protection of minority shareholders, especially with respect to the judicial

review of the provided compensation. The BCA newly stipulated for the right for “evening-up”, i.e. the right for a judicial review of the adequacy of the provided compensation and the right to obtain the difference between the compensation set and paid by the majority shareholder and the compensation (price) fixed by the court. Minority shareholders can enforce their right for “evening-up” only from the day when the payment of the compensation is due. In addition, minority shareholders must request their “evening-up” from the majority shareholder during a three-month preclusive period running from the day of the publication of the resolution of the general meeting in the Commercial Register. If they do not reach a settlement agreement about “evening-up”, the minority shareholder can file a lawsuit in court, i.e. the minority shareholder can start court proceedings for a judicial review of the adequacy of the compensation. The BCA newly reversed the burden of proof in favor of the weak and less informed party, minority shareholders, and hence the majority shareholder has to prove that the compensation set and provided by him to minority shareholders is adequate. Then, the court makes a judgment which is newly binding as well with respect to all other, not legally suing, minority shareholders. Hence the BCA brings a significant change in the enforcement of payments of the difference, i.e. “evening-up” by making the judgment binding for other subjects, who were not parties in the court proceedings but who are in the same position – they are as well a minority “squeezed-out” by the same majority shareholder in the same process. Similarly, if one minority shareholder succeeds in reaching a settlement agreement with the majority shareholder about “evening-up” and does not have to go to court, this agreement has the same effect vis-à-vis all other minority shareholders, they all will get the difference payment. However, are they aware of it?

4 Questionnaire Investigation of the Awareness of the Execution of the Squeeze-out

Based on set hypotheses, the questionnaire investigation was performed. Questionnaires were given to respondents – minority squeezed-out shareholders – who were forced out after the Czech Private Law re-codification, i.e. already in the regime of the BCA. The respondents and questions for the investigation were selected while relying on the understanding of the new regulation, the preliminary field observation and data generated by the secondary source. This preliminary knowledge induced methodological considerations leading to the selection of criteria, grouping of respondents, and to the well-balanced selection of a battery of heterogeneous intra-related questions suitable to address all goals of this paper, and, naturally, mainly the second goal. Ultimately, it was decided that, for the purposes of the questionnaire investigation and its following assessment, the respondents would be split into two groups. The first group consisted of shareholders with shares of a value not exceeding CZK 100 000. The second group consisted of respondents with shares of a value exceeding CZK 100 000. The value of the shares was determined based on the registered capital of the concerned shareholder company. The questionnaires included ten (10) questions of a disjunctive type, i.e. the choice of one of several offered options, five (5) questions leading to dichotomy alternative answers, i.e. Yes/No, and two (2) open questions allowing a free answer. In total, 100 questionnaires were sent to the first group and 100 questionnaires to the second group. The prima facie low number, one hundred, was caused by the strict demand to interview only respondents fitting the given profile, i.e. being squeezed-out under the BCA (applicable less than 3 years) and having a share of a value up to or above CZK 100 000. The return rate of the completed questionnaires was high and reached 95% in the first group and 95% in the second group. The yield data was processed by the categorical data analysis by using the program Statistica. The importance level was set at $\alpha = 0.05$. For the assessment of the collected data, the statistic method of the quantitative signs dependency pursuant Pearson’s Chi-squared Test was used. Conditions for the use of a chi-squared test were met ($n > 40$).

The main purpose of the questionnaire investigation focusing on questions targeting the awareness of shareholders was to confirm or to reject the set hypotheses about the awareness of minority shareholders about the execution of the squeeze-out and about the purchases of minority shares by the majority shareholder wanting to reach the 90% threshold.

According to H_1 , the minority shareholder was aware of the aspiration of the purchasing shareholder to acquire the majority share, and according to H_0 the minority shareholder was not aware of this aspiration of the majority shareholder.

Tab. 1: Contingency table of hypothesis No. 1 (H_1)

	Yes	No	Total
The value of minority shares not exceeding CZK 100 000	25	30	55
The value of minority shares exceeding CZK 100 000	18	22	40
Total	43	52	95

Source: Authors' own processing

The value of Pearson's Chi-squared Test is $X^2 = 1.931$. The importance level is $\alpha = 0.05$ i.e. $X^2_{0.05}(1) = 3.841$. Considering the value $X^2 < X^2_{0.05}(1)$, H_0 , the zero hypothesis, is confirmed. Minority shareholders were not aware of the aspiration of the purchasing shareholder to acquire the majority share, i.e. to progressively get to the 90% threshold.

According to H_2 , the minority shareholder was aware that after the purchasing shareholder acquires a 90% share of the company, he or she will proceed with a squeeze-out, and according to H_0 the minority shareholder was not aware of this squeeze-out plan.

Tab. 2: Contingency table of hypothesis No. 2 (H_2)

	Yes	No	Total
The value of minority shares not exceeding CZK 100 000	15	40	55
The value of minority shares exceeding CZK 100 000	21	19	40
Total	36	59	95

Source: Authors' own processing

The value of Pearson's Chi-squared Test is $X^2 = 6.262$. The importance level is $\alpha = 0.05$ i.e. $X^2_{0.05}(1) = 3.841$. Considering the value $X^2 > X^2_{0.05}(1)$, H_0 , the zero hypothesis, is rejected. Minority shareholders were aware of the aspiration of the purchasing shareholder to proceed with the squeeze-out. The prima facia discrepancy between the nominal total values for H_1 and H_2 and their rejection/confirmation is due to the manner of the statistic calculation implied by the operation of an underlying form of the categorical data analyses via Pearson's Chi-squared Test.

The tested sample of Czech minority shareholders often did not see "the writing on the wall", i.e. did not recognize the active behavior of the majority shareholder to acquire shares in order to reach the threshold for the squeeze-out vis-à-vis the remaining shareholder(s). Even their awareness that the acquisition of 90% of the shares will or can mean that the majority shareholder will launch a squeeze-out was not impressive. There was not a dramatic difference between the (ambiguous) awareness of the minority shareholders with shares under and over the value of CZK 100 000. However, the minority shareholders had a basic notion about "evening-up" and seemed ready to go ahead with the enforcement, i.e. to attempt the settlement and, if not successful, then follow up with legal proceedings.

5 Comparative Comments – the Awareness of the Squeeze-out and its Execution in the EU

The post-Lisbon EU is well aware that an undistorted operation of the single internet market is crucial, that the global, post-modern, knowledgeable society heavily relies on virtualization and employment of information systems and information technologies [21] and that the dynamics of the participation in shareholder companies have an impact on the entire economy and society as such [5]. Already before and especially after the set of 2007 crises, the EU attempted to be pro-active and expressed its commitment to the trio of priorities depicted by the strategy Europe 2020 – smart, sustainable and inclusive growth. This endeavor is backed up by empirical studies indicating serious problems related to misbalancing of control and ownership in shareholder companies linked to the devaluation of minority shares [10]. Hence, the EU drive for public information and fair and non-discriminatory treatment of shareholders had a milestone by the Takeover Directive and keeps going. However, this is not a smooth way, because e.g. the Takeover Directive is the result of over 15-year-long negotiation and its wording is basically the “Portuguese compromise” with a number of optional provisions enabling EU member states to select between them [16]. By the Takeover Directive and related legislative and other instruments, the EU attempted to harmonize the protection of minority shareholders facing a 90% or 95% shareholder, making the squeeze-out “public” so that minority shareholders, regarding both the bid to be accepted and the squeeze-out, can be granted a “fair price” [5]. The deadline for the transposition for the Takeover Directive expired one decade ago, so it is highly illustrative to observe certain aspects of the squeeze-out, including the awareness issue, in EU member states and their national laws, which shared predominantly the Continental (civil) law tradition based on Roman law and a robust codification and belongs to the same legal family as the majority of EU members.

According to the prevailing opinion in basically all EU member states and even states out of the EU, stricter rules on a squeeze-out with requirements regarding compensation determination and ownership disclosure are considered as preferable [28]. The related EU harmonization wave induced all EU member states jurisdictions to modify their previous rules in this matter. These changes were generally welcomed by the majority of EU member states – see the Czech Republic and Czech law after the re-codification – but not by all of them. In addition, EU member states used the possibility of selecting between options offered by the Takeover Directive, and thus the harmonization was undermined in the name of national preferences. The Slovak Republic transposed the Takeover Directive by the amendment of the Slovak Security Act and it appears to be much less controversial than the original transposition in the Czech law, i.e. in the Czech Commercial Code [16]. Whether the new Czech regulation of the squeeze-out via BCA is better will be shown in the near future. In contrast, we do not need to wait regarding other EU member states. Scandinavian countries have really strong shareholder protection, but this leads to the fact that controlling shareholders “are” corporate governance [10] able to take advantage of minority shareholders. Even worse, in Spain, the squeeze-out regulation is unsatisfactory and allegedly the initiated changes have not increased minority shareholder’s protection [1]. A critical voice comes from Poland as well, where there is no hesitation to speak about “expropriation” of minority shareholders and where it is suggested that this reduces the company market value [9]. However, even in Germany, where the legislation on squeeze-out is well developed and is not subject to any harsh criticism, the general experience with eternal disputes over compensation in squeeze-out is pragmatically grim. Namely, nearly all squeeze-outs in Germany are legally challenged by minority shareholders [4] (Croci, 2017), resembling the litigation trends in the USA [14]. Additional cash compensation is larger in appraisal procedures, but actions of avoidance are completed much faster. Overall, the evidence suggests that starting post-deal

litigation by challenging the cash compensation offered in a squeeze-out delivers high returns for minority shareholders, i.e. minority investors [4]. Basically, minority shareholders in all EU member states are “surprised” by the squeeze-out and really have to fight in court for what they should have received smoothly and without any further ado by the law and to have been treated fairly, not discriminatorily. In Germany, Austria and the Netherlands, these arguments are based on general fairness. In France and Belgium, the criminal law offers assistance. Spanish and Portuguese rules are perhaps more suitable, requiring – in certain situations – that minority shareholders at disadvantage confirm the general meeting decision by a majority vote [11]. Obviously, this means that the poor application of law leads to the litigation trying to offset it and random rules from various branches of law are helpful in this matter. This is highly inefficient and unfair. Would it not be better to prevent it? Should not we help minority shareholders in the first place to avoid such a situation?

Conclusion

The squeeze-out legislation, namely the Czech BCA with respect to the squeeze-out launching and compensation, was described, the awareness of its potential of application was tested and analyzed, and the comparison was provided. Hence, all three goals were met and led to identification of a cross-border issue. The analyzed literature and questionnaire investigation confirm the significance of the squeeze-out, complexity of a balanced legislation with effective and efficient application, and suggest that the awareness of squeeze-out, especially of its physical approaching, is ambiguous, if not directly reduced; and this might have various negative impacts on the individual as well as the entire society. In the Czech Republic, there is an asymmetry of information and minority shareholders are not fully in touch with enough information, especially about the entire business and financial situation of the shareholder company, and also about the fact that other minority shareholders are approached by one shareholder desiring to reach the 90% threshold of this shareholder company. Even if they were aware of the squeeze-out requirements and regulations, they could not take the full benefit of it, because they simply did not see it coming. Similarly, issues arise when one of them succeeds with the “evening-up” judgment and other squeezed-out shareholders do not learn about this judgment and so they cannot enjoy, and possibly enforce, their right for the even treatment. In other EU member states and jurisdictions, the inefficiency of the squeeze-out legislation and its interpretation and application is a serious issue as well. The minority shareholders are not sufficiently protected and, if they are protected, then they are not aware of it and cannot recognize the situation of a pending squeeze-out. Once they learned about it, they would be strongly inclined to litigate [4]. This general drive of minority shareholders to petition the court for an improved compensation, evening-up, is perhaps slightly new in continental law jurisdictions, but it is a historically well-known trend in common law jurisdictions, especially in the USA, namely in Delaware [14]. Thus, again, the state via judiciary is dragged in disputes about ill-informed minority shareholders truly squeezed-out by majority shareholders. Since, the states and laws passed the Rubicon and decided to legislatively protect them; they should make sure that this protection is real, effective and efficient, and not ephemeral and fictive. It is correctly suggested that the treatment of minority shareholders testifies about the company integrity [10] and has an impact on the perception of its products, thus it is in the interest of the company to treat minority shareholders fairly. However, in a situation of a predator seeking to get the company, it cannot be expected that he or she would change their heart due to this concern.

The presented information points out that a critical problem is the ambiguous awareness on the part of the minority shareholders about the approaching squeeze-out, which is magnified, if not caused, by an insufficient communication between minority shareholders. Minority shareholders have often a complicated, if any at all, access to information about “their”

shareholder company and the potential inside predator, with an influential shareholder recklessly going for the majority and then exclusivity being in a stronger position and benefits by the information asymmetry, partially natural and partially perhaps pre-arranged by them. The enhancement of information is redressed and rebalances this information asymmetry and better communication between minority shareholders would undoubtedly help them to take better care and to protect their investment better. They would be able to reach more sophisticated decisions and arguably they could handle their situation and shares in such a manner so as to protect them even better than the (partially dead) letter of the BCA and other legislation. It might be suggested that both the freedom of making business decisions as well as the protection of the property of these individuals, would be achieved, consequently an indirect control against predatory “grass-hopper” shareholders would be established, ultimately supporting the entire business environment. However, even without dramatic legislative changes, the current ambiguity and information asymmetry can be addressed. Already now, the fundamental corporate documents, such as the Act of Incorporation, By-Laws, etc. allow for establishing a reinforced duty of information backed by sanctions. Since the shareholder structure can change dramatically over time, it appears advisable to set a rather low threshold launching this right, i.e. when one shareholder reaches 20%, he or she has to inform all remaining shareholders... This would increase both the freedom of information and investment acting by minority shareholders; it could serve as a preventive measure against the “expropriation” by the creeping 90% shareholder as well. The law principles of the autonomy of will and of the contracting freedom allows incorporating such provisions and a mechanism in fundamental corporate documents. However, once the shareholder company is established and its fundamental corporate documents do not include such measures, the options of minority shareholders are dramatically reduced. Basically, such minority shareholders need to take the initiative and look for allies in order to improve their communication and make it more efficient, and coordinate their endeavors too. They can create informal associations or form groups, or at least take advantage of modern information technologies [19] and the social media in order to “stay in touch and pass information.” Such a synchronization of efforts can increase their mutual protection as well as the protection of the entire shareholder company, discourage predatory single shareholder temptations and activities, and even help minority shareholders to exercise their other rights more effectively and efficiently, such as the rights linked to annual general meetings of the shareholder company.

The EU attempts to harmonize various aspects of shareholder company law and thus brings these jurisdictions even closer. Despite all these endeavors and the massive priority given to the single internal market and the competition within, the squeeze-out national rules and their application remain different and even face diverse challenges and are not perceived with a similar degree of satisfaction or dissatisfaction. The national implementations of the equal treatment rule are not homogenous [11] and the only common denominator is that the minority shareholders in the EU are generally “surprised”, not fully informed in advance, and then they really have to fight for their rights. It is well established worldwide that reducing information asymmetry improves firms’ “earnings management behavior” [6], increases effectiveness and efficiency and is beneficial for stakeholders. Hence, the above mentioned recommendations, to address the information asymmetry and to improve the co-operation of minority shareholders, and generally to go more for the prevention of potentially abusive and advantage taking squeeze-out, appears relevant even outside of the Czech Republic, i.e. basically to all EU member states and their laws. All this seems to fit the proclaimed bottom-up approach as well as the philosophy of the Europe 2020 with its sustainable growth. An ounce of prevention is better than a pound of cure and knowledge is power, is it not?!

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NEJEDNOZNAČNÉ POVĚDOMÍ O BLÍŽÍCÍM SE SQUEEZE-OUT – ČESKÁ PŘÍPADOVÁ STUDIE V EU PERSPEKTIVĚ

Nucený přechod účastnických cenných papírů, neboli vytěsnění či squeeze-out, je kritizovaná právní metoda používaná akcionáři v EU, která byla podstatně změněna v rámci současné české právní rekonstrukce. Nově byla zakotvena povinnost většinových akcionářů pro případ squeeze-out postupovat na základě stejných podmínek vůči všem minoritním akcionářům. Tito mají obdržet stejnou kompenzaci, a případně dorovnání. Účinné uplatnění tohoto pravidla vyžaduje, aby minoritní akcionáři o něm měli povědomí. Trojice cílů tohoto příspěvku je popsat a vysvětlit předmětnou novou povinnost a poskytnout hloubkovou, kritickou a komparatistickou analýzu povědomí o blížícím se squeeze-out, které ji zakládá. S ohledem na cíle jsou stanoveny hypotézy a využity multidisciplinární primární a sekundární prameny, a to z ČR i EU. Získané výsledky s komentáři naznačují nedostatečné povědomí, které má negativní dopad na aplikaci nově uložené povinnosti v ČR a celkově in na squeeze-out situace v EU.

DAS AMBIVALENTE BEWUSSTSEIN ÜBER DAS NAHEN DES SQUEEZE-OUT – TSCHECHISCHE FALLSTUDIE IN DER EU PERSPEKTIVE

Eine gezwungene Übertragung von teilnehmenden Wertpapieren, Squeeze-out, ist eine kritisierte Rechtsmethode, die in der EU verwendet wird und durch die neueste tschechische Rekonstruktion deutlich verändert wurde. Für ein Squeeze-out-Szenario wurde eine neue Pflicht der Mehrheitsgesellschafter eingeführt, und zwar mit allen Minderheitsgesellschafter in gleicher Weise zu verhandeln und gleichen Ausgleich zu erteilen. Um diese neue Regel effektiv und effizient anwendbar zu machen, müssen sich die Minderheitsgesellschafter dessen bewusst sein. Das Trio der Ziele dieses Aufsatzes ist, diese Pflicht zu beschreiben und zu erklären und eine tiefe, kritische und vergleichende Analyse über das Bewusstsein über die Annäherung von Squeeze-out zu schaffen. Dazu werden zusammenhängende Hypothesen und primäre als auch sekundäre multidisziplinäre Daten verwendet. Die erzielten Resultate deuten darauf hin, dass das unzureichende Bewusstsein die Anwendung der neuen verhängten Pflicht in der Tschechischen Republik und die Squeeze-outs im Allgemeinen in der EU beeinträchtigt.

NIEJEDNOZNACZNA ŚWIADOMOŚĆ ZBLIŻAJĄCEGO SIĘ SQUEEZE-OUT – CZESKIE STUDIUM PRZYPADKU Z PERSPEKTYWY UE

Przymusowy wykup papierów wartościowych, czyli squeeze-out to krytykowana metoda prawna stosowana przez akcjonariuszy w UE, która została w istotny sposób zmieniona w ramach czeskiej rekonstrukcji prawa. Nowością na wypadek squeeze-out jest obowiązek większościowych akcjonariuszy postępowania na takich samych warunkach wobec wszystkich drobnych akcjonariuszy. Mają oni otrzymać taką samą rekompensatę i ewentualnie wyrównanie. Skuteczne stosowanie tej zasady wymaga, by drobni akcjonariusze mieli tego świadomość. Niniejszy artykuł ma trzy cele, opisanie i wyjaśnienie nowego obowiązku i przeprowadzenie dogłębnej, krytycznej i porównawczej analizy wiedzy nt. zbliżającego się squeeze-out, który taki obowiązek rodzi. Pod kątem określonych celów postawiono hipotezy i wykorzystano wielodyscyplinarne źródła pierwotne i wtórne, zarówno z Czech, jak i UE. Uzyskanie wyniki wraz z ich omówieniem wskazują na niewystarczającą wiedzę, która ma negatywny wpływ na stosowanie nowo nałożonego obowiązku w Czechach i ogólnie też na sytuację squeeze-out w UE.

CZECH REPUBLIC IN THE CONTEXT OF INTERNATIONAL TOURISM: ITS POSITION AND COMPETITIVENESS

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Abstract

Tourism is one of today's phenomena. It is a major sector of the economy and it is therefore essential to focus on the competitiveness of individual tourism destinations. Compared to the classic product, the destination differs in many aspects and approaches to competitiveness. The Czech Republic is an integral part of international tourism and therefore the aim of the paper is to evaluate its position in this sector. The position is analyzed from the point of view of international tourist arrivals and receipts by means of indexes and ranking in the list of countries. The Travel & Tourism Competitiveness Index, published by the World Economic Forum, is used to illustrate its competitiveness. As this index is mainly compiled on the basis of quantitative data, it provides an objective comparison of both the country's position among other destinations and the evaluation of its position over time.

Keywords

Competitiveness; Czech Republic; Destination; International tourism; TTCI.

Introduction

Tourism is considered to be one of the key development factors in all countries. It generates revenue for the economy, creates jobs, and at the same time contributes to the growth of well-being. Moreover, it plays an important role in promoting the country's image and its international perception, as well as in influencing internal political events. In spite of occasional slumps, the number of international arrivals shows a growing trend – from 25 million in 1950 to 1,186 million in 2015. Similarly, international tourism receipts are steadily rising, having reached 1,260 billion USD in 2015. International tourism represents 7% of the world's exports of goods, and over the past 4 years it has grown faster than world trade. In addition, it is directly and indirectly involved in creating 10% of GDP [1]. The basic factors of the growth of tourism include the increase in the volume of leisure time and disposable income of the population [2]. Its importance to the economy is therefore indisputable and it is important to focus on measuring competitiveness in this sector.

Factors that affect competitiveness can change rapidly, and this dynamics creates additional challenges and the need for ongoing research and development of indicators. The importance of this issue is further stressed by trends in the global economy and tourism, including changing market trends and consumer behaviour, the role of social media and the new sources of demand and growth [3].

1 Destination Competitiveness in the Context of Tourism

In recent years, many researchers have dealt with destination competitiveness, however, the definitions of competitiveness, its models and measurement methods described in their studies differ.

The term competitiveness comes from the field of economics. Its application in tourism has thus stimulated many debates about its concept. Most experts agree that it is a complex and multifaceted term. The most cited authors are Ritchie and Crouch [4, p. 2], who defined the destination competitiveness as “ability to increase tourism expenditure, to increasingly attract visitors while providing them with satisfying, memorable experiences, and to do so in a profitable way, while enhancing the well-being of destination residents and preserving the natural capital of the destination for future generations”. The common features of most definitions are the terms “ability”, the economic dimension (e.g. the ability to increase tourism expenditure), “attractiveness and satisfaction” and, last but not least, “sustainability”. Along with the economic dimension, the emphasis is placed on the welfare of the local community [4].

Furthermore, the measurement of destination competitiveness raises the question of the concept of the destination. Buhalis [5, p. 98] defined it as a “geographical region which is understood by its visitors as a unique entity, with a political and legislative framework for tourism marketing and planning”. These well-defined geographic areas can be countries, regions or cities.

In the case of a tourism destination, competitiveness does not relate to a particular well-defined product or service like in other sectors but to the overall experience from the destination. This “total experience” [6] is not only created by a company but by many other entities that have the impact on the visitor experience and include business entities, locals, other complementary industries, destination management organizations and the public sector [7]. According to the type of expenditure of the visitors to the destinations, the economic impacts can be divided into:

- Local businesses – providers of accommodation, restaurants or historical monuments.
- Households (wages) – employees of local businesses who switch disposable income for goods and services.
- Government (taxes) – levies on expenditure and revenue (VAT, excise tax, income tax for natural and legal persons) [8].

Destination competitiveness is a phenomenon that affects and is also affected by many different stakeholders. These stakeholders have different interests, opinions and roles in this phenomenon [3].

1.1 Models of Destination Competitiveness

Just as competitiveness is defined differently, there are different models of destination competitiveness. Most attention in papers focusing on this issue has been paid to the Crouch and Ritchie model [4] entitled Destination Competitiveness and Sustainability.

The determinants of significant models of competitiveness could be divided into three groups depending on how they can be affected by the destination [4], [6], [9]. The first group consists of inherited and capitalizable determinants that relate to the factors and benefits that are part of the destination. This category comprises natural environment, culture and history, location and market ties. Specifically, they include landscape, climate, fauna, flora, history, food and wine, traditions, music, as well as availability of human and capital resources. The second group, which is called created and manageable determinants, includes components that can directly affect and change destinations in the short or long term. It comprises items directly related to the tourism product (mix of activities, entertainment, shopping, hotels, restaurants etc.) and those related to management from a macro perspective (general infrastructure management, security and safety, destination management and marketing etc.). The third group, external and adaptable determinants, includes external forces that could affect the

competitiveness of the destination. These are political, economic, demographic, technological, natural and cultural factors. All of this results in the fact that destinations face many influences. Therefore, it is essential to understand which attributes are crucial to increasing competitiveness so that they can make better and more efficient use of their resources.

Palatková [10] adds that destination competitiveness is based on comparative and competitive advantages. A comparative advantage is determined by equipment factors in destinations. These are baseline conditions that cannot be changed at all (exogenous advantages) or only slightly (in this case they are called endogenous or created competitive advantages). If a country has the ability to make the most of its resources, it has a competitive advantage. The important resources of competitive advantages are frequently technological and technical changes and innovations.

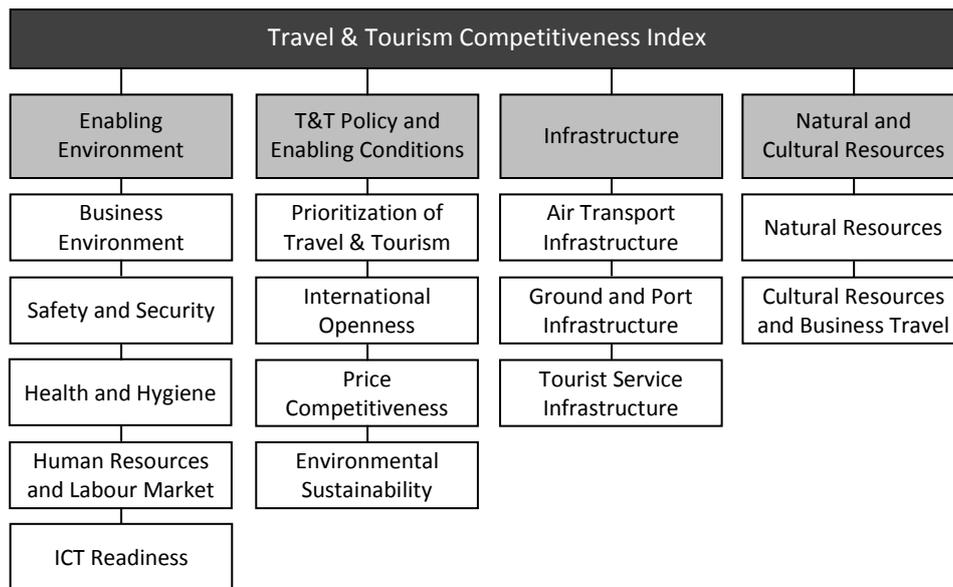
1.2 Measuring Destination Competitiveness

A lot of scientific papers have dealt with measuring destination competitiveness. Two different aspects could be distinguished in the concept of measurement: Firstly, “what is measured” and secondly “how it is measured”. The research studies related to the first aspect initially focused on measuring destination image and attractiveness (e.g. Kim [11]) and price competitiveness (e.g. Dwyer et al. [12]). Competitiveness was thus conceived as part of the competitive advantage represented by expenditure incurred by tourists for both the stay in the destination and the trip to / from the destination. Subsequently, the experts approached the measurement of competitiveness as a multidimensional concept and they included both price and non-price factors in the methodology (e.g. Crouch [7], Dwyer and Kim [13]).

The second aspect “how it is measured” includes, in particular, the type of data and methods. Regarding the type of data collected, so called hard and soft data are distinguished. The hard data are objective, quantitative, and include indicators such as tourist arrivals, market share or tourism expenditure. These data assess destination competitiveness from the point of view of tourism demand. On the contrary, the soft data are subjective and rather of qualitative nature. Such measurements focus on indicators such as the quality of service, friendliness of residents, perceived beauty of scenery, etc. The methods using soft data are based on qualitative marketing research and predominantly take into account the view of the demand [10].

The methods and tools used for measuring competitiveness are very diverse. Nevertheless, a frequently applied tool is Importance Performance Analysis [e.g. Dwyer et al. [14], mainly because it identifies the opportunities for improvement and is easy to apply.

Furthermore, the methods based on the combination of objective and subjective data include multi-factor comparisons and sorting. An example could be Travel & Tourism Competitiveness Index (TTCI), see Figure 1, which every second year at the World Economic Forum (WEF) is compiled. The index consists of 14 pillars and is calculated for more than 130 countries. It provides a comprehensive strategic tool for measuring factors and policies that enable sustainable development of the Travel & Tourism sector, which contributes to the competitiveness of a region or country [15]. Nevertheless, Gryszel assumes that the empirical application of TTCI is quite time consuming because of extensive surveys and interviews. Therefore, the costs of its application are significantly higher [16].

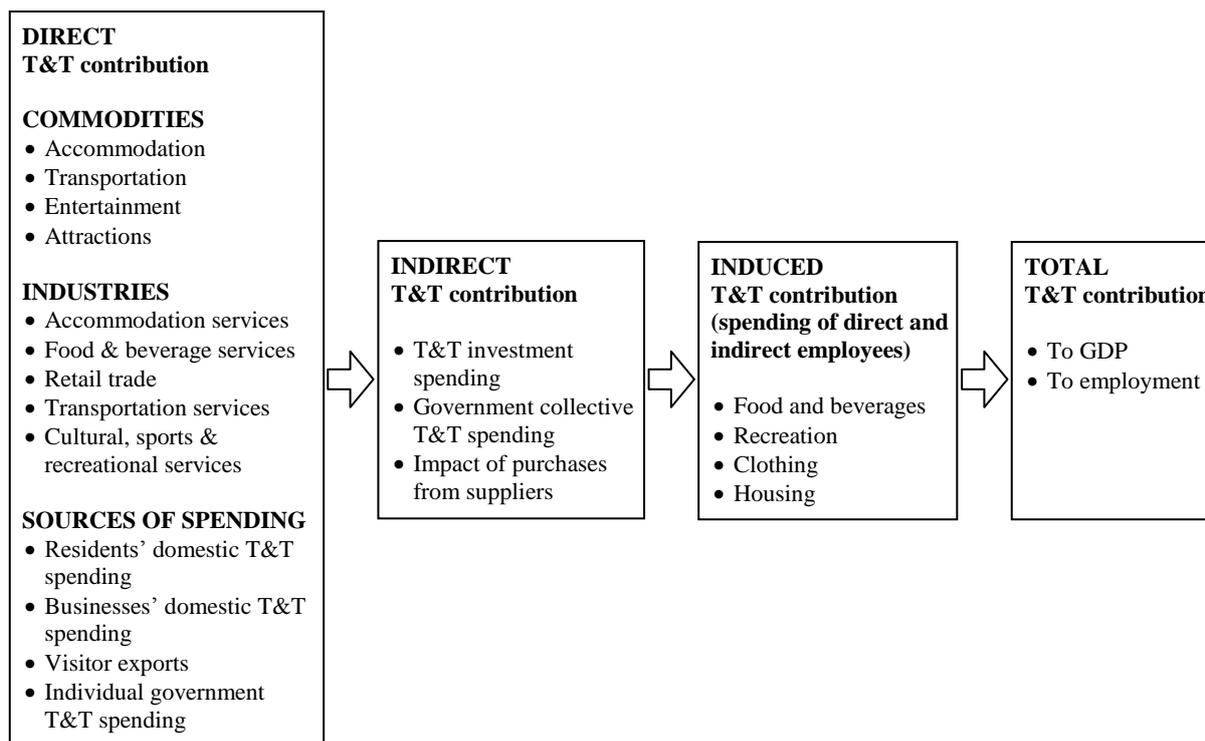


Source: [15]

Fig. 1: *Travel & Tourism Competitiveness Index Framework*

Apart from measuring competitiveness, the research might also be concentrated on measuring the performance of the tourism sector as a whole (it means calculating the incoming, outgoing as well as the domestic tourist consumption). With this regard, there exist various approaches and indicators. The most significant and worldwide approved is the Tourism Satellite Account (TSA). It has been developed by the UNWTO, OECD and Eurostat. The TSA enables the generation of tourism economic data (such as tourism direct GDP) that are comparable with other economic statistics. The TSA reflects only the direct contribution of tourism, it includes internal spending on tourism (within a particular country by residents and non-residents), as well as government individual spending (on services directly linked to visitors). The World Travel and Tourism Council (WTTC) also measures the impact of tourism on the economy. Nevertheless, the methodology of WTTC is much wider. It calculates the direct as well as indirect and induced impacts (see Figure 2). The measure of direct contribution calculated by the WTTC is consistent with the definition of tourism GDP specified in the tourism satellite account methodology. [17, 18]

There is no clear view regarding the number of the destinations included in competitiveness assessment. However, the traditional concept, in which destinations would compete due to geographical proximity, is no longer valid. Thanks to the development of air transport, the reduction of transport costs and time to / from the destination, a wide array of destinations that can compete together has opened.



Source: [18]

Fig. 2: Economic Contribution of Travel & Tourism (T&T) – WTTC framework

2 Research Objectives

The Czech Republic is an integral part of international tourism. Therefore, the main objective of the presented research was to find out what position the Czech Republic in this world tourism market has. This main objective was divided into three specific sub-objectives:

- to analyze the position of the Czech Republic as well as its development and market share from the year 2000 in terms of international tourist arrivals and tourism receipts
- to analyze the position of the Czech Republic in terms of tourism contribution to GDP comparing two approaches of direct and total contribution
- to evaluate the competitiveness of the Czech Republic as a destination by means of Travel & Tourism Competitiveness Index as well as its detailed analysis revealing the weaknesses of the CR

3 Methodology

The paper is supported by secondary data research. The most up-to-date data published by the United Nations World Travel Organization (UNWTO) are used to quantify the position of the Czech Republic in international tourism. They provide information of quantitative nature like the number of international arrivals or international tourism receipts. The paper also complies with the UNWTO methodology regarding the breakdown to tourist regions. The position of the country is expressed by an indicator and ranking in the list of countries. Furthermore, the performance of tourism as a sector is assessed by means of the contribution of tourism to GDP. For this purpose, the data of Czech Statistical Office and World Travel and Tourism Council are used. The contribution of tourism to GDP is assessed statically (2016) – the comparison of the direct and overall impact of tourism on GDP in the CR and other countries, as well as dynamically (the development of the direct contribution since 2003). In addition, the presented work is based on data published by the WEF, specifically the Travel & Tourism Competitiveness Index. This index was established on the basis of quantitative data

supplemented by some qualitative data. The analyses were performed using descriptive statistics methods including basic indexes to express the development over time. The data for the CR are not assessed separately but always in comparison with the world ones so that the world trends in the development have also been taken into account. The analysis thus provides a comprehensive view of the Czech Republic's position in international tourism and at the same time it reveals the weaker aspects of its competitiveness.

4 Position of the Czech Republic in International Tourism

The Czech Republic (CR) is an integral part of international tourism. In 2015 it recorded 11,148,000 international arrivals and international tourism receipts reached 6048.3 million USD. Tourism accounted for 2.5% of gross domestic product and employed 4.1% of the population [1], [15].

4.1 International Tourist Arrivals and Tourism Receipts

The position of the Czech Republic in terms of tourist arrivals and tourism receipts is described in Table 1, which compares the CR with the indicators for the whole world, the region of Europe and the European Union. The data for other regions of international tourism were added to the table for an overview and better understanding of the issue. The division of regions is based on the UNWTO methodology. The CR accounts for 0.9% of the world's arrivals, 1.8% of arrivals in Europe and 2.3% in the European Union. Furthermore, it accounts for 0.5% of the world's tourism receipts, 1.3% of European tourism receipts and 1.6% of EU tourism receipts. Based on the above it can be concluded that in general the CR has a bigger share in international arrivals than in tourism receipts. This is illustrated by Figure 3 as well by the indicator in the last column of the table (receipts per arrival), which was 542.5 USD in the CR in 2015. The world's average is almost twice the sum (1062.4 USD).

Tab. 1: Position of the Czech Republic based on tourist arrivals and tourism receipts in 2015

	Tourist arrivals		Tourism receipts		Receipts per arrival (USD)
	Mil. arrivals	%	USD bn	%	
WORLD	1186.0	100.0	1260.0	100.0	1062.4
of which Czech Republic	11.1	0.9	6.0	0.5	542.5
EUROPE	607.7	51.2	450.7	35.8	741.6
of which Czech Republic	11.1	1.8	6.0	1.3	542.5
EUROPEAN UNION	478.4	40.3	373.4	29.6	780.5
of which Czech Republic	11.1	2.3	6.0	1.6	542.5
Asia and the Pacific	279.2	23.5	418.3	33.2	1498.2
Americas	192.6	16.2	303.7	24.1	1576.8
Africa	53.5	4.5	33.1	2.6	618.7
Middle East	53.3	4.5	54.4	4.3	1020.6

Source: Own processing based on the data from [1]

Table 2 shows the list of countries by international tourist arrivals and receipts from tourism. It provides ranking of the first 10 countries in the world and Europe. As it can be seen in the table, the CR ranked in very good places in the world's list where about 150 countries are evaluated, winning the 27th place for its arrivals and the 41st place for the receipts. In the European ranking, it takes the 15th place for the arrivals and the 17th place for tourism receipts, which is approximately in the first third of 51 evaluated countries in Europe.

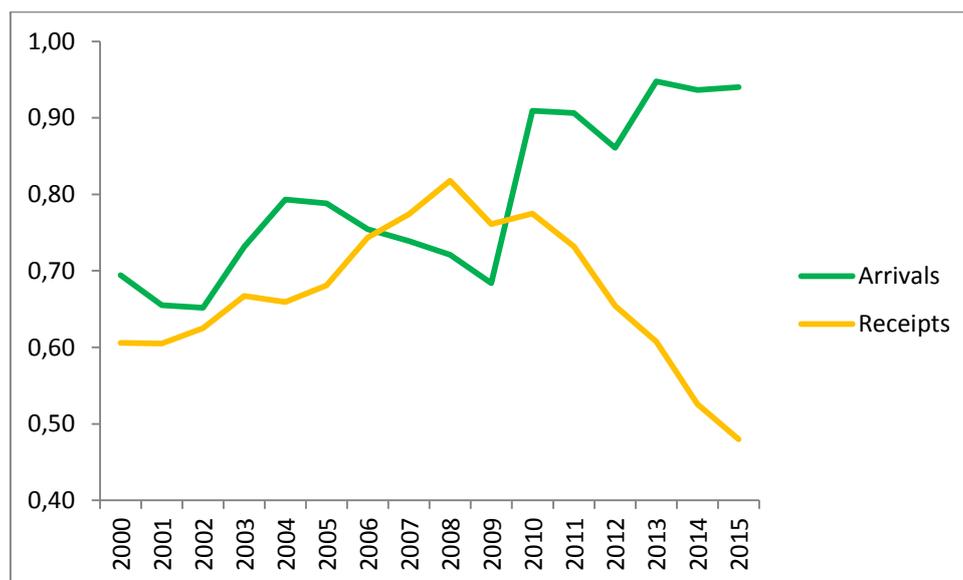
Tab. 2: List of countries by international tourist arrivals and receipts in 2015

International tourist arrivals				International tourism receipts			
World		Europe		World		Europe	
Country	mil.	Country	mil.	Country	USD bn	Country	USD bn
1. France	84.5	1. France	84.5	1. United States	204.5	1. Spain	56.5
2. United States	77.5	2. Spain	68.2	2. China	114.1	2. France	45.9
3. Spain	68.2	3. Italy	50.7	3. Spain	56.5	3. Italy	39.4
4. China	56.9	4. Turkey	39.5	4. France	45.9	4. Germany	36.9
5. Italy	50.7	5. Germany	35.0	5. UK	45.5	5. Turkey	26.6
6. Turkey	39.5	6. Russia	31.3	6. Thailand	44.6	6. Austria	18.3
7. Germany	35.0	7. UK	34.4	7. Italy	39.4	7. Switzerland	16.2
8. UK	34.4	8. Austria	26.7	8. Germany	36.9	8. Greece	15.7
9. Mexico	32.1	9. Greece	23.6	9. Hong Kong	36.2	9. Netherlands	13.2
10. Russia	31.3	10. Poland	16.7	10. Macao	31.3	10. Portugal	12.6
27. Czech Rep.	11.1	15. Czech Rep.	11.1	41. Czech Rep.	6.0	17. Czech Rep.	6.0

Source: Own processing based on the data from [1]

Although Table 2 shows absolute values for arrivals and receipts, it is not possible to measure these values in tourism with e.g. the population or the size of the country (such as the GDP vs. GDP per capita economic indicator). The relative values calculated this way would not have the right informative capability as tourist arrivals and receipts are influenced by different determinants than the population or the area. These determinants are listed in Chapter 1.1. Thus, the dynamic analysis of the country's position in the world tourism market is used more often in the form of e. g. basic or chain indexes.

The basic overview of the market share of the CR in world tourism (in terms of both arrivals and receipts) is presented in Figure 3. The graph clearly illustrates that the market share measured by arrivals shows a growing trend, while the market share measured by receipts has been decreasing since 2008.

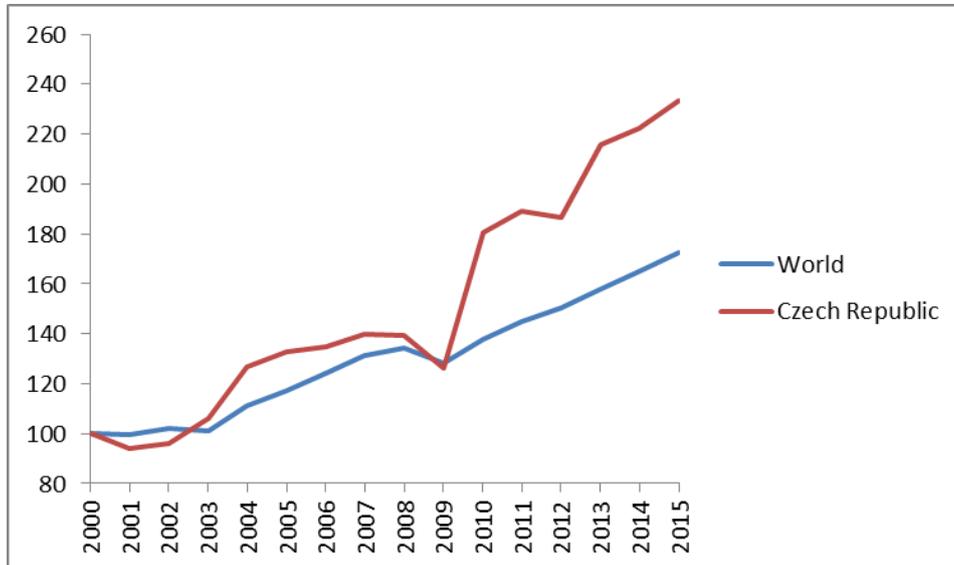


Source: Own processing based on the data from [1, 19-24]

Fig. 3: Market share of the Czech Republic in world tourism (in %)

Furthermore, the analysis focuses on the development of arrivals and receipts in the CR and in the world, which are depicted using basic indexes (the base year is 2000).

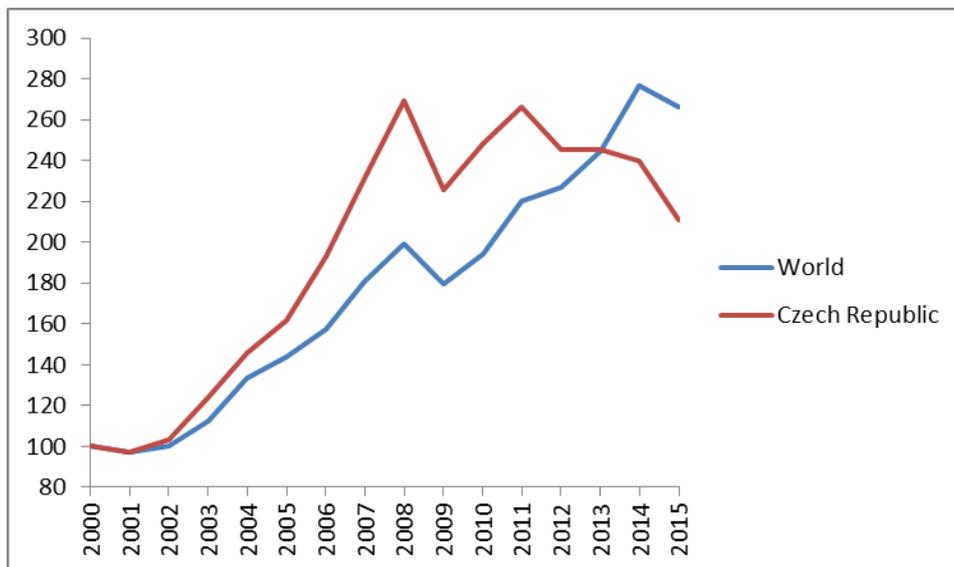
Figure 4 illustrates the development of international arrivals index from the year 2000. In the picture, both curves show a growing trend, however the index of arrivals in the CR is growing faster than this indicator for the whole world.



Source: Own processing based on the data from [1, 19-24]

Fig. 4: International arrivals index (the base year = 2000)

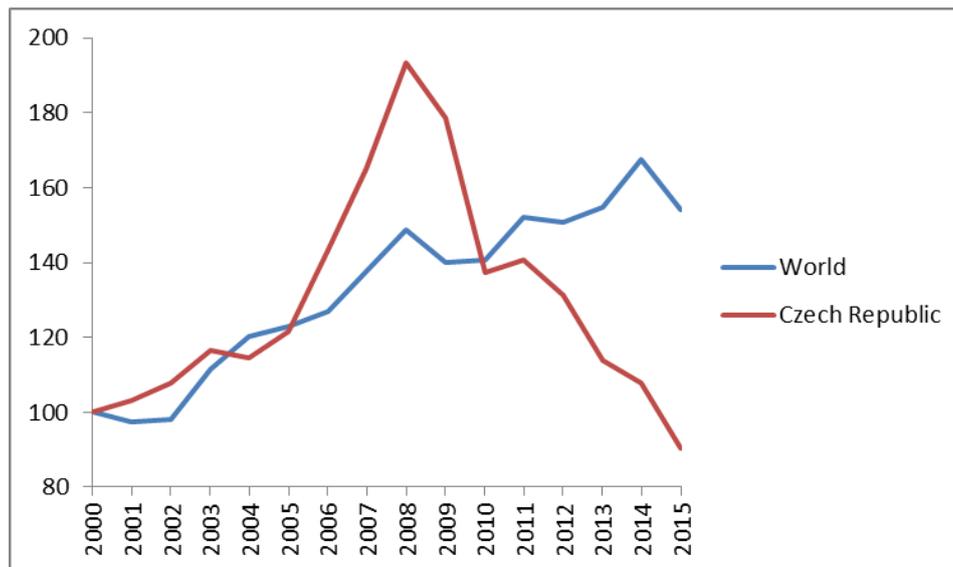
The development of the index of international tourism receipts for the CR and the world is shown in Figure 5, starting again in the year 2000. The receipts show a growing trend in both the world and the CR. The index for the CR was stabilized at higher levels until 2013, after that the worldwide receipts grew faster than the ones in the CR (compared to 2000).



Source: Own processing based on the data from [1, 19-24]

Fig. 5: Index of international tourism receipts (the base year = 2000)

The index of international tourism receipts per one arrival from 2000 is shown in Figure 6. At first sight it is clear that the curve of world index shows a growing trend, whereas the curve of the Czech index reached its peak in 2009 and since then it has been decreasing; in 2015 going even below the level of the value from the year 2000.



Source: Own processing based on the data from [1, 19-24]

Fig. 6: Index of international tourism receipts per one arrival (the base year = 2000)

The following can be deduced from graphs 2 to 6. The number of international arrivals in the CR shows a similar trend as in the world (measured from the year 2000). Indexes for the CR show even slightly higher values than the world's ones. Regarding the tourism receipts, this indicator shows a lower growing trend than the arrivals. Figure 3 clearly illustrates that the market share measured by the means of tourism receipts has been decreasing since 2008. The similar result is illustrated in figure 6. Index of international tourism receipts per one arrival (from the year 2000) in the CR has been decreasing since 2008, whereas this index for the whole world shows a growing trend. Conclusion: the number of tourists coming to the Czech Republic increases but they spend less money. There are other destinations in the world where tourists are more likely to spend their budget. There might be various reasons that stay behind this trend (e.g. trend of shorter stays that have an impact on lower spending per arrival) but this is already beyond the scope of this article and therefore should be the subject of further research.

As to aforementioned figures and tables, it is necessary to mention that there are also other indexes for measuring the importance of tourism to a place, for example Defert's tourism function index. Nevertheless, this index underestimates the impact of tourism in major cities or historic towns that attract large numbers of one-day visitors [25]. Therefore, the carried out analysis, with respect to the aim of this article, is based on the objective statistical data (receipts, arrivals) that are also used by the recognized tourist world organizations.

4.2 Tourism Contribution to the Gross Domestic Product

Chapter 4.1 focuses on the number of international tourist arrivals and tourism receipts (so the focus is only on the incoming tourism). In contrast to this, the indicator of tourism contribution to the GDP covers the whole sector of tourism (incoming, domestic and outgoing consumption). As stated in the chapter 1.2, it is possible to assess direct and total contribution of tourism to the GDP (see table 3 for the comparison). The order of the countries is given by their ranking in absolute value of total contribution to GDP.

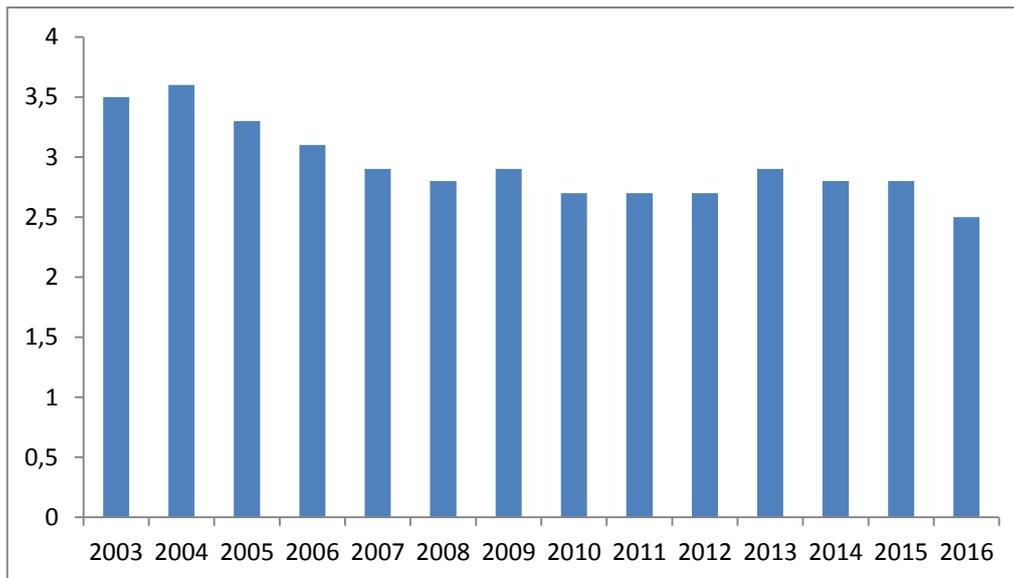
Tab. 3: Comparison of tourism contribution to GDP in 2016

Country	Total contribution				Direct contribution (=TSA)			
	Absolute value		Relative value		Absolute value		Relative value	
	USD bn	Rank	% of total GDP	Rank	USD bn	Rank	% of total GDP	Rank
United States	1509.2	1.	8.1	115	503.7	1.	2.7	126
China	1000.7	2.	9.0	106	275.2	2.	2.5	137
Germany	376.7	3.	10.8	78	138.1	3.	4.0	80
Japan	343.2	4.	7.4	126	110.5	4.	2.4	141
UK	283.2	5.	10.8	79	89.8	6.	3.4	98
France	221.3	6.	8.9	109	90.0	5.	3.6	89
India	208.9	7.	9.6	97	71.7	9.	3.3	105
Italy	207.6	8.	11.1	73	86.2	7.	4.6	63
Spain	177.2	9.	14.2	54	63.7	10.	5.1	56
Mexico	165.9	10.	16.0	49	76.7	8.	7.4	35
Czech Republic	15.0	54.	7.8	120	4.9	57.	2.5	131
World Average	57.3		10.2		19.1		3.1	
EU Average	60.1		10.2		21.8		3.8	

Source: Own processing based on the data from [18]

Regarding the absolute value of total and direct contribution, the list of the first ten countries is the same, although the ranking of some countries is slightly different. Out of 185 countries the CR with its 15 USD billion ranks at the 54th place in the total contribution and at the 57th place in direct contribution. On the other hand, the ranking of the given countries in terms of relative values represents significant differences. The CR takes the 120th and the 131st place (similar values were calculated for example for Bosnia-Herzegovina). It is necessary to add that the first ten countries are mainly small island developing states (such as British Virgin Islands, Maldives or Seychelles), which are strongly dependent on tourism (contribution to GDP exceeds 45%).

Figure 7 illustrates the development of the direct contribution of tourism to GDP in the CR (% of the whole economy GDP). Neither WTTC nor the Czech Statistical Office has published the data for the total contribution since 2003. As the figure shows, the trend in this measure is decreasing (from 3.5% in 2003 to 2.5% in 2016).



Source: Own processing based on the data from [26]

Fig. 7: Direct contribution of tourism to GDP in the CR (% of whole economy GDP)

The long term development of tourism contribution to the economy in the period of 2017 – 2027 in the CR is alarming. The WTTC expects 2.2% annual growth of direct contribution, which moves the CR to the 166th place (the expected value for this indicator is 4.0% in the world and 2.3% in the European Union). In terms of total contribution WTTC forecasts 1.8% annual growth for the CR (177th place), 3.9% for the world and 2.2% for the European Union [18].

4.3 Competitiveness Measured by TTCI

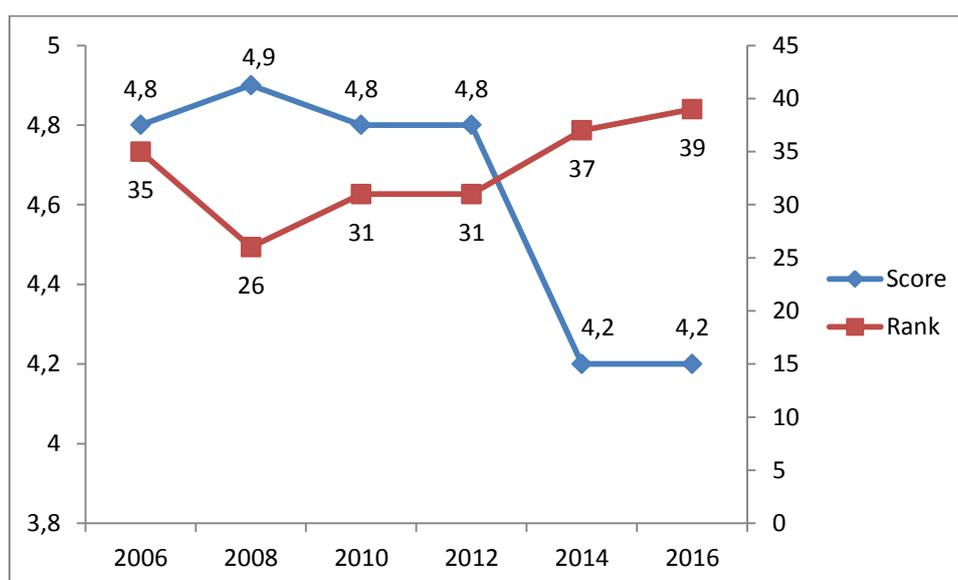
The Travel & Tourism Competitiveness Index (TTCI) is one of the competitiveness indicators that combine data on both objective and subjective basis. TTCI scale goes from 0 to 7, which is the best rating. The index is calculated for about 130 countries on the basis of 90 indicators divided into 14 pillars. Two thirds of the indicators is statistical data, the remaining third is surveyed by WEF using the Executive Opinion Survey [15]. Some pillars cannot be perceived as unchanged during the years. For example, natural conditions indicator may change under the influence of tourism itself. Moreover, its perception by tourists can also shift over time. Table 4 lists top 10 countries in the world and Europe. The Czech Republic, with an index value of 4.22, ranked at the 39th place in the world ranking and the 22nd place in the European ranking.

Tab. 4: *Travel & Tourism Competitiveness Index – Top 10 Countries - 2016*

World Ranking		Europe Ranking	
Country	Score	Country	Score
1. Spain	5.43	1. Spain	5.43
2. France	5.32	2. France	5.32
3. Germany	5.28	3. Germany	5.28
4. Japan	5.26	4. United Kingdom	5.20
5. United Kingdom	5.20	5. Italy	4.99
6. United States	5.12	6. Switzerland	4.94
7. Australia	5.10	7. Austria	4.86
8. Italy	4.99	8. Portugal	4.74
9. Canada	4.97	9. Netherlands	4.64
10. Switzerland	4.94	10. Norway	4.64
39. Czech Republic	4.22	22. Czech Republic	4.22

Source: Own processing based on the data from [15]

If the focus is only on the Czech Republic, it is also important to evaluate the development of the index in recent years (see Figure 8). The index value in the last two surveys has fallen from about 4.8 to 4.2. In connection with the continually improving index value as such, the result is that the Czech Republic is constantly placed in the list of countries at a lower rank.



Source: Own processing based on the data from [15, 27-31]

Fig. 8: *The development of TTCI index in the Czech Republic*

As to the fall between 2012 and 2014, it is necessary to add that WEF slightly modified the index calculation methodology in 2014. The number of pillars remained the same (14), although some of their indicators were added or dropped. The four subindexes were also renamed. Nevertheless, the detailed analysis of 14 pillars in 2012 and 2014 revealed more significant decrease in the following components: human resources and labour market (from 5.0 to 4.7), environmental sustainability (from 5.1 to 4.9), air transportation infrastructure (from 3.7 to 3.1), natural resources (from 3.4 to 2.6). The value of cultural resources and business travel also decreased (from 5.4 to 2.3) but this difference is mostly caused by the change of the methodology. Therefore, a lower value for mentioned pillars worsened the total TTCI.

The detailed analysis of individual pillars of the index for 2016 (see table 5) shows that compared to other countries the Czech Republic reaches the top of the list in health and hygiene pillar (7th place), environmental sustainability pillar (14th place) and ground and port infrastructure pillar (18th place). On the contrary, it ranked very low in the pillar of the prioritization of travel and tourism (94th place), natural resources (98th place), price competitiveness (67th place) and business environment (65th place) [15].

Tab. 5: Components of the TTCI in the Czech Republic in 2016 (the number in brackets means ranking of particular pillar)

TTCI – 4,2 (39)							
Enabling Environment		T&T policy and enabling conditions		Infrastructure		Natural and Cultural Resources	
Business Environment	4.5 (65)	Prioritization of Travel & Tourism	4.2 (94)	Air Transport Infrastructure	3.1 (49)	Natural Resources	2.5 (98)
Safety and Security	5.9 (30)	International Openness	4.2 (24)	Ground and Port Infrastructure	4.9 (18)	Cultural Resources and Business Travel	2.4 (42)
Health and Hygiene	6.7 (7)	Price Competitiveness	4.9 (67)	Tourist Service Infrastructure	5.1 (32)		
Human Resources and Labour Market	5.0 (33)	Environmental Sustainability	4.9 (14)				
ICT Readiness	5.6 (26)						

Source: Own processing based on the data from [15]

In order to improve the TTCI index, it is essential to concentrate on improving the following indicators within pillars whose values were very low, in particular:

- Prioritization of travel and tourism – indicators: country brand strategy rating, government prioritization of travel and tourism industry, effectiveness of marketing and branding to attract tourist, timeliness of providing travel and tourism data, travel and tourism government expenditure,
- Natural resources – indicator that might be influenced: attractiveness of natural assets,
- Price competitiveness – indicators: fuel price levels, purchasing power parity, ticket taxes and airport charges,
- Business environment – indicators: the time required to deal with construction permit, the effect of taxation on incentives to work, total tax rate, efficiency of legal framework in setting disputes, efficiency of legal framework in challenging regions, cost to start a business.

Conclusion

The analyses proved that the Czech Republic occupies a significant position in international tourism and its importance as an international tourism destination is constantly growing. Globally, it ranked in the first quarter of the countries with the most tourist arrivals and highest tourism receipts. In addition, the country's share in international arrivals increases. However, the receipts per arrival as well as the market share on tourism receipts have been falling since 2008. The analysis shows that foreign tourists tend to come to the Czech Republic but they spend less money there. The causes of the decrease, which oppose the growing world trend of this indicator, could be revealed by additional detailed analyses focusing on another spectrum of factors, which is beyond the scope of this article.

The performance of the tourism was also evaluated by means of tourism contribution to the GDP. The development in recent years illustrates that the sector of tourism in the Czech economy has been losing its importance.

Furthermore, TTCI was used to assess competitiveness. The CR ranked in the first third of the world's index. However, its value is decreasing and, in the context of the global growth of this index, the position of the Czech Republic in competitiveness assessment deteriorates. As far as the growing trend of TTCI is concerned, it is necessary to mention that it is typical for the developing and emerging destinations, particularly in the Asia Pacific region. With the development of the economy, an increasing share of international tourists is travelling from/to these destinations [15]. Consequently, they are catching up with the world leaders and providing better conditions for the development of competitiveness and are therefore prepared to attract and welcome millions of new tourists who will travel for the first time in the next decade. This trend should be taken into account and the CR should focus on improving the conditions for increasing competitiveness, specifically on prioritization of travel and tourism, natural resources, price competitiveness and business environment.

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ČESKÁ REPUBLIKA V KONTEXTU MEZINÁRODNÍHO CESTOVNÍHO RUCHU: JEJÍ POZICE A KONKURENCESCHOPNOST

Cestovní ruch patří k fenoménům dnešní doby. Je to významné odvětví ekonomiky, a proto je podstatné zaměřit se na konkurenceschopnost jednotlivých destinací. Oproti klasickému produktu se však destinace v mnohých aspektech a pojetí konkurenceschopnosti odlišuje. Česká republika je nedílnou součástí mezinárodního cestovního ruchu, a proto je cílem příspěvku zhodnotit její pozici v tomto odvětví. Pozice je analyzována z hlediska mezinárodních příjezdů a příjmů pomocí podílových ukazatelů a pořadí v rámci žebříčku zemí. Pro vyjádření konkurenceschopnosti je využit Travel & Tourism Competitiveness Index, který publikuje World Economic Forum. Jelikož je tento index sestavován převážně na bázi kvantitativních dat, umožňuje objektivní srovnání – jak mezi destinacemi navzájem, tak i hodnocení pozice země v čase.

TSCHECHISCHE REPUBLIK IM RAHMEN DER INTERNATIONALEN TOURISMUS: IHRE POSITION UND WETTBEWERBSFÄHIGKEIT

Tourismus ist eines der Phänomene dieser Zeit. Er ist ein wichtiger Wirtschaftssektor und deshalb ist es wichtig auf die Wettbewerbsfähigkeit der einzelnen Destinationen zu konzentrieren. Im Gegensatz zu üblichen Produkten unterscheidet sich die Destination in vielen Aspekten und im Konzept der Wettbewerbsfähigkeit. Die Tschechische Republik ist ein untrennbarer Bestandteil des internationalen Tourismus, deshalb ist Ziel dieses Beitrags ihre Position in diesem Wirtschaftssektor zu bewerten. Die Position wird in Bezug auf die internationale Ankünfte und Einnahmen mittels Anteilkennzahlen und Rangordnung der Länder analysiert. Die Wettbewerbsfähigkeit wird mithilfe Travel & Tourism Competitiveness Index dargestellt, der World Economic Forum veröffentlicht. Da dieser Index in erster Linie auf quantitative Daten zusammengestellt wird, ermöglicht er einen objektiven Vergleich – die Destinationen untereinander, sowie die Beurteilung der Lage des Landes im Laufe der Zeit.

REPUBLIKA CZESKA W KONTEKŚCIE TURYSTYKI MIĘDZYNARODOWEJ: JEJ POZYCJA I KONKURENCYJNOŚĆ

Turystyka jest jednym z fenomenów naszych czasów. Jest ważną gałęzią gospodarki, więc istotnym jest, aby skupić się na konkurencyjności poszczególnych regionów. W przeciwieństwie do tradycyjnego produktu, region turystyczny jest jednak pod wieloma względami i pod kątem konkurencyjności inny. Republika Czeska jest integralną częścią rynku turystyki międzynarodowej, a zatem celem niniejszego artykułu jest ocena pozycji tego regionu w branży. Pozycja ta jest analizowana pod względem międzynarodowych przyjazdów i przychodów za pomocą wskaźników i miejsca w rankingu poszczególnych krajów. Do pokazania konkurencyjności wykorzystano Travel & Tourism Competitiveness Index, publikowany przez World Economic Forum. Ponieważ wskaźnik ten oparty jest głównie na danych ilościowych, pozwala na obiektywne porównania – zarówno pomiędzy regionami, jak i w ramach danego kraju w różnych okresach czasu.

SINGLE COLOUR TRADEMARKS NOT ONLY ON THE CURRENT CZECH MARKET

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Abstract

Post-modern global society is marked by a highly intense competition in which proper referencing is critical. Indeed, a competitive advantage is useless without a legally protected method of linking the undertaking to its products. This method par excellence takes the form of a trademark, which is both a referencing tool and an extremely valuable intangible asset. Each jurisdiction provides for the registration of trademarks and over time the registries have become densely filled, i.e. it is extremely difficult to find a new, attractive and universal sign able to be registered in several jurisdictions and thus become a global trademark understood and recognized world-wide. To address this issue linked to conventional trademarks, both the EU law and the Czech law newly explicitly allow unconventional trademarks, such as colours. The goal of this paper is very innovative and pioneering, namely to research primary and secondary data about single colour Czech trademark registrations and related trends and to provide indices to confirm or to reject the hypothesis that single colour trademarks are perceived both by the fields of law and economics as more than a viable option for referencing and marketing, as well as being an asset.

Keywords

Colour; Trademarks; Registration; Distinctiveness.

Introduction

Post-modern global society is marked by a clash of contradictory values and priorities [13] and highly intense competition on national, regional [11] and even global levels. Indeed, as a consequence of globalizing markets, markets and competition in them do not end at national borders [7]. The competitive advantage is a key phenomenon and undertakings and businesses seek to obtain it, maintain it and make it public. Hence, it is critical to appreciate and appropriately use an effective and efficient method of linking them to their superior goods and services. The intellectual property law offers a world-wide recognition option enjoying legal protection – trademarks. Naturally, despite the more than 100 years long international harmonization via the Paris Convention and Madrid System, and other treaties managed by the World Intellectual Property Organization (“WIPO”), national laws on trademarks demonstrate differences. However, it seems that the distinctiveness is a key capacity which each and every sign must satisfy to be able to be registered in any jurisdiction and thus to become a trademark enjoying a strong legal protection and making sure that, without the consent of a trademark owner, nobody will be allowed to use such a trademark for pertinent goods and services.

Traditional trademarks AKA conventional trademarks include word marks, figurative marks (images) and figurative marks with letters. Their importance and popularity along with the

need of registration led to the status quo when basically “everything attractive is taken” [3]. Hence especially SMEs have been facing the difficult issue – how to find a good and attractive sign, which is capable to be registered as a trademark, and has not yet been registered. In other words, the density of the conventional trademark registrations makes it extremely difficult to get a new attractive trademark to be used on goods and services of a new undertaking.

The economic reality confronted the law rigidity and for last two decades in the EU, including the Czech Republic, businesses have been fighting to get new and attractive unconventional trademarks. Their endeavours were oriented in three main lines – colour, signs, smells and 3D. These are important elements which can aid in brand promotion, thus creating a strong product association and positive feelings among the customers and, therefore, should prove to be an advantage in the marketplace.

Law is an image of society, and the political and especially economic demands shape the law, hence both the EU trademark law and the Czech law underwent big changes in this respect reaching the extent of a reform. The EU law on trademarks firstly allows the registration of EU trademarks with the European Union Intellectual Property Office (“EUIPO”) and grants them the validity in the entire EU, including the Czech Republic, and secondly harmonizes the national law on national trademarks valid only in the given EU member state, e.g. the Czech national law on trademarks is harmonized and provides that the Industrial Property Office of the Czech Republic (“CZ IPO”) registers Czech national trademarks valid only in the Czech Republic and eventually able to have protection in other countries via WIPO and the Madrid System. Both the EU law on trademarks and the Czech law on trademarks have been recently reformed, even in the respect of unconventional trademarks. So, is the Rubicon crossed? Do the Czech law and the EU law and economic disciplines allow and even perhaps welcome colour trademarks? Many more questions touching public policies, good manners [12] of competition, both ethical and hard business concerns emerge. However, already the confirmation of the hypothesis, that both laws applicable in the territory of the Czech Republic open the door to the economic drive for colour trademarks, provides indices about the current status of colour trademarks and even what their future might be on the Czech market, and perhaps even in the entire EU.

1 Statement of a Problem and Aims of Research

A market needs brands for consumer orientation and a strong brand identity is an important factor for a brand’s success [6]. The trademark law is relatively harmonized in the EU and even in the global context due to both important international treaties as well as the cross-border reality of our cyber life and business operation. Multi-national, national, regional, local and other types of businesses are more and more looking for a competitive advantage and, once reached, it is absolutely critical that everybody from all over can link this undertaking to such a superior product. Hence, registering an identical trademark in various jurisdictions is practically a must. Both the EU law and the Czech law require that a sign, to be registered as a trademark, must be able to meet the definition of a trademark and perform functions of a trademark, even ultimately become an investment and/or asset [9]. The hallmark of this test is the ephemeral and eternally discussed concept of distinctiveness. Boldly, a distinctive sign should work for the owner (being his protected property) and for consumers (being a reference and source of information for them) [8]. The 20th century was dominated by the law and economic stream recognizing only signs which are nowadays called conventional trademarks. Neither the EU law nor the Czech law explicitly allowed or rejected colour trademarks, but they both confronted them with an almost insurmountable obstacle – distinctiveness. However, the wind started to blow in the opposite direction over two decades

ago in the USA with *Qualitex Co. v Jacobson Products Co.* (1995) [4] and it seems that the world follows this new pattern. Currently, there is not any doubt that consumers are able to recognize without difficulty a colour as an identifier of a commercial source [1] even if the colour is used on a barely visible bottom part of the product, see the famous “red sole mark” case *Christian Louboutin S.A. v. Yves Saint Laurent Am. Holdings, Inc.* 696 F. 3d 206, 212 (2nd Cir. 2012) [16]. In addition, courts are inclined to protect against copycat activities only highly distinctive features of brands [15] and so a colour as a mere part of a logo trademark is highly vulnerable.

Hence, the aim of this research is to identify and analyze the Czech law and the EU law currently valid and applicable in the territory of the Czech Republic and figure out whether they allow colour trademarks and how the large public, especially businesses, react to them. Due to the extent limitation, this paper focuses only on the EU trademarks and “totally” Czech trademarks, i.e. the EU law on trademarks and the Czech law on trademarks, i.e. it does not cover WIPO treaties and international trademark venue to the Czech Republic and to the Czech market.

To put it another way, the static-substantive problem is whether the EU and Czech legal frameworks truly and genuinely allow registration of colour signs as trademarks and grant them a legal protection on the Czech market. The dynamic-procedural problem is whether these legal provisions are dead letters or really useful vehicles, namely, what is the result of their application of the EUIPO and CZ IPO. The authors of this paper deeply appreciate colour trademarks and are convinced that the importance and potential massive impact of colour trademarks strongly litigate for seriously addressing both problems – whether they are doable and whether they are really done. Hence, the authors conducted this very first pioneering research and study on the single colour trademarks in the Czech Republic – what is their legal framework? How many are there? Who are their owners? What goods and services are registered? What do they look like? Can we already see any patterns?

2 Sources and Methods

This paper is the result of a multi-disciplinary research of primary and secondary sources able to generate data for addressing the stated aims and dual hypothesis. Regarding primary sources, a statute, cases and register exploration and field observation were performed and assessed. Regarding secondary sources, an abundance of Czech, as well as foreign, academic and scientific literature focusing on legal or business aspects was studied. The first hypothesis, H_1 , to be confirmed or rejected is that both the EU law and the Czech law allow single colour trademarks, i.e. they do not prohibit them and they recognize their distinctiveness potential. The second hypothesis, H_2 , to be confirmed or rejected is that businesses go for single colour trademarks, i.e. they file applications for colour trademarks, succeed in obtaining and using colour trademark with the Czech legal protection, i.e. monopolize the use of a colour as a marketing and referring vehicle for their products on the Czech market. In addition, auxiliary and related questions about the number, types, owners and covered goods and services of these single trademarks can be answered. Perhaps, even certain trends might be revealed.

A matching battery of appropriate methods including description and comparison is employed. Logically, the preference was given to the register mining and field observation along with analysis of statutes, cases and academic literature over econometric and mathematical methods. Nevertheless, the qualitative predominance and argumentative legal reasoning [10] is complemented by the quantitative pointing out the total number of valid colour trademarks and length of proceedings leading to them. In sum, the Meta-Analysis and relevancy of the legal and economic perspectives cannot be overlooked, so it must include

both deductive and inductive aspects [5] and the static and dynamic approach deals both qualitative and quantitative aspects and their juxtaposition should not be overplayed [14].

3 The Current EU Law and the Czech Law on Colour Trademarks – a Single Colour Can Pass the Distinctiveness Test

The law on trademarks seeks to ensure market transparency [1], protects and facilitates all trademark functions and creates a valuable asset. As mentioned above, the law applicable regarding trademarks on the Czech market belongs basically to two systems, either to the EU law system with the EUIPO or to the Czech national system with the CZ IPO. In addition, the international law on trademarks with WIPO institutional framework comes into the picture, but the critical role for colour trademark registrations is played by the EU law and the Czech national law. They both allow colour trademarks, focus on their distinctiveness and partially non-functionality as well.

3.1 The EU Law on Colour Trademarks – 2015 Reform Provides for Colour Trademarks and Allows Distinctive Single Colour Trademarks

Since there are three types of EU law competencies – conferred exclusive, conferred shared and others, the EU law on trademarks has two branches – regulations that deal with EU trademarks previously granted by the OHIM and now EUIPO in Alicante (conferred exclusive) and directives that deal with the harmonization and approximation of all EU member states' national laws on trademarks (conferred shared) [3]. Traditionally, colour trademarks were omitted in EU regulations and directives and OHIM has interpreted the EU law on trademarks in the light of the internal single market, i.e. the distinctiveness has to be established vis-à-vis the EU population at large. Hence, until 2015, the EU law was rather silent about colour trademarks, but still not excluding them, naturally providing the massive awareness of such a colour sign linking the undertaking and products was spread all over on the single internal market. At the same time, trademarks have been always important for the EU and they have received a lot of attention, especially due to their capacity to support the proper functioning of the single internal market [1].

The 2015 EU reform brings dramatic changes in the registration of trademarks and particularly colours, which are explicitly admitted. Namely, pursuant to Art.4 of Regulation (EU) 2015/2424 of the European Parliament and of the Council of 16 December 2015, Official Journal of the European Union, L 341/21 amending Regulation 207/2009:

An EU trademark may consist of any signs, in particular words, including personal names, or designs, letters, numerals, colours, the shape of goods or of the packaging of goods, or sounds, provided that such signs are capable of: (a) distinguishing the goods or services of one undertaking from those of other undertakings; and (b) being represented on the Register of European Union trademarks, (“the Register”), in a manner which enables the competent authorities and the public to determine the clear and precise subject matter of the protection afforded to its proprietor.

Similarly, pursuant to Art.3 of Directive (EU) 2015/2436 of the European Parliament and the Council of 16 December 2015 to approximate the laws of the Member States relating to trade marks, Official Journal of the European Union L 336/1:

A trade mark may consist of any signs, in particular words, including personal names, or designs, letters, numerals, colours, the shape of goods or of the packaging of goods, or sounds, provided that such signs are capable of: (a) distinguishing the goods or services of one undertaking from those of other

undertakings; and (b) being represented on the register in a manner which enables the competent authorities and the public to determine the clear and precise subject matter of the protection afforded to its proprietor.

This novelization is progressively taking effect during several years and no case law has been established yet. From the old case law, it should be pointed out e.g. *C-104/01 Libertel*, *C-50/01-55/01 Linde*, according to which the CJ EU assumes that consumers do not recognize the colour as an identifier of commercial source, but this assumption can be (allegedly to easily) reversed [1].

Indices about the interpretation and applications of the post-reform EU law on trademarks can be detected based on the wording of EUIPO Guidelines for examination in the Office, Part B from 2017, presenting the view that a colour alone cannot be considered as inherently distinctive and its registration is possible only with a demonstration of an acquired distinctiveness among customers, while a colour combination can be inherently distinctive. However, it is crucial for applicants that the more colours the mark contains, the less distinctive it is, because it is not easy for customers to remember and represent them all in the right sequence. Similar to the USA functionality doctrine, probably even the post-reform EU law does not allow a colour trademark reflecting the nature of goods and services, e.g. it seems impossible to establish the distinctiveness of the colour green as a trademark for an undertaking producing or commercializing Bio products, nor the colour white for the bridal industry or, on the other side of the coin, black for funeral services.

3.2 The Czech Law on Trademarks – 2003 Provides for a Single Colour Trademark with Certain Distinctiveness

The Czech law, until 2003, i.e. the Act No. 37/1995 Coll., on trademark, defined in its Art. 1 a trademark as

“a sign consisting of words, letters, numbers, pictures or shape of a product or its package, possibly their combination, designed ...”,

which induce the positivistic interpretation and application of this provision as a ban on anything else, i.e. as a prohibition of a colour trademark. However, international and EU trends have been increasing and the preparation of the Czech accession to the EU, finalized in 2004, contributed to it. This was the very background setting of the milestone case of “Milka – Lilac/violet” which ultimately ended with the registration of one single colour trademark and with curtailing of copycat mischievous imitation activities [15].

The new Czech Act on trademarks, i.e. Act No. 441/2003 Coll. ended all doubt and stated in its Article 1 that any sign can be a trademark if it can be represented graphically and particularly by colours, see

“Under the terms of this Act, a trademark may consist of any sign capable of being represented graphically, particularly words, including personal names, colour, designs, letters, numerals, the shape of goods or their packaging, provided that such sign is capable of distinguishing goods or services of one person from those of another person.”

In the context of the EU law, it is worthy to observe that the Czech national law mentions “colour” in the singular – which is perhaps at least positive – and goes ahead and even surpasses the EU law mentioning the colours in the plural. Hence, at least hypothetically, it can be argued that the Czech national law explicitly and expressly welcomes even single colour trademarks, while the EU law rather goes for a combination of colours. Nevertheless,

the ultimate distinctiveness test and further harmonization trends along with the single market reality will probably wipe off this linguistic difference.

4 Colours and Single Colour Trademarks Protected on the Czech Market

As indicated above, as of 15th June 2017 there were 303 colour trademarks valid for the Czech Republic and thus able to provide legally protected labelling and referencing to their goods and services on the Czech market. Only 5 of these 303 are colour trademarks filed originally with the CZ IPO, i.e. only for the Czech market. The remaining 298 colour trademarks are valid in the Czech Republic via the operation of the EU law, i.e. they are EU colour trademarks valid for the entire single internal market, i.e. as well for the Czech market.

4.1 Colours and Single Colour Trademarks' Registrations Status Quo – 28 Winners

As of 15th June 2017, the Czech IPO had in its official register of valid (already registered) colour trademarks a total of 303 entries, i.e. 303 colour trademarks – see www.upv.cz and <https://isdv.upv.cz/webapp/webapp.oza.formular>. However, a closer scrutiny provides very illustrative and unexpected information bringing more light in this arena.

Firstly, 298 colour trademarks of these 303 are colour trademarks registered by the OHIM/EUIPO and only five are “totally” Czech colour trademarks, i.e. their application was filed with CZ IPO and their validity was (originally) only for the Czech market. Secondly, the “oldest” of these 303 colour trademarks, it is the only colour trademark with a priority since 1995, the above mentioned 31336 “Milka – Lilac/violet” (Pantone E 176-4” and “E 176-3”) of Kraft Foods Schweiz Holding GmbH for chocolates, pralines, chocolate products and chocolate goods from the Nice class 30. Hence, the year of 1995 was the (re)start of the colour trademark, not only in the US [4], but in Europe as well and this has created a certain tension. Thirdly, out of the 303 colour trademarks, only one half consists exclusively of a colour or colours, i.e. another half includes some image, 3D and other elements. Fourthly, out of these approximately 150 truly colour and colours trademarks, only 28 are a single colour trademark. The oldest of them has again been the “Milka – Lilac/violet” since 1995 and the newest is the “Zentiva-Pink/Red” (Pantone 225C). Out of these 28 single colour trademarks, only four were originally filed with the Czech IPO, i.e. they are “totally” Czech; and the remaining 24 came from OHIM, newly EUIPO, i.e. they are EU trademarks protected on the territory of the EU and protecting (labelling of) goods and services on the single internal market, i.e. as well on the Czech market. Table 1 demonstrates which these lucky single colour trademarks recognized as distinctive and thus having a legal monopoly for the use of the given colour for the protected goods and services from the indicated Nice class are, and who their owners are.

Tab. 1: Czech single colour trademark registered and valid on 15th June 2017

Trademark	Colour	Colour	Priority	Owner	Protected goods and services
EUIPO 31336		Lilac/Violet	1995	Kraft Foods, CH	30 chocolate
EUIPO 212787		Pink/Magenta	1996	Deutsche Telecom, GE	38 telecommunication 42 designing installations
EUIPO 396176		Dark Yellow	1996	Northern Tech., US	2, 16, 17 anticorrosion
EUIPO 655019		Canary Yellow	1997	3M Company, US	16 self-stick notes, stationery
EUIPO 747501		Green	1998	Vanguard, TM, US	39 automobile rental and services
EUIPO 773630		Orange-Red	1998	KWS SAAT SE, GE	42 technical and business consultancy
EUIPO 867408		Aubergine	1998	Rexnord Flat Top ..., NL	7 conveyor components
EUIPO 962706		Brown	1998	United Parcel Service, US	39 transport, packaging
EUIPO 1029552		Blue	1998	Chep Technologie, AU	20, 39 pallets made of wood
EUIPO 1292705		Light Orange	1999	Stroh Austria, AT	33 rum and beverages containing rum
EUIPO 2550457		Canary Yellow	2002	3M Company, US	16 self-stick notes, stationery
EUIPO 379336		Purple	2003	Marks Petcare, UK	31 Foodstuffs for cats
EUIPO 3425311		Red	2003	Hilti, AG, GE	7 Drill hammers for constructions
CZ IPO 304707		Red	2004	Vodafone, CZ	38 mobile telecommunication services
EUIPO 4248399		Turquoise	2005	Husqvarna, SE	7, 8 garden equipment 12, 20 hose carts, hose carriers
EUIPO 4899233		Black	2006	Renova- Fábrica, PT	16 toilet paper

EUIPO 5298989		Yellow	2006	Jakob Maier, GE	7 fittings for milking installations
EUIPO 5983283		Light Green	2007	BASF, GE	17 boards of polystyrene extruded foams for heat
EUIPO 7114011		Traffic Purple	2008	Vallourec & Mannesmann, FR	17 Pipe end protectors (not of metal)
CZ IPO 316059		Magenta	2009	Deutsche Telekom, GE	38 42 telecommunications
CZ IPO 332507		Cyan/Magenta	2009	PROFIMED s.r.o., CZ	35 business linked to dental care 44 medical care – dental care
EUIPO 10194835		Red/Brown	2011	Grundfos Holding, DK	7 circulator pumps
EUIPO 11849791		Green	2013	CLAAS KGaA mbH, GE	7 agricultural machines 12 tractors, trucks
EUIPO 11886777		Heather Violet	2013	RUD Ketten Rieger, GE	6 round steel chains 8 devices for chains
EUIPO 12886677		Green	2013	Bornack GmbH, GE	9 securing and rescue apparatus for rappelling up or down shafts
EUIPO 12549218		Gold/White	2014	Toshiba, JP	9 notebook and tablets PCs
CZ IPO 357967		Red/Magenta/ Dots	2015	Zentiva, CZ	5 medication reducing pain
EUIPO 13852215		Blue	2015	Ziehl-Abegg, GE	7 9 11 ventilations

Source: Authors' own processing based on the Czech IPO registry database – www.upv.cz

Obviously, the snap-shot of the current status quo of the colour trademark registrations is illustrative, but not indicative. In other words, the total number of 28 does not allow employing typical econometric and statistical methods, and basically only one piece of information can be extracted without the danger to be objected to by the random and standard deviation objections – the fact that basically all owners of single colour trademarks are well-known large companies. Otherwise, it seems that no particular class of goods and services is preferred for a single colour trademark and no particular types of colours have been used.

Therefore, the exploration of data about the single colour trademarks needs to be approached and explored, not only from the statistical perspective, but, as well, a move has to be made to the dynamic perspective. In other words, we should not only ask what the single colour trademarks are, but, as well, how did they come to be colour trademarks? To put it in the strict

legal context, the question can be rephrased – how did these large companies manage to pass the distinctiveness test and threshold so as to be allowed trademark registration?

4.2 Single Colour Trademark Registration History – How Much Time and Effort Is Required to Pass the Distinctiveness Test

On 29th May 1995, Kraft Foods filed for single colour applications “Milka – Lilac/violet” in Switzerland and via WIPO they sought international protection for this trademark 644464 (114897) to be translated in national protection in designated countries and, shortly after, the file reached the Czech Republic as well. Between 1996 and 1998, the fight over the admissibility of the colour trademark and the very distinctiveness of “Milka – Lilac/violet” took place before the Czech IPO, which decided against it in 1999. Since the internal administrative appeal confirmed this rejection, Kraft Foods filed a lawsuit and the case reached the Czech Superior Court in Prague. The judges, with a brilliantly drafted judgment, reached the opposite result, they decided directly for Kraft Foods and, indirectly, for the registration of this trademark. The protection, i.e. the registration, was granted in 2002, which means that the international venue towards the protection in the Czech Republic took almost seven years. In contrast to this, on the 1st of April, 1996, Kraft Foods applied for this colour as an EU trademark with a priority going back to 24th October 1995, under 31336. The EU trademark application process by OHIM successfully ended with the registration of 31336 Milka – Lilac/violet” in 1999, i.e. it took four years.

The historically second single colour trademark is 212787 and the application for it was filed by Deutsche Telekom in 1996 and was registered in 2004, i.e. it took four years. The third one, 396176, was filed in 1996 and registered in 2001, i.e. it took five years. The fourth one, 655019, was filed in 1996 and was registered in 2001, i.e. it also took five years. The fifth one, 747501, was filed in 1998 and registered in 2003, so the process took five years again, etc. However, the most recent single colour trademark successfully applied for and granted by CZ IPO, O-520137 (reg.357967) passed the registration process, including bringing evidence and proving the distinctiveness, in less than two years.

Again, since the total number of all single colour trademarks recognized by the EUIPO or CZ IPO enjoying the validity as of 15th June 2017 is only 28, the study of the registration process is not conclusive, but definitely more than just illustrative. Indeed, it is indicative at least with respect to the Czech national law and CZ IPO. Consequently, the OHIM was changed into EUIPO and the EU law on trademarks has been undergoing a reform, which started in 2015 and is in the process of taking effect. However, the Czech national law on trademarks has been set favourably for single colour trademarks for over one decade and, even though there are very few cases, the registration process can be successfully completed in less than two years. Further, out of these four “totally” (originally filed with the CZ IPO) Czech single colour trademarks, none needed to go to the court, i.e. the CZ IPO required and obtained sufficient evidence about the distinctiveness, and nothing more than a further requested or internal appeal were needed. Even more interestingly, these trademarks were, during the registration process, and even after it as well, attacked by third parties. Nevertheless, they have survived all these challenges and Table 2 summarizes the dynamics and national particularities of the successful single colour trademark applications filed first with the CZ IPO.

Tab. 2: Single colour trademark filed first and registered with the CZ IPO as of 15th June 2017

Trademark	Colour	Colour	Filed/ Priority	Registered	Owner	Protected goods and services
O-360082 304707		Red	2004	2009	Vodafone, CZ	38
O-470186 316059		Magenta	2009	2011	Deutsche Telekom, GE	38, 42
O-471135 332507		Cyan/ Magenta	2009	2011	Profimed, CZ	35, 44
O-520137 357967		Red/Mag enta/Dot	2015	2017	Zentiva, CZ	5

Source: Authors' own processing based on the Czech IPO registry database – www.upv.cz

The analysis of “totally” Czech single colour trademarks and the Table 2 overview not only suggest that warm magenta-red colours seem to be the top candidate for single colour trademarks, perhaps following the milestone international-Czech single colour trademark “Milka – Lilac/violate” and that the large profit generating companies from telecommunications (by the way, the last from the Czech telecommunication trio, O2, has a colour trademark – consisting of a set of blue shades – as well) and pharmaceutical industries have the resources, capacity and know-how to pass the distinctiveness test and to get the single colour trademark. The Czech national inclination for warm colours, such as red, matches the general experience and knowledge that warm colours are perceived as stimulating, as opposed to cold colours, such as blue and green, which have a calming effect [2].

However and perhaps more importantly, it has been a matter of concern shared not only by many scholars stating that “colour should not be monopolized by big companies”. In other words, there is a legitimate fear that the public domain is under pressure, especially in the context of the EU law on trademarks, with respect to not strongly distinctive signs, including colours. Certain voices are even being raised against the possibility of acquiring distinctiveness through use in trade [1]. However, the available data, including the above tables, indicate that these fears are linked only to rare application excesses and not to the systematic setting. It appears that CZ IPO manages very well to filter colour trademark applications and, despite perhaps more flexible legal wording (a colour instead of colours), the four colour trademarks are truly known to the large Czech public truly linking them to their owners and their goods and services. Naturally, a question can be raised about whether it is fair that, so far, with the CZ IPO and basically as well the EUIPO, only big companies prevail and manage to prove the distinctiveness of their single colour signs. Undoubtedly, the strategy EUROPE 2020 for smart, sustainable and inclusive growth appreciates small and medium sizes businesses (“SMEs”). However, the economic reality needs to be observed – the distinctiveness needs to be established vis-à-vis to the public-at-large, and if there are only three telecommunication service providers and each of them uses one colour, then everybody in the country knows which colour goes to whom. This perhaps creates an impression of inherent injustice for SMEs producing and commercializing particular goods or services known to a small segment of the population, because these SMEs can hardly pass the distinctiveness test for a single colour trademark. In addition, it is argued that colours are

more important for superficial choices when consumers do not spend too much time checking products [1], i.e. SMEs with particular goods; and services generally target and get attention of more attentive consumers. So the lack of a single colour trademark does not seem to be catastrophic for them. Indeed, adhering to a colour is generally beneficial for product categories of a dominant market leader, especially high-involvement categories [6].

Further, we should keep in mind that unconventional trademarks are true specialties – difficult, rare and expensive, i.e. perhaps only the top companies from certain industries can reach them. Again, this is the economic reality and the law should not step heavily into it and artificially create some social engineering for SMEs. And who knows, perhaps, thanks to modern technologies, the internet and domain universe, special social media, perhaps some SMEs will manage it too. And if not, they have much a better chance to go for a colour combination trademark or a good colour-word logo.

Allowing trademark protection for colour(s) trademark which truly appeal to consumer and manifestly signify a specific source incentivizes the continued creation of attractive products [16] and reinforce healthy and informed competition. A single colour trademark deserves to belong in the plans and projects of Europe 2020 and definitely has its place on the Czech market.

Conclusion

Colour trademarks have existed, to a certain extent, for centuries and they and their fantastic potential got (re)discovered around 1995 and they became, along with other unconventional labelling signs, such as 3D, smell, taste, etc., hot candidates for signs to be allowed to pass the distinctiveness test and to be registered as trademarks. The strong demand by businesses pushed by the economic reality made first judges and then even legislatures change the legal setting and allow colours signs, even single colour signs, to be registered as EU trademark with EUIPO or Czech trademark with CZ IPO. Especially single colour trademarks are all consumers friendly, i.e. they are appreciated even by children and people with reading difficulties; they also have the potential to become a hallmark and referencing asset supporting market transparency nationally, regionally and even globally.

The static-substantive problem was resolved in an absolutely clear manner, since the analysis of the post-reform EU law on trademarks and the Czech law on trademark indisputably confirms that colours signs can be registered as trademarks, provided they satisfy general criteria for trademark registration, especially if they pass the distinctiveness test. The Czech legal wording even mentions the colour in singular! The dynamic-procedural problem is whether these legal provisions are dead letters or really useful vehicles, namely what was positively resolved too, i.e. the records on registration of EU trademarks and “totally” Czech trademarks reveals that colour trademarks are definitely part of both economic and law reality, i.e. approximately 150 of them are valid in the Czech Republic. The first trend to be observed consists in the shortening of the registration proceedings and elimination of the need to go to court, while the distinctiveness test seems to be vigorously applied. At the same time, the law is doing just a legal framework with objective rules and requirements hard to be met, and thus leading to a much higher rate of success by large companies than SMEs and in certain industries (telecommunication, pharmaceutical, chocolate). In any case, this is the economic reality and the law is set properly and it could be hardly suggested that it should be changed in order to make colour trademark registration easier for some and discriminate others. This would be as mixing in the selection of colours. Unlike the EU law distinctiveness test [1] which perhaps needs a serious readjustment, the Czech law one does not need any. Hence, the second trend is shaping of a typical single colour trademark, especially the Czech

one, which is red-magenta-violet, owned by a large company and is linked to goods or services from the indicated industries.

In sum, a single colour trademark is an attractive and viable option for the Czech market, but it does not come “easily and for free”. Businesses should study the legal framework and its application by the EUIPO and CZ IPO carefully and competent judges should create their “SWOT” analysis in this respect. A single colour trademark is definitely not for everyone and a combination of colours or colour wording logo could be an easier option. However, if the analysis reveals that the business has a single colour sign with strong distinctiveness features, it would be foolish to give a pass on the legal protection of such a supra attractive sign providing many marketing and referencing functions, serving both the business as well as consumers and even becoming a well-deserved valuable asset. *Ave colourata nota! Ave colarata stigma!*

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JEDNOBAREVNÉ OCHRANNÉ ZNÁMKY NEJEN NA SOUČASNÉM ČESKÉM TRHU

Postmoderní globální společnost je poznamenána velmi intenzivní konkurencí, ve které je správné odkazování kritické. Konkurenční výhoda je zbytečná bez právně chráněné metody propojení podniku s jeho produkty. Tato metoda par excellence má podobu ochranné známky, která je jak referenčním nástrojem, tak nesmírně cenným nehmotným majetkem. Každá jurisdikce zajišťuje registraci ochranných známek a je obtížné nalézt nové, atraktivní a univerzální označení, které by mohlo být registrováno v několika jurisdikcích, a stát se tak globální ochrannou známkou. Pro řešení tohoto problému jak právo EU, tak české právo nově výslovně umožňují nekonvenční ochranné známky, jako jsou barvy. Cílem tohoto příspěvku je velmi inovativní výzkum primárních a sekundárních údajů o jednobarevných registracích českých ochranných známek a souvisejících trendů ve světle hypotéz prokazujících, že jednobarevné ochranné známky jsou vnímány právem i ekonomikou jako více než životaschopná volba pro odkazování a marketing i jako majetek.

EINFARBIGE SCHUTZMARKEN NICHT NUR AUF DEM AKTUELLEN TSCHECHISCHEN MARKT

Die postmoderne globale Gesellschaft zeichnet sich durch eine sehr intensive Konkurrenz aus, in der die richtige Referenzierung entscheidend ist. Ein Wettbewerbsvorteil ist nutzlos, ohne eine gesetzlich geschützte Methode, das Unternehmen mit seinen Produkten zu verknüpfen – die Schutzmarke, die sowohl ein referenzierendes Werkzeug als auch ein äußerst wertvolles immaterielles Gut ist. Es ist äußerst schwierig, ein neues, attraktives und universelles Zeichen zu finden, das in mehreren Ländern registriert werden kann und somit zu einer globalen Marke wird. Deswegen erlauben sowohl das EU-Recht als auch das tschechische Recht ausdrücklich unkonventionelle Marken wie Farben. Das Ziel dieser Arbeit ist sehr innovativ und zukunftsweisend, nämlich die Erforschung von Primär- und Sekundärdaten über einfarbige tschechische Schutzmarken und verwandte Trends mit den Hypothesen, dass einfarbige Schutzmarke bei dem Recht und der Ökonomie als eine lebensfähige Option für die Referenzierung, sowie ein Vermögenswert wahrgenommen werden.

JEDNO KOLOROVE ZNAKI TOWAROWE NA AKTUALNYM RYNKU CZESKIM

Postmodernistyczne społeczeństwo globalne charakteryzuje się bardzo silnej konkurencji, w prawidłowy odsyłania jest kluczowa. Przewagi konkurencyjnej jest bezużyteczny bez zastrzeżona metoda połączyć firmę z jej produktów - znak towarowy, który jest zarówno narzędziem katalogowanie i niezwykle cenny składnik wartości niematerialnych. Jest niezwykle trudno znaleźć nowy, atrakcyjny i uniwersalny charakter, który może być zarejestrowany w kilku krajach, a tym samym staje się globalną marką. Dlatego pozwalają zarówno prawa UE i prawa czeskiego jawnie niekonwencjonalne marek jak kolorach. Celem tej pracy jest bardzo innowacyjne i przyszłościowe, czyli eksploracja danych pierwotnych i wtórnych na monochromatycznych czeskich znaków towarowych i powiązanych trendów z hipotezą, że pojedynczy znak towarowy koloru w prawo i ci gospodarka jako realną opcją na przedstawieniu, jak również aktywa postrzegane być.

PERFORMANCE OF THE TEXTILE INDUSTRY COMPANIES IN THE LIBEREC REGION

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Abstract

The aim of the article is to evaluate performance of small and medium-sized companies in the textile industry located in the Liberec Region. The textile industry was chosen because of its importance in the Liberec Region in the past. The analysis is focused on the current performance of textile and clothing enterprises between the years 2013 and 2015. To do so, two different approaches are used. The first approach is based on the traditional measurement of performance using the accounting profit or loss. The second approach uses modern techniques, namely the Economic Value Added ratio (EVA). In both cases, the development of the values of both indicators is analysed over time. The research confirmed quite a substantial difference when measuring performance using the above mentioned approaches.

Keywords

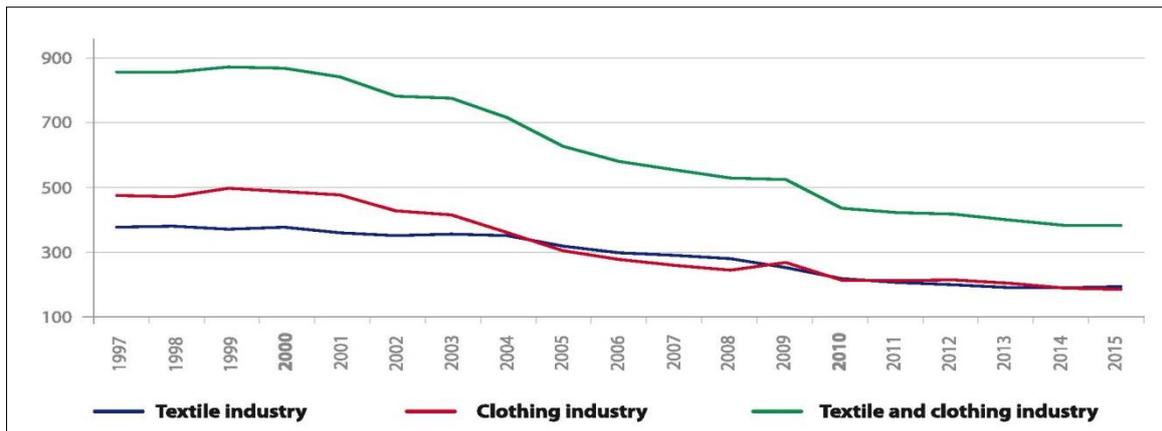
Accounting profit; Economic profit; EVA ratio; Textile industry.

Introduction

The most important person influencing the development of the textile industry in the Liberec region from the 1830s onwards was Johann Liebieg. After the Second World War, the textile company Textilana was founded in Liberec. In addition, other companies were located in the region, such as Bytex producing carpets, Retex processing waste textile or Hedva producing silk mixed fabrics. At the end of the 1980s the textile industry was one of the most important industries in Czechoslovakia and Liberec itself was a town with the highest number of employees working in textile companies.

After the Velvet Revolution, the textile industry was restructured, which was characterized by changes in the quantity of output, number of companies or the structure and quality of products. The restructuring can be presented by a number of companies operating in the industry between 1997 and 2015 (see Fig 1).

The current textile industry is oriented mostly on the automotive industry. It provides supplies of textiles designed for noise isolation, fabric car seats, textile fills for the interior of vehicles, etc. Other promising branches are focused on geotextiles, fabrics for the construction industry, the application of nanofibers (filters, textiles for healthcare). In the year 2015 there were 184 textile enterprises and 1390 clothing enterprises registered in the Liberec region.



Source: [1]

Fig. 1: The development of textile and clothing enterprises in the Czech Republic between 1997 and 2015

1 Company Performance

Company performance is the concept of an abstract character, which is relatively often characterized in the course of time but its definitions and ratios used for its measurement change. As a basic approach used in this article, the measurement of performance from a financial perspective was chosen.

Kislingerová [2] defines performance as an ability of an entity to achieve certain results that are based on certain criteria and can be compared with the results of other entities. Company performance from the theoretical point of view is analysed, for example by Brabec [3], Pavelková and Knápková [4], Neumaierová and Neumaier [5]. On the company level, financial performance can be measured using the accounting profit or by calculating the value of a company for external users with the help of the economic profit [6].

1.1 Traditional Concept of Performance – Accounting Profit or Loss

Based on certain rules and conventions (national or international legislation), the accounting profit is expressed as the difference between the income and the expenses of a company, whereas profit means a positive result and loss a negative one. Income is usually defined as increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in increases in equity, other than those relating to contributions from equity participants. Expenses, on the other hand, are decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrence of liabilities that result in decreases in equity, other than those relating to distributions to equity participants.

According to Bokšová [7], the accounting profit or loss is not only a measurement of a company performance but it is also a resource for financing company activities. Although accounting profit is a sophisticated and methodically described measure used in all accounting systems, there are some areas that can be influenced by a subjective approach of accounting entities. These areas include, for example, depreciation and amortization, impairment of assets, provisions, measurement of own inventories or definition of long lived assets. Further issues concerning accounting profit or loss, as well as pros and cons of this approach, are analysed by Hasprová [8].

In practice, as pointed out by Pavelková a Knápková [4], companies can disclose different modification of accounting profit or loss in their financial statements. From the widest to the narrowest approach, the following ones can be used: Earnings Before Interest, Taxes,

Depreciation and Amortisation (EBITDA), Earnings Before Interest and Taxes (EBIT), Earnings Before Taxes (EBT) and Earnings After Taxes (EAT). When using the above mentioned phenomena for measuring company performance, the possible influence of different depreciation, amortization, interest, as well as taxes has to be taken into consideration.

Measuring company performance differs by the income and expenses incorporated in its calculation. Czech accounting legislation prefers disclosing items on the form over content principle. This can lead to inaccurate disclosure of profit and loss. The content of income statement is regulated by the Regulation No. 500/2002 Collection of Law [9]. It embodies profit and loss from operating and financial activities and it also contains profit and loss before and after taxation.

1.2 Economic Approach to Profit

According to Hasprová [8], economic profit is a well-known phenomenon. There are several ways of its calculation. The most important as well as the most often used one is the Economic Value Added (EVA). According to Kubíčková and Jindřichovská [6], the EVA ratio is the best available tool for measuring economic profit. Generally speaking, the EVA ratio represents the economic profit generated by a company after reimbursement of all costs including also cost of capital.

In practice, the EVA ratio is calculated based on the data disclosed in financial statements. The accounting profit or loss is transformed into the economic profit. According to Mařík and Maříková [10], this procedure contains about 164 changes, which are the intellectual property of the creators and developers of Economic Value Added (EVA) Joel M. Stern and G. Bennett Stewart III (within the Stern Value Management, formerly Stern Stewart & Co). As this ratio is based on financial statements prepared according to US GAAP, therefore it cannot be directly used in the Czech Republic. To apply this ratio in the Czech Republic, two different approaches are used. The first approach has been presented for example by Mařík and Maříková [10] or Pavelková and Knápková [4]. The second approach includes the calculation developed by Neumaierová and Neumaier [5], which was modified by the Czech Ministry of Industry and Trade.

1.2.1 The calculation of the EVA ratio – the Neumaier's approach

As the transformation of accounting profit into the economic one is neither clear nor simple, Neumaierová and Neumaier [5] suggest that its calculation according to the Formula (1) is more transparent for Czech companies. The same methodology is also used by the Czech Ministry of Industry and Trade [11].

$$EVA = (ROE - r_e) \cdot Equity \quad (1)$$

where:

$(ROE - r_e)$ = a spread, which represents the influence of company capital structure; a company creates value only if the spread is positive;

r_e = cost of equity,

ROE = Return on Equity.

This calculation seems to be quite simple but the problem lies in the calculation of the cost of equity r_e . To solve this problem, the INFA model is applied. This model is able to measure both short- and long-term financial performance. Neumaierová and Neumaier (2002) united the most important ratios with the calculation of risk margins that increase the risk-free rate. This calculation was made assuming constant Weighted Average Cost of Capital (WACC).

On the other hand, the r_e does change if the capital structure is changing. The r_e can be calculated with the help of Formula (2).

$$r_e = r_f + r_{company} + r_{finstr} + r_{finstab} + r_{la} \quad (2)$$

where:

- r_f = risk-free rate,
- $r_{company}$ = premium for business risk,
- r_{finstr} = premium for the risk arising from the capital structure,
- $r_{finstab}$ = premium for financial stability risk,
- r_{la} = premium for the insufficient liquidity of the share.

The amount of the above mentioned premiums is difficult to determine. The risk-free rates are expressed by the Czech Ministry of Industry and Trade as the Yield of 10-year government bonds. These rates for the analysed period are presented in Tab. 1.

Tab. 1: Risk-free rate

Year	2013	2014	2015
Risk-free rate (r_f)	2.26%	1.58%	0.58%

Source: Own elaboration according to [11]

The premium for financial stability risk is dependent on the liquidity, namely on the current ratio (L3). After that, current ratio is compared with quick ratio (L2) and cash ratio (L1). Although these ratios should be calculated for each industry, for simplicity's sake the Czech Ministry of Industry and Trade [11] suggest the cash liquidity equal to 1 and the quick ratio equal to 2.5.

- If $L3 \leq L1$ then $r_{finstab} = 10\%$,
- if $L3 \geq L2$ then $r_{finstab} = 0\%$,
- if $L1 < L3 < L2$ then $r_{finstab}$ is calculated using Formula (3).

$$r_{finstab} = (L2 - L3)^2 / (L2 - L1)^2 \cdot 0.1 \quad (3)$$

The premium for the insufficient liquidity of the share is calculated as a sum of the following resources: equity, bank loans and bonds, i.e. Used Resources (UR).

- If $UR \leq 100$ million CZK then $r_{la} = 5\%$,
- if $UR \geq 3$ billion CZK then $r_{la} = 0\%$,
- if 100 million CZK $< UR < 3$ billion CZK then r_{la} is calculated using Formula (4).

$$r_{la} = (3 - UR)^2 / 168.2 \quad (4)$$

UR in Formula (4) is expressed in billion CZK.

The premium for business risk is connected with the Return on Assets (ROA). The amount of ROA is compared with X_1 ratio, which is calculated using Formula (5).

$$X_1 = UR / TA \cdot r_d \quad (5)$$

where:

- TA = total assets
- r_d = real or estimated interest rate of debt.

If $ROA > X_1$ then $r_{company} = \text{minimum } r_{company}$,
 if $ROA < 0$ then $r_{company} = 10\%$,
 if $0 < ROA < X_1$ then $r_{company}$ is calculated using Formula (6)

$$r_{company} = (X_1 - ROA)^2 / (X_1)^2 \cdot 0.1 \quad (6)$$

The minimum amount of $r_{company}$ is dependent on the particular industry. The Czech Ministry of Industry and Trade recommends using average values that are shown in Tab. 2.

Tab. 2: Minimum premium for business risk

	2013	2014	2015
Textile industry	2.54%	2.65%	2.65%
Clothing industry	3.00%	3.00%	3.00%

Source: Own elaboration according to MPO (2016).

The premium for the risk arising from the capital structure is calculated according to the Formula (7). The own calculation of r_e and WACC is shown in Formulas (8) and (9).

$$r_{finstr} = r_e - WACC \quad (7)$$

$$WACC = r_f + r_{company} + r_{finstab} + r_{la} \quad (8)$$

$$r_e = WACC \cdot UR / TA - EAT / EBT \cdot r_d \cdot (UR / TA - EQUITY / TA) / (EQUITY / TA) \quad (9)$$

If $r_e = WACC$ then $r_{finstr} = 0\%$,
 if $r_e - WACC > 10\%$ then $r_{finstr} = \text{max. } 10\%$.

2 Research Objectives

The aim of the article is to evaluate performance of small and medium-sized companies in the textile industry located in the Liberec Region. To do so, two different approaches are used. The first approach analyses company performance using the accounting profit or loss. The second approach uses the Economic Value Added ratio (EVA). In both cases, the development of the values of both indicators is analysed between the years 2013 and 2015.

Based on the above mentioned issues the following research question was set:

- Is there a difference in measuring performance of selected companies by using the two above mentioned approaches, and if so, how big is the difference?

3 Methodology

Based on the review of relevant scientific literature, the goals were achieved by descriptive research methods. As mentioned above, the research deals with two different approaches of measuring company performance. This analysis was performed using a research sample obtained with the help of the Magnus Web database containing data of entities located in the Czech Republic. The research sample was limited to companies operating in the Liberec Region, which met the following criteria: legal entity, economically active company, small and medium-sized enterprises operating in the textile and clothing industry. For determining the size of companies, the criteria set by the Act No. 563/1991 Coll., Act on Accounting valid from 1st of January 2016 were used. On 1st of March 2017 the above mentioned criteria were met by 161 companies. But only 22 of them published complete financial data between the years 2013 and 2015. The year 2016 was not included into the analysis because the data were

not available. The key characteristics describing the selected companies, as requested by the Act No. 563/1991 Coll., Act on Accounting, are shown in Tab. 3.

Tab. 3: Selected textile and clothing companies in the Liberec region in 2015

Company	Number of Employees.	Total Assets in CZK	Turnover in CZK
ARIES	110	112,634,000	27,091,000
BOHEMIA - FASHION	31	8,013,000	9,899,000
CALEDON textile	11	34,123,000	70,376,000
CLIQUO	3	454,000	1,034,000
Damino CZ	171	38,627,000	95,250,000
DIMATEX CS	25	16,983,000	50,837,000
ECE Group	28	32,358,000	46,512,000
Hansa-textil	16	10,437,000	23,889,000
Hoftex Liberec	2	50,530,000	11,042,000
Inter Flag	50	19,475,000	29,770,000
KERBO	1	299,000	322,000
L K V	29	16,181,000	22,703,000
LIBEA	9	12,017,000	14,693,000
LICOLOR	27	60,964,000	37,056,000
Mehler Engineered Products	157	1,030,721,000	710,148,000
Mirka SPORT	20	4,731,000	13,166,000
SEBATEX	19	6,689,000	5,091,000
ŠICÍ RAJ	5	2,617,000	4,499,000
TRANSIMO	10	1,905,000	3,352,000
VESTIMENTO	1	174,000	519,000
Výroba stuh - ELAS	93	75,307,000	113,709,000
W. Wülfing CZ	183	96,384,000	105,288,000

Source: Own elaboration.

As shown in Tab. 3 the research sample contained 10 micro companies, 10 small companies and 2 medium-sized companies.

4 Results of the Research

To compare the performance of selected companies, the accounting profit and the EVA ratios are used. To eliminate the effect of different size of the analysed companies, both of the performance measures were expressed on a relative basis. To do so, both of the absolute performance measures were divided by the number of employees working in the selected companies during the analysed time periods.

Firstly, Tab. 4 shows the accounting profit disclosed by the selected companies during the research period. As shown in the table, two of the companies achieved zero profit in the year 2013. This was caused by the fact that they started their business in that year. The fourth column of the table shows the average accounting profit of the analysed companies during the examined period. Based on the analysed data it can be stated that about a third of the analysed companies disclosed on average accounting loss during the examined period. On the other hand, about two thirds of the research sample disclosed on average accounting profit. Comparing the companies according to their average accounting profit per employee, the most profitable ones are Mehler Engineered Products followed by W. Wülfing CZ and ECE Group. On the negative side of the scale Hoftex Liberec, KERBO and CALEDON textile can

be found. The company Hoftex Liberec, which achieved the worst average loss, went into liquidation at the beginning of the year 2017.

Tab. 4: Accounting profit per employee in the years 2013 – 2015

Company	Accounting profit (in CZK)			Average	Ranking
	2013	2014	2015		
ARIES	- 32,176	27,010	- 12,782	- 5,983	17
BOHEMIA - FASHION	0	15,071	17,000	10,690	11
CALEDON textile	0	- 595,818	228,273	- 122,515	20
CLIQUO	- 2,000	- 60,000	- 8,000	- 23,333	18
Damino CZ	41,561	7,352	142,450	63,788	4
DIMATEX CS	1,105	59,042	- 32,640	9,169	12
ECE Group	55,483	80,036	73,000	69,506	3
Hansa-textil	- 99,813	- 101,563	63,688	- 45,896	19
Hoftex Liberec	- 92,119	- 868,610	- 2,546,500	- 1,169,076	22
Inter Flag	11,340	9,540	16,560	12,480	10
KERBO	- 70,000	- 97,000	- 554,000	- 240,333	21
L K V	1,483	35,862	29,793	22,379	7
LIBEA	95,000	- 889	27,778	40,630	5
LICOLOR	111,333	49,815	- 103,560	19,196	8
Mehler Engineered Products	806,151	350,063	288,357	481,524	1
Mirka SPORT	54,000	20,316	24,600	32,972	6
SEBATEX	26,176	15,765	2,632	14,858	9
ŠICÍ RÁJ	28,000	- 56,200	14,200	- 4,667	16
TRANSIMO	- 4,143	6,200	2,800	1,619	15
VESTIMENTO	- 23,333	- 20,000	64,000	6,889	14
Výroba stuh - ELAS	22,259	4,209	- 763	8,568	13
W. Wülfing CZ	36,609	79,415	100,415	72,146	2

Source: Own elaboration.

When calculating the economic profit using the EVA ratio per employee, quite different results were found among the analyzed companies. As shown in Tab. 5, about 60% of the research sample achieved on average the negative economic profit. Moreover, the companies with positive economic profit achieved lower profit compared to the profit achieved by accounting profit measure. Comparing the companies according to their average EVA ratio per employee, the most profitable ones are again Mehler Engineered Products now followed by VESTIMENTO and W. Wülfing CZ. The less profitable companies according to this measure are again Hoftex Liberec, KERBO and now LICOLOR.

Tab. 5: EVA per employee in the years 2013 – 2015

Company	EVA (in CZK)			Average	Ranking
	2013	2014	2015		
ARIES	- 92,195	- 34,601	- 52,874	- 59,890	16
BOHEMIA - FASHION	10,528	23,852	11,138	15,173	4
CALEDON textile	- 6,815	- 425,043	75,173	- 118,895	18
CLIQUO	- 107,240	- 41,685	- 920	- 49,948	15
Damino CZ	25,935	- 3,406	- 7,880	4,883	7
DIMATEX CS	- 36,115	5,918	- 96,215	- 42,137	14
ECE Group	- 19,698	- 5,865	- 7,194	- 10,919	9
Hansa-textil	- 87,374	- 53,124	52,811	- 29,229	12
Hoftex Liberec	- 199,256	- 700,963	- 3,803,190	- 1,567,803	22
Inter Flag	- 19,622	- 8,340	- 8,965	- 12,309	10
KERBO	- 273,170	- 261,720	- 479,830	- 338,240	21
L K V	- 51,985	- 11,128	- 10,779	- 24,631	11
LIBEA	- 170,971	- 184,811	- 56,740	- 137,507	19
LICOLOR	- 92,219	- 174,148	- 417,631	- 227,999	20
Mehler Engineered Products	292,142	- 37,649	- 98,475	52,006	1
Mirka SPORT	34,078	3,173	7,717	14,989	5
SEBATEX	22,118	11,565	217	11,300	6
ŠICÍ RÁJ	- 2,582	- 73,596	- 12,432	- 29,537	13
TRANSIMO	- 15,490	1,449	- 2,133	- 5,391	8
VESTIMENTO	11,760	7,830	87,490	35,693	2
Výroba stuh - ELAS	- 42,001	- 76,817	- 86,420	- 68,413	17
W. Wülfig CZ	- 11,951	36,433	57,571	27,351	3

Source: Own elaboration.

To express the difference between the two analysed approaches used to measure company performance, Tab. 6 shows the difference between EVA per employee and accounting profit per employee during the research period. As shown in the fourth column, the analysed companies achieved, on average, worse results when using the EVA ratio instead of the accounting profit measure. In more detail, by 18 of the analysed companies the difference between EVA per employee and accounting profit per employee was negative and only by the remaining four companies the performance measured by the EVA per employee was higher. The average difference between EVA per employee and accounting profit per employee was 82,548.3 CZK. Analysing the change between the above mentioned performance measures, the biggest negative difference between the accounting profit per employee and the EVA ratio per employee was achieved by the Mehler Engineered Products, followed by Hoftex Liberec, LICOLOR and LIBEA. On the other hand, by the CALEDON textile, BOHEMIA - FASHION, Hansa-textil and VESTIMENTO the EVA ratio per employee was even higher than the accounting profit per employee. From the ranking point of view, the biggest change was by LIBEA and LICOLOR, which fall in the ranking by 14 respectively by 12 places. On the other hand, the biggest positive change in their ranking position was achieved by VESTIMENTO and BOHEMIA-FASHION, which moved upwards in the ranking by 12 respectively by 8 places.

Tab. 6: The difference between EVA per employee and accounting profit per employee in the years 2013 - 2015

Company	EVA – Accounting profit (in CZK)			Average	Ranking
	2013	2014	2015		
ARIES	- 60,018	- 61,610	- 40,092	- 53,907	9
BOHEMIA - FASHION	10,528	8,781	-5,862	4,482	20
CALEDON textile	- 6,815	170,775	- 153,100	3,620	19
CLIQUO	- 105,240	18,315	7,080	- 26,615	13
Damino CZ	- 15,626	- 10,758	- 150,330	- 58,905	8
DIMATEX CS	- 37,221	- 53,123	- 63,575	- 51,306	10
ECE Group	- 75,180	- 85,901	- 80,194	- 80,425	6
Hansa-textil	12,439	48,438	-10,877	16,667	21
Hoftex Liberec	- 107,138	167,648	- 1,256,690	- 398,727	2
Inter Flag	- 30,962	- 17,880	- 25,525	- 24,789	15
KERBO	- 203,170	- 164,720	74,170	- 97,907	5
L K V	- 53,468	- 46,990	- 40,572	- 47,010	11
LIBEA	- 265,971	- 183,922	- 84,518	- 178,137	4
LICOLOR	- 203,552	- 223,963	- 314,071	- 247,195	3
Mehler Engineered Products	- 514,009	- 387,712	- 386,832	- 429,518	1
Mirka SPORT	- 19,922	- 17,143	- 16,883	- 17,982	16
SEBATEX	- 4,058	- 4,200	- 2,415	- 3,558	18
ŠICÍ RÁJ	- 30,582	- 17,396	- 26,632	- 24,870	14
TRANSIMO	- 11,347	- 4,751	- 4,933	- 7,010	17
VESTIMENTO	35,093	27,830	23,490	28,804	22
Výroba stuh - ELAS	- 64,261	- 81,026	- 85,657	- 76,981	7
W. Wülfig CZ	- 48,560	- 42,982	- 42,844	- 44,795	12

Source: Own elaboration.

Other descriptive statistics characterizing the average difference between the EVA per employee and accounting profit per employee are shown in Tab. 7. As there are four significant outliers, the average difference between EVA per employee and accounting profit per employee has a negative skewness, which results in the situation that the average is lower than median and even lower than the lower quartile.

Tab. 7: Descriptive statistic of the average difference between EVA per employee and accounting profit per employee

Statistic	Value
Average	- 82,548.3
Standard deviation	124,416.0
Minimum	- 429,518.0
Lower quartile	- 80,425.0
Median	- 45,902.7
Upper quartile	- 7,010.4
Maximum	28,804.4
Range	458,322.0

Source: Own elaboration.

Conclusion

The research conducted by the Department of Finance and Accounting of the Faculty of Economics at the Technical University of Liberec suggested that Czech companies used both

accounting and modern measures when evaluating their performance. The accounting profit or loss was used by about 81.9% of companies surveyed, whereas the EVA ratio was used only by 22.3% of them. [8]. The reason might be a historical inertia, a relatively easy way of calculating the accounting profit or loss, a known informative value or other functions used by managing companies [12]. In addition, the accounting profit is the output of the compulsory accounting evidence used in the Czech Republic. Another reason may also be the negative difference between the EVA ratio and the accounting profit, as suggested in this article. To confirm this phenomenon in a more detail, the analysis should be extended to other sectors, regions and time periods.

When using these two approaches by measuring company performance, the following aspects have to be taken into account. Both of the measures use different methods to evaluate company performance and also the input data are not the same. The economic model adjusts accounting data in favour of the needs of investors. Therefore, company assets disclosed in financial statements are transformed into net operating assets that are used in core business activities. Similar adjustment is performed by the profit or loss which is transformed into the net operating profit. These transformations are quite substantial and their application is different in various companies, which may lead to less comparable results. As these adjustments are quite difficult and time-consuming, it could be the reason why most companies still use the accounting profit as a measure of their performance.

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VÝKONNOST PODNIKŮ TEXTILNÍHO PRŮMYSLU V LIBERECKÉM KRAJI

Cílem článku je zhodnotit výkonnost malých a středních podniků textilního průmyslu se sídlem v Libereckém kraji. Textilní průmysl byl zvolen z důvodu jeho významného podílu na prosperitě Libereckého kraje v minulosti. Analýza je zaměřena na posouzení výkonnosti textilních a oděvních podniků v letech 2013 – 2015. Za tímto účelem jsou použity dvě metody hodnocení. Východiskem prvního přístupu stanovení výkonnosti je tradiční pojetí výkonnosti používající pro měření především účetní výsledek hospodaření. Druhý přístup je zaměřen na moderní pojetí výkonnosti, vycházející z kategorie ekonomického zisku. V obou případech je rovněž sledován vývoj hodnot obou sledovaných ukazatelů v čase. Výzkum potvrdil podstatný rozdíl ve výkonnosti podniků, jestliže se použijí výše uvedené přístupy k jejímu měření.

DIE LEISTUNGSFÄHIGKEIT DER UNTERNEHMEN IN DER TEXTILINDUSTRIE IN DER REGION LIBEREC

Ziel des Artikels ist es, die Leistungsfähigkeit kleiner und mittelständischer Unternehmen, die in der Textilindustrie tätig sind und ihren Sitz in dem Region Liberec haben, zu bewerten. Die Textilindustrie wurde wegen ihrer wichtigen Rolle in der Region Liberec in der Vergangenheit gewählt. Die Analyse konzentriert sich auf die Bewertung der Leistungsfähigkeit von Textil- und Bekleidungsfirmen in den Jahren 2013 – 2015. Zu diesem Zweck wurden zwei Methoden verwendet. Der Ausgangspunkt des ersten Ansatzes besteht in der traditionellen Messung der Leistungsfähigkeit, deren Grundlage der Buchgewinn ist. Der zweite Ansatz konzentriert sich auf die moderne Messung von Leistungsfähigkeit, die auf dem ökonomischen Gewinn basiert. In beiden Fällen wird die Entwicklung der Werte von beiden Indikatoren in der Zeit analysiert. Die Forschung hat einen wesentlichen Unterschied innerhalb des Niveaus der Leistungsfähigkeit, die auf Basis der oben genannten Ansätze gemessen wurde, bestätigt.

EFEKTYWNOŚĆ PRZEDSIĘBIORSTW PRZEMYSŁU TEKSTYLNIEGO W KRAJU LIBERECKIM

Artykuł ma na celu dokonanie oceny efektywności małych i średnich przedsiębiorstw przemysłu tekstylnego mających siedzibę na terenie kraju (regionu) libereckiego. Przemysł tekstylny wybrano dlatego, że w przeszłości miał znaczny udział w rozwoju regionu. Analiza dotyczy oceny efektywności przedsiębiorstw z branży włókienniczej i odzieżowej w latach 2013 – 2015. Do tego celu wykorzystano dwie metody oceny. Punktem wyjścia w ramach pierwszej metody jest tradycyjne podejście do efektywności oparte na pomiarze przede wszystkim księgowego wyniku finansowego. Druga metoda bazuje na nowoczesnym podejściu do efektywności, opartym na kategorii zysku ekonomicznego. W obu przypadkach analizowana jest także dynamika wartości obu analizowanych wskaźników. Badania potwierdziły istotną różnicę efektywności przedsiębiorstw, w zależności od zastosowania jednej czy drugiej metody badania.

DEBT CHARACTERISTICS KNOWLEDGE OF ENTREPRENEURS IN THE SME SECTOR OF THE CZECH REPUBLIC

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Abstract

Due to lack of internal and own sources in small and medium-sized enterprises (SMEs), the debt financing is an inevitable part of a total amount of capital used in business. The aim of this paper is to find out what knowledge of debt financing (e.g., in the sense of its costs and risk) the SMEs entrepreneurs have. We also tried to reveal the differences regarding such knowledge in relation to age and education of the entrepreneurs and the length of doing their business. The data was collected through the questionnaire survey undertaken on the sample of 352 SMEs entrepreneurs in the Czech Republic. Our results revealed that 83% of entrepreneurs understand the most important aspects of credit risk and 73% of them think that an entrepreneur needs to use a certain amount of loans. There were found statistically significant differences in this statement between male and female entrepreneurs.

Keywords

Small and medium-sized enterprises; Debt; Credit risk; Age; Education; Length of doing business; Czech Republic.

Introduction

Small and medium-sized enterprises (SMEs) have the utmost importance in modern economies due to their quick adaptation to changes in business conditions, and due to their significant contribution to the economic growth. However, a firm's survival is the major issue for small businesses due to entrepreneurs' lack of strategic behaviour, and due to suppressive behaviour from the large corporate firms. [29]

In total, the SME sector is represented by more than one million enterprises and it employs almost two thirds of all employees in the Czech Republic [17]. SMEs are not only an integral part of the Czech Republic economy, but they are also extremely important for the whole European Union.

Despite many advantages, the entrepreneurship of SMEs has also many limitations and constraints, e.g. much smaller economic power, very often a difficult access to finance and consequently limited capacity-building options. According to Synek [34], SMEs are considered to be risky clients. Because of this fact, obtaining loans is too difficult for these enterprises. Moreover, this aspect is also a reason for having worse credit conditions of banks for SMEs without respecting a good business plan. Delic, Peterka and Kurtovic [6] state that high collaterals are one of the biggest obstacles to financing through debt for small and medium-sized enterprises, which, on the other hand, cannot be decreased without institutional development as well as development of the financial market.

It is generally known that loans can decrease the total capital costs due to interest tax shield even though they are more risky than equity. It is important for the SMEs' entrepreneurs to know about the advantages and disadvantages of using loans. The SMEs' entrepreneurs can get such knowledge through their educational process, in various courses, or just from experience. It is also possible that they do not have any knowledge of this kind. Due to the fact that not much information with regard to this knowledge in the SME segment has been published, we would like to extend it through this paper.

This article has the following structure: in the theoretical part, the essential attributes of using loans in a capital structure of SMEs, the knowledge of credit risk, the advantages and disadvantages of this form of capital, and the role of gender and education of entrepreneurs and the length of doing business are introduced. In the next section, there are presented objectives, methodology and resources of information used in the research. Finally, the most important recommendations for the theoretical area as well as economic practice and limits of this study and possibilities of future research are stated.

1 Theoretical background

An entrepreneur must be a person who is able to take a risk and understand the possibility of failure of his/her decision. In general, women are more risk averse than men. For example, Forlani [8] indicates that women believe less in their abilities to make financially risky business development-type decisions than men do, and that these beliefs are unsubstantiated.

The analysis of Kepler and Shane [14] shows that male entrepreneurs were significantly less likely to prefer low-risk/low-return businesses than female entrepreneurs.

The issue of capital costs and risk connected with loans finally leads to a search for an optimal capital structure. Since Modigliani and Miller [24] first proposed the MM theory that a capital structure is irrelevant to determining corporate value in a non-friction (perfect) market in 1958, the issue of capital structure has generated great interest among financial economists represented by the trade-off theory, the agency cost theory, the pecking order theory and the equity timing market theory. It is argued that agency costs arise from conflicts between two parties, namely the principle and the agent (e.g., owners and managers) within firms. Leverage has been deemed as an instrument of the first perception to reduce agency costs (the use of debt can effectively displace equity capital) and remaining borrowing at higher levels might increase the probability of bankruptcy and job loss, and resolve the free cash flow problem [19]. According to Delic et al. [6], agency costs are particularly devastating for external financing of the SME sector, primarily because of the quality of information that the owner, i.e., a manager of a SME provides to the financial institution.

Financial knowledge is one of the most important determinants of a capital structure that enables growth and development of the SME sector as well as a greater competitiveness of enterprises, regardless of size, activity, industry and the form of ownership of these enterprises. An efficient risk-taking is primarily reflected in the availability of a large number of sources of funding, which enables enterprises to have freedom when forming their capital structure. Enterprises that do not have a large number of sources of funding at their disposal have to resort to debt financing when forming their capital structure, which ultimately means excessive financial vulnerability. [6]

SMEs cannot avoid the general existence of financial risk that has a certain influence on their production and management. In order to survive in the challenging market competition and put forward effective prevention and control measures, and thus lower the possibility of occurrence of risks to ensure their development, SMEs need to have a full understanding of the characteristics and the causes of financial risk in relation to their enterprises. [15]

In general, an entrepreneurial risk can be understood as the possibility that real results will not meet the expected results [9]. Part of these risks is also a financial risk that includes a credit risk. The authors consider the credit risk as a risk connected with insolvency or payment refusal of customers. In fact, it is possible that a contracting party does not meet its obligations of repaying the debt, paying an invoice, etc. Shuying and Mei [33] argue that financial risk is one of major reasons for SMEs default. A poor capital structure of SMEs is another major reason for financial risk. The authors propose that effective management of a capital structure can reduce the debt burden and the financial risk of SMEs.

Joseph [13] defines the credit risk as probability of loss caused by granting credit because of not meeting obligations of a contracting counterparty. All above-stated for the reason of unwillingness, incapability or any other reason that does not enable a counterparty to meet its obligations. If the probability of loss is high, then the credit risk is also high and vice versa.

Režňáková [31] distinguishes different types of credit risk, e.g. the risk of insolvency (it is caused by a worsening debtor's financial situation), the risk of payment default (it is caused by unwillingness to pay the liabilities in time), the risk of postponing payments, the risk of extending a due period of the invoice and territorial risk.

For comparison, Jílek [12] divides credit risk into four categories: direct credit risk (risk of loss caused by a partner's failure regarding traditional balance sheet items), the risk of credit equivalents (risk of loss caused by a partner's failure regarding off balance items), the risk of paying/not paying loans (risk of loss caused by failure of transactions in the process of paying loans), the risk of credit involvement (risk of loss when being involved with individual partners).

However, firm risk may be strategic as well as structural. Irrespective of age and size considerations, firms adopting specific strategies may face an increased risk and uncertainty. Riskier strategies increase perceived environmental uncertainty and, from the perspective of potential funders, information opacity. [32]

Various types of research clearly show that the access to finance is one of the main challenges for the growth and development of entrepreneurs, especially in the SME sector. [1; 2; 16]

The demand and supply of finance to the SME sector involves more complex issues than applied to large firms. SME owners' patchy knowledge of funding opportunities may reflect not sufficient skills and knowledge of their business advisors, especially accountants. The search for finance is impeded by business characteristics such as size, age, profitability and growth objectives. [7]

Other researches show that the access to finance and credit costs is not a small constraint on financing SMEs [1; 2]. Binks and Ennew [4] consider in their study lack of access to finance together with job skills, management and government regulations to be the main constraints on the SMEs growth.

The results of Mc Namara, Murro and O'Donohoe [21] suggest that countries' lending infrastructure influences the SMEs' capital structure. It is evident that the SME debt is higher in countries with more efficient bankruptcy environments in terms of debt recovery as well as in countries with less stringent regulatory environments by having lower capital regulatory requirements for banks. In case the control variables are missing, many of the lending infrastructure components appear significant. These include information, legal and regulatory environments together with bankruptcy and regulatory regimes.

Lending to small firms (and lending smaller amounts) carries disproportionately higher costs of due diligence with these costs inflated, facing limited credit histories or audited financial

statements [35]. For these reasons, mainly, smaller firms have historically been identified as especially susceptible to credit rationing. [32]

The empirical research shows that asymmetric information and agency costs in small business lending can be alleviated by imposing a shorter loan maturity because it will reduce the risk-shifting behaviour of the borrower [3; 26]

Rostamkalaei and Freel [32] state that discouraged borrowers do not apply for credit because they are afraid of rejection – despite their declared neediness and despite being observationally indistinguishable from those who have applied for and have received money. There is also evidence that some entrepreneurs face initial rejection or are presented with unsuitable terms of contract at the first attempt and must re-apply, renegotiate or switch banks for a better deal.

The results of Ključnikov and Belás [15] indicate that management and owners of smaller companies have inferior or insufficient financial knowledge and lack of management skills, which leads to a lower perception of the importance of credit risk during the crisis. In this context, it is interesting to note that the level of knowledge of credit conditions is relatively low. Only a small part of the SME entrepreneurs is well informed about conditions under which commercial banks provide loans.

Regarding gender, Treichel and Scott [35] found out that gender does appear to be related to some aspects of access to bank financing. Specifically, gender is significantly related to the application for bank loans as well as size of the loans, and these effects persist over time. They also revealed that women-owned businesses are significantly less likely to apply for a bank loan. Their results suggest that there is no likely difference in approval of the loans to women- and men-owned businesses after controlling firm's characteristics.

The study of Garwe and Fatoki [10] confirmed that gender does not have any significant impact on the SME finance, however, females were more discouraged from bank finance than males due to the fact that females were afraid of rejection because of lack of education and lack of personal assets or collateral.

Higher education of the entrepreneurs had an impact on getting rid of the problem with financial restrictions, and it can be generally said that higher education of an entrepreneur helps to remove the problem with the access to finance in comparison with the impact of gender and ethnicity. [11]

According to North, Baldock and Ekanem [25], the influence of such factors as size and age of the company seems to influence its access to the credit financing. New and early-stage SMEs are facing more intensive problems with the bank financing than their more established counterparts. In comparison with the results of Ključnikov and Belás [15], older companies perceive the growth of credit risk more intensively than the younger ones.

According to Yazdanfar and Öhman [37], older firms tend to rely less on debt capital than younger ones do. This may be for the reason that older firms are aware of opportunities to use internal financing sources more than their younger counterparts are.

2 Research Objective, Methodology, Data

2.1 Research Objective

The aim of this paper is to find out what knowledge of debt financing (e.g. in the sense of its costs and risk) the SMEs' entrepreneurs in the Czech Republic have. We also tried to reveal the differences in such knowledge in relation to gender and education of the entrepreneurs and the length of doing business.

In accordance with the objectives, we have chosen five statements from the questionnaire that was used, and through chi-square and p-value, we tried to reveal statistically significant differences in the overall structure of responses to each statement in each defined group (between entrepreneurs men and women, university-educated and otherwise educated entrepreneurs, entrepreneurs doing their business for less and more than 10 years). Consequently, we tried to reveal statistically significant differences inside of each studied group in affirmative and discrepant answers and in neutral answers. We chose the following statements from the questionnaire:

Statement I: ***“I understand the most important aspects of credit risk.”***

Statement II: ***“Loans (a bank loan) are cheaper than equity of an entrepreneur, therefore I make use of a bank credit.”***

Statement III: ***“Loans (a bank loan) are less risky than equity, therefore I use the service of borrowing money from a bank.”***

Statement IV: ***“When doing business, a certain amount of loans is necessary. However, I think an entrepreneur should have more equity than the loans.”***

Statement V: ***“Loans should be first used for financing current assets of a company.”***

We aimed at entrepreneurs of SMEs defined in Annex 1 to Commission Regulation (EU) No. 651/2014. The category of microenterprises, small and medium-sized enterprises consists of the companies which employ less than 250 employees and their annual turnover does not exceed 50 million EUR or whose annual balance sheet in total does not exceed 43 million EUR. Within this category a small enterprise is defined as an enterprise employing less than 50 people and whose annual turnover or annual balance sheet in total does not exceed 10 million EUR. Microenterprises are defined as the enterprises which employ less than 10 people and whose annual turnover or annual balance sheet in total does not exceed 2 million EUR. [23]

2.2 Research Methodology and Data

The research into business environment was carried out in the Czech Republic throughout the period of November 2016 to February 2017. The companies surveyed were chosen from the database Albertina and 2,100 randomly selected firms were addressed by e-mail or phone to fill in the questionnaire placed at website

<https://docs.google.com/forms/d/e/1FAIpQLSc8VFW1EzSfjCqVCPTt4ZozjBpMIXbAnkyn8KGVYQCfIKkOQ/viewform>.

We asked purposefully the owner or one of the owners of selected SMEs or chief manager to fill in the questionnaire. Finally, the data was provided by 352 entrepreneurs of SMEs in 14 regions of the Czech Republic. The questionnaire consisted of 42 questions. In this context, in the first six questions, the structure of respondents in relation to their education, gender, residency and size of a firm, the length and area of doing business were analyzed. The rest of the questions were questions on a 1-5 scale (1 – totally agree, 2 – agree, 3 – no opinion, 4 – disagree, 5 – completely disagree) focused on knowledge and conditions of debt financing.

The structure of the respondents with the use of descriptive statistics according to geographical locations of companies in the Czech regions was as follows: Zlín (20%), Moravia-Silesia (13%), Olomouc (8%), South Moravia (5%), Liberec (24%), Prague (8%), Pardubice (2%), Plzeň (1%), Central Bohemia (6%), Hradec Králové (7%), Vysočina (2%), South Bohemia (1%), Ústí nad Labem (2%), and Karlovy Vary (2%).

Majority of respondents were men (75%) and the rest of them (25%) were female entrepreneurs. Most of the entrepreneurs in the sample, more precisely 39%, had secondary education, 49% of them had university education, and 12% had secondary education without graduation examination.

The structure of the sample with regard to the business area was as follows: trade companies (26%), manufacturing companies (18%), construction companies (13%), transport companies (3%), and agricultural firms (4%). The largest portion of companies operated in other sectors (37%).

Regarding the length of doing business, out of 352 companies, 64% of them were doing business for more than 10 years, 17% of them between 1 to 5 years, and 18% of them between 5 to 10 years. It can be stated that the owners of the companies were rather experienced entrepreneurs.

Out of 352 companies surveyed, 66% of them were microenterprises, 19% were small enterprises and 15% were medium-sized enterprises.

Different authors search the issue of the importance of gender in entrepreneurship in general and also specifically in relation to risk taking as an element of entrepreneurial orientation. For example Langowitz a Minniti [18] found out that women are more risk averse than men and men's willingness to risk does not prevent them from starting a business.

The issue of entrepreneurs' education is discussed by many researchers. For example Rauch and Rijdsdijk [30] and Millán et al. [22] showed that higher education can positively influence business performance and according to Wang [36] it can improve management of financial risks.

According to Marques et al. [20] cognitive factors such as exposure to high risk, recognition of opportunities and perception of probability of success are related to experience. Pervan and Kuvék [27] and Canton et al. [5] state that the length of doing business besides the size of a company can play an important role in obtaining external financial resources.

For the purpose of this paper with respect to the above stated opinions of different authors we have selected the following sociodemographic factors: gender and education of entrepreneurs and the length of doing business as important factors influencing the attitude to using debt in business and also knowledge of debt financing and relating financial risk. The rest of the factors (business area, regions of the Czech Republic) were not taken into account in this article.

Following the findings and taking into account gender, education and the length of doing business as selected factors influencing knowledge of debt financing and attitude to financial risk, we have stated the following five basic hypotheses. Moreover, in relation to the selected factors of gender, education and the length of doing business, we have set other three hypotheses to verify and achieve a secondary aim of the paper:

H_1 : I understand the most important aspects of credit risk. At least 65% of respondents agree with this statement.

H_2 : Loans (a bank loan) are cheaper than equity of an entrepreneur, therefore I make use of a bank credit. At least 50% of respondents agree with this statement.

H_3 : Loans (a bank loan) are less risky than equity, therefore I use the service of borrowing money from a bank. A maximum of 40% of respondents agree with this statement.

*H*₄: When doing business, a certain amount of loans is necessary. However, I think an entrepreneur should have more equity than the loans. At least 70% of respondents agree with this statement.

*H*₅: Loans should be first used for financing current assets of a company. A maximum of 45% of respondents agree with this statement.

*H*₆: There are no statistically significant differences with regard to gender of respondents in the responses to statements I – V.

*H*₇: There are statistically significant differences with regard to education of respondents in the responses to statements I – V. University-educated respondents understand terms of using debt financing statistically better than respondents with other types of education.

*H*₈: There are statistically significant differences with regard to the length of doing business in the responses to statements I – V. More experienced entrepreneurs (being in business for more than 10 years) understand terms of using debt financing statistically better than younger enterprises.

To assess statistical statements in the area of financial risk, we used the following statistical tools of descriptive statistics: tables, descriptive characteristics – average, scattering, and score. The score is calculated by adding all the evaluations. Next, we applied statistical methods such as absolute quantity and simple classification of a statistical marker, classification according to two statistical markers.

The associations in contingency tables were analyzed by Pearson statistics in order to count the data. *P*-value was compared to a standard confidence level of 5%. *P*-value that is lower than the confidence level leads to rejection of the null hypothesis. The null means that there is no association between variables. We used a double-choice *t*-test (non-pair). We tested whether the difference of mean values between the sets is zero (zero hypothesis) in contrast to a non-zero difference between mean values (alternative hypothesis). All the tests were done on the level of significance 0.05. The critical values of acceptance or refusal of the zero hypothesis with the use of number of degrees of leeway are provided in the subject data evaluation in the tables (*t*-Statistics and *p*-value ($P(T \leq t)$)). The prerequisites for doing this test such as regular distribution of the data in the sets, independence of the sets, even variance between the sets were a subject to scrutiny before the actual *t*-test. For verification of the normality assumption, we used a graphic analysis of the data (a comparison of data's histogram in a set with a curve of normal distribution), but we also tested with the use of Chi-square test of good agreement (goodness-of-fit). For verification of statistically irrelevant differences in scattering, we used the F-test. All conditions for doing the double-choice *t*-test (non-pair) were met. The calculations were done by using sophisticated statistics software, SPSS Statistics.

3 Results and Discussion

In Table 1 we present results of different attitudes of men and women to the statements examined (I – V).

Tab. 1: Differences in knowledge of debt financing in relation to gender of the entrepreneurs

GENDER	Men (265)					Women (87)					Chi-square P-value
	-2	-1	0	1	2	-2	-1	0	1	2	
Statement I (in %)	0 0	10 4	33 12	171 65	51 19	2 2	7 8	9 10	54 62	15 17	5.7691 0.2171
Statement II (in %)	28 11	98 37	55 21	70 26	14 5	6 7	32 37	25 29	21 24	3 3	3.3373 0.5030
Statement III (in %)	40 15	122 46	56 21	43 16	4 2	5 6	42 48	25 29	13 15	2 2	6.4996 0.1648
Statement IV (in %)	3 1	46 17	33 12	128 48	55 21	1 1	5 6	10 11	57 66	14 16	10.5641 0.0319
Statement V (in %)	15 6	81 31	81 31	82 31	6 2	6 7	25 29	32 37	23 26	1 1	1.8841 0.7571

Notes:

-2 – absolutely disagree, -1 – disagree, 0 – no opinion, 1 – agree, 2 – absolutely agree.

Numbers in % were rounded to whole numbers (e.g., 1.56 rounded to 2) and calculated, e.g., as the amount of men absolutely agreeing with the statement I (51) compared to the total amount of men (265), which is 19%.

Source: Own calculation

Regarding the aspect of gender, the final values of test criteria (chi-square, p-value) have confirmed that there are statistically significant differences in the overall structure of answers of male entrepreneurs in comparison with female entrepreneurs only in statement IV (10.5641/0.0319).

Female entrepreneurs agreed with the opinion on having more equity than debt statistically more often (71 out of 87, which is 82%) than their male counterparts (183 out of 265, which is 69%). This fact can be connected with a different risk attitude in relation to gender because women are generally more risk-averse than men [8; 14; 28].

In Table 2, we present a different attitude of university-educated and other educated respondents (secondary-educated and secondary-educated without graduation).

Regarding education, the final values of test criteria (chi-square, p-value) have confirmed that there are statistically significant differences in the overall structure of answers of university-educated entrepreneurs in comparison with other educated entrepreneurs only in statement II (16.7662 / 0.0215).

University-educated respondents agreed statistically more often (69 out of 171, which is 40%) with the statement that loans are cheaper than equity in comparison with others (39 out of 181, which is 22%). If the university-educated respondents graduated from economic faculties, it is logical that they should have a certain level of knowledge of the capital costs.

Tab. 2: Differences in knowledge of debt financing in relation to education of the entrepreneurs

EDUCATION	UE (171)					OE (181)					Chi-square P-value
	-2	-1	0	1	2	-2	-1	0	1	2	
Statement I (in %)	1	6	16	111	37	1	11	26	114	29	4.5808
	1	4	9	65	22	1	6	14	63	16	0.3307
Statement II (in %)	12	52	38	57	12	22	78	42	34	5	16.7662
	7	30	22	33	7	12	43	23	19	3	0.0215
Statement III (in %)	18	78	41	30	4	27	86	40	26	2	2.8732
	11	46	24	18	2	15	48	22	14	1	0.5793
Statement IV (in %)	2	31	27	81	30	2	20	16	104	39	8.9430
	1	18	16	47	18	1	11	9	57	22	0.0625
Statement V (in %)	8	43	65	52	3	13	63	48	53	4	7.3958
	5	25	38	30	2	7	35	27	29	2	0.1164

Notes:

UE – university education, OE – other education (secondary education and secondary education without graduation)

-2 – absolutely disagree, -1 – disagree, 0 – no opinion, 1 – agree, 2 – absolutely agree.

Numbers in % were rounded to whole numbers (e.g., 1.56 rounded to 2) and calculated, e.g., as the amount of UE absolutely agreeing with the statement I (37) compared to the total amount of UE (171), which is 22%.

Source: Own calculation

Results of different attitudes to the statements examined (I – V) in relation to the length of doing business are presented in Table 3.

Tab. 3: Differences in knowledge of debt financing in relation to the length of doing business

LENGTH OF DOING BUSINESS	-10 (125)					+10 (227)					Chi-square P-value
	-2	-1	0	1	2	-2	-1	0	1	2	
Statement I (in %)	0	5	17	76	27	2	12	25	149	39	1.8600
	0	4	14	61	22	1	5	11	66	17	0.7615
Statement II (in %)	11	51	28	29	6	23	79	52	62	11	1.4703
	9	41	22	23	5	10	35	23	27	5	0.8319
Statement III (in %)	17	65	25	16	2	28	99	56	40	4	3.2722
	14	52	20	13	2	12	44	25	18	18	0.5134
Statement IV (in %)	2	16	23	62	22	2	35	20	123	47	7.5351
	2	13	18	50	18	1	15	9	54	21	0.1102
Statement V (in %)	6	38	38	40	3	15	68	75	65	4	1.0929
	5	30	30	32	2	7	30	33	29	2	0.8954

Notes:

-10 – enterprises doing business for less than 10 years, +10 – enterprises doing business for more than 10 years, -2 – absolutely disagree, -1 – disagree, 0 – no opinion, 1 – agree, 2 – absolutely agree.

Numbers in % were rounded to whole numbers (e.g., 1.56 rounded to 2) and calculated, e.g., as the amount of -10 absolutely agreeing with the statement I (27) compared to the total amount of -10 (125), which is 22%.

Source: Own calculation

Regarding the length of doing business, the final values of test criteria (chi-square, *p*-value) have not confirmed any statistically significant differences in the overall structure of the answers of enterprises being in business for less than 10 years in comparison to the enterprises being in business for more than 10 years.

In our research, 261 respondents (82.67%) understand the most important aspects of credit risk (statement I). Within the designated groups, university-educated entrepreneurs (87%) most frequently reported this answer. H_1 was confirmed. A relatively high percentage of entrepreneurs familiar with properties of capital is a positive result. This corresponds with the results of research carried out by Delic et al. [6] in Croatia which indicate that 95.4% of respondents (owners and/or managers of SMEs) highlighted the importance of knowing the strengths and weaknesses of individual sources of financing (financial literacy) as an important factor when making decisions about a capital structure.

108 respondents (30.68%) think that loans are cheaper than equity; therefore, they make use of bank loans. The most frequently reported answer was again by university-educated entrepreneurs (40%). H_2 was not confirmed because less than 50% of respondents agreed with statement II.

The answers to the statement III were affirmative in 62 responses (17.61%). 62 respondents consider debt to be less risky than equity and it is the reason why they use credit in their business. H_3 was confirmed because only 17.61% of respondents agreed with the statement III, which is less than a considered value of 40% set as the maximum value in hypothesis H_3 .

In our research, 254 respondents (72.16%) think that an entrepreneur needs to use a certain amount of loans but they think that an entrepreneur should have a larger amount of equity than loans (statement IV). H_4 was confirmed because more than 70% of respondents agreed with statement V.

112 respondents out of 352 respondents (31.82%) agree with the opinion that debt should be preferably used to finance current assets of the enterprise (statement V). H_5 was confirmed because the final value of 31.82% is below the considered value of 45%.

Results on Z-score from P-value to reveal the statistically significant differences in affirmative, neutral, and dissenting responses in each statement are presented in Table 4. For this purpose, we merged the answers “absolutely agree” (2) and “agree” (1) in a single value, and in the same way we merged “absolutely disagree” (-2) and “disagree” (-1).

Tab. 4: Differences inside the groups in relation to gender, education and the length of doing business

P-VALUE FROM Z-SCORE	Men / Women			UE / OE			-10 / +10		
	-2, -1	0	1, 2	-2, -1	0	1, 2	-2, -1	0	1, 2
Statement I	0.0188	0.5961	0.3421	0.2937	0.1471	0.0615	0.3898	0.4715	0.9203
Statement II	0.5287	0.1236	0.4715	0.0008	0.8259	0.0001	0.4009	0.9124	0.4179
Statement III	0.2420	0.1443	0.9124	0.2301	0.6745	0.2757	0.0784	0.3173	0.2420
Statement IV	0.0099	0.8103	0.0232	0.0658	0.0466	0.0032	0.6384	0.0085	0.1236
Statement V	0.9203	0.2801	0.3271	0.0173	0.0209	0.8887	0.8026	0.6101	0.4413

Notes:

-10 – enterprises doing business for less than 10 years, +10 – enterprises doing business for more than 10 years, UE – university education, OE – other education,

-2 – absolutely disagree, -1 – disagree, 0 – no opinion, 1 – agree, 2 – absolutely agree.

Source: own calculation

The final values of test criteria (P-value from Z-score) revealed statistically significant differences in dissenting answers in statement I between male and female entrepreneurs (0.0188). Female entrepreneurs statistically more often stated (9 women out of 87, which is 10.34%) that they understood the most important aspects of credit risk in comparison with male entrepreneurs (10 men out of 265, which is 3.77%). Regarding gender, statistically

significant differences were also found out in both affirmative and dissenting answers to statement IV. Female entrepreneurs are statistically more aware (71 out of 87, which is 87.61%) of the fact that an entrepreneur needs a certain amount of loans but he/she should have more equity than loans in comparison with male (183 out of 265, which is 69.06%). These results correspond with statistically less significant dissenting responses of female entrepreneurs to this question (6 out of 87, which is 6.90%) in comparison with male entrepreneurs (49 out of 265, which is 18.49%). H_6 was partially confirmed (in statements II, III, V).

In statement II, there were revealed statistically significant differences both in affirmative and dissenting answers between university-educated ones and others (P -value from Z -score: 0.0008 in dissenting ones; 0.0001 in affirmative answers). 100 respondents out of 181 respondents with secondary education or secondary education without graduation (55.25%) do not think that they understand the most important aspects of credit risk. These results are supported by the results in affirmative answers because university-educated respondents think that they understand the most important aspects of credit risk statistically better (69 out of 171, which is 40.35%) than other educated entrepreneurs (39 out of 181, which is 21.55%). Regarding education, we have also found out statistically significant differences in statements IV and V. In statement IV, other educated respondents more often agreed (143 out of 181, which is 79%) with the need of having loans in business in comparison with university-educated ones (111 out of 171, which is 64.91%). In statement V, other educated entrepreneurs more often did not agree (76 out of 181, which is 41.99%) with the opinion that loans should be used especially for financing current assets in comparison with university-educated ones (51 out of 171, which is 29.82%). H_7 was partially confirmed (in statements II, IV, V).

Regarding the length of doing business, statistically significant differences were found out in neutral responses to statement IV only. H_8 was not confirmed.

The capital structure is dependent on a number of determinants, and it is shaped, among other things, by business environment, as well as the characteristics of a company's owner/manager. Financial literacy, which is represented by knowledge of advantages and disadvantages of individual sources of financing as well as knowledge of own company's accounting and financial information, significantly influences the shape of a capital structure. A capital structure, which enables companies to grow and develop, certainly affects the competitive position of each individual company [6]. Our results confirmed this opinion, especially for the reason of financial knowledge as the level of education reached caused statistically significant differences between the studied group and this result enhanced the importance of financial knowledge.

The optimal ratio between different financial sources (especially between equity and different types of loans) should enable trouble-free financing of business current needs and strategic plans. Due to the obstacles to external financing in the SME sector and in favorable business environment, financial knowledge can be a crucial factor in the capital structure decision-making process.

Although numerous studies have proved the importance of a large number of factors (notably financial ones), the characteristics of company owners and/or managers are still insufficiently explored areas, which can provide an answer to the question asked about the key determinants in the decision-making processes with regard to a capital structure [6]. For this reason, our results can be inspiring for both, entrepreneurs (representatives of practice) as well as educational institutions in the economic field (representatives of theory). For business practice, our results represent a view on knowledge of debt financing in the group studied in

the Czech Republic. From this point of view, there are positive results concerning a relatively high number of entrepreneurs being well informed about the aspects of financial risk and those considering the necessity of using debt but of less importance in comparison with equity. On the other hand, for the purpose of educational process, our results show a certain gap in debt knowledge (in the sense of its price and risk). With regard on the importance of SMEs for Czech economy and on the other hand on their specific features concerning to the access to external financing, concretely to bank loans we recommend to put more emphasis on entrepreneurial education including above stated financial literacy.

Conclusion

The aim of this article was to examine knowledge of debt financing (e.g., in the sense of its costs and risk) of SMEs entrepreneurs in the research done in the Czech Republic. At the same time, we tried to reveal the differences in debt knowledge in relation to gender and education of the entrepreneurs and the length of doing business.

The most important findings of our research indicate that vast majority of respondents (83%) understand the most important aspects of credit risk (responses to statement I were predominantly positive) and 73% are convinced that it is necessary to use loans, however, under the circumstances of certain values that must not be higher than the value of equity (responses to statement IV were predominantly positive).

We have also found out that only a few respondents have good knowledge of basic characteristics of loans concerning the price and the risk of this financial source. Out of 352 respondents, only 31% consider a loan to be cheaper than equity (responses to statement II were predominantly negative), and 18% consider a loan to be less risky than equity (responses to statement III were predominantly negative). These results are not very positive and can indicate knowledge gaps or false knowledge because of previous education or practical experience gained in business. Out of 352 respondents, only 32% think a loan should be first used for financing current assets of a company (responses to statement V were predominantly negative). It also suggests false knowledge or gap in knowledge of rules for using debt for financing assets.

Due to the examined factors of gender, education and the length of doing business, only gender and education showed to be the factors statistically differing opinions between male and female entrepreneurs and between university-graduated and otherwise educated entrepreneurs. 82% out of 87 women recommend using more equity than loans. Respecting the significance level of 0.05 set, this result was statistically significant compared to 69% out of 265 men. In other words, female entrepreneurs prefer so-called safe sources to the risky ones. 40% out of 171 university-educated respondents agree with the statement that loans are cheaper than equity, which was statistically more significant than 22% out of 181 respondents with secondary education and secondary education without graduation examination.

It is it is clear that there are certain limits to our research, especially it is necessary to emphasize regional character of this study. It does not have ambitions to generalize the findings with the aim to predict certain patterns of behavior but to bring new knowledge about opinions on debt financing in SME sector as an important source of Czech economy that can be used especially by various government institutions when searching ways helping this sector, e. g. by organizing different educational courses for SME entrepreneurs or creating educational programs at higher schools or universities. Despite these limits, we believe that our article has brought interesting findings and new incentives for further research that can be aimed also at other factors found out during the questionnaire survey and also influencing debt knowledge and debt experience, such as the age of entrepreneurs or business area.

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ZNALOSTI PODNIKATELŮ MALÝCH A STŘEDNÍCH PODNIKŮ ČESKÉ REPUBLIKY Z OBLASTI CHARAKTERISTIK DLUHOVÉHO FINANCOVÁNÍ

Vzhledem k nedostatku interních a vlastních zdrojů v malých a středních podnicích (MSP), je dluhové financování nevyhnutelnou součástí celkové hodnoty kapitálu podniku. Cílem tohoto článku je zjistit, jaké znalosti dluhového financování (ve smyslu jeho ceny a rizika) mají podnikatelé MSP. Současně jsme se pokusili zjistit rozdíly v těchto znalostech ve vztahu k věku a vzdělání podnikatelů a délce podnikání. Data byla získána prostřednictvím dotazníkového šetření od 352 podnikatelů MSP v České republice. Naše výsledky ukázaly, že 83 % podnikatelů rozumí nejdůležitějším aspektům úvěrového rizika a 73 % z nich si myslí, že podnikatel potřebuje používat určité množství úvěrů. V tomto tvrzení byly zjištěny statisticky významné rozdíly mezi podnikateli muži a ženami.

KENNTNISSE DER CHARAKTERISTIKEN DER SCHULDENFINANZIERUNG AUF DEM SEKTOR KLEINER UND MITTLERER BETRIEBE IN DER TSCHECHISCHEN REPUBLIK

Im Hinblick auf den Mangel an internen und eigenen Quellen in kleinen und mittleren Betrieben ist die Schuldenfinanzierung ein unerlässlicher Bestandteil des Betriebskapitals. Das Ziel dieses Beitrags besteht in der Feststellung, was für Kenntnisse der Schuldfinanzierung (im Sinne von deren Preis und Risiko) die Unternehmer in kleinen und mittleren Betrieben mitbringen. Gleichzeitig versuchen wir, die Unterschiede innerhalb solcher Kenntnisse in Bezug auf das Alter und die Ausbildung der Unternehmer sowie auf die bisherige Unternehmensdauer festzustellen. Die Daten wurden mittels einer an 352 Unternehmern mittlerer und kleinerer Betriebe Fragebogenumfrage erhoben. Die Ergebnisse zeigen, dass 83 % der Unternehmer eine Vorstellung von den wichtigsten Aspekten des Kreditrisikos besitzen und 73 % von ihnen meinen, dass der Unternehmer auf eine gewisse Anzahl von Krediten angewiesen ist. In dieser Behauptung wurden statistisch relevante Unterschiede zwischen männlichen und weiblichen Unternehmern verzeichnet.

WIEDZA NT. CECH FINANSOWANIA DŁUŻNEGO W SEKTORZE MAŁYCH I ŚREDNICH PRZEDSIĘBIORSTW W REPUBLICIE CZESKIEJ

Ze względu na niedobór wewnętrznych i własnych środków w małych i średnich przedsiębiorstwach (MŚP) finansowanie dłużne stanowi nieunikniony element ogólnej wartości kapitału przedsiębiorstwa. Celem niniejszego artykułu jest sprawdzenie wiedzy nt. finansowania dłużnego (w aspekcie jego ceny i ryzyka), jaką posiadając przedsiębiorcy prowadzący MŚP. Jednocześnie podjęto próbę ustalenia, jakie są różnice w posiadanej wiedzy w zależności od wieku i wykształcenia przedsiębiorców i czasu prowadzenia działalności gospodarczej. Dane pozyskano w badaniu ankietowym od 352 przedsiębiorców prowadzących MŚP w Republice Czeskiej. Wyniki badań wskazują, że 83 % przedsiębiorców rozumie najważniejsze aspekty ryzyka kredytowego a 73 % z nich uważa, że przedsiębiorca potrzebuje korzystać z pewnej liczby kredytów. W tym stwierdzeniu stwierdzono statystycznie istotne różnice między prowadzącymi działalność gospodarczą kobietami a mężczyznami.

AN INNOVATIVE APPROACH TO HUMAN RESOURCE MANAGEMENT IN SMALL AND MEDIUM ENTERPRISES: THE SHARPEN PROJECT

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Abstract

The aim of this paper is to bring a new perspective to how Human Resource Management (HRM) in Small and Medium Enterprises (SMEs) is performed and supported. SMEs in Europe are facing several challenges in the field of HRM and the SHARPEN project aims to deliver solutions to these challenges based on specific needs of regional SMEs. The SHARPEN project will develop a university taught learning module focusing on HRM in SMEs and a Handbook of HRM that will provide SMEs with compact HRM knowledge and tools. Both of these outputs will be supported by cross-regional research performed in 5 project regions of the EU. The overall result of the project should be a better state of HRM in SMEs due to new, easily accessible knowledge and tools as well as more attention given to the challenges facing SMEs in the area of HRM.

Keywords

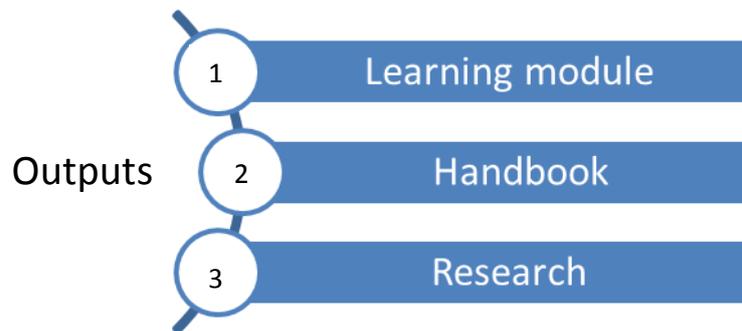
Human Resource Management; Small and Medium Enterprises; Innovative approach; Erasmus+ project.

Introduction

Small and Medium Enterprises (SMEs) in Europe are facing several challenges in the field of Human Resource Management (HRM) and even though HRM can be a source of competitive advantage of firms, SMEs tend not to have effective HRM. The importance of SMEs themselves and their contribution to EU economy is well known and a number of initiatives has been created to support the creation and development of SMEs in Europe and the SHARPEN project is one such initiative. Co-funded by the Erasmus+ Programme of the European Union and belonging to the Key Action 2 – Strategic Partnership activity group, the 3-year project brings together 5 universities from 5 different regions of the EU to collaborate on the support of effective Human Resource Management in Small and Medium-sized Enterprises.

Partner universities and project regions:

- Technical University of Liberec (TUL), Czech Republic - Liberec Region,
- Kajaani University of Applied Sciences (KAMK), Finland - Kainuu Region,
- Zwickau Westächsische-Hochschule (ZUAS), Germany – Westsachsen,
- The University of Huddersfield (UoH), United Kingdom – West Yorkshire,
- Socialiniu Mokslu Kolegija Klaipeda (SMK), Lithuania – Klaipeda Region.



Source: Own elaboration

Fig. 1: Outputs of the SHARPEN project

The primary aim of this project is to leverage on the HRM knowledge, experience and competencies of all the partner universities to develop a specialized learning course for students and a Handbook for SMEs. Both tools will be based on findings from a cross-regional research conducted through questionnaires, shadowing and interviews.

This innovative approach to HRM in SMEs is bringing together various actors (universities, firms, chambers of commerce, experts, etc.) in order to support SMEs and underline the importance and advantages of good HRM, no matter the firm size.

1 Human Resource Management in SMEs: A Literature Review

Contemporary literature has found a positive relationship between HRM practices and performance of large firms [1, 2, 3, 4]. Such a relationship has been implied in the case of SMEs as well. It has been suggested that adoption of particular HRM practices can boost small and medium firm performance and enhance their long-term competitiveness (e.g. [5, 6, 7, 8, 9]). One of the reasons why HRM might be a source of sustainable competitive advantage is that the advantages gained through HR become the firm's intangible assets that are valuable, rare and difficult to imitate [10]. Moreover, these intangible assets might be important to SMEs, because it is harder for SMEs to compete with larger firms in terms of other, tangible resources [11, 12]. Furthermore, Koubek [13] states that HRM is more important in SMEs than in large firms. Koubek explains that SMEs suffer much more from negative performance of its workers, they have a significant disadvantage in hiring new employees compared to larger firms, evaluating and rewarding employees is harder and SMEs usually need more flexible workforce than their larger counterparts.

Based on the previous observations, it is possible to say that HRM can be a very important tool for SMEs. However, it is often suggested that HRM in these firms is generally in a poor state [14] and the inability to identify and deal with HRM issues is seen as a common cause of failure of SMEs [15, 12]. The often-poor state of HRM in SMEs can be explained by the fact that in a large number of SMEs the role of an HR specialist is performed by the owner, executive manager or by one or more members of the administrative staff [13]. Research indicates that by these workers, HRM is often perceived as an administrative issue that becomes important only when it seems to acutely affect the firm [16]. In short, most SMEs do not have the time, resources and/or knowledge to perform HRM activities on an effective and efficient basis. It is for these reasons that SMEs are unable to follow latest HRM trends and ensure their successful implementation. The SHARPEN project hopes to deliver SMEs cost-efficient tools to help them deal with this issue.

Academic research [17, 18, 19], and common sense as well, suggest that HR practices differ among micro, small and medium-sized firms and that with increase in firm size, HR practices become more formalised. It can thus be expected that smaller firms will not have an HR

department or strategic HR plan and will not use state-of-the-art HR tools and practices. On the other hand, Timming [20] points out in his article that there is a great degree of variance in HRM practices in SMEs and that there are many variables affecting formalisation of HR practices in these firms. Timming goes on to conclude that due to this variance, HR practices in SMEs should not be homogenized straight away. Taking this in mind, the SHARPEN project aims to gather data from SMEs of various sizes, different sectors and across 5 different European regions, in order to find the most common HR issues among a wide range of subjects.

2 Research Objectives

The objectives of the project are relatively straightforward. The main aim of the project is to develop, in a good quality, the 3 outputs described in the following Methods section of this paper. Overarching mission of the project is to help nurture a new generation of HRM professionals, both from students and from already working HR specialists that will have the expertise to deal with HRM issues in SMEs. Furthermore, the project has been designed so as to provide support for SMEs in an area that is known to be a weakness of many of small firms. The objectives of the research part of the project are described in the following chapter.

The project goals of SHARPEN are:

- to create a university learning module that will produce graduates with deep knowledge of HRM in SMEs,
- to enhance cooperation among universities across EU, and between universities and firms inside the project regions,
- to perform research among firms in the 5 project regions and gain better understanding of HRM issues in SMEs,
- to develop tools, frameworks and solutions to HRM issues and put them together into an easily accessible Handbook,
- to bring innovation and new ideas to SMEs.

3 Methods

This section will present the means and methods used in constructing the 3 outputs of the SHARPEN project. Firstly, the project's learning module will be presented.

3.1 Output 1 – Learning Module

The end product of this output is a fully developed, university-taught learning module specializing in the field of HRM with focus on SME environment. The final learning module will be developed after a 3-year testing period during which 3 groups of students (1 group each year) in each partner university complete the learning module and provide feedback, allowing the project team to tweak and optimize teaching techniques used within the module. The module is designed to facilitate cooperation between universities and small and medium sized firms and provide students with practical experience. The entire module will be taught in English so as to provide students with the ability to work with the newest international HRM trends and academic literature. This output is divided into 3 phases.

3.1.1 Phase 1

At the beginning of the module, after the students have been selected, they are introduced to the project, its goals and their part in it. The students are informed about their responsibilities and the expected gains they will have from the project. After this, the students undertake several study sessions with their supervisor, where they learn specifics of HRM in SMES,

deepening their knowledge base of HRM. In one of these sessions, guest expert lecturers teach the students how to perform qualitative and quantitative research in firms that the students are to visit. During this session, students are also taught how to communicate the benefits of the project to the firm and how to properly conduct an interview and shadowing with an HR specialist from the involved SME. At the end of this phase, the students visit SMEs where they conduct the research. During their session with the HR specialist, the students ought to become familiar with HR issues affecting the firm. In Phase 3, their goal will be to write an assignment containing a case study about the firm and practical tools and solutions for the firm's HR issues.

3.1.2 Phase 2

During this phase 5 students from each project's university came together to participate in an ISP (intensive study programme) in one of the project's university. This short-term (1 week) mobility is designed to allow the students to discuss their findings in a cross-cultural setting. The ISP consists of ice-breaking sessions, several lectures on relevant issues (e.g. how to write a case study), presentations of project's regions and involved SMEs. Several of the SMEs involved in the project are then visited and all the students have a chance to discuss the findings of the student team researching these particular firms. At the end of the week, the students present the progress they have achieved with their assignment.

3.1.3 Phase 3

The final phase of the learning module is focused on finalisation of the student assignment. Students have the opportunity to visit their respective firms again and discuss their findings with their supervisors. At the end of the learning module, the students hand in their assignment and receive a certificate of successful completion of the learning module.

The student assignment structure:

- Description of the respective region (size and location of the region in Europe, age structure of the population, structure of the labour force, migration trends, number and structure of the SMEs, industrial structure, development of these facts in the next 5 years),
- Selection and description of regional SMEs (size, industry, technology, employee structure, specific needs),
- Analysis of HRM priorities for these firms – based on student's research,
- Developing practical HR-tools for these SMEs for these issues,
- Critical evaluation of the results obtained,
- Developing of conclusions in these SMEs,
- Developing of conclusions for the design of HRM for SMEs in Europe.

3.2 Output 2 – Handbook of HRM for SMEs

The Handbook will be built upon the knowledge and experience gained in Outputs 1 and 3 as well as an extensive literature review. The aim here is to create a practical guide for SMEs, which will allow them to take inspiration from case studies or use the tools provided straight away. The Handbook will be written in concise and clear manner with real-world focus. The project team will translate the findings from the literature review and the other outputs in a way that will be easily accessible by HR specialist workers as well as SME owners and managers. The main focus of the Handbook will be on the following issues as well as on any HR issues that will come into light from the other outputs and literature review:

- Specific Needs of SMEs in HR – such as recruitment and selection, integration and retention of employees with focus on young employees,

- Inclusion of Employees with Special Needs (disabled people, immigrants, foreign workers, elderly employees),
- Employer Branding and Personnel Marketing in SMEs – boosting the attractiveness of employers for graduates,
- Strategic Management and Strategic HRM,
- International Aspect of HR in SMEs,
- Business Ethics and Interpersonal Skills in HR.

3.3 Output 3 – Research

The research part of the SHARPEN project will be mainly based on a CAWI method. To collect data, researchers will use an electronic questionnaire created in SurveyMonkey, which will be distributed with help from local Chambers of Commerce to SMEs in all the 5 regions of the project. The main aim of the research is to find out the needs of SMEs in terms of HRM as well as to determine to what extent HRM is performed in the firm, who performs it and how and what the differences in HRM among SMEs of various sizes and industries are. Great care will be given to the creation of this questionnaire. Pilot questionnaire will be given by students to the SMEs where the students perform their assignment research and the SMEs will provide feedback. In addition, experts and HR specialists from the 5 countries will be asked to provide feedback as well.

The pilot questionnaire has 51 questions and asks a range of questions starting with basic information about the firm and its HR workers continuing onto questions concerning how HR is performed in the firm and what HR issues it currently faces.

The end result of this output will be a study that will analyse the data and pave the way for the project team to create the Handbook tailored to specific needs of the project region's SMEs and, hopefully, even the whole EU.

4 Results

At the end of the first year the results of the project look promising. Development of **case studies** from shadowing and interviewing of HR specialists in SMEs has led to the creation of specific **practical tools, recommendations** and **solutions** for the participating SMEs. The learning module has also produced 25 young students (5 in each country) who now possess deeper knowledge of how HR is performed in SMEs.

Examples of proposed tools are:

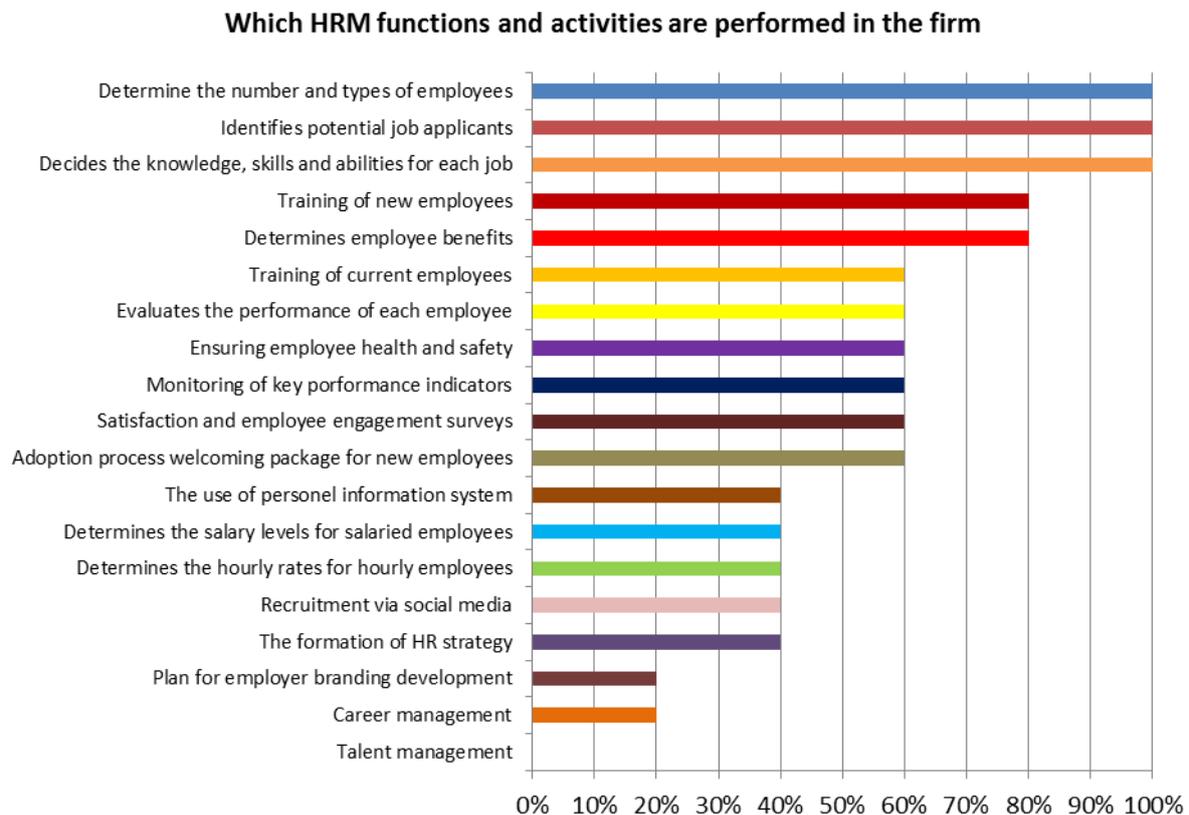
- Evaluation forms to be used during induction process,
- Manuals on how to communicate with young generations through social media,
- Custom-made benefits package,
- Employee satisfaction questionnaire template,
- Competency-based HRM.

The pilot questionnaire was first distributed among 5 Czech firms in Liberec region. Students collected quantitative as well as qualitative data during their shadowing phase in the first year of the project. Even though this constitutes a relatively small and not representative sample, the results have in a lot of ways been in line with the knowledge gained in this paper's literature review.

4.1 Results of the Pilot Survey

Three of the five firms were medium-sized, with the rest being small (determined by the number of employees: 0-9 micro, 10-49 small, 50-249 medium). The medium-sized firms all

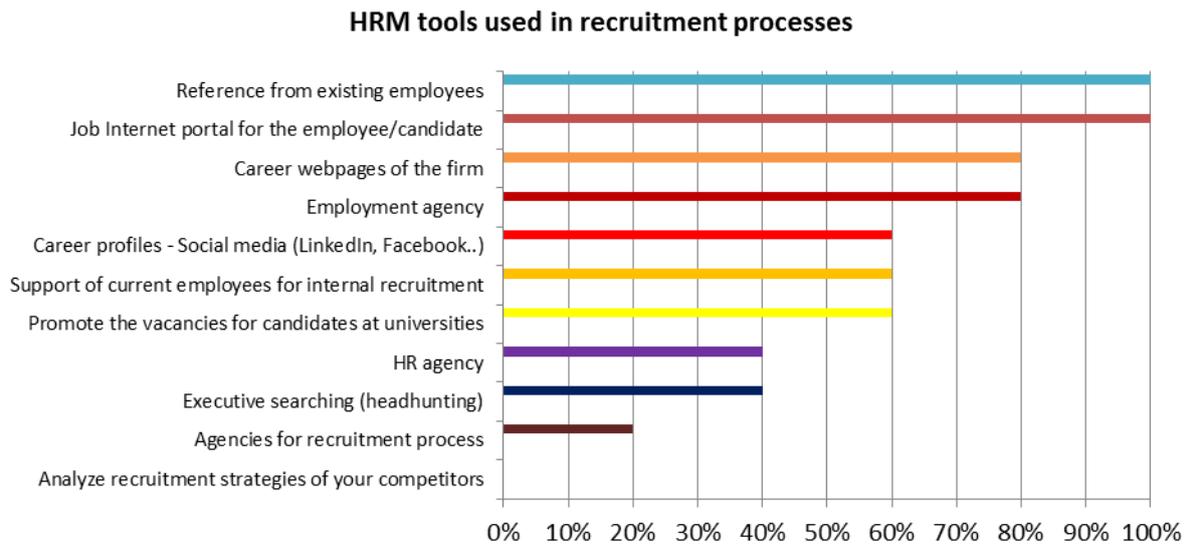
had a specialised HR department and the small firms did not, which agrees with the assumption that HR practices get more formalised with increase in the firm’s size. All of the firms have defined overall firm strategy and 4 out of 5 also have HRM embedded within it. In 3 of these 4 firms, the owner is responsible for setting the HR strategy, while in the remaining 1 it is an HR specialist. Figure 1 shows which HR activities are performed in the firm. Again, it goes in line with the literature review, showing that HR specialists in these firms mostly perform the necessary administrative activities.



Source: SHARPEN project pilot questionnaire

Fig. 2: Which HRM functions and activities are performed in the firm

Similarly, Figure 2 shows that the firms mostly use basic HRM recruitment tools, even though the use of social media and promoting themselves at universities is used in 3 firms. Overall, all the firms stated that employees were very important to the development of the firms and 4 firms also stated that they were afraid of the possibility of their key employees leaving.



Source: SHARPEN project pilot questionnaire

Fig. 3: HRM tools used in recruitment processes

Conclusion

The SHARPEN project is a European Key Action 2 Strategic Partnership project that focuses on the issue of HRM in SMEs in 5 European regions. The success of the project is threefold. Firstly, the development of innovative learning module that directly cooperates with firms has contributed to the enhancement of the students' knowledge in the field of HRM while also improving their language and cross-cultural skills. Secondly, the creation of a Handbook will provide SMEs all across Europe with free of charge tools and advice on how to effectively deal with HRM issues. Lastly, the cross-regional research will make sure that the content of the previous two parts is consistent with the state-of-the-art literature and current situation in regional SMEs. The overall result of the project should be a better state of HRM in SMEs due to new, easily accessible knowledge and tools as well as more attention given to the challenges facing SMEs in the area of HRM.

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INOVATIVNÍ PŘÍSTUP K ŘÍZENÍ LIDSKÝCH ZDROJŮ V MALÝCH A STŘEDNÍCH PODNICÍCH: PROJEKT SHARPEN

Cílem tohoto článku je přinést novou perspektivu do způsobu, jakým se podporuje a provádí řízení lidských zdrojů (ŘLZ) v malých a středních podnicích (MSP). MSP v Evropě se potýkají s řadou výzev v oblasti ŘLZ, a projekt SHARPEN je zaměřen na poskytnutí řešení těchto výzev na základě specifických potřeb regionálních MSP. Projekt SHARPEN vyvine univerzitní vzdělávací kurz zaměřený na ŘLZ v MSP a příručku ŘLZ, která poskytne malým a středním podnikům kompaktní znalosti a nástroje týkající se ŘLZ. Oba tyto výstupy budou podpořeny výzkumem provedeným napříč 5 regiony EU. Celkovým výsledkem projektu by měl být lepší stav ŘLZ v MSP, a to díky novým, lehce dostupným znalostem a nástrojům a věnováním větší pozornosti výzvám z oblasti ŘLZ, kterým musí MSP čelit.

EINE INNOVATIVE ANNÄHERUNG AN DIE MENSCHLICHE RESSOURCE MANAGEMENT IN KLEINEN UND MITTLEREN BETRIEBEN: DAS SHARPEN PROJEKT

Das Ziel dieses Artikels besteht in der Schaffung einer neuen Perspektive, wie man die Führung menschlicher Ressourcen in kleinen und mittleren Betrieben unterstützt und durchführt. Kleinere und mittlere Betriebe haben in Europa mit einer Reihe von Herausforderungen auf dem Gebiet der menschlichen Ressourcen zu kämpfen. Das Projekt SHARPEN zielt auf die Gewährleistung der Lösung dieser Herausforderungen auf Grundlage spezifischer Bedürfnisse regionaler kleiner und mittlerer Betriebe. Das Projekt SHARPEN entwickelt einen universitären Ausbildungskurs, der auf die menschlichen Ressourcen in kleineren und mittleren Betrieben ausgerichtet ist, sowie eine Handreichung menschlicher Ressourcen, welche kleinen und mittleren Betrieben kompakte Kenntnisse und Instrumente im Hinblick auf menschliche Ressourcen vermittelt. Beide Auftritte werden durch eine Umfrage quer durch fünf Regionen der EU unterstützt. Das Gesamtergebnis des Projekts sollte ein besserer Zustand der menschlichen Ressourcen in kleineren und mittleren Betrieben sein, und das dank neuen, leicht zugänglichen Kenntnissen und Instrumenten und durch Beimessung größerer Aufmerksamkeit, die den Herausforderungen auf dem Gebiet der menschlichen Ressourcen geschenkt wird, welche kleine und mittlere Betriebe bewältigen müssen.

INNOWACYJNE PRZYBLIŻENIE DO ZASOBÓW LUDZKICH ZARZĄDZANIE MAŁYMI I ŚREDNIMI PRZEDSIĘBIORSTWAMI: PROJEKT SHARPEN

Celem niniejszego artykułu jest przedstawienie nowych możliwości w zakresie wspierania i realizowania zarządzania kapitałem ludzkim (ZKL) w małych i średnich przedsiębiorstwach (MŚP). MŚP w Europie borykają się z wieloma wyzwaniami w zakresie ZKL a projekt SHARPEN ma na celu przedstawienie możliwości podejścia do tych wyzwań w oparciu o specyficzne zapotrzebowanie regionalnych MŚP. W ramach projektu SHARPEN zostanie stworzony uniwersytecki kurs edukacyjny dotyczący ZKL w MŚP oraz podręcznik ZKL, który małym i średnim przedsiębiorstwom przekaże kompleksową wiedzę i narzędzia dotyczące ZKL. W ramach projektu będą też przeprowadzone badania w 5 regionach UE. Ogólnym rezultatem projektu powinno być lepsze ZKL w MŚP dzięki nowej, łatwo dostępnej wiedzy i instrumentom a także poświęceniu większej uwagi wyzwaniom w dziedzinie ZKL, przed którymi stoją MŚP.

INTER-SECTORAL MOBILITY IN THE CONTEXT OF THE EUROPEAN RESEARCH AREA

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Abstract

The article presents the results of pilot research related to a wider study of a midterm inter-sectoral mobility phenomena as supported by the European Commission. To understand the concept of inter-sectoral mobility, the paper starts with theoretical background on academia-industry links and their role in the knowledge economy. The second chapter introduces the methodology used. In the third chapter, the results gained from the pilot research are presented. The final section discusses these results in the context of the research questions, summarizes the first view of the possible interpretation of immeasurable criteria into measurable variables and recommends the design of further research on the topic.

Keywords

Mobility; Human resources; Entrepreneurship; Horizon 2020; Knowledge transfer.

Introduction

The phenomenon of temporary inter-sector mobility is assumed by the European Commission to be one of the possible inhibitors for knowledge transfer support between research and industry. It is expected that it will enrich EU competitiveness both in terms of new innovative solutions and competitive human resources in research and academia. This specific support scheme implementing the concept of temporary inter-sector mobility was introduced under the name Research and Innovation Staff Exchange (RISE) in 2013 as one of the events of the Marie Skłodowska-Curie section of Horizon 2020.

Funding to be obtained from this scheme by successful projects is basically dependent on the number of person-months the research team spends on research work both in different countries and different sectors at the same time. With such a specific principal “no international inter-sector mobility, no funding”, the original question behind this research paper was related to the nature of the successfully funded projects. How was the concept implemented in practice and are there any measurable features that would describe the phenomenon to inspire both new research teams while applying in response to the new calls for proposals of this scheme and policy makers in possible future implementation of the scheme?

However, with no previous specific research on this topic, it was necessary to identify relevant information resources and implement the pilot research to verify their information potential with regard to the original research question. The research on the topic was therefore split into two phases – the pilot research, and the final research which would be based on the pilot’s results.

This paper presents the results of the first phase – the pilot research project, the objective of which was to identify promising resources of reliable, valid and measurable information, and propose the design of the second phase of research on the topic. The pilot research was based on pre-scanning of the existing information sources which identified three possible information sources, each of them containing a different type of information (based on theoretical background of the topic).

The interest of the research sector to participate in the Marie Curie funding scheme was confirmed both by the previous history of the successful Framework EU programmes for research and technological development and by several previous research projects related to the analysis of Marie Curie scheme (see the chapter on its background), The unknown feature of the studied phenomenon was the role of different sectors and their interest to collaborate under such specific financial and technical arrangements the RISE scheme offers. Therefore, the objective of the pilot research was to identify relevant information resources that would be able to answer two main specific research questions – what kind of organizations from different sectors collaborate in RISE projects of inter-sectoral scientific collaboration; and can the excellence in HR on the side of research sector be of any significance to the evaluation process?

1 Background Information

1.1 RISE Scheme in the Frame of the EU Policy

In its Treaty on the Functioning of the EU (article 179.1), the European Union highlights the need for strengthening its scientific and technological bases by developing a common European Research Area [1]. The article emphasizes the importance of free circulation of researchers, knowledge and technology between sectors to back up the EU's future in competitiveness. To implement this idea, the European Commission has introduced several support mechanisms, including specific strategies (such Europe 2020) or specific financial support tools, the aim of which is, besides other topics, to break down barriers and foster collaboration between sectors.

Among many specific collaboration support tools introduced by the 8th Framework Programme for Research and Development (Horizon 2020), there is a set of specific support actions directed to human resources development called Marie Skłodowska-Curie Actions. These actions are intended to support career development and training of researchers with a focus on innovation skills through international and inter-sectoral mobility. It is expected that some 65 000 researchers will obtain support from these actions [2].

1.2 Inter-Sectoral Mobility and Human Resources Development

While the concept of human resources development by international mobility is quite common within the research community, the concepts of mutual learning by inter-sectoral mobility are relatively new.

The opportunities for inter-sectoral mobility have been present in some form in all previous Framework programme mobility schemes, but they have never been widely used. The Impact assessment of the Marie Curie Fellowships under the 4th and 5th Framework Programmes implemented by the IMPAEL project [3] in 2005 shows that the majority of researchers (88%) carried out their career development fellowship at a university or a public research centre. However, the research also discovered a strong tendency for the industrial sector to offer follow-up contracts after the Marie Curie Fellowships. As an example, 65% of fellows who had spent their training fellowship period in an industrial environment (although the total

number of them was relatively low) were subsequently employed by the same sector after their fellowship was completed. The IMPAEL project is not the only research highlighting the need for the introduction of specific incentives for the transfer of pathways for staff between industry and academia.

The Aho report, for example, confirmed that the lack of movement of researchers between sectors was partly due to structural barriers and also partly due to lack of incentives [4]. In the EC's report *Mobility of Researchers between Academia and Industry* 12 practical recommendations [5], developed by four working groups of experts from meetings in 2005 in Brussels, the need for EU researchers to "follow in Einstein's footsteps and build academia-industry links" is highlighted as well. This group of experts agreed, in collaboration with the Steering Group on Human Resources and Mobility (established by the EC in 2002 [6]), that advancing inter-sectoral-mobility is necessary to eradicate the so called "European Paradox" that describes the EU's low ability to turn research results into globally competitive products.

The van de Velde's report [7], summarizing the results of the mutual learning workshop on Human Resources and Mobility on intersectoral mobility from 2014, speaks of 'leaving a great terrain of innovation potential outside academia unexplored due to low rate of inter-sectoral mobility and the need for fostering the inter-sectoral mobility'. The European University Association emphasizes the need for inter-sectoral mobility in its report *Mobility: Closing the gap between policy and practice* [8]. The importance of Personnel exchanges and inter-sectoral mobility is mentioned in the OECD's *Science Technology and Industry Policy Papers No. 7* [9], and the cross-sectoral collaboration is considered by Technopolis group while suggesting the certification mechanism for HR quality management in the public research sector in Europe [10]. The need for inter-sectoral mobility is also emphasized by the OECD in its key findings on the careers of doctoral holders [11].

1.2.1 Inter-Sectoral Mobility under Horizon 2020

As demonstrated above, there has been an increase in interest in the inter-sectoral mobility of researchers in the last decade. It is therefore not surprising that the EU has introduced a specific support tool directed particularly in support of inter-sectoral mobility in the framework of Horizon 2020. This scheme is part of the Marie Skłodowska-Curie actions and is known as Research and Innovation Staff Exchange (RISE).

The RISE scheme was available for the first time to applicants in 2013, and until now, four calls for proposals have been open (with only first three of these providing final results). According to the Work Programme [12] and the Guide for Applicants [2] the purpose of RISE is to "promote international and inter-sector collaboration through staff exchanges". With those staff exchanges, the basic idea is to work on a common research and innovation projects. By such arrangement, it is expected that a shared culture can be fostered between research and innovation sectors and the entrepreneurial skills of researchers could be strengthen. It is also expected that by this scheme the European paradox can also be reduced.

To guarantee the fairness of the selection process of projects that are funded, "the evaluation of proposals is carried out by the Research Executive Agency (REA) with the assistance of independent experts. Experts perform the evaluation on a personal basis" [2].

1.2.2 Research Objective: Evaluation of Projects under the RISE Scheme – The Challenge

Successful projects under the RISE scheme are selected based on a set of evaluation criteria which are comprised of three sections – excellence, impact, and the quality and efficiency of the implementations. The projects are evaluated by at least three independent experts, who, in

addition to scientific qualities, judge each project from a political and managerial perspective, which include criteria such as quality and credibility of inter-sectoral project aspects, quality and appropriateness of knowledge sharing, quality of proposed interactions or, for example appropriateness of the institutional environment. Each project is judged on eleven specific criteria in total [2]. The evaluation criteria are known to applicants before project submission, and it is expected that availability of that knowledge improves the quality of applications.

Unfortunately, the challenge of the evaluation procedure is that the set of evaluation criteria is relatively wide and in the majority of evaluation criteria even experts on innovation do not often agree on the method of measurement or possible impact of phenomena on the innovation process. From this point of view, there is significant room for differences in interpretation by evaluators who are usually experts in the scientific field of the project, but are not necessarily experts on innovations. Therefore the knowledge of how the criteria are manifested in successful projects can be a valuable source of inspiration for those who wish to apply for the RISE funding in the future. Future applicants could utilize this knowledge to better understand how to potentially address these criteria in their project proposals.

Therefore the objective of this paper is to initiate discussion on this topic. This will be done by implementing pilot research the objective of which is to identify whether there is any additional measurable information to be gained from the collected data related to successful RISE projects, their topics and consortia.

1.2.3 Theoretical Background on Inter-Sectoral Mobility

The majority of scholars consider that links between research (including academia) and industry are beneficial resources for innovation and economic growth [13–17]. Links between the two sectors are not only the subject of extensive research by the scientific community but are also part of many political agendas worldwide. The literature available on innovation and links between research and industry is sizeable. It deals with an array of topics, which reflect the complexity of innovation processes, knowledge transfer and knowledge generation. These can be affected by many aspects from macroeconomic factors to individual competences of a single researcher.

The RISE projects are directed to support the links between research and industry at individual and organizational levels in international contexts. Therefore, it is necessary for anyone who is interested in the scheme to become familiar with the background knowledge that focuses on many topics. This means that potential applicants should at least have knowledge of technology and knowledge of transfer [18, 19]; they should be aware of the opportunities networks can bring in the context of both knowledge generation and its commercial applications [20–22]; they should learn about relationships between organizations and scientific creativity [20]; and they should understand the basic issues related to human resource management and career planning in science [23–25].

However, even experts on every single one of these areas will encounter certain obstacles. Regardless of the area of specialty, there are various limitations that are common to the majority of research on science industry links. Firstly, the majority of authors highlight the limitations of their conclusions from the perspective of possible application. A second challenge that may arise is that many inter-sectoral collaboration research topics are complex and relatively new, and further research is required for them to be properly understood. Finally, perhaps one the greatest challenges the authors face relates to the possibility of the objective measurement of performance of innovation or industry-research links.

In the book *Academic Capitalism* [26], Münch et. al. introduce several challenges of the New Public Management (NPM) [27, 28], that are related to its ability to set objective measures to

compare project quality. This is seen as a weakness in the system. A similar idea referring to the debatable objectivity of selection criteria in the context of publicly funded projects was expressed by the Swiss economist M. Binswanger [29]. In relation to the NPM system and the way that projects are selected for funding he goes so far as to use the expression “illusion” of measurability. Another interesting research paper opening the debate on quality of any effort related to measurement and quality evaluation of science and technology performance was authored by Christopher Freeman and Luc Soete [30].

From this point of view the overall challenge of the RISE scheme and its implementation can be understood – it tries to implement several features of inter-sectoral collaboration aspects at once and yet those qualities are difficult to measure. Therefore to analyse the results of the evaluation procedures (successfully funded RISE projects) can shed light on how the selection criteria can be manifested in practice.

2 Data and Methods

As already mentioned the objective of the pilot research was to evaluate the validity of available information resources and identify the most promising information resources and categories of information in order to optimize the second research phase (which shall be implemented on the complex set of all 265 RISE projects funded in the period of 2014 – 2016). With this objective in mind, the research methodology combined a quantitative document analysis with a qualitative content analysis.

The original data on successful RISE projects were very limited and they were presented by the European Commission online at the Cordis database of projects [31]. Cordis is the European Commission’s primary public repository and portal for disseminating information on all EU-funded research projects and their results. The search engine of Cordis enables the selection of projects financed under specific financial schemes or calls. The dataset generated by a specific search question contains rudimentary information on the number of projects financed, their duration and identification number, as well as a link to a single project’s fact sheet (containing the same information structure for every project). The project fact sheet was utilized as a basic resource of primary information on successful RISE projects.

The data from the project fact sheet were assessed in the context of theoretical and background knowledge. This evaluation resulted in categorization of primary data into three groups according to their content and possible resource (Table 1).

In the context of the research questions, the analysis of documents related to European Research Area development suggested that the "HR Excellence in Research" award could be one of the promising measurable variables typical for successful RISE projects. The HR Excellence in Research award (HRS4R) can be attained by research and academic institutions who implement the Charter & Code [32] in their policies and practices related to human resources development. By the end of April 2017 there were three hundred and fifty one organisations that had received the HR Excellence in Research award. Databases of HRS4R Acknowledged Institutions were available on the Euraxess web page [33].

Tab. 1: Categorization of information for the purpose of qualitative content analysis

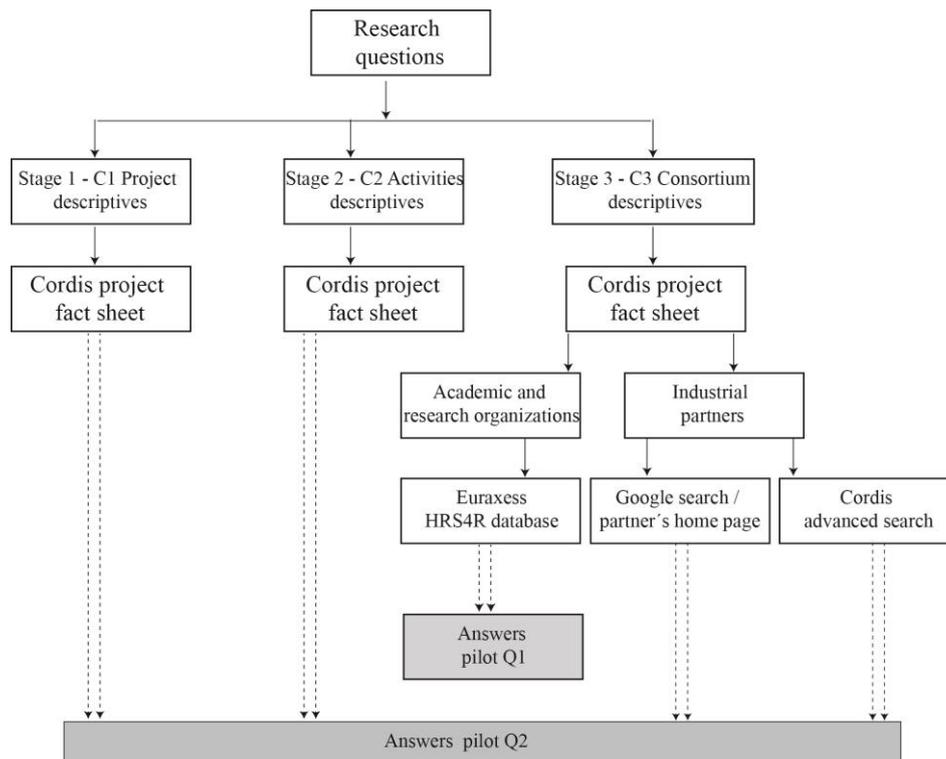
Category	Resource	Data
C1: Basic measurable variables describing the project	CORDIS (cordis.europa.eu), Project fact sheet, sections Project details and Related information	numerical
C2: Measurable variables on scientific profile and actions of the project	CORDIS, Project fact sheet, section Objectives	text
C3: Measurable variables describing the project consortium	CORDIS, Project fact sheet, sections Project details and Related information CORDIS, Project advanced search – reference information to the previous experience of the project partners EURAXESS (https://euraxess.ec.europa.eu), section The Human Resources Strategy for Researchers, database HRS4R Acknowledged Institutions	numerical categorical

Source: Own

The objective of the pilot research was to identify whether primary data that were available on a single project consortium could provide evidence of features (other than the scientific topic of the project) which may characterize the majority of successfully financed RISE projects. Specific objectives of the pilot research that were considered while planning the research design were to confirm or reject the HRS4R significance assumption and to verify or indentify other promising directions for further data gathering (to avoid the collection of data with low validity to answer the research questions) with a view to designing the second phase research (on the complete set of data).

2.1 Pilot Data Collection

For the purpose of the pilot study a random sample of 30 projects financed under the RISE support action was selected (April 2017). Since there were no differences in the specific requirements for single RISE calls, random selection was applied and no stratification based on the year of the call was necessary. The basic list of projects was generated by the Cordis search function. A data collection plan was developed (see Fig. 1) according to which the data collection for every project was implemented in three stages (reflecting the nature of the collected data and information resources).



Source: Own

Fig. 1: Data collection design

Data gathered during the first and second stages were based on information presented in Project fact sheets only. The third stage required additional information resources (see Fig. 1). This stage involved searches directed to HR quality of research and academic partners that had been awarded ‘HR Excellence in Research’ (HRS4R). To identify whether and how many partners were awarded the HRS4R, the Euraxess database was used, since it lists all organizations that were awarded the HRS4R. To obtain additional information on industrial partners of the single project, the Google search engine was used to locate partners’ web pages. Web page content analysis involved searching for information supporting the presumption that companies interested in this scheme might have taken part in previous collaborative research with academia or are likely to become members of international networks.

3 Results of the Research and Discussion

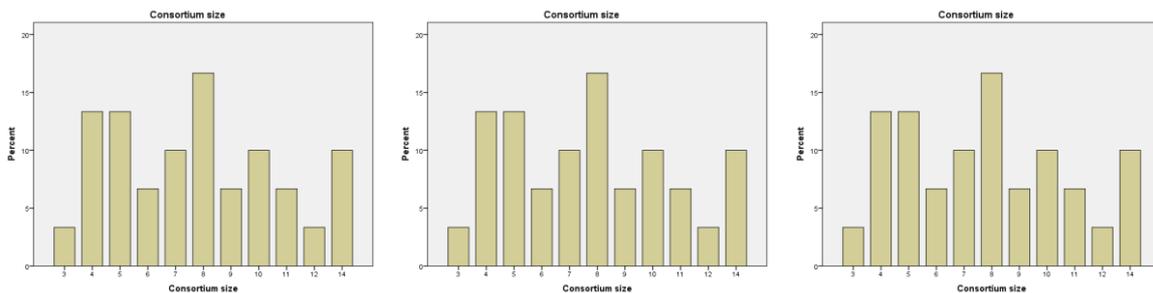
The process of pilot data collection culminated in a datasheet comprising thirty complete project profiles, each consisting of a set of thirty-five measurable variables which include characteristics such as the size of the consortium, its basic financial strategy (in terms of budget distribution and EC contribution), the structure of the various organization types within it, the regional distribution of partnerships, the incidence of the HRS4R, and the presence of interrelations between entrepreneurial partners with either research or international organizations (both from the personnel and organizational points of view) including the possible history of Framework programmes’ participation. The text information from the project fact sheets that described the objectives was processed by using text mining principles. Descriptive data were generated for all the variables to identify features that are present in the majority of projects, and the most promising categories of variables were identified in order to be used for further research on the whole data set.

3.1 Basic Measurable Variables Describing the Project – C1 Category Results Overview

From the financial point of view, the costs of projects vary significantly, starting from EUR 346,500 to EUR 2,344,500, with EUR 1,182,450 being the average cost of a single project. Two thirds of the projects obtained 100% financial support from the EC. The EC contribution to the remaining one third of projects varies significantly, from 56% to 97%. The duration of all projects was 48 months.

Although the guide for proposals recommends consortia sizes of from 4 to 6 partners [2], the actual sizes were from 3 to 14 partners, with 7 partners per consortium on average and both the mode and modus at 8 partners per consortium.

The majority of projects were coordinated by Higher or Secondary Education Establishments and by organizations from the United Kingdom. For detailed overview see Fig. 2.



Source: Own, data from CORDIS database

Fig. 2: Basic descriptive information on projects

There was quite significant variability in the majority of the data collected within the first stage under C1 category. Further research based on a larger data set is therefore considered promising in terms of adding new knowledge on measurable criteria describing successful RISE projects. In particular, the fact that the average size of the project consortia is higher than the recommended size already suggests the flexibility of the scheme in favour of project excellence and impact.

3.2 Scientific Profile and Actions of the Project – C2 Category Results Overview

The information on project actions presented within project fact sheets was very general (but it is the only existing information source containing relevant information on the topic on all financed RISE projects). The original objective was to summarize all information on project actions, from excellence and impact to its implementation. While planning the pilot research, it was expected that this data would be too general to provide any specific information adding knowledge to the discussion on measurable success criteria. From this point of view, the objective of stage two was to confirm or reject this assumption.

The textual analysis was implemented manually so as not to miss out any important information that could add to the knowledge of the topic. All texts were read, and draft thematic groupings of information were designed (in the context of document analysis resulting from the Work Programme – the Guidelines for Applicants, the strategic document Europa 2020 and other reference documents for Horizon 2020). This stage was relatively time-consuming, as for every project a list of up to 20 key words was created and based on this list the final thematic groupings of words were designed.

The textual analysis resulted in thematic groupings of information: 1. scientific topic; 2. methodology; 3. relevance to the Europe 2020 strategy; 4. entrepreneurship and

transferable skills; 5. networking. Most of the evaluated texts presented the information on project action in the combination of topics 1, 3, 4 and 5; topic 2 (methodology) was relatively scarce (8%).

The results of the textual analysis have shown that the profile texts were mainly directed to the presentation of the wider impact of the projects rather than project implementation. These findings have confirmed the original assumption related to the relevance of this information in the context of the main research question. Data collected in C2 category were general and did not add any significant knowledge of inter-sectoral mobility financed under the RISE scheme.

3.3 Variables Describing the Project Consortium – C3 Category Results Overview

The third stage of the pilot data collection project was considered to be the most promising in terms of data gathering. The stage was implemented on three levels:

1. Evidence of regional distribution of project partners (with special attention to the regional distribution of industrial partners and collaboration with countries other than EU member states or countries associated with Horizon 2020);
2. Evaluation of academic and research organizations in the context of HRS4R award acknowledgment;
3. Evaluation of available background knowledge on industrial partners related to their nature, networking activities and previous collaboration in research with academia.

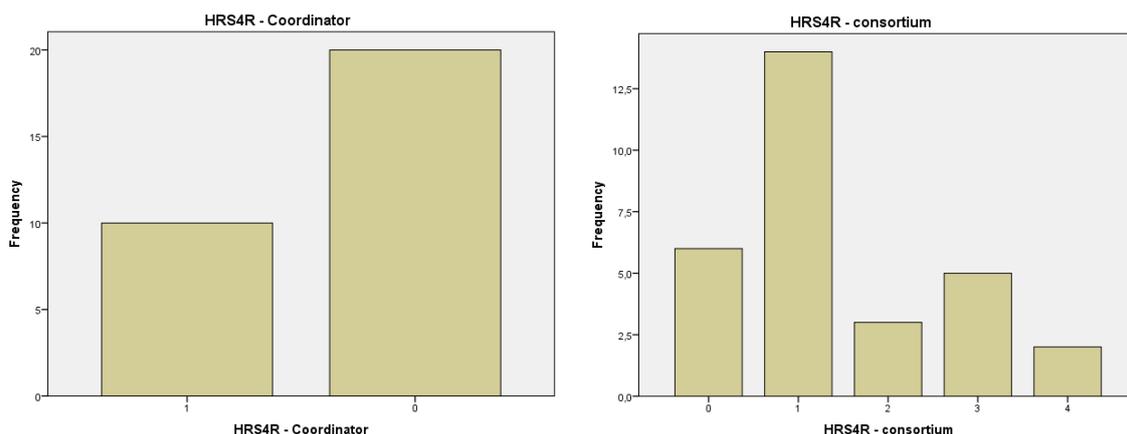
3.3.1 C3 Results – Regional Collaboration

As the objective of the pilot study was to evaluate the validity and reliability of information sources, the data set was relatively small and couldn't be used to identify some specific trends related to the regional concentration of midterm inter-sectoral mobility. But even this relatively small set of data showed a concentration of research activities in organizations originating from the United Kingdom (34 cases), France (33), Italy (24), Spain (26), Greece (16), Germany (15).

Another interesting finding was related to collaboration with so-called third countries (countries that are neither EU members nor associated with the Horizon 2020 programme). In the case of collaboration with partners from third countries, the financial rules of the RISE scheme [2] change. They allow project funding even if the partner from the third country is from the same sector. It was expected that the rate of industrial partners in such projects would be lower, but this assumption was not entirely confirmed. There were only 6 projects out of 17 involving collaboration with third countries with no industrial partners.

3.3.2 C3 Results – HRS4R Award

The results of this part of the analysis fully confirmed the original assumption relating to the significance of the HRS4R award. In one third of the cases, the coordinating organization was listed as an HRS4R acknowledged institution. Numbers were even more convincing when looking at the complete consortium structure. There were only 6 projects out of 30 with no HRS4R acknowledged organization, 46% of all the evaluated projects had one organization that was awarded the HRS4R, and 33% of consortia included more than 1 HRS4R acknowledged institution (for details see Fig. 3).



Source: Own processing of data from CORDIS database and Euraxess HRS4R list of acknowledged institutions
Fig. 3: Results of the HRS4R analysis

3.3.3 C3 Results – the Industrial Partners

This section of the pilot data collection project was the most time-consuming, but also the most promising part of the pilot research related to the knowledge on industrial partners interested in midterm inter-sectoral mobility financed in the framework of the RISE scheme.

The results gained from the pilot research confirmed the original idea about industrial partners with previous experience of international research collaboration (68% cases), including participation in other EU financed projects (results from an additional Cordis project search), being more likely to participate in the RISE scheme.

Beyond the original idea, the pilot research during this stage identified several other interesting pieces of information relevant to the research topic. By looking at a history of industrial partners, we were able to identify those who were either spin-off or start-up organizations. The presence of spin-off or start-up phenomena in project consortiums was surprisingly high (40%).

Other interesting knowledge was discovered while performing the content analysis of the management or human resources sections of the industrial partners' web pages. It was revealed that majority of the industrial partners had history of previous human resources interactions between industrial and research (academic) sectors.

It was found out that the management of industrial partners was often simultaneously employed by the academic or research sector or originally came from the research and academic sector (this information was checked on LinkedIn profiles or by full text Google searches using name, titles and country of origin of a person). About 17% of all sample projects involved direct personnel relations between industrial and research (or academic) project partners and 33% of all sample projects involved industrial partners with management with strong academic backgrounds (experienced researchers).

Conclusion

The phenomenon of the mid-term and short-term inter-sectoral mobility financed in the frame of the RISE action of Horizon 2020 is relatively new (from 2013) and no research related to its practical implementation has been performed so far. Previous research projects related to the topic or strategic documents on European Research Area, HR in research or the EU competitiveness confirmed the necessity of further support of inter-sectoral mobility. But as there are many other financial schemes directed to industry-research collaboration and the financial rules of the RISE scheme are very specific, the original question that motivated this

research project was related to the nature of inter-sectoral partnership that would be able to benefit from such specific scheme.

By the mid 2017 there was information available on 265 successfully funded RISE projects from 2014 – 2016 calls for proposals. While evaluating the possible research approaches to the topic and scanning existing relevant data resources, it was decided that the in depth research would be performed on the whole set of 265 project records. As the in-depth analysis would be time-consuming and costly, it was necessary to perform the pilot research project to develop research design and evaluate the information resources in terms of their validity and reliability to the research topic (with respect to the shortcomings of the New Public Management system and its principals of selecting successful projects).

The pilot research project on the topic was designed using a sample of 30 successful RISE project cases. To implement the pilot data collection, a set of 35 variables was designed to be collected on every project (based on available data resources). Based on their nature and information resources they were gained from, the variables were segmented in the following categories: 1. Variables describing the project (category C1), 2. Variables on the scientific profile and actions of the project (category C2), and 3. Variables describing the project consortium (category C3).

The results of the pilot study have confirmed that some of the original assumptions that the pilot study was based on were correct, and that they should be investigated further in the frame of the follow-up research project. At the same time, the pilot verified which categories of data were too time-consuming and costly in terms of their added value and relevance to the research topic and should therefore be omitted from further research.

The C1 category of information was of a more basic, descriptive nature and could provide some information in combination with data from different categories. For this reason, it was recommended to include this information segment in the follow-up research project.

The information category C2 was assessed as the least valuable out of the three categories tested. The ratio between costs and time taken for the data gathering process in comparison with data relevance to the research questions was evaluated as inadequate, and therefore the C2 category of information is not recommended for further study.

On the other hand, the C3 category of information was evaluated to offer much deeper information than expected. The anticipated significance of the HRS4R award (only 6 out of 30 projects had no partners with the HRS4R award) was confirmed. It was also confirmed that the web pages of industrial partners in combination with evaluation of their previous performance under Framework Programmes (Cordis projects database) can bring even more information describing the nature of inter-sectoral partnership than originally expected. This new knowledge relates to the personnel relations and networks between industrial and research (and academic) partners. As this kind of information is considered to be relevant to the research topic, new variables describing the nature of partnership were added to the project information profile based on C3 pilot collection of data.

The research design tested by the pilot data collection project was confirmed to be efficient in terms of relevant knowledge generation. Information resources were found to be advisable to the topic and offering plentiful information to learn more about the phenomena of short and midterm inter-sectoral mobility at this stage of knowledge. Segmenting the measurable variables of single project into three categories and testing them separately enabled to suggest adjustments to the originally designed list of variables.

For the efficiency of the follow-up research project (to be implemented on the complete file of 265 projects) it was recommended to omit C2 category of information entirely (low

information value compared to price and time related to the data collection process) and enlarge the C3 category of data by a new set of specific variables. This group of new 6 descriptive variables relates to history of previous research-industrial collaboration of projects' industrial partners and personal links between sectors to be identified on the side of the industrial partners.

The implementation of the pilot research project has confirmed that the research on inter-sectoral midterm mobility phenomena can bring interesting and actual knowledge applicable both for future applicants to the RISE scheme (by giving them inspiration how this phenomena can be manifested in real partnerships) and those who are responsible for designing research and innovation financial support tools funded from public resources (such as 9th Framework Programme EU for Research and Technical Development). For the second group of knowledge users it could be interesting to compare the final research results with the original expectations for the RISE scheme practical impact.

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MEZISEKTOROVÁ MOBILITA V KONTEXTU EVROPSKÉHO VÝZKUMNÉHO PROSTORU

Článek shrnuje výsledky pilotní studie, jejímž cílem bylo ověřit navržený postup výzkumu fenoménu mezisektorové mobility tak, jak je podporována Evropskou komisí v rámci Horizon 2020. V teoretické části je téma mezisektorové mobility popsáno jak z pohledu teoretického výzkumu relevantního pro dané téma, tak také z pohledu politik a praxe související s tématem sdílení znalostí mezi sektory v rámci konceptu Evropského výzkumného prostoru. Návazně je představen navrhovaný design výzkumu, který byl ověřen pilotní studií. Na základě jejích výsledků byl původní design upraven a doporučen k dalšímu výzkumu. Výsledky jak z pilotní studie, tak i následného výzkumu budou využitelné nově připravovanými projekty do Horizon 2020, které budou ve svém řešení zahrnovat prvek mobility mezi sektory. Výsledky výzkumu nabídnou zájemcům o finanční podporu inspiraci, jak převést obecná hodnotící kritéria kvality mezisektorové mobility do objektivně měřitelných veličin.

MOBILITÄT ZWISCHEN DEN SEKTOREN IM KONTEXT DES EUROPÄISCHEN FORSCHUNGSRAUM

Dieser Artikel fasst die Ergebnisse einer Pilotstudie zusammen, deren Ziel darin bestand, den vorgeschlagenen Vorgehensweg der Erforschung der Mobilität zwischen den Sektoren so zu überprüfen, wie er von der Europäischen Kommission im Rahmen von Horizon 2020 unterstützt wird. Im theoretischen Teil wird das Thema der Mobilität zwischen den Sektoren beschrieben, und das sowohl aus Sicht der für das gegebene Thema relevanten theoretischen Erforschung als auch aus Sicht der Politik und der Praxis, die mit dem Thema Mitteilen von Kenntnissen zwischen den Sektoren im Rahmen des Konzeptes des europäischen Forschungsraums zusammenhängt. Anschließend wird das vorgeschlagene Design der Forschung vorgestellt, welche durch die Pilotstudie überprüft worden ist. Auf Grundlage von deren Ergebnissen wurde das ursprüngliche Design angepasst und zur weiteren Erforschung empfohlen. Die sowohl aus der Pilotstudie als auch aus der nachfolgenden Forschung hervorgegangenen Ergebnisse werden durch die neu vorbereiteten Projekte für Horizon 2020 nutzbar gemacht, welche in ihrer Ausführung das Element der Mobilität zwischen den Sektoren enthalten. Die Forschungsergebnisse bieten den an finanzieller Unterstützung Interessenten eine Inspiration, wie man allgemeine Bewertungskriterien für die Qualität der Mobilität zwischen den Sektoren in objektiv messbare Größen überführt.

MOBILNOŚĆ MIĘDZYSEKTOROWA W KONTEKŚCIE EUROPEJSKIEJ PRZESTRZENI BADAWCZEJ

W artykule podsumowano wyniki badań pilotażowych, których celem było sprawdzenie zaproponowanego sposobu badań zjawiska mobilności międzysektorowej wspieranego przez Komisję Europejską w ramach programu Horyzont 2020. W części teoretycznej tematyka mobilności międzysektorowej opisana jest zarówno z punktu widzenia badań teoretycznych właściwych dla danego zagadnienia, jak i z punktu widzenia polityk i praktyki związanej ze współdzieleniem wiedzy pomiędzy sektorami w ramach koncepcji Europejskiej Przestrzeni Badawczej. Przedstawiono też proponowaną formę badań, którą poddano weryfikacji w ramach przeprowadzonych badań pilotażowych. Na podstawie ich wyników skorygowano pierwotną formę, zalecając dalsze badania. Wyniki badań pilotażowych, jak i późniejszych badań będzie można wykorzystać w nowych projektach przygotowywanych do programu Horyzont 2020, które będą zajmowały się zagadnieniem mobilności międzysektorowej. Wyniki badań staną się dla aplikujących o dofinansowanie inspiracją, w jaki sposób ogólne kryteria oceny jakości mobilności międzysektorowej przekształcić w obiektywnie mierzalne wielkości.

INTERNATIONALIZATION OF CZECH COMPANIES IN BRAZIL

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Abstract

The first part of this article brings a review of the Czech-Brazilian bilateral trade and its changes throughout the years, showing the most common exports and imports. In the second part we expose how to operate inside the largest market in Latin America, Brazilian barriers to trade and bureaucracy are scrutinized, showing examples and drawing comparison with the reality in Czech Republic and Germany. Besides that, some protective measures are analyzed in order to show the country's idea of protectionism and how this affects foreign goods nowadays. In its third part, the article analyzes the ways a company can properly deal inside the country, showing which businesses from different sectors are already profiting from the operations available by the law.

Keywords

Brazil; Czech Republic; Foreign trade; Bilateral relations; Laws; Taxes.

Introduction

Brazil is one of the most diverse and folkloric countries in the world, being known for its football and forests. However, the country has also many economical qualities, as its raw materials abundance, huge work force and a leading role in Mercosur [42].

Czech companies, on other hand, play an important part in the European scenario, supplying Germany and the UK with its industrial goods. However, over the past years it has been focusing on expanding the trade with non-European countries, in order to protect itself against bloc crisis [48].

The first part of this article focuses on the Czech-Brazilian relations and how they have evolved throughout the years, analyzing the amount and types of goods exchanged. In the second part, we observe the internal environment for business, showing several difficulties to operate in the country. In the third part, we overview the ways a company can expand its business to Brazil.

Following its colonial historical heritage, Brazilian trade relies on commodities export and manufactures import. Analyzing Brazilian imports in 2016 [43], 10% are basic products, 4% are semi-manufactured and 86% are manufactured ones, showing the country potential for new Czech companies to operate in.

To keep developing in the changing world we live in, Czech companies must adapt to new market needs and profit from them. Kuada [40] says that “although international business will still be centered on the interlinked economies of the Triade – Western Europe, Japan and North America –the contribution of other countries to the world trade ... will grow in significance”. In addition, according to this scenario, Brazil is already playing a major role.

Aiming to fulfill its objectives, the present study aims at supplying a lack of information about the Czech-Brazilian trade and ways to do business. We have tried to review more literature about the subject, however, none was found on this specific topic. Ellis [41] highlights that “Culture, language and currency are key issues on doing international business”, all subjects that are going to be explored in the following text.

1 Research Objectives

This article has two objectives. The first one is to analyze the Czech-Brazilian bilateral trade relations. The second aim is to describe how to operate on the Brazilian market, identifying the country’s barriers and ways to overcome them.

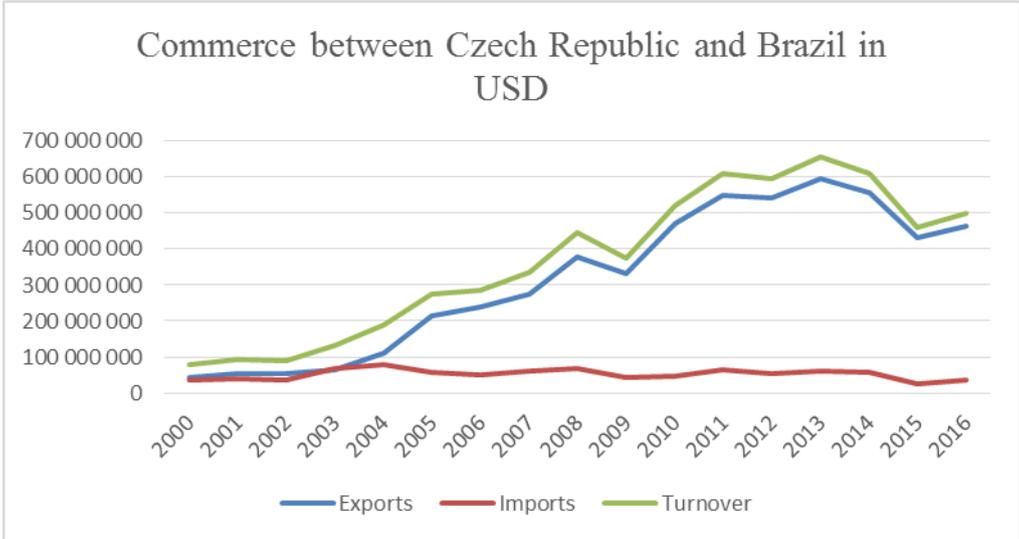
2 Research Methods

This is a problem-oriented research. The entire study has been constructed aiming to help the Czech companies to expand their business and to decide whether to keep exporting from the Czech Republic or to open a factory in Brazil. To do so, this article will analyze data from the World Bank, Brazilian Government and Czech Government. Also, we will use statistical data from several Brazilian institutes to measure the country internal barriers and desire to do business. The applied research methods are mainly comparative analysis, synthesis, and deduction.

3 Czech – Brazil Trade and Bilateral Relations

There are fifteen bilateral agreements between the Czech Republic and Brazil. However, as has already been observed, due to Mercosur, Brazil cannot negotiate tax reduction without the other member states. As a result, most of the treaties are oriented to cooperation and help, e.g. Treaty for diplomatic work (13/06/1997) [1].

The commerce between Brazil and Czech Republic has grown strong over the last 15 years. We can observe in Figure 1 that turnover is growing due to the volume of Czech exports to Brazil, although the volume of Czech imports is almost the same. For example, the total exported amount from the Czech Republic was 110 million USD in 2004, against 610 million in 2013. On the other hand, the Czech Republic imported 80 million USD in 2004 against 55 million in 2013.



Source: Own processing of data from [2]
Fig. 1: Trade in goods between the Czech Republic and Brazil in USD (2000 – 2016)

Analyzing the data, we can observe that the Czech exports are focused on manufactured items, with special attention to machines, transport equipment and its parts, which, together, correspond to 65% of all exports, as can be seen in Table 1.

Tab. 1: Top Czech export trade categories to Brazil in USD according to the Harmonized System (2016)

Product	Volume in USD	% Total
Total	464,887,719	100%
Machines and parts (XVI)	182,562,772	39%
Transport equipment and parts (XVII)	120,301,256	26%
Plastic and rubber (VII)	46,189,131	10%
Metals (XV)	31,785,658	7%
Chemical products (VI)	27,166,428	6%
Glass (70) *	7,815,154	2%

* The Glass (subcategory) is in the table due to the expressive amount of sales and due to the importance that the material has to the Liberec region, place where this research was conducted.

Source: Own processing of data from [3]

It is also significant that since 2010 there has been an agreement on defense matters and, probably related to that, the first and the third most exported Czech products in 2016 in trade volume are related to military industry, as can be seen in Table 2.

Tab. 2: Top 5 Czech export products to Brazil in USD in 2016

Product	NCM classification *	Volume in USD	% Total
Total		464,887,719	100.00%
Airplanes, Helicopters and parts	88033000	49,198,183	10.58%
Combined products with sound reproducer	85272100	28,461,004	6.12%
Armored vehicles	87100000	18,005,125	3.87%
Catalyst in beehive	38151210	17,572,704	3.78%
Chassis parts	87082999	13,727,166	2.95%

* NCM stands for the Mercosur classification system

Source: Own processing of data from [4]

Besides the exports for the army, we can see a lot of industrial production going to Brazil. It is important to observe Brazilian automotive needs and the fact that more than 9% of all Czech exports are related to this industry. From the total data, we observe that Czech exports growth is related to manufactured products, which are good for the Czech Republic economy. On other hand, Brazil keeps its tradition as a third world country, exporting raw materials and receiving industrialized products. From the historical data it can be presumed that this behavior will continue for a long time and the products showed in the TOP 5 will remain in the trade core.

4 Brazilian Environment for Companies

As it has already been mentioned, Brazil is a huge market with good connections within the majority of South American countries. As a result, some Czech companies are already operating in the country, with special attention to SEKO, in a partnership with Siemens in the production of aircraft engines. In addition, Centropjekt is a construction company that experienced the big boom into Brazilian economy and now is facing a hard time [45].

However, in order to operate inside Brazil, there are a few issues to be aware of, as corruption, the amount of taxes, bureaucracy and trading barriers. For better understanding the

business environment Table 3 highlights the ranking differences between doing business inside Brazil, the Czech Republic and Germany. In fact, Germany entered this comparison to give a more familiar point of view to an ordinary European person that might read this article. The original World Bank ranking compares 190 countries.

Tab. 3: *Economy rankings for business*

	Brazil	Czech Republic	Germany
Overall	123	27	17
Starting a business	175	81	114
Dealing with construction permits	172	130	12
Getting Electricity	47	13	5
Registering Property	128	31	79
Getting Credit	101	32	32
Protecting Minority Investors	32	53	53
Paying Taxes	181	53	48
Trading Across Borders	149	1	38
Enforcing Contracts	37	68	17
Resolving Insolvency	67	26	3

Source: Own processing of data from [5, 6, 7]

The World Bank ranking shows that Brazil is a difficult place to do business, being on the 175th place when it comes to “Starting a business” and on the 181th place concerning “Paying taxes”. On the other hand, the Czech Republic with its strong trade policy is number 1 in “Trading across Borders” and Germany is the 5th in “Getting Electricity”. On the overall, Brazil comes in 123rd, the Czech Republic 27th and Germany 17th. From the eleven topics analyzed by the institution, Brazil figures below the 100 better in seven of them, appearing on the TOP 20 worst countries three times.

Therefore, when analyzing the data in more detail, it is obvious that Brazilian economy needs urgent transformation by simplifying its bureaucracy and taxes, allowing the companies to perform in an easier way inside the country. In order to explore more about Brazilian obstacles to do business, in the next section it will be clarified and demonstrated how the country is developing right now.

4.1 Bureaucracy – Laws

Brazil faces a high level of bureaucracy. First, it is important to understand that there are the Federal, the State and the Municipal Governments, each with different laws and independent processes. For example, if you want to set up a factory in Brazil, one of the Federal Government agencies (Federal Receipt, IBAMA, INMETRO) will provide you a license to import. The State Government will charge you the ICMS (Tax over services and goods movement) and the Municipal Government is the one authorizing your factory to be installed in the city itself. Therefore, independently of the business, you are going to deal with several different authorities and agencies.

Focusing on the European Commission again, Brazil has been requested to reduce the bureaucracy, citing as an example a process for an engineer to be allowed working legally in the country and the non-adoption of the International Standards; the fact of the matter being that Brazil has its own agency for patterns, which differs to the ones used throughout the world. All these national specificities are seen as protective measures against free trade by WTO [8].

Another important data is the fact that from the 513 Brazilian congressional representatives, only 43 are lawyers. In other words, more than 90% of the people responsible for making the laws in Brazil have no degree or education on the matter. Therefore, we conclude that this is one reason why Brazilian bureaucracy is so confusing, large and non-efficient [9].

4.2 Bureaucracy – Taxes

In Europe, any time a purchase is made, there is a note going with the receipt stating the taxes, known as VAT, making it clear how much the customer is paying to the state. In Brazil, however, transparency is not so common in public offices, since there is no unified tax like the VAT. We believe that this is a measure to avoid public pressure for tax reduction. In Table 4 it is possible to observe the most representative taxes on consume in Brazil.

Tab. 4: Taxes on consume in Brazil

Name	Description	To Whom?	How much?
PIS / Confins	Social contribution *	Federal	0.62% to 7.6%
ICMS	Tax on services and goods movement	State	7% to 19%
IPI	Tax on industrialized products	Federal	0% to 55%
ISS	Tax on services	Municipal **	2% to 5%
IOF	Tax on financial operations	Federal	0.38% to 25% ***

* Contribution to Social Programs and Social Security. In Brazil, Social Security is financed by income taxes and by consume.

** Municipal but controlled by the federal government.

*** Operations to send money abroad [37].

Source: [10]

One of the main aspects in Table 4 is the Column “To Whom”, in which we can see that the taxes are paid to different entities. As a result, Brazil has more than 490,000 accountancy professionals who only deal with state bureaucracy. In addition, Brazil charges a 15% tax on the company final profit. The World Bank rates Brazil on the 181th position of places to pay taxes, putting the country into the top 10 more complex places in the world [5].

The two most expensive taxes are normally the IPI and the ICMS. The IPI is calculated product by product and the final amount over the good can be found in a table with 425 pages available on the Federal Agency website [11]. The ICMS, on other hand, is charged state by state, being equal to all products.

The standard VAT in the Czech Republic is 21% and in Germany it is 19%. In Brazil, it is difficult to calculate an average VAT (see Sum of all taxes in Table 4) for all the products. Therefore, to highlight some goods, the total tax on beer is 55.60%, on fuel 56.09%, on airplane tickets 22.32% and on a car it is 35.27%. As a result, more than 60% of the federal money covers these taxes and not income, as it is normal in developed countries [10].

Besides that, there are taxes on importation, compiled together with all Mercosur countries. These taxes are analyzed in Section 5. However, there is a list for exception products, giving Brazil the autonomy to change the amount charged on these products. The European Union has processed 11360 complains exactly about how Brazil uses this power to protect its industry, as we have already seen above.

4.3 Syndicates + Labor Laws

The work laws in Brazil are among the priority concerns to executives [13], with several strict regulations. For example, if the employer is going to dismiss someone, they need to keep this employee for one month after warning him about the cut or they have to pay a one-month salary in advance. Another important fact is the benefits, as transportation and meals, which

the employer is obliged to pay. Putting all the salary taxes and benefits together, it is normal for this amount to represent more than 90% of the employee salary itself [14].

Tab. 5: *Work benefits*

Benefit	What the law states
Working hours	44 hours
Holidays	30 running days (weekends included)
Notice periods	1 month
Probation	3 months
Transport	The company must pay for the employee transport to work and back home
Extra Hours	At least 150% the normal hour wage

Source: Author’s own work based on [15]

From Table 5 we can observe the labor laws in Brazil. The Working hours, though 44 hours, are normally split between 5 days of 8 hours plus 4 hours on Saturdays. Unlike in Europe, holidays must be taken in succession and without interruptions. Therefore, nothing like “a long weekend” including Friday as a day off is possible.

Another problem is the frequency of former employees suing their companies asking for money compensating some kind of distress originated there [34]. In fact, in 2016 there were approximately 3 million new employment discrimination lawsuits. As an example of how this can escalate, there was a process against Volkswagen where some employees were prosecuting the company because they had to do their own laundry [16].

Another barrier is the syndicates, which, in some categories as the automotive, are very strong and frequently organize strikes with certain. For example, Hyundai factory in Piracicaba was on strike only 4 days after the inauguration. To understand the situation better, the Brazilian Employment Law (CLT) states that all employees are obliged to pay the syndicate of their category. Hence, the country has more than 15.000 very well organized syndicates that impose their wills over the workers, promoting strikes and negotiating salaries [17]. Another interesting fact is that there are no limits for the number of syndicates, so, for example, teachers in public schools have three huge ones. However, those syndicates have different agendas which means that sometimes one is pushing a strike and the others are not.

From all the obtained data we concluded that the amount and inefficiency of labor laws is one of the main reasons why the illegal work is accounting for almost 10 million people [12], against 95 million legal employees. According to recent available data, 50.9% of Brazil population were economically active in 2013 [44]. This 2013 data is the freshest we could find.

4.4 Corruption

Brazil faces a huge amount of corruption. In fact, corruption is spread in all levels of governmental control, not being unusual to hear about small bribes paid mainly to regulatory organs. According to Transparency International [18], Brazil is the 79th country in this matter, on the same level as China and India, and 4 places below Tunisia.

It is important to bear in mind that Brazil was a Portuguese exploitation colony from 1500 to 1808, the year of the Royal family’s arrival to Brazil. The objective has never been to develop the country itself, with no education and proper infrastructure available. As a result, since that time corruption has been a major issue. It is also important to understand that corruption is not only briberies, but also common “influence traffic”, meaning that someone with public power (financial, juridical or political) pressures people to gain favors or advanced information to themselves or someone they favor [19].

Nowadays the “Car Wash” operation is running in Brazil, arresting businessmen and politicians for enormous schemes involving the World Cup, the Olympic Games and running the Presidential election of 2010/2014. In numbers, BBC [20] says that 2.5% of the Brazilian GDP went down in 2015 due to the operations side effects, as frozen contracts and penalties applied to the companies involved.

This operation became a symbol of justice in the country. Because of it, more than two hundred people were arrested, including two former governors from Rio de Janeiro state. This operation hit president Dilma’s party, undermining her already weak position in the Congress and giving strength to the impeachment process, which took her out of the power in favor of the Vice-President [46].

4.5 Financial Resources

Finding financial resources is difficult in Brazil. As the interest rate commands how much the governmental titles are going to pay, Brazilian Central Bank has a high interest rate of 13% [21]. However, as we know, this makes the cost of borrowing money inside the country very expensive. For example, in the U.S.A. the interest rate is 1% [22]. This also reflects the confidence the market has in the U.S.A. and explains its ability to pay its duties. On the other hand, Brazilian government does not share the same appreciation as the U.S.A., needing this high interest rate to keep the resources coming to the government.

As a result, many companies borrow money in the international market, with payments fixed in dollars which can represent a problem if the Real (Brazilian currency) devaluates a lot in a short period, letting the company with an unpayable debt. It is also important to observe that Brazil has a tax on money transactions (IOF) of 6% when it is related to foreign currency. The World Bank [5] rates Brazil on the 101th position to get credit.

All operations in Brazil are done in the national currency. However, the government allows some institutions to trade external currency as well, buying and selling them to the public for profit. It is possible to borrow money outside the country and exchange it to Reals. Nowadays, the government is pushing down the IOF for companies who borrow abroad, in order to bring dollars back into the economy [47]. In order to do so, a company only needs to contact an authorized agent (bank, currency houses), fill in the required forms and send the money from abroad to this agent.

4.6 Language Barrier

Unlike the current situation in Europe, where the number of foreigners is high, Brazil is a country with low levels of non-natives, having a history of immigrants that arrived in the country more than 100 years ago. Nowadays, neither the immigrants’ original languages are spoken, nor is English. In fact, a research [23] shows that only 5% of the population in Brazil can speak English. We conclude that this is related to a low level of education in the country, which affects other business aspects as well.

Therefore, almost entire official and non-official communication, laws, proceedings etc. are in Portuguese only. For example, from a quick research we can observe that the Sao Paulo state website¹ and the Brazilian Bank website² (the largest governmental bank) are available only in Portuguese. It is even worse when observing the Inmetro³ and the Customs Agency⁴

¹ <http://www.saopaulo.sp.gov.br>

² <http://www.bb.com.br>

³ <http://www.inmetro.gov.br>

⁴ <http://idg.receita.fazenda.gov.br>

websites, where the English version, though available, is not actualized and does not provide the information needed to foreign people to operate in the country.

Therefore, in conclusion, it is very hard to find any worthwhile information in English, being practically mandatory to rely on Portuguese language speakers for the majority of the data that is going to be needed to establish a company inside the country. However, despite all troubles, it is possible to operate and profit in Brazil, as several multinational companies do by hiring local people to work for them.

5 Possibilities to Operate in Brazil

In order to increase the Czech trade with Brazil, this article will now show three most common strategies used by companies to operate inside the country, explaining the differences of opportunities and giving examples of enterprises that are operating there. Among these strategies belong national production, importation and producing in Paraguay.

5.1 National Production

Setting up a factory is a usual way to produce goods in Brazil and enjoy the market freedom all over Mercosur. The positive points are the low land cost, cheap workforce and proximity of raw materials suppliers. However, as already explained, there are a few barriers to have in mind, especially the legal requirements and syndicates that will require a lot of effort from the company. In addition, we in 4 we have already discussed some of the taxes that the company will be obliged to pay.

In general, the process to set up a company will consist of the operations summarized in Table 6.

Tab. 6: *Opening a company in Brazil*

Procedure	Time	Costs
Check Company name with Jucesp *	1 day	No charge
Pay registration fees	7 days	R\$150.36 registration
Register at Jucesp *	1 day	R\$110.8 (expediting fee)
Register with the municipal taxpayers	1 day	No charge
Apply and obtain digital certification for the e-invoice	2 days	The cost may vary from R\$ 450.00 to R\$ 600.00
Apply to the municipality for an operations permit	90 days	No charge
Register and pay TFE (Registry Tax) to the Municipal Taxpayers' Registry	1 day	R\$ 425.46 (for retailing business), may vary in accordance with the company's activities
Register the employees in the social integration program (PIS)	1 day	No charge
Open a special fund for unemployment (FGTS) in bank	1 day	No charge
Notify the Ministry of Labor	1 day	No charge
Registration with the Patronal Union and with the Employees Union	5 days	No charge

* State organ

Source: Author's own work based on [5]

As it can be observed, the amount of bureaucracy is enormous and the cost of opening a company will be around 1300 Reals. The most time consuming process is to wait for a legal license from the municipality, which can extend up to 3 months. Together with all other proceedings, to open a company will probably take more than 100 days.

As an example of an international industry that went to Brazil, Faber Castell has a huge factory in São Carlos, responsible for 40% of the company global trade, supplied almost exclusively by local industries and Brazilian raw materials [24]. However, due to the increase of technology and complexity, most goods need several items from abroad to be concluded. In this case, one option is to set up the factory in the country and enjoy the “Nationalization” process.

To be a national product and pay fewer taxes, Brazilian government has an original law that demands 60% of the product value to be added inside the country. So, one alternative to import the needed parts and still pay less for the final product is importing semi-finished products and adding value to them, until the mandatory percentage is reached. As an example, automotive companies add value to wired systems by putting tape on it. In addition, the main example is the automotive assembly lines, which receive parts from all over the world and form a national product in the end.

The account made by the government is the one shown in Formula (1), where IV is the value index, X is the imported value and Y is the final sale price. If IV is more than 60%, the product is considered national [25].

$$IV = \left[1 - \left(\frac{X}{Y} \right) \right] * 100 \quad (1)$$

5.2 Importation

Another option is to import finished goods. Though common, as can be seen by the amount of Chinese manufactured products sold inside the country [3], Brazil has some protectionist measures that tend to overtax finished goods, particularly if they are competing with the national industries. One good example is the car industry, for which it is very expensive to import finished cars; it is even illegal to import used ones [38]. Due to these taxes, Geely company closed its operations in 2016 for not being able to compete in the internal market [27]. In conclusion, the more industrialized the product, the heavier the taxes on it.

To import to the country, it is important to follow all the extensive legislation and requirements. The average procedure to import is shown in Table 7.

Tab. 7: Importation process

Step	Explanation
Company	First of all the company that is importing the products must exist in Brazil. If it not so, the company must be opened as a juridical person.
Siscomex	The company must register itself into the External Trading System (Siscomex). This system is going to be used to follow up all the legal operations. Into the website (system), the company must choose the option that best suit it and nominate an official representative. It is very common for both small and large enterprises to nominate a Forwarding Agent, who is a government-authorized person or a company that only deals with official bureaucracy.
Radar	The Company needs to habilitate the Siscomex account into the nearest federal office, which will insert it in the Radar (Federal Centralized Network) system.
Legal Requirements	It is important to verify if the product has some restrictive measure against it. Most products are free to enter the country. However, the government keeps a list of products that must have a special license, called LI, to enter. It is the case of cheese and glasses, for instance [28].
NCM	Verify NCM (Mercosur tax table in accordance to the TEC – Common External Tariff) to calculate the amount of taxes that are going to be paid for the country. It is also important to see if the product is not on the Brazilian exception list for the NCM, which means that the country can target some categories of products with higher tributes to protect its industries. This is, for example, the case of automotive companies.
Tributes	The company must pay all legal taxes to the government, based on the NCM, through the creation of a DARF (Declaration of fiscal collection) to be paid in a bank.
DI	After all the procedures mentioned above, including the LI, the system will generate an Import Declaration. The importer company must present the DI in the nearest Federal Agency with proof of tributes payments (DARF), invoices and any other legally required documents.
Payment to the company	The payment must pass through the central Brazilian bank, converting the amount from Reals to the proper currency (normally USD).
Shipment	The products must be sent to Brazil.
Documents	The exporter company must send the Invoice, the Packing list (showing what was shipped) and Proof of shipment to the importer company.
Desembaraço Aduaneiro	This process means that the legal representative must present all the needed documents (section 10 and 4) and the tax payment proof. This information will enter the system (SISCOMEX) and, when the Federal agency authorizes it, the company will receive the C.I. (Proof of Import) and the product is free to be commercialized in the country.

Source: Authors own work based on [35] and [28]

As can be observed, the process to import is extensive and involves many regulatory organs, with different agendas and operations. We highlight the “Legal Requirements” procedure, which, varying from product to product, can involve several institutions and laws, with the importer company being responsible for arranging all the required papers.

To better understand how a process like this involve taxes, UOL [26] made a simulation with a Mustang (car) being imported from the USA. In the end, as it can be seen, the cost of import can double the amount to be paid for the product. Especially in the automotive industry, this

can be understood as the result of years of Lobby from the massive automotive companies in the country.

Tab. 8: Import taxes

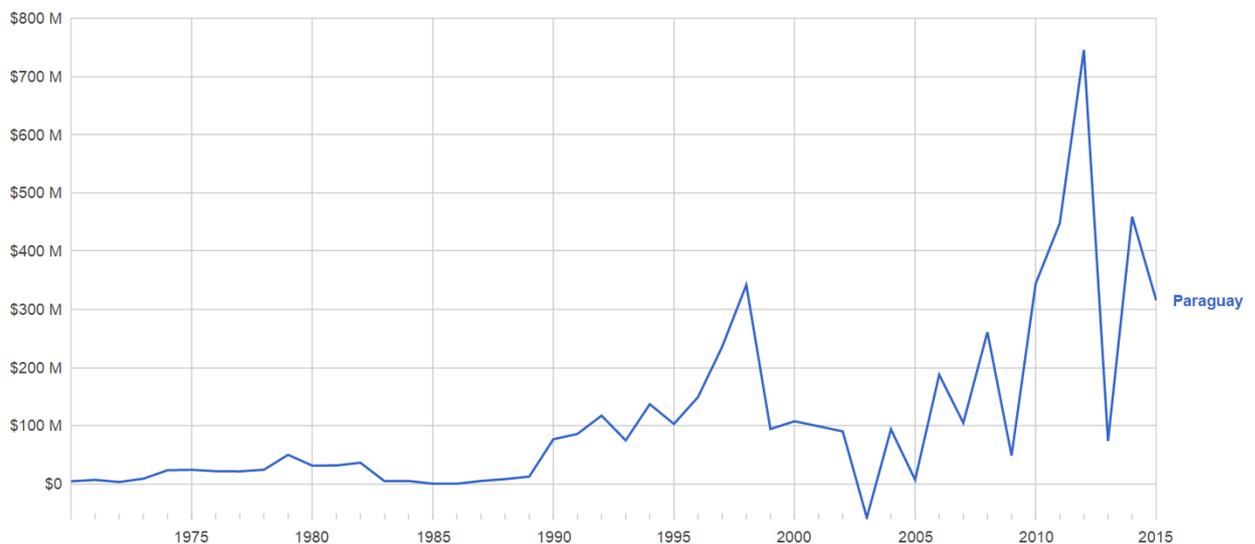
Tax	Value
IPi	40%
Import Tax	35%
Cofins	9,6%
PIS/PASEP	2%
ICMS (for São Paulo)	18%
Marine Tax	25% of the freight
Forwarding Agent	R\$ 5.000
Port Storage	R\$ 5.000
International Shipment	R\$ 4.500

Source: Authors own work based on [26]

As shown in Table 8, the price will be more than double to reach the country legally. In addition, it is important to observe that the internal procedures are not clear enough since the Federal Customs Agency has the power to delay the products asking for extra explanation and can fine the products if they find something that is not in accordance with their rules.

5.3 Trading EU – Paraguay – Brazil

Recovering from a long past heritage, Paraguay is trying to develop again, bringing foreign industries to work in the country, mainly focusing on exports to Brazil. As it can be seen in Figure 2, Paraguay reached more than 700 million USD from Foreign Investment in 2013. For comparison, Paraguay trade turnover was only 19.6 billion USD in 2014 [29].



Source: Author's own processing of World Bank data through Google

Fig. 2: Paraguay FDI in USD (1970 – 2015)

In Figure 2 we can see the change that the Manquilla Law brought to the economy after 1996, with a huge increase of FDI. However, a few years later (2003 – 2008) as Brazil was booming, Paraguay was not attractive for the companies anymore. The situation was reverted after 2008 again.

Nowadays, the Manquilla Law is generating a movement of Brazilian companies to Paraguay, due to the Crisis that is hardening the competition and the need for cutting down costs. The

law imposes 0% taxes on machine and material import and there is a single tax of 1% on the aggregated price for sale, very similar to the standard European VAT [30].

By definition, the aggregate price is the sum of hired services, salaries and acquired goods used on the manufacture process. In addition, the company needs to have a temporary contract for importation and exportation to another company in another country. The company needs to employ Paraguayan people and to train them. Other advantage is the possibility for machinery importation without paying any taxes. However, if the machine is bought in Paraguay, they are going to add this cost into the 1%. The law applies the tax exoneration to all other existing taxes and that can be created in the near future [31].

To be fitting, the company has to export 100% of its production. It can trade in the internal market up to 10% of the previous year production, but it still has to pay all the taxes that have not been applied. Those products also have to follow the same quality rules as the products that are being exported.

Another important factor is that it is cheaper to operate in Paraguay than in Brazil, with lower energy costs of 6.2 Cents/kWh against 16.9 cents/kWh in Brazil, according to the World Bank [32]. Also according to them Paraguay is on the 106th place of the best countries to do business, 17 positions ahead of Brazil.

As a part of Mercosur, the Paraguayan products can be traded in all the other countries without import taxes, except for the items that are on the countries' exclusion list. The most important feature of the Mercosur trade aspect is the original law, which demands 60% of the products to be made inside Mercosur countries and 40% inside Paraguay itself [33], being a great opportunity to increase profit.

Conclusion

The Brazilian-Czech trade is important for both countries to keep developing independently in the world. As both economies are integrated in huge economical blocs, we need to understand the specific needs of trade and work on them, improving the quantity and the quality of the goods exchanged.

In the first part of this article we focused on the contemporary Brazilian trade structure, having shown that 43% of Brazilian exports are raw materials and 86% of the imports are manufactured products. Therefore, we observed that the colonial trading system is still operating, with Mercosur buying manufactured goods and selling raw materials.

Keeping the trade connection, we analyzed how the Czech Republic trades with Brazil. In addition, we observed how protective Brazil is with its own market and how the EU tries to change that through complains in the WTO. Focusing on the Czech Republic – Brazil trade, we observed that during the past 15 years the Czech imports have kept stable and concentrated on products to supply its industries, highlighting tobacco and automotive parts. On the other hand, Czech exports increased 6 times, reaching its historical peak of 600 million USD in 2013 against less than 100 million USD in imports, with a positive balance of more than 500 million USD.

In the second part, in order to enforce the Czech sales and expansion into the Brazilian market, we developed a study on how the market works and what the threats of negotiation are, exposing corruption, bureaucracy, the language barrier, syndicates, taxes and others. We also concentrated efforts on how to enter the market itself, showing step-by-step how to import to Brazil as well as the advantages of setting up a company there.

We observed how a company can “nationalize” a product by adding value inside the country. We also reviewed an opportunity in Paraguay, which is growing fast due to the companies that are operating there and profiting from the Mercosur free trade deal, having a special law of 1% tax on the aggregated value for exportation. Therefore, we can conclude that, despite all the difficulties described in this article, it is possible to operate and sell products inside the country.

From all this we conclude that Brazil has a large market, especially when considering Mercosur as a whole, and a lot of companies are already profiting from this opportunity. Another opinion is that, due to the massive amount of bureaucracy and money needed to face it, Brazilian market gives an advantage to large companies, which can pay for the best attorneys, forwarding agents, accountancy personnel and advisors in order to get the best deals available. On the other hand, small and medium companies face several difficulties to contend with an unwieldy bureaucracy.

Having in mind the Czech industrial branches and comparing the different ways to operate in Brazil, we can conclude that, to protect its market share and expand its business, the Czech companies that sell assembled goods (high importation tax), as armored vehicles or airplane engines, should open factories in Brazil or in Paraguay instead of only exporting. This way, the companies will act like the large automotive manufactures and will have a stronger position in the country, protecting their interests against other enterprises and profiting from the tax reduction. To give an example already explained in this article, a car assembled inside the country will pay 35.27% of taxes, against more than 100% (in some cases) for an imported one. As other Czech branches are concerned, unless the importation tax (regulated by Mercosur) is enormous, we think they should stay in the Czech Republic and enjoy the political stability to grow and reduce costs at home.

Another clear conclusion is that, if the laws in Brazil were simpler and clear, with more market freedom, the country would be better integrated in the world economy and would profit from it, with more entrepreneurship. In addition, the average standard of life for all the population would increase, because they would also be better inserted into the economy, working and opening business, helping the whole economy to move forward and to develop. However, if the law confusion remains, huge taxes are imposed, corruption flourishes, and massive bureaucracy grows, Brazil is going to remain a poor country exporting raw materials and keeping its colonial tradition possibly for the next 500 years.

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INTERNACIONALIZACE ČESKÝCH FIREM V BRAZÍLII

Článek v první části přináší přehled česko-brazílského bilaterálního obchodu a jeho změn v průběhu let, představuje nejdůležitější komodity exportu a importu.

Druhá část se věnuje možnostem podnikání na největším trhu Latinské Ameriky, jsou rozebrány překážky v podnikání, uvedeny názorné příklady a je nabídnuto srovnání se situací v České republice a Německu. Jsou zde také analyzována ochranná opatření, popsána idea protekcionismu a současný vliv na dovoz zboží ze zahraničí.

V třetí části autor analyzuje možné způsoby, jak v Brazílii úspěšně podnikat, a vysvětluje na příkladech již zavedených firem, jak legálně operovat v tomto podnikatelském prostředí.

INTERNATIONALISIERUNG TSCHECHISCHER FIRMEN IN BRASILIEN

Dieser Artikel bietet einen Überblick über den tschechisch-brasilianischen bilateralen Handel und dessen im Laufe der Zeit eingetretenen Änderungen und stellt die wichtigsten Waren für den In- und Export vor.

Der zweite Teil widmet sich den Unternehmensmöglichkeiten auf dem größten Markt Lateinamerikas. Es werden Hindernisfaktoren analysiert und anschauliche Beispiele angeführt. Des Weiteren werden die dortige Situation und die Situation in der Tschechischen Republik und in Deutschland miteinander verglichen. Auch die Schutzmaßnahmen werden hier analysiert und die Idee des Protektionismus und der gegenwärtige Einfluss auf den Import von Waren aus dem Ausland beschrieben.

Im dritten Teil analysiert der Autor mögliche Arten und Weisen, wie man in Brasilien erfolgreich unternehmen kann, und erklärt an den Beispiel bereit eingeführter Firmen, wie man legal in diesem unternehmerischen Umfeld operieren kann.

INTERNACJONALIZACJA CZESKICH FIRM W BRAZYLI

W pierwszej części artykułu przedstawiono informacje dotyczące czesko-brazylijskiej wymiany handlowej i jej zmian na przestrzeni lat a także zaprezentowano najważniejsze produkty będące przedmiotem eksportu i importu.

W drugiej części uwagę poświęcono możliwościom prowadzenia działalności gospodarczej na największym rynku Ameryki Łacińskiej, omówiono bariery w jej prowadzeniu, pokazano przykłady i dokonano porównania z sytuacją w Republice Czeskiej i Niemczech. Ponadto analizie poddano działania ochronne, opisano ideę protekcjonizmu i obecny wpływ na import towarów z zagranicy.

W trzeciej części autor analizuje możliwe sposoby udanego prowadzenia działalności gospodarczej w Brazylii i na przykładach już istniejących firm wyjaśnia, w jaki sposób legalnie poruszać się w tym środowisku biznesowym.

COMPARATIVE ANALYSIS STUDY OF SELECTED ALTERNATIVE FINANCE

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Abstract

Alternative finance industry is considered as an industry with various financial channels that have a position outside of the traditional financial system. Currently, the alternative finance market is emerging the economy. This article presents an analysis of two alternative finance tools, crowdfunding and venture capital. The analysis is a part of a larger research project which is focused on the alternative finance market. As the topic itself is quite new, the paper focuses first on the identification of the theoretical background. A comprehensive theoretical review follows, a study investigating selected aspects and the position of these alternative finance tools on markets is provided. A comparative study was conducted using data mapping several important areas related to venture capital and crowdfunding investment. The results of the analysis provide an answer to the question what the position of the discussed alternative finance instruments within the Czech market is in comparison to selected EU countries and open questions for further research.

Keywords

Alternative finance; Crowdfunding; Venture capital; Analysis.

Introduction

Alternative finance represents a very fast growing segment. This segment does not pose a single definition. One of the commonly discussed definitions describes financial instruments which are not in mainstream of traditional financial ways [20] or [5]. There is a very few systematic research to benchmark the alternative finance market, nor to educate policy makers, public. One of the best known researches, *Sustaining momentum, the 2nd European alternative finance industry report* [35], associates alternative finance with online environment and describes a rapid growth across Europe during last several years.

The purpose of this presented analysis is to gain information about the situation, more precisely, the position of venture capital and crowdfunding in the Czech Republic and in other three selected countries.

Many important changes have occurred on the financial market, not only in the Czech Republic, but in the whole EU. The market is constantly changing and is reflecting economic changes, but also the cultural and social ones are considerably important too. Alternative finance started to thrive on the market. The development of the market has significantly changed conditions and requirements for financing new or existing ventures.

Financial needs and options of entrepreneurs are changing as the business grows [33] or [14]. Entrepreneurs have now the option to combine traditional financial sources (e.g. personal saving, friends, family, bank loans) with newer types of finance sources (angel investors, venture capital, microfinance, crowdfunding or invoice trading) [28], [6].

This research focuses on the description of two models of alternative finance, especially on their division into several segments and their classification into an own ranking system, i.e. by showing the factors that play a key role in understanding and development of the concept. Crowdfunding and venture capital are discussed in more details. Crowdfunding is a financial tool that enables to fund business, cultural or social activities. Moreover, it enables involvement of wide audience and it is understood as the most favorite alternative type of finance instrument; it holds the 1st place in ranking on the EU alternative finance market [35]. Understanding venture capital as an alternative source of financing varies. There are many experts who understand venture capital as an innovative and special source of financing, e.g. Chemmanur and Fulghieri [11], or Metrick [19]. The Czech Republic is relatively specific in the venture capital financing. The market is small and not yet well developed. However, improvement steps are observed. Based on the World Economic Forum [32], the Czech Republic took the 34th ranking from the total of 138 compared countries (in 2015 it was the 42nd place) when comparing availability of venture capital. What venture capital and crowdfunding have in common is that they currently tend to show signs of a rapidly increasing tendency to become a possible finance instrument for new business venture (or an existing one).

The findings of our research help to understand the aspects and environment of non-typical ways of financing. The analysis can indicate a gap and opportunities for the non-traditional financial market. Moreover, results can show further research orientation in order to support broader concept of such kind of financing.

1 Venture Capital

Venture capital is still considered as alternative type of finance by the majority of experts, e.g. Gompers, Lerner [17] or Schefczyk [27]. It tends to show some similar aspects as crowdfunding, microfinance or community shares. On the other hand, this kind of investment is strongly innovatively oriented on high business potential. In many countries worldwide it still does not belong to the mainstream of financing system.

Venture capital is based on the principle of investing money through professionally managed funds. It is an alternative finance source dedicated to innovative projects and ventures with a high growth potential [7]. Wealthy individuals invest in this fund as limited partners. A fund enters into an enterprise and provides it with the necessary capital, by which it gains an appropriate, generally minority share [25]. Companies with venture capital tend to have risky and positively skewed return distributions with a high probability of weak returns [26] or [31]. Whereas crowdfunding type of financing enables funding a wide variety of (non)business activities, venture capital mainly concentrates on high innovative projects with strong business focus.

Venture capital can be used in several stages of the business life cycle. Very common is using this source in the early stage of the business venture. In contrary to crowdfunding, the impact of using venture capital in business ventures has been discussed several times, e.g. EVCA [12], Frontier Economics [15], Strömberg [29], Groh et al. [18], or Bottazzi, Da Rin [4]. In all studies the impact and influence of venture capital has been discussed mainly according to several areas, such as innovation and research and development level, productivity measured by various economic indicators, or competitiveness and business environment. These indicators are significantly affected by legislative regulation. At this point, it is very important to mention The Alternative Investment Fund Managers Directive [10] which regulates this kind of investment in the whole European Union and will be mentioned later in this text.

2 Crowdfunding

Crowdfunding including peer-to-peer lending is currently at the top of the alternative finance instruments. It is the mainstream which attracts massive investments from various subjects of public [35], [36], or [9]. The availability of such an alternative finance instrument has an important role in stimulating economic development. Its power dwells in immediate reaction and interconnection with funders and fundraisers. Furthermore, its concept supports building sustainable network with stakeholders through collaborative funding.

Fraser et al. [14] ask what we know about entrepreneurial finance and its relation with growth. They mention that entrepreneurs may feel discouraged from applying for finance for several reasons, such as because of the perception that they will have their applications turned down or due to not having adequate information. Crowdfunding offers a solution to this problem. The overall concept is easy to provide and quick for a finance applicant. The principle represents more diverse and transparent way to invest/borrow money. Several concepts are available, such as peer-to-peer consumer or business lending, equity-based, reward-based and or donation-based model. This alternative type of finance also means a delicate approach to investment. It keeps the balance so people won't be crowded out by huge sums of money.

Having been born from crowdsourcing, crowdfunding itself has wide roots. The idea of the concept is similar to crowdsourcing but it does not deal only with finance but with sharing ideas, feedbacks or solutions [3]. Even though crowdfunding is still a new phenomenon and it struggles with poor supply of adequate data, there are several studies discussing factors and conditions for its development available, e.g. Bruton [5] or Zhang et al [35]. Each of these studies mentions the importance of several aspects playing a significant role in development such as regulatory framework, cooperation with other subjects (e.g. banking industry), the volume of the invested amount, future expectations and also approximated potential for the growth of this type of business.

3 Aim of Research

The market of alternative finance represents a fast-growing area, but there is still a need for more information regarding the situation in this industry. The call for more information led to the establishment of the main aim. The main aim of this paper is to characterize the position of the selected alternative finance instruments with special emphasis on the Czech Republic. The alternative finance instruments are presented by venture capital and crowdfunding. The main aim is subdivided into several individual sub-goals:

1. To provide theoretical background of alternative finance instruments.
2. To analyze and determine the position and degree of using venture capital and crowdfunding within the Czech Republic and selected EU countries.
3. Based on the provided comparative analysis to identify and comment on key aspects of the discussed alternative finance tools.

4 Methodology

To deal with the topic, a standard procedure is provided based on preparation, executing, evaluation and interpretation phases. During the preparation phase literature review was provided, followed by the executing phase when data were analyzed. Afterwards review on the position of alternative finance in selected countries was executed in form of an analytical output. Analytical output helped to interpret the data gained during the phases of executing and evaluating.

Two research questions were provided:

- “What is the position of venture capital within followed criteria in the observed EU countries?”
- “What is the position of crowdfunding within followed criteria in the observed EU countries?”

Two chosen research approaches are applied. Descriptive, which is mapping the study field, and explorative, helping to identify the position on the alternative finance market. The study is conducted while using analysis-synthesis and comparative method. Comparative research is divided into 2 sections. The first one addresses the area of venture capital, the second one focuses on crowdfunding. In both cases the position of the Czech Republic is confronted with other three EU countries (Austria, Estonia and Slovakia). The countries were selected a priori to follow similar economic activity based on GDP per capita, then based on inspiring results in processing venture capital and crowdfunding activities and last but not least based on the increasing number of Czech investment activities in these countries (especially in the case of Austria).

First, comparative research of the area of venture capital was provided. For the planned research data were identified, gathered and calculated based on 3 most important sources: the data from the European Venture Capital Association (EVCA), from the Organisation for Economic Co-operation and Development (OECD) and from the World Bank (Doing Business Project). Furthermore, the Venture Capital and Private Equity Country Attractiveness Index [18] was also used as an inspiration source for setting the comparison criteria. The index provides up-to-date aggregated information on the quality of the investment environment and on the assessment of the easy transaction-making in 125 countries and drafts the Czech Republic is on 56th place of the attractiveness of venture capital investment. Afterwards, the comparison criteria were set. The criteria were carefully chosen in regard to data availability and to theoretical review mentioned in the text above. The comparison criteria are described in Table 1.

Tab. 1: Comparison criteria – venture capital

Venture Capital	Venture capital investment / GDP
	Venture capital investment/total risk capital investment
	Number of companies which were invested by venture capital
Total rating	
Regulation, Research	Government support programs
	Date of acceptance <i>AIFMD</i> *
	Research and development expenditures / GDP
Total rating	
Business environment	Starting a business – rating
	Getting credit – rating
	Protecting minority investors - rating
	Resolving insolvency - rating
	Paying taxes - rating
	Average rating
Total rating	
* <i>AIFMD</i> = Alternative Investment Fund Managers Directive	

Source: Own based on [13], [21-24], [30]

The criteria are divided into 3 main areas: (a) venture capital activities with the risk capital investments, where the main criterion chosen in this area was the indicator of *venture capital investment / GDP*; (b) research and development and regulation, where the main criterion

chosen in this area was the indicator of *research and development expenditures / GDP*; (c) business (investment) environment, where the ranking is calculated as arithmetic average of all indicators. All data are calculated for the year 2015 to ensure data availability for all observed countries. Final ranking is shown in Table 2.

Tab. 2: *Ranking – venture capital criteria*

Area / Rating	A	B	C	D	E
Venture capital investment / GDP	>=0.03%	0.029% – 0.01%	0.009% – 0.001%	0.0009% – 0.0001%	< 0.00009%
Research and development expenditures / GDP	>= 3%	2.9% – 2%	1.9% – 1%	0.9% – 0.1%	< 0.09%
Business environment – average rating	1. – 20.	21. – 35.	36. – 50.	51. – 65.	66. +

Source: Own

On a similar basis analysis of crowdfunding activities is provided. Again, activities in the Czech Republic are compared with those in 3 chosen EU countries (Slovakia, Austria, and Estonia). The main criteria for the selection are described above. As a starting point for the comparison, the Alternative Finance Maturity Index [6] was selected. The index captures the causes behind the current state of crowdfunding in the EU countries. It provides a list of 15 research areas which assess the maturity of this alternative finance industry. Further, the basis of this index was divided by the author into 3, more precisely 4 areas: (a) volumes (volumes of invested finance per capita), (b) regulations, (c) approach of the banking industry and (d) potential. Based on this analysis, final ranking and comparison is provided. Each analyzed segment is evaluated on the scale from A – E (A means the highest score in the observed area, E the lowest one). Detailed evaluative criteria are described in Table 3.

Tab. 3: *Ranking – crowdfunding criteria*

	Volumes of invested finance per capita	Regulatory framework	Approach of the banking industry	Potential
A	Excellent results in all types of crowdfunding	Complex regulatory framework	Banking industry shows significant interest in cooperation, acts actively in this industry and tries to develop it	High potential with enormous growth forecast
B	Above-average results plus one of the crowdfunding category with excellent result	Partial regulations, in close future will be improved	Banking industry is active in this industry	High potential with slight growth forecast
C	Average results plus one of the crowdfunding category with above-average results	Regulations are only selective, based on particular legislation, no improvement is expected in the near future	Banking industry was in past active in the crowdfunding industry	Slight growth forecast with occasional fluctuation

D	Below-average results plus one of the crowdfunding category with an average result	Poor regulations, unfavorable situation for crowdfunding	Banking industry does not show any kind of activity in crowdfunding	Very few opportunities for growth
E	The crowdfunding market almost does not exist	Completely missing regulations	Banking industry tries to decrease crowdfunding activities	No opportunities for growth, forecast of future closing of this market

Source: Own

5 Results and Discussion

The following text shows the results of comparative analysis in the case of two models of alternative finance – venture capital and crowdfunding. By each observed EU country partial conclusions are provided when at the end of the subchapter general conclusion is drawn.

5.1 Venture Capital

General issues of venture capital were described in the text above. The following text deals only with information related to comparative analysis. All data in Table 4 were calculated based on EVCA, OECD and World Bank data.

Tab. 4: Comparison criteria – venture capital

Indicator		Czech Republic	Estonia	Slovak Republic	Austria
Venture Capital	Venture capital investment / GDP	0.00102%	0.015%	0.0091%	0.0329%
	Venture capital investment/total risk capital investment	12.07233%	20.965%	74.8617%	10.2153%
	Number of companies which were invested by venture capital	7	65 **	24 ***	109
Total rating		C	B	C	A
Regulation, Research	Government support programs	YES	YES	YES	YES
	Date of acceptance AIFMD *	August 18, 2013	April 16, 2014	June 22, 2013	June 5, 2013
	Research and development expenditures / GDP	1.947%	1.495%	1.18%	3.07%
Total rating		B	C	C	A
Business environment	Starting a business – rating	81.	14.	68.	111.
	Getting credit – rating	32.	32.	44.	62.
	Protecting minority investors – rating	53.	53.	87.	32.
	Resolving insolvency – rating	26.	11.	30.	18.
	Paying taxes – rating	53.	21.	56.	42.
	Average rating	49.	26.	57.	53.
Total rating		C	B	D	D
Data are calculated for the year 2015.					
* AIFMD = Alternative Investment Fund Managers Directive					
** Data reported for all Baltics countries, Estonia data were not available					
*** Data reported regarding EVCA statistics. Category “other CEE” was used (includes totally countries Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia and Slovakia). Slovakia data were not available.					

Source: Own based on [13], [21-24], [30]

Partial commentary on the venture capital analysis:

- Czech Republic – C is based on the analyzed data rating in the venture capital category. Venture capital financing is not so common under the Czech conditions. The number of venture capital investments according to GDP per capita is not high. Most of these investments were also noticed by ventures in their development stage of life-cycle. Based on EVCA data [13], the most active venture investor in the Czech Republic was from

Poland. Regarding the second category, the ranking is B. Czech Republic accepted the AIFMD very soon after the EU deadline (July 22, 2013). The research and development expenditures/GDP do not reach the limit of 2%, but continuous growth is forecasted. The last category got ranking C. In general, the business environment obtained average evaluation; especially evaluation of starting a business is very poor. In comparison to other evaluated countries, Estonia possesses the best conditions.

- Estonia – Estonia is quite a small country and in analytical studies it is very often related to other Baltic countries. However, Estonia is perceived as a country with favorable conditions for start-ups (e.g. business ventures such as Taxify, Lingvist). In comparison to the Czech Republic, Estonia reached better rating in the first category (B). This fact is due to higher Estonian activities in the venture capital branch and also due to quite an unsuccessful year of Czech venture capital activities. The most active investors came from Austria, the United Kingdom and Poland and provide more than 50% of all risk capital investments [13]. Regarding the second category, the ranking is C. Estonia accepted the AIFMD almost one year after the EU deadline (July 22, 2013). The research and development expenditures/GDP do not reach the limit of 2% which is even lower than in the Czech Republic. Despite the C ranking in the second category, the third category evaluating business environment proved good conditions for business ventures (B ranking). This fact is mainly thanks to the fact of e-government development and its processes.
- Slovak Republic – Venture capital is considered as not strongly developed in this country. This fact confirms also EVCA's statistics [13] showing that in years 2007-2015 the Slovak Republic was recorded only in group "other CEE". In the observed year there was only one risk investment which was not from the category venture capital. The ratio of venture capital investments to GDP is not high and confirms the lower activities in this kind of finance instrument. The ranking is C. On the other hand, the Slovak Republic was among first countries who accepted AIFMD and since 2009 there has been a systematic governmental support of risk capital investments. However, the rating in the second category is C. Business environment conditions are rated as D which signaled area for future improvement.
- Austria – based on the Venture Capital and Private Equity Country Attractiveness Index [18] Austria has the best position in comparison to other analyzed countries. Austria signaled higher activity in the branch of venture capital instruments. During the observed time period there were investments into more than 100 companies in the early stage of their life-cycle. It may seem that the area of venture capital is not so developed, but the opposite is true. Risk capital is quite developed and that is why venture capital represents only a tiny part of this financial instrument. The ranking is A. This country got A ranking also from the research and development perspective. Austria is considered as one of the top EU countries in financing research and development [16] and also as a country with widely developed start-up support. However, the business environment is not evaluated satisfactory (D) and the evaluation is on the last position in comparison the other evaluated countries.

Based on the provided analysis, it is clear that the Czech Republic is not in the best condition regarding using the venture capital as an alternative finance instrument. Especially, the first observed category (venture capital investment) showed enough space for improvement. For example, the indicator *venture capital investment / GDP* is ten times lower in comparison to Estonia's figure. Other categories demonstrate more satisfactory data. Especially in the area of research and development the Czech Republic is in a fair way. A very key factor seems to be the future development of National Innovation Fund which can be very helpful for the venture capital activities. Business environment is evaluated as being in average condition for

the development of venture capital. Especially rating of starting a business reached poor evaluation.

5.2 Crowdfunding

The principles of evaluation are set on the same basis as in the case of venture capital. The position of the Czech Republic and other 3 EU countries was evaluated. It is important to mention that getting the crowdfunding data is partially very difficult due to missing central statistical data. The analysis in Table 5 is provided mainly with the latest possible available data (year 2016, partially 2015).

Tab. 5: Comparison criteria – crowdfunding

	Czech Republic	Slovak Republic	Estonia	Austria
Volume of invested finance per capita	B	B	A+	A-
Regulatory framework	C	C	C-	A+
Approach of the banking industry	B	B	B	B
Potential	A-	B-	A	A
Total rating	B	B-	A-	A

Source: Own

Partial commentary on the crowdfunding analysis:

- Czech Republic – The highest volume of invested finance was in 2016 reached in the category peer-to-peer (approximately 420 million CZK, especially thanks to the company Zonky). The second widespread type is reward-based crowdfunding; in 2015 it reached approx. 46 million CZK, in 2016 more than 55 million CZK (especially thanks to HitHit and Startovač platform). As a positive fact seems to be also the development of another crowdfunding type, equity-based model (especially thanks to Fundlift platform). In total, 42 million CZK were invested in 2016 [36]. On the basis on this information, the first observed category was ranked as B. At the moment, there is a little legislative framework progress. There are some legislation examples dealing partially with some of the crowdfunding specifics. Generally, the regulation can be divided into 3 categories – regulation of collecting finance from public, regulation of consumer and regulation against money laundering. Specific for this segment is Act No. 256/2004 – Capital market undertaking act. Each platform dealing with equity-based crowdfunding is regulated by this act [34]. In the end of 2017, or in 2018, United European legislation for crowdfunding segment should be presented by the European Union. Even the development of National Innovation Fund may be helpful for legislation improvement as there is currently no overall legislative concept for this segment. Also, no near future improvement was announced. The rating for this segment is C. The approach of banking industry is evaluated as B. There was detected some effort in the past, especial in 2014 with the project “Odstartováno” launched by Raiffeissen bank, but it is over now. The most significant current example showing interest of banking industry is the peer-to-peer platform Zonky. Zonky is one of the key players on the Czech market and it is a project coordinated by the financial group PPF, more precisely by Home Credit. Year 2016 shifted crowdfunding activities toward better perspective. A new platform for equity-based activities was launched, existing peer-to-peer platforms reached significant increase in invested volume and the reward-based segment showed up with several high-quality products and campaigns. Participation in the Kickstarter platform is one of the open questions in the Czech crowdfunding world. Kickstarter is a world famous platform and direct participation would help Czech campaign authors. Czech participants can arrange a

campaign only by using a middleman. However, Czech crowdfunding is in a fair way. The last year brought a lot of changes and higher public participation. One of the future challenges is mainly the governmental and legislative approach. The overall potential is evaluated as A-.

- Slovak Republic – Crowdfunding in this country is in a similar position as the Czech Republic. The activities started in a form of donation-based model in 2007. Donation-based model is very popular. In 2015, several platforms reached an amount of approx. 48 million CZK. The reward-based model was launched later in 2014 when Czech platform HitHit joined the Slovak market. Besides the key player, HitHit, there are a few smaller platforms (e.g. Marleada, StartLab) who gained approx. 1.6 million CZK in 2016. Equity-based model is in pretty the same situation as the Czech market in its early stage. Since 2015 to present it has been possible to collect an amount of approx. 66 million CZK. In peer-to-peer segment the situation is quite similar to the Czech Republic. There is one key player, Žltý melon. This platform collected 67 million CZK from 2012 to 2016 [6]. Interesting is the fact that crowdfunding kept a large portion of attention not to business ventures, but to other ventures. Most attention is probably paid to peer-to-peer lending. The rating is B-. Regulatory framework is in the same situation as in the Czech Republic, ranking C. No overall regulatory framework is currently available, only legislation partially covering some specific areas. Banking industry is again very similar to the Czech situation and ranked as B. There might be seen some efforts, such as by the platform Žltý melon that succeeded with a cooperation with investment group FTK Invest, but there was no other significant cooperation. Crowdfunding in the Slovak Republic has different roots. It is based on donation-based type, followed by peer-to-peer segment. The other types, such as reward and equity based, are in their very early stage. The potential for further development is ranked as B-. It may be very helpful to integrate common regulation and to open the equity and reward-based market more for new platforms. The crowdfunding market in this country may be considered as important and it is expecting growth especially via peer-to-peer lending and equity-based type.
- Estonia – Estonia is a country approximately seven times smaller than the Czech Republic. It is one of the few countries that are supporting massive spread of this alternative finance source and especially the peer-to-peer type model is very successful there. In 2009 platform isePankur was established (currently active under name Bondora). In 2015 Estonia reached the second best place in volume of invested finance per capita. This fact is caused by two factors: a significant spread of peer-to-peer lending and a relatively small alternative finance market. The most famous platform for reward-based type Hooandja launched several projects in a total amount of 4 million CZK. Equity-based model is a relatively new type in Estonia, mainly represented by platform Fundwise with approximate invested amount of 12 million CZK [6]. As mentioned above, the most favorite is the peer-to-peer model. The strongest representative is platform Bondora with the invested amount of 675 million CZK. Furthermore, there is one interesting platform called Estateguru which specializes in real estate lending. The invested amount on this platform is high, approx. 320 million CZK [6], [36]. The total rating is A+. Its legislative framework is very close to the system in the Czech Republic or in the Slovak Republic. Compact legislation dealing with this topic is missing, again only partially solving. For example, equity-based platforms must have their own investment license and since 2006 also peer-to-peer platforms have had to fulfill this requirement. One of the difficulties is the current situation when only a maximum of 100 000 EUR could be fundraised from the public. Getting any investment over 100 000 EUR is very complicated and under strict conditions at the moment [6]. The total rating for this segment is C-. The approach of the bank industry is very similar to all other observed countries without any significant

exception. One of the best known examples is the cooperation of Swedbank that reached the amount of 1.1 million EUR for the reward-based and equity-based types [6]. Rating is B. Future perspective is currently valued on a very high scale, also with respect to previous successful crowdfunding projects. Especially, the segment peer-to-peer lending reaches over 100% increase annually and has still the potential for growth. The equity-based type is also very highly appreciated. As soon as it is possible to adjust legislative processes in a more convenient way, crowdfunding potential will be very strong. Currently it is evaluated as very significant, rating A.

- Austria – Austria is evaluated as one of the most important countries in the crowdfunding sphere [6], [36]. A very important step in the crowdfunding development was made in 2015, when a special law [1] dealing with this phenomenon was accepted. Every type of participant has now their exact position and knows his/her role in the process. One investor cannot offer an investment higher than 5.000 EUR to one project. Online platforms must provide clear information about the subject asking for investment, including all fees, rewards etc. Rating of this segment is A+. Year 2015 can be considered as very important for Austria alternative finance market. Since 2013 to first half of 2016 a total of 680 million CZK was invested to this segment, when during 2016 it was 370 million CZK from this amount [2]. Rating is A-; and strong expansion of this type of financing is expected there. In Austria, the approach of banking segment is on the same level as in other observed countries. Crowdfunding is accepted as one of the supplements to traditional finance system. Rating is B. Crowdfunding potential for the growth is very strong in Austria. Austria disposes of significant advantage that dwells in the complex legislative framework. The market is expected to be growing. Rating is A.

Based on the provided analysis, it is possible to sum up that the general position of the Czech Republic is satisfactory. In 2016 there were several successful campaigns and the key players on the market are expected to grow. A significant boom was monitored in peer-to-peer lending. Examples of Austria and Estonia can be an inspiration for future action in this segment; Austria in particular in the segment of regulation. Since the single regulation had been launched in Austria, during the following year Austria reached the same amount of invested finance as during previous three years. Clear legislative framework for all crowdfunding participants would support this segment strongly. Estonia is one of the countries that are connected with strong IT development and functional e-government. Since crowdfunding is mainly provided online, rapid increase is forecasted in Estonia. Such positive approach to IT and online platforms should be a clear hint for the Czech market.

Conclusion

The article provides foundations for understanding new financial possibilities, especially two selected models that can now be used to start new ventures or help the existing ones grow. In the first part of the article, a review of the literature on emerging trends in alternative finance is provided, followed by setting the framework for a systematic comparative research approach. The base of the research is conducted on secondary research data which are further investigated and compared up to specified methodology.

Crowdfunding and venture capital (more precisely alternative finance in general) share a number of common features. They can be considered as an innovative approach in traditional financial systems and have diffused across the world. First, they allow offering entrepreneurs financial services that would otherwise be difficult to access. Second, they aggregate more financial funds/transactions which allow to pool investments in order to meet needs of new or expanding business venture. Crowdfunding is furthermore based on a platform-moderated approach that opens a playing field for smaller, individual transactions.

The research proved that over the last several years there have been a number of positive changes on alternative finance market. It also confirmed that the segment is expected to grow. The results pointed out only a tiny part of crowdfunding and venture capital aspects that play a role in understanding these financial tools as a future part of standard financial system. This provided analysis is a part of a larger research project which is focused on the alternative finance market. The analysis pointed out several issues that could be a future goal for stakeholders (e.g. government, online platforms, entrepreneurs, experts from various branches etc.) such as opening up a wider discussion about legislative regulations or more convenient business environment supporting these activities.

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KOMPARATIVNÍ ANALÝZA VYBRANÝCH ALTERNATIVNÍCH ZDROJŮ FINANCOVÁNÍ

Trh s alternativními zdroji financování je považován za oblast, která stojí mimo tradiční systém financování. V současné době se tento trh dostává do popředí. Tento článek představuje analýzu dvou vybraných, alternativních zdrojů financování, konkrétně crowdfundingu a venture kapitálu. Tato analýza je součástí většího výzkumného projektu, který se zaměřuje na trh s alternativními financemi. Téma samo o sobě se stále řadí mezi ty novější. Proto se článek v první řadě zaměřuje na identifikaci teoretických informací. Následně navazuje studie, která rozebírá současné pozice těchto alternativních zdrojů financování, a to především na českém trhu. Je zpracována komparativní studie, která mapuje významné aspekty investic typu venture kapitálu a crowdfundingu. Výstup analýzy odpovídá na otázku, jakou pozici zaujímají tyto alternativní zdroje financování na českém trhu v porovnání s vybranými zeměmi Evropské unie. Zároveň otevírá další výzkumné otázky v této oblasti.

VERGLEICHsstudIE AUSGEWÄHLTER ALTERNATIVEN FÜR FINANZIERUNGSQUELLEN

Der Markt für alternative Finanzierungsquellen wird als Bereich betrachtet, der außerhalb des traditionellen Finanzierungssystems liegt. Derzeit rückt dieser Markt in den Vordergrund. Dieser Artikel analysiert zwei ausgewählte alternative Finanzierungsquellen, konkret Crowdfunding und Venturekapital. Diese Analyse ist Teil eines größeren Forschungsprojektes, das sich auf den Markt für alternative Finanzen konzentriert. Das Thema selbst gehört nach wie vor zu den neueren. Daher konzentriert sich der Artikel in erster Linie darauf, wesentliche theoretische Informationen zu identifizieren. Anschließend folgt eine Studie, die die aktuelle Position dieser alternativen Finanzierungsquellen diskutiert, vor allem auf dem tschechischen Markt. Die ausgearbeitete Vergleichsstudie stellt wesentliche Aspekte der Art der Investition durch Venturkapital und Crowdfunding vor. Das Ergebnis der Analyse beantwortet die Frage, welche Position diese alternativen Finanzierungsquellen in der Tschechischen Republik im Vergleich zu ausgewählten Ländern der Europäischen Union einnehmen. Gleichzeitig wirft sie neue Forschungsfragen in diesem Bereich auf.

ANALIZA PORÓWNAWCZA WYBRANYCH ALTERNATYWNYCH ŹRÓDEŁ FINANSOWANIA

Rynek alternatywnych źródeł finansowania uważany jest za obszar stojący poza tradycyjnym systemem finansowania. Obecnie rynek ten wychodzi na plan główny. W niniejszym artykule przedstawiono analizę dwóch wybranych alternatywnych źródeł finansowania, crowdfundingu i venture capital. Analiza ta stanowi elementem większego projektu badawczego poświęconego rynkowi alternatywnego finansowania. Temat ten w sam w sobie wciąż jest raczej nierozpoznany. Dlatego w pierwszej kolejności w artykule przedstawiono informacje teoretyczne. Następnie przedstawiono badania obejmujące obecną pozycję tych alternatywnych źródeł finansowania, skupiając się przede wszystkim na czeskim rynku. Opracowano analizę porównawczą, pokazującą ważne aspekty inwestycji typu venture capital i crowdfunding. Wniosek z analizy udziela odpowiedzi na pytanie, jaką rolę alternatywne źródła finansowania mają na czeskim rynku w porównaniu z wybranymi krajami Unii Europejskiej. Ponadto przedstawiono inne aspekty badawcze w tej dziedzinie.

Miscellanea

APPLICATION OF SPARE PARTS MANAGEMENT METHODS IN THE COMPANIES IN THE CZECH REPUBLIC

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Abstract

The concern about proper management of spare parts in nowadays corporate environment is a great demand and strategy for many global companies in many types of business, especially because they are expensive, require much storage space in their plants and represent a big portion of their financial results. Some unanswered key questions enhance this discussion: which are the influences and how spread is this concern of spare parts management in companies all over the world today? This paper presents an overview of quantitative and qualitative research regarding the usage of spare parts management methods in Czech Republic companies. Many types of analysis comparing multiple aspects of the companies (size, type of business, used methods, demand patterns) and some statistics are also presented.

Keywords

Spare parts; Logistics; TPM; Inventory management; TQM.

Introduction

The level of service quality in industry is measured, among other things, by the time at which the technician is able to arrive at the customer's place with a spare part after the customer has reported an error or a defect on the machine. Manufacturers are forced to comply with delivery times to their customers and within the shortest possible downtime of production equipment it is necessary to have at least certain types of spare parts in stock. Spare parts are expensive and the purchase of individual components is associated with high depreciation and other costs associated with their obsolescence. For this reason, enterprises are forced to keep spare parts stock levels at the lowest possible level.

1 Spare Parts Inventory Control

Spare parts logistics has become an important aspect of supply chain management. The size of the spare parts market has greatly increased in the last decade, according to estimation, reached \$150 trillion worldwide and annually increases by five to nine percent [1]. Companies have started to benchmark their costs for logistics operations with the best organizations in their class. The demand for logistics providers and their services has increased in this area. More and more companies realize the strategic value of a well-built logistics service, especially in the context of ensuring spare parts availability and faster response times to their customers.

The inventory of spare parts can be generally controlled by mathematical models. These methods usually focus on cost optimization of inventories and setting the required level of

inventory of spare parts which is necessary to the smooth running of production. An effort to find a compromise among them led to the classification of inventory items by their economic value. While using information systems, complex modelling is feasible without major problems. However, the selection of input parameters, such as the allocation of control variables, purchasing decisions and individual management strategies for various types of items, still needs to be set straight. For this reason, the classification of items is an important aspect. Most authors focus on specific areas of spare parts logistics; therefore, it is useful to examine the different factors that affect the level of service, and to propose a framework that provides a holistic view.

Within the management of spare parts inventories, numerous methods have been developed. Management of spare parts is often considered a special case of a general model of inventory management thanks to its special features, such as low and sporadic demand [2]. Their goals, however, are identical: to achieve the desired level of service with minimal cost. Professional literature mentions so called multilevel systems of spare parts management [3]. One of the first works in this field was Sherbrook's METRIC model. Other related works that live in multi-level storage systems to budgetary considerations, are by the authors Muckstadt and Thomas (1980) [4] and Hausman and Erkip (1994) [5].

K. Ficoń in [6], on the other hand, analyzes the logistics of supplies and characterizes management system of spare parts and components such as material stocks, also distinguishes between raw materials and semi-finished products. The author points out that some components of the machine can be made directly at the point of production so that an organization can flexibly meet their own needs. This statement can be successfully supported by using 3D printing technologies. Another aspect of safety and reliability should be considered within the spare parts management.

Generally, the requirements for spare parts can be the result of the following factors [7]:

- replacement of parts which reached the technical or warranty lifetime
- exchange due to the limit of the technical conditions, e.g. a device does not meet the parameters required for operation during the technical inspection,
- damage of the workpiece during application (damage discovered during the operation, during regular maintenance)
- damage of the workpiece during storage (loss of quality), e.g. replacement of the parts recommended by the manufacturer or an authorized person in the technical documentation with respect to the warranty period.

Another classification of spare parts inventory is divided according to their availability in the market and sales volume [8]:

- key components are only available from a few vendors and only made to order, causing long delivery times. Therefore, manufacture and repair should be planned in advance, because there is a high likelihood of shortages of parts in the required time;
- industrially produced parts, which have similar characteristics as key components, but produced in large volumes, greatly reduce the risk of lack of spare parts and provide a larger number of suppliers of these items. They are made in accordance with the technical documentation of customers, but they have a universal character, and their lead time is significantly shorter than those of key components;
- parts of the counter are universal, so it is possible to use them in all industries. These include small items such as light bulbs, screws, etc., which are readily available and the delivery time is very short.

On the other hand, with regard to the type of production requirements for spare parts, it is possible to divide [9]:

- individual parts such as gaskets, screws, filters, etc.
- components assembled from various parts by the supplier which are ready for installation.

Different characteristics of this inventory items requires a different management strategy than the conventional inventory [10]. At the same time, it is also necessary to take into account the following special conditions of storage [11]:

- Delivery time requirement associated with scheduled maintenance. The event (part replacement) is especially difficult to be predicted if there is no information about the previous failures, for example due to the absence of regular inspection or in case of brand new facilities. The only way to avoid unexpected shutdowns is to constantly monitor the device status and scheduled repairs and replacements.
- Maintenance strategy determines the demand for spare parts inventory. One of the approaches is an emergency recovery of the device or replacing the defective part. A larger number of storage units enable to cover a sudden increase in demand. Lower number of storage units increases the probability of sudden supply and thus the increase of the costs.
- Costs incurred by a deficit of spare parts are the costs of downtimes and production loss.
- The purchase of partial components is more desirable than the purchase of the entire device. This is coupled with the fact that the purchase and the cost of repairing the equipment are usually higher than the cost of replacement parts. Disorder parts are usually dependent on each other, which means that the failure of one element may be the result of the dysfunction of the second one. This can represent a serious problem, especially when the relationship of the components is unknown.
- In the case of obsolete equipment at the end of the life cycle, the acquisition of spare parts is difficult. Prevention is the acquisition of a sufficient number of spare parts in advance. It is also a source of excessive capital freezing. Moreover, it is difficult to replace the component which has been discontinued. As already mentioned, by definition spare parts inventory control differs from the control of traditional warehouse inventory. In order to control the necessary spare parts effectively, lifecycle tools need to be monitored carefully and these parts should be continuously ordered and stored at a certain level. Optimum pool is then determined by a more complicated manner than by standard inventory. However, the goal is the same; to minimize the risk of losses resulting from downtime and maintenance costs and to eliminate unnecessary costs of holding inventory in the warehouse.

2 Methods and Techniques of Inventory Management of Spare Parts

In the previous chapter, various kinds of spare parts were outlined including their possible typologies reported in professional literature. Regarding the methods and techniques of inventory management, most notably mentioned is ABC analysis, which is the classification based on the distribution of individual inventory items by the cash value of sales or other criteria. In practice, however, many situations require more accurate classification than just by using one of the criteria. The traditional approach has been extended by the inclusion of other classification criteria. Flores and Whybark (1989) [12] and Cohen and Ernst (1988) [13] also introduced a clustering method, which multiplies the effect of individual criteria. This approach takes into account also other criteria than solely production factors. For example, Fuller et al. (1993) [14] used the criteria in relation to sales volume, order size, the coordination and requirements for shipping and handling. De Leeuw (1996) [15] uses the

properties of individual products, processes and markets and accordingly adjusts the individual criteria. Van der Veecken and Rutten (1998) [30] determined the profile of the customer's order by three attributes: according to basic data about the customer, the number of deliveries and by product attributes (its value and size).

The literature research shows focus on further categorization to improve the internal management of spare parts inventory, for example by Braglia et al. (2004) [16]. There are also studies that combine both aspects, demand and purchasing policies depending on demand. Vaughan (2003) [17] studied the strategy orders in case of accidental failure. Specific studies concerning the categorization of spare parts depending on the strategy of supplying and purchasing portfolios were conducted by Caniels and Gelderman (2005) [18] or Kraljic (1983) [19]. Categorization according to the type of demand for spare parts has been studied by Kobbacy and Liang (1999) [20] but also by Kalchschmidt et al. [21] who examined the impact on the demand for spare parts in times of uncertain demand. Lee (2002) [22] created a work which combines the uncertainty in supply and demand for spare parts and accordingly suggests a strategy for reducing these uncertainties. The concept of integrating demand and supply chains is discussed in the work of D. Walters (2006) [23].

In deciding on a strategy for inventory management, it is important to have a balanced view of both its efficiency and effectiveness. As reported by Jouni et al. [8], it is necessary to connect the analysis of customer's needs with management strategies, so that spare parts and the aggregate demand for a particular product will add to the characteristics of individual customers.

3 New Trends in Inventory Management of Spare Parts

In the previous chapters various methods of inventory control were presented. According to Jouni et al. [8], for classifying the parts it is particularly helpful to focus on characteristics other than price and volume demand. This led the scientists to propose the above-mentioned multidimensional models designed specifically for the management of spare parts inventory. Duchessi et al. [26] use a two-dimensional system combining criteria such as the cost of spare parts inventory and the risk of shortages. D. Petrović and R. Petrović [27] designed an expert model for deciding a strategy for managing these stocks. This model is based on a heuristic method of making and use of the following characteristics: availability of the required system cost, weight and volume of parts, parts availability in the market and the effectiveness of the repair. Gajpal et al. [28] developed a critical analysis of the spare parts management using the method of analytical hierarchy process (AHP).

In addition, the current literature shows that the results concerning optimization of parts inventory mainly focus on the following four aspects:

1. optimization of the classification of the spare parts;
2. optimization of the forecasts methods for ordering spare parts;
3. optimization of strategies for inventory management of spare parts;
4. development of information systems for inventory management of spare parts.

4 Research Methodology

For the quantitative research, a questionnaire survey was used as a method of data collection. The pilot survey was performed on a sample of 126 enterprises from different regions of the Czech Republic in order to examine trends and levels of spare parts management. Disproportionate stratified selection was used with the same size of subgroups, where the sorting character was the size of the company and the sector. For the statistical processing of data, the descriptive statistics and the methods of statistical analysis was used. A quantitative

analysis rating the survey shows the distribution of opinions in the total number of responses. It is not an in-depth survey but a statistical presentation of the respondents' answers.

5 Results and Discussion

Initially, the survey intended to map the corporate scenario of spare parts and inventory concern over Czech companies and originally contained 26 different questions, in which only 23 were considered for discussion. Right after its submission, 126 complete answers over Czech Republic's corporate environment could be gathered for further analysis. Some demographic data results are shown. Regarding a company's first business, the majority is automotive, representing more than 30% of total results, followed by mechanical engineering with 15% and services companies, with 10% of total respondents.

Changing the focus to the type of production, most companies are customized, representing more than 41% of all answers, followed by Serial, with more than 27% and then mass production, with 14.29%.

Most companies adopt a single shift system, and the three-shift and continuous production.

It was also noticed that the majority of Czech companies do concern about spare parts and inventory management, represented by 59.52% of total respondents.

Question number 4 presents a scenario of outsourcing usage over enterprises, where most answers reveal that a small part of their inventories is outsourced, which shows that they prefer to manage their stocks inside doors.

When it comes to the methods of inventory management, the answers vary. However, ABC curve is still the most often used method, representing 18.25% of all answers, followed by qualified estimate based on historical data, which represents 17.45% of total respondents.

Regarding the variability of consumption of spare parts, the answers were quite close. Most respondents stated that spare parts were commonly available (37.30%) and 30.16% answered that they were specially ordered; or both cases can happen, also with 30.16%. In another perspective, not very often their equipment and machinery outage due to the lack of spare parts, shown by 63.49% of all answers, and none of them with 21.43%. The minority of them (15.08%) actually feel the impact of a lack of spare parts, which proves to be a gap and an opportunity for implementation and usage of methods for spare parts management.

Additionally, most of the companies plan maintenance, representing 76.19% of all answers, which also shows an opportunity mentioned in the previous paragraph. 67.45% adopt preventive maintenance, which is very important and directly associated with the consumption of spare parts and, at the same time, avoiding production downtimes, followed by 26.19% of companies which only take actions after the failure happens (corrective maintenance) and the minority, shown by 6.35%, do predictive analysis over their machinery.

When it comes to the connection and relationship of maintenance within companies' other key departments, as purchasing, procurement, logistics and production planning, the answers show that the companies mostly share information over many departments, some of them exemplified previously, with 34.92% of all answers, followed by purchasing, represented by 20.63% of all answers, followed by production planning, with 11.11%, then controlling (also known as procurement), with 7.94% of all answers, and further logistics, represented by 7.14% of them, and after that accounting and warehouses, with 4.76% and 3.94% of all answers, respectively.

As far as the usage of evidence for planning and inventory of spare parts is concerned, most companies use records, represented by 54.76% of all answers, followed by the usage of

barcodes system, 16.67% and the other 28.57% vary between maintenance plans, ERP's such as Microsoft® SAP®, OHP permanent marker and others.

To the authors great surprise, when the discussion was related to the usage of ERP software for inventory management over Czech companies, the majority of them answered that they do not use ERP's, represented by 36.51% of all answers. The second place goes to Microsoft® SAP®, with proves to be the most used ERP over Czech companies, shown in 21.43% of all answers, followed by custom systems, represented by 3.17% of total population.

The other part of the survey presents the aging scenario of machinery inside Czech companies, where most of them have middle-age equipment, between 5 and 10 years old, represented by 36.51% of all answers, followed by ones older than 10 years, which require more attention, predictive maintenance and proper management of associated spare parts, otherwise these will cause many production downtimes and/or delays on delivering their products. They are represented by 23.02% of all answers. 21.43% represent figures between 3-5 years old (21.43%), then between 1-3 years old (16.67%) follow, and the minority have newer equipment less than 1 year old (2.38%).

It's very important to mention that the key factors prior to spare parts buying are also considered by most Czech companies, such as the lead time of suppliers, spare parts costs, criticality in the production process, replacement time and stock size. As expected, the lead time of suppliers and the cost are the most important factors, represented by 49.21% of all answers, followed by cost, as 44.44%. Regarding this analysis, it was noticed that multiple factors analysis are combined prior to spare parts buying, which is clear taking into account that management departments should rank and weight their importance inside their buying matrix.

When it comes to who is in charge of this whole process, the data show that maintenance, purchasing and production are responsible for inventory management of spare parts, represented by 33.33%, 32.54% and 22.22% of all answers, respectively. The remaining 11.90% show varied answers. From this data, it is possible to conclude and confirm that these 3 departments are the ones that deal with spare parts on a daily basis and it doesn't mean that they deal alone. In fact, trading information between their management systems is deeply connected in order to handle their inventories of spare parts properly.

Regarding suppliers of spare parts, most companies have single and multisource suppliers, depending on the type, cost and criticality of them. Level on majority of percentage with 43.65% each are both and single, followed by multi-sourcing with 12.70%.

Additionally, and also very importantly, the discussion comes to how companies deal with outdated or inefficient inventories of spare parts. Most of them have the policy of selling with a below market price, represented by 32.54% of all answers. Closely to this come companies that prefer scrap or discard these parts, shown by 30.95% of all answers. There are also the ones that provide exchange business with other plants, with 13.49% of responses. 5.56% prefer to keep spare parts in stock. The remaining 17.46% answers vary between not having any inefficient/outdated spare parts, didn't answer to this question, purchase on demand, define the usage of spare parts in another contract, do not have any stocks, or are not applicable to any of the options mentioned above.

Another key discussion is related to quality management. As expected, most of the companies use Quality management, represented by 58.73% of all answers. These include ISO9001 standards, 6 Sigma, non-conformities tracking and other quality management tools. The minority but also a very representative percentage of 41.27% shows the companies that do not use quality management. A key question remains unanswered: How do they evaluate

inefficient or outdated spare parts? Do they concern about their impact over the cost control and their annual financial results?

The last question analyzed in the survey is related to the size of companies according to the number of employees. Most of them are medium-sized, having between 50 and 250 employees (26.19%), small companies (between 10 and 50) (22.22%), large ones (between 250 and 1,000) as 21.43%, micro (below 10), as 16.67% and finally enterprises, with over 1,000 employees, representing 13.49%.

Conclusion

This article intended to discuss and present data obtained by a survey regarding diverse aspects and scenarios inside corporate environment in the Czech Republic, focused on the usage and concern regarding spare parts and inventory management, connected with their size, business type, quality management, maintenance types, usage of ERP's and software for SP management, variability of consumption and many other aspects. All gathered information clearly confirms that spare parts management still needs to be deeply viewed and taken care of, as it can cause serious problems and negative financial impacts on companies' results. All data collected lead to further and combined analysis of these aspects and many other conclusions and diagnostics are possible.

Effective inventory management of spare parts is a challenge for many industrial companies that seek to maximize the use of their machinery and equipment. Determination of the optimal level of inventory of spare parts, which meets the requirements for their timely availability in repair and maintenance and balancing the costs of storage for enterprises, is a key concern. As in the case of other types of inventory, the main objective is minimizing the sum of direct and indirect costs.

Individual classifications of spare parts mentioned in this paper have their limits, which enable their usefulness in difficult situations. Another important limitation is that the boundaries between different types of spare parts can be very thin. Also very similar types of spare parts located near the border may become subject to different management strategies inventory. To overcome these limitations, statistical clustering analysis can be used. Other methods of techniques that can be used to solve complex problems in the area of inventory management of spare parts are not a part of this article but it is an interesting topic for further research.

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VYUŽITÍ METOD PRO ŘÍZENÍ ZÁSOB NÁHRADNÍCH DÍLŮ V PODNICÍCH V ČESKÉ REPUBLICE

Řízení zásob náhradních dílů je v současné době v podnikovém prostředí velké téma a výběr strategie v tomto směru je pro mnoho globálních společností výzvou, a to zejména proto, že tyto zásoby představují vysoké skladovací náklady a tím jsou zátěží na celkových finančních výsledcích. Tento příspěvek se snaží nalézt odpovědi na některé nezodpovězené klíčové otázky: jaké jsou vlivy a jakými metodami se řídí zásoby náhradních dílů ve firmách? Tento příspěvek představuje dílčí výsledky kvantitativního a kvalitativního výzkumu prezentující používání metod řízení náhradních dílů podniky v České republice. Výsledky analýzy se zaměřují na porovnání několika aspektů (velikost, typ podnikání, použité metody, vzory poptávky) a prezentují je z pohledu deskriptivní statistiky.

EINSATZ VON METHODEN FÜR DIE VERWALTUNG VON INVENTARERSATZTEILEN IN UNTERNEHMEN IN TSCHECHIEN

Die ordnungsgemäße Verwaltung von Ersatzteilen ist in der heutigen Unternehmensumgebung ein großes Thema und die Wahl der Strategie ist für viele globale Unternehmen in vielen Arten von Unternehmen eine große Herausforderung, vor allem, weil sie viel Geld und Speicherplatz in ihre Werke investieren. Dies ist eine Belastung für ihre finanziellen Ergebnisse. Einige unbeantwortete Schlüsselfragen steigern diese Diskussion noch: Was für Einflüsse gibt es und wie verbreitet ist das Anliegen des Ersatzteilmanagements in Unternehmen auf der ganzen Welt? Dieser Beitrag bietet einen Überblick über quantitative und qualitative Untersuchungen zur Verwendung von Ersatzteilmanagementmethoden in Unternehmen der Tschechischen Republik. Viele Arten von Analysen, die verschiedene Aspekte der Unternehmen vergleichen (Größe, Art des Unternehmens, verwendete Methoden, Nachfragemuster), und einige Statistiken werden ebenfalls vorgestellt.

WYKORZYSTANIE METOD ZARZĄDZANIA ZAPASAMI CZĘŚCI ZAMIENNYCH W PRZEDSIĘBIORSTWACH W REPUBLICIE CZESKIEJ

Zarządzanie zapasami części zamiennych jest na dzień dzisiejszy w środowisku biznesowym bardzo omawianym zagadnieniem i wybór strategii w tym zakresie jest dla wielu globalnych spółek wyzwaniem. W szczególności dlatego, że zapasy te oznaczają duże koszty magazynowania, a tym samym znaczne obciążenie ogólnego wyniku finansowego. W niniejszym opracowaniu podjęto próbę znalezienia odpowiedzi na niektóre pozostające bez odpowiedzi kluczowe pytania: jakie są oddziaływania i jakie metody stosowane są do zarządzania zapasami części zamiennych w firmach? W niniejszym artykule przedstawiono cząstkowe wyniki badań ilościowych i jakościowych pokazujące stosowanie metod zarządzania zapasami części zamiennych w przedsiębiorstwach w Republice Czeskiej. Wyniki analizy skupiono na porównaniu kilku aspektów (wielkość, typ działalności gospodarczej, stosowane metody, wzorce popytu) pokazując je z punktu widzenia statystyki deskryptywnej.

MASTER PRODUCTION SCHEDULING AND THE RELEVANCE OF INCLUDED SOCIAL CRITERIA

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Abstract

The requirements to consider worker utilizations and processing times, which depends on this worker utilization, are examined at the following paper for the Master Production Scheduling. For this reason, it is shown, that there is a gap in research regarding the social dimension in the range of Production Planning and Control. Thus, there are presented an own developed linear optimization model for the Master Production Scheduling with consideration of social criteria and an appropriate case study at this paper. The results demonstrate substantial deviations due to the ignorance from worker utilizations and worker utilization specific processing times. Therefore, the integration of these criteria is to be recommended. But it is also shown, that there is a need for further research activities for the development of specific human fatigue courses, like it also exists for human learning courses.

Keywords

Sustainability; Production planning and control; Master production scheduling; Linear optimization; Human fatigue.

Introduction

The justification from production systems in a more sustainable direction is one of the central research focuses actual. But there is to mention, that economical, ecological and social criteria have to be considered to achieve sustainability [1] and in this context, there are substantial potentials in the field of Production Planning and Control (PPC) [2] [3] [4]. So, the resource consumption is influenced due to the production plan, which has to be determined. Thus, ecological and social issues like energy consumption or worker's stress are affected next to the classical economical monetary assessment [5]. In this process, the ecological dimension is already explored broadly (see: [6] [7] [8]). However, there is a gap in research for the social dimension at the field of PPC. Here the papers from [9], [10] as well as [11] have to be mentioned, who considered human learning and forgetting effects for a Lot-Sizing problem and reduce worker's stress for a specific Scheduling problem. Especially in consideration of the already proven Hierarchical Production Planning system from [12], it should be noted, that there are no appropriate approaches for the consideration of the social dimension at the level of Master Production Scheduling, which is the top level at the Hierarchical Production

Planning system from [12]. This lack of social improvements is also affirmed by the paper from [13], who reports, that there are only smart improvements for worker conditions in spite of different research activities. Especially the physical stress and the work intensity are rated to be too high out of 11 defined criteria [13]. For this reason, an extended version of the linear optimization model for the Master Production Scheduling with consideration of social criteria from [5] is presented at this paper and as an extension to the studies in [5] there is also presented an investigation regarding the necessity to integrate social criteria based on a more comprehensive case study.

1 Linear Optimization Model for Master Production Scheduling

In classical models as a restriction for the production plan at the level of the Master Production Scheduling there are defined stipulated limits for existing capacities. But a compensation for capacity bottlenecks are doable due to a production in advance or by using overtime hours, so that the minimization of costs for inventory and overtime hours is the goal in such models [14]. Furthermore, constant processing times for each quantity unit per product are assumed. Now the linear optimization model, which is based on this standard, is described. The consideration of costs for shift bonuses, the possibility of different worker utilizations for each production segment and the specification of the worker utilization as an interval are the extensions to the model, which is introduced in [5].

The integration of a variable personnel supply of capacity, see Equation (5), is the first essential improvement at this model. Thereby it is also considered, that there are requirements for lead times to adjust capacities. For the consideration of social criteria this all is imperative, because this connects elements of the human resources management with the PPC and in that order not only the human resources management has to provide the necessary capacities but also the PPC has to consider the workers requirements [5]. In addition, the limitation of a maximum supply of technical capacity, see Equation (6), remains unchanged. The determination of a fixed relation (worker utilization), see Equations (11) and (12), between supply of capacity, see Equation (5), and capacity requirements, see Equation (4), is the second essential improvement at this model. This ensures that workers cannot be overloaded. Next to the classical production plan, see Equations (2–4), the number of workers required, see Equations (5–7), is also determined. Thereby different classes of workers are also considered for every production segment. Further, intern conditions from the company and extern conditions from the labor market are integrated by defining initial, minimal and maximal numbers of employees, see Equations (8–10),. The objective function (see equ. 1) is calculated by minimization the sum of storage costs, manpower costs, costs for shift bonuses as well as costs for building and removing capacities. For this purpose, the appropriate shift model (one, two, or three shifts) due to the number of employees is also determined, see Equations (13–15).

Compared to the basic model from [14] the consideration of worker utilization specific processing times is the third essential improvement at this model. But these processing times are determined as parameters, because a non-linearity is caused by a direct calculation within the optimization model. Therefore, the processing times are calculated extern by multiplication from standard processing times with weighting factors, which are derived from fatigue courses due to the worker utilization. Then, to receive the optimal solution the optimization model is solved for all worker utilization constellations and the associated processing times. Now the mathematically model description is presented.

Parameters:

$a_{j,t}^{\max}$	Maximum supply of technical capacity
$d_{k,t}$	Product requirements per product k and time period t
$f_{j,k,z}$	Capacity requirement per production segment j , product k and forerun period z
h_k	Cost rate for storage per product k
I_k^{init}	Initial inventory per product k
J	Number of production segments ($j = 1, 2, \dots, J$)
K	Number of products ($k = 1, 2, \dots, K$)
$KAPA_{ma,t}$	Supply of capacity per worker of a worker class ma and time period t
m^{Kost}	Cost rate for building supply of capacity
MA	Number of worker classes ($ma = 1, 2, \dots, MA$)
$Mit_{ma,j,s}^{\text{init}}$	Initial number of worker per worker class ma , production segment j and shift s
$Mit_{ma,j,t}^{\text{Kost}}$	Cost rate per worker of class ma , production segment j and time period t
$Mit_{ma,j,t}^{\max}$	Maximum number of worker per worker class ma , production segment j and time period t
$Mit_{ma,j,t}^{\min}$	Minimum number of worker per worker class ma , production segment j and time period t
n^{Kost}	Cost rate for removing supply of capacity
R_j^{\max}	Maximum worker utilization per production segment j
R_j^{\min}	Minimum worker utilization per production segment j
S	Number of shifts ($s = 1, 2, \dots, S$)
S_s^{Kost}	Cost factor for calculating shift bonuses per shift s
$S_{j,s}^{\text{Oben}}$	Maximum limit for number of worker per production segment j and shift s
$S_{j,s}^{\text{Unt}}$	Minimum limit for number of worker per production segment j and shift s
T	Planning horizon in time periods ($t = 1, 2, \dots, T$)
W	Number of forerun periods for removing supply of capacity ($w = W$)
Y	Number of forerun periods for building supply of capacity ($y = Y$)
Z	Number of forerun periods for production ($z = 1, 2, \dots, Z$)

Decision variables:

$a_{j,t}$	Supply of capacity per production segment j and time period t
$b_{j,t}$	Capacity requirement per production segment j and time period t
$I_{k,t}$	Inventory per product k and time period t
$m_{ma,j,t}$	Number of worker recruitments per worker class ma , production segment j and time period t
$Mit_{ma,j,s,t}$	Number of worker per worker class ma , production segment j and time period t
$n_{ma,j,t}$	Number of worker redundancies per worker class ma , production segment j and time period t
$P_{j,s,t}$	Boolean variable for calculating the number of shifts per production segment j , shift s and time period t

$x_{k,t}$ Produced quantity per product k and time period t **Objective function to minimize:**

$$\begin{aligned}
& \sum_{t=1}^T \sum_{k=1}^K h_k \cdot I_{k,t} + \sum_{t=1}^T \sum_{s=1}^S \sum_{ma=1}^{MA} Mit_{ma,j,t}^{Kost} \cdot Mit_{ma,j,s,t} \\
& + \sum_{t=1}^T \sum_{s=1}^S \sum_{ma=1}^{MA} Mit_{ma,j,t}^{Kost} \cdot Mit_{ma,j,s,t} \cdot s_s^{Kost} \cdot p_{j,s,t} \\
& + \sum_{t=1}^T \sum_{j=1}^J \sum_{ma=1}^{MA} m_{ma,j,t}^{Kost} \cdot m_{ma,j,t} + \sum_{t=1}^T \sum_{j=1}^J \sum_{ma=1}^{MA} n_{ma,j,t}^{Kost} \cdot n_{ma,j,t}
\end{aligned} \tag{1}$$

Constraints:

$$x_{k,t} + I_{k,t-1} - I_{k,t} = d_{k,t} \tag{2}$$

$$I_{k,0} = I_k^{init} \tag{3}$$

$$\sum_{k=1}^K \sum_{z=1}^Z f_{j,k,z} \cdot x_{k,t+z} = b_{j,t} \tag{4}$$

$$\sum_{ma=1}^{MA} \sum_{s=1}^S Mit_{ma,j,s,t} \cdot KAPA_{ma,t} = a_{j,t} \tag{5}$$

$$a_{j,t} \leq a_{j,t}^{\max} \tag{6}$$

$$\sum_{s=1}^S Mit_{ma,j,s,t-1} + m_{ma,j,t-Y} - n_{ma,j,t-W} = \sum_{s=1}^S Mit_{ma,j,s,t} \tag{7}$$

$$Mit_{ma,j,s,0-Z} = Mit_{ma,j,s}^{init} \tag{8}$$

$$\sum_{s=1}^S Mit_{ma,j,s,t} \geq Mit_{ma,j,t}^{\min} \tag{9}$$

$$\sum_{s=1}^S Mit_{ma,j,s,t} \leq Mit_{ma,j,t}^{\max} \tag{10}$$

$$b_{j,t} \leq R_j^{\max} \cdot a_{j,t} \tag{11}$$

$$b_{j,t} \leq R_j^{\min} \cdot a_{j,t} \tag{12}$$

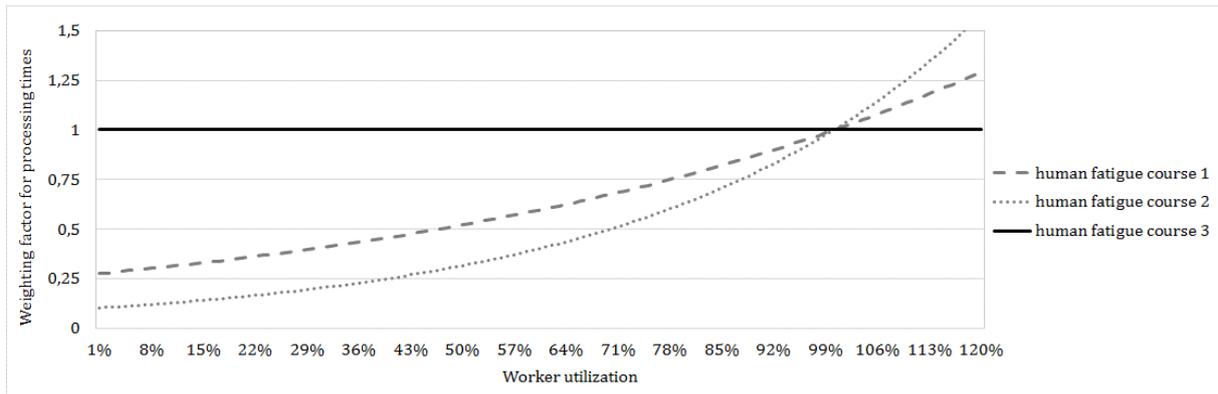
$$\sum_{ma=1}^{MA} Mit_{ma,j,s,t} \geq p_{j,s,t} \cdot s_{j,s}^{Unt} \tag{13}$$

$$\sum_{ma=1}^{MA} Mit_{ma,j,s,t} \leq p_{j,s,t} \cdot s_{j,s}^{Oben} \tag{14}$$

$$\sum_{s=1}^S p_{j,s,t} = 1 \tag{15}$$

2 Examination Scenarios and Case Study

The scenarios differ between their assumed human fatigue courses and their product requirement classes. There are three different human fatigue courses (1 = flat exponential course, 2 = steep exponential course, 3 = constant course). Thereby course 3 is equal to the non-consideration of worker utilization specific processing times or rather it means that no human fatigue occurs. Courses 1 and 2 are chosen, because an exponential course is often used in literature (see: [15] [16]). The weighting factors for the worker utilization specific processing times due to the different courses are presented in Figure 1. These factors are taken into account to calculate the appropriate processing times for each worker utilization, product and production segment.



Source: Own

Fig. 1: Worker utilization specific weighting factors for processing times per human fatigue courses

Next to this there are also three product requirement classes (1 = medium requirements, 2 = small requirements, 3 = large requirements), which are determined based on the results for capacity requirements of the higher planning level - the Aggregated Production Planning. Furthermore, there are three different and randomly defined product requirement sequences per product requirement class, so that there are 9 different requirement sequences in total. In conjunction with the human fatigue courses this result in overall 27 different examination scenarios.

In addition, the considered worker utilization should not decrease arbitrary and to establish a concrete point of worker utilization is not practicable. Another aspect, which should be considered, is that worker utilization from more than 100% also should not be recommended due to social aspects. That is why we use these four different worker utilization intervals 80-85%, 85-90%, 90-95% and 95-100%. Associated with the two regarded production segments 16 different worker utilization constellations have to be calculated per examination scenario to determine the optimal solutions for each of the 27 scenarios. Further used parameters are presented in [5]. Differences occur by the standard processing times, which are in this paper at the first production segment 2534 time units per quantity units (TU/QU) for product A and 4735 TU/QU for product B as well as 7019 TU/QU for product A and 6632 TU/QU for product B at the second production segment and there is also considered that only a part of the processing times (manual part) is affected by the worker utilizations. These proportions are 80% in production segment 1 and 30% in production segment 2.

Finally, for the additional calculation of costs for shift bonuses, the manpower costs are multiplied with the factors 0.0% for one shift models, 1.5% for two shift models and 15.0% for three shift models.

3 Results and Discussion

First the deviations between the optimal solutions with and without consideration of worker utilizations are presented in Figure 2. Classically it is expected that a maximization of the utilization leads to the optimal solution. Therefore, we compare the determined real optimal solution from our optimization model with the solution for the maximal worker utilization, which is identical with a non-consideration of worker utilizations. For this case, the worker utilization constellation from 95-100% for each production segment is taken into account to calculate the solutions for non-consideration of worker utilizations.



Source: Own

Fig. 2: Deviations between solutions with and without consideration of worker utilizations

From Figure 2 it emerges that the solutions without consideration of worker utilizations deviate from the optimal solutions by 7.2% in average about all requirement sequences and human fatigue courses. The deviations in average per product requirement class (average per requirement sequences at the same requirement class) demonstrate that this result is not caused by specific demand sequences, because the deviation to each product requirement class is always between 6% and 8%. Therefore it is shown that the ignorance of worker utilizations causes essential deviations from reality, so that more defected production plans, cost budgets and personnel plans occur and disadvantages in competition and overloading from workers are the consequences. Next to this, the real optimal solutions are presented at table 1, together with the deviations between a consideration and non-consideration of worker utilization specific processing times. In this context, the fatigue course 3 was used to represent the case of a non-consideration of worker utilization specific times.

Tab. 1: Optimal solutions [in money units] and deviations between consideration and non-consideration of worker utilization specific processing times

Requirement Sequence	Optimal Solution dependent on Human Fatigue Course			Deviation between 3 & 1		Deviation between 3 & 2	
	1	2	3				
1.1	132 797	132 949	129 215	2.70%	3.51%	2.81%	4.86%
1.2	144 159	144 504	132 885	7.82%		8.04%	
1.3	123 092	118 660	123 082	0.01%		3.73%	
2.1	128 789	133 677	124 303	3.48%	1.46%	7.01%	5.63%
2.2	133 248	139 995	133 748	0.38%		4.46%	
2.3	130 483	124 424	131 145	0.51%		5.40%	
3.1	133 511	136 770	127 739	4.32%	1.62%	6.60%	3.10%
3.2	133 780	133 398	134 035	0.19%		0.48%	
3.3	127 142	124 783	127 566	0.33%		2.23%	

Source: Own

From table 1 it emerges that the optimal solutions from the human fatigue course 3 deviate by 3.4% in average about all requirement sequences and other human fatigue courses. But the deviation in average about all requirement sequences between human fatigue course 3 and 1 (2.19%) is only half as high as the comparable deviation between human fatigue course 3 and 2 (4.53%). So, for one thing it is shown that the consideration of worker utilization specific processing times has an important impact, but on the other hand it is also important to take into account the right human fatigue course, what is a gap in research actual. Therefore, to prevent more defected production plans, cost budgets and personnel plans the consideration of worker utilization specific processing times is also a necessity. However, further research activities are necessary to quantify fatigue effects correctly, like it is done for human learning effects.

Conclusion

At this paper, it is demonstrated that there is a gap in research for the integration of the social dimension along the Production Planning and Control. Especially approaches with considered social criteria are missing at the level of Master Production Scheduling. Therefore, an appropriate optimization model is presented and 27 different scenarios are analyzed. From the results, it emerges that advantages in competition and a reduction of worker's stress could be achieved by considering optimal worker utilizations and worker utilization specific processing times. That means that a timely consideration of social effects causes a more carefully use of the human resources but also monetary advantages. Finally, a gap in research is recognized for quantifying right fatigue courses, which should be solved in further research activities.

Acknowledgements

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NUTNOST INTEGRACE SOCIÁLNÍCH KRITÉRIÍ DO PLÁNOVÁNÍ PROGRAMU HLAVNÍ PRODUKCE

Příspěvek zkoumá nutnost zohlednění vytížení spolupracovníků a na něm závislé pracovní doby v hlavním plánování programu hlavní produkce. Navíc je ukázáno, že tato tematická oblast aktuálně představuje ve výzkumu mezeru. Z tohoto důvodu je tu představen vlastnoručně vyvinutý lineární model optimalizace na plánování programu hlavní produkce, který obsahuje sociální kritéria a vhodnou případovou studii. Výsledky ukazují, že značné odchylky jsou odvislé od ignorance při vytížení spolupracovníků v pracovní době. Z tohoto důvodu je doporučována integrace. Zároveň se ukazuje, že bude třeba dalšího výzkumu, obzvláště pro stanovení vhodných vytěžujících funkcí, jako jsou např. funkce pro efekty v učení.

VON SOZIALEN KRITERIEN IN DIE HAUPTPRODUKTIONSPROGRAMMPLANUNG

Folgender Beitrag untersucht die Notwendigkeit einer Berücksichtigung von Mitarbeiterauslastungen und davon abhängiger Bearbeitungszeiten in der Hauptproduktionsprogrammplanung. Zudem wird aufgezeigt, dass dieses Themengebiet aktuell eine Forschungslücke darstellt. Aus diesem Grund wird ein selbst entwickeltes lineares Optimierungsmodell für die Hauptproduktionsprogrammplanung vorgestellt, welches soziale Kriterien und eine geeignete Fallstudie enthält. Die Ergebnisse verdeutlichen, dass erhebliche Abweichungen durch eine Ignoranz von Mitarbeiterauslastungen und davon abhängiger Bearbeitungszeiten entstehen. Deshalb ist eine Integration zu empfehlen. Allerdings wird auch deutlich, dass weitere Forschungen notwendig sind, speziell für die Bestimmung geeigneter Erschöpfungsfunktionen, so wie beispielsweise Funktionen für Lerneffekte existieren.

KONIECZNOŚĆ INTEGRACJI KRYTERIÓW SPOŁECZYCH W PLANOWANIU PROGRAMU GŁÓWNEJ PRODUKCJI

W niniejszym artykule zbadano konieczność uwzględnienia obciążenia współpracowników i od niego zależnego czasu pracy w głównym planowaniu programu głównej produkcji. Ponadto wskazano, że ta dziedzina jest obecnie w badaniach pomijana. Z tego względu przedstawiono opracowany we własnym zakresie model liniowy optymalizacji planowania programu głównej produkcji, obejmujący kryteria społeczne oraz odpowiednie studium przypadku. Wyniki pokazują, że znaczne odchylenia wynikają z ignorancji przy obciążaniu współpracowników w czasie pracy. Z tego powodu zalecana jest integracja. Ponadto wskazano, że konieczne są kolejne badania, w szczególności w celu określenia odpowiednich funkcji obciążeniowych takich jak np. funkcja dla efektów w uczeniu się.

CAN AGGREGATE PRODUCTION PLANNING (APP) BE MODIFIED TO BE AS GOOD AS MASTER PRODUCTION SCHEDULING (MPS)?

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Abstract

In this paper, the significance of master production scheduling (MPS) for hierarchical production planning should be brought out. Therefore, several modifications of aggregate production planning (APP) are made and realization of the planning results of APP and MPS are compared. The goal is to improve the realization of APP in such a way that the realization is as good as the realization of MPS. Improvements for individual planning situations could be achieved, but no general solution could be found. Especially the use of a suitable capacity reduction factor (CRF) combined with the consideration of lead time leads to an improvement of the solution. However, finding a suitable CRF for more than one product is difficult. This usually depends on the underlying demand profile and must be re-determined for each constellation.

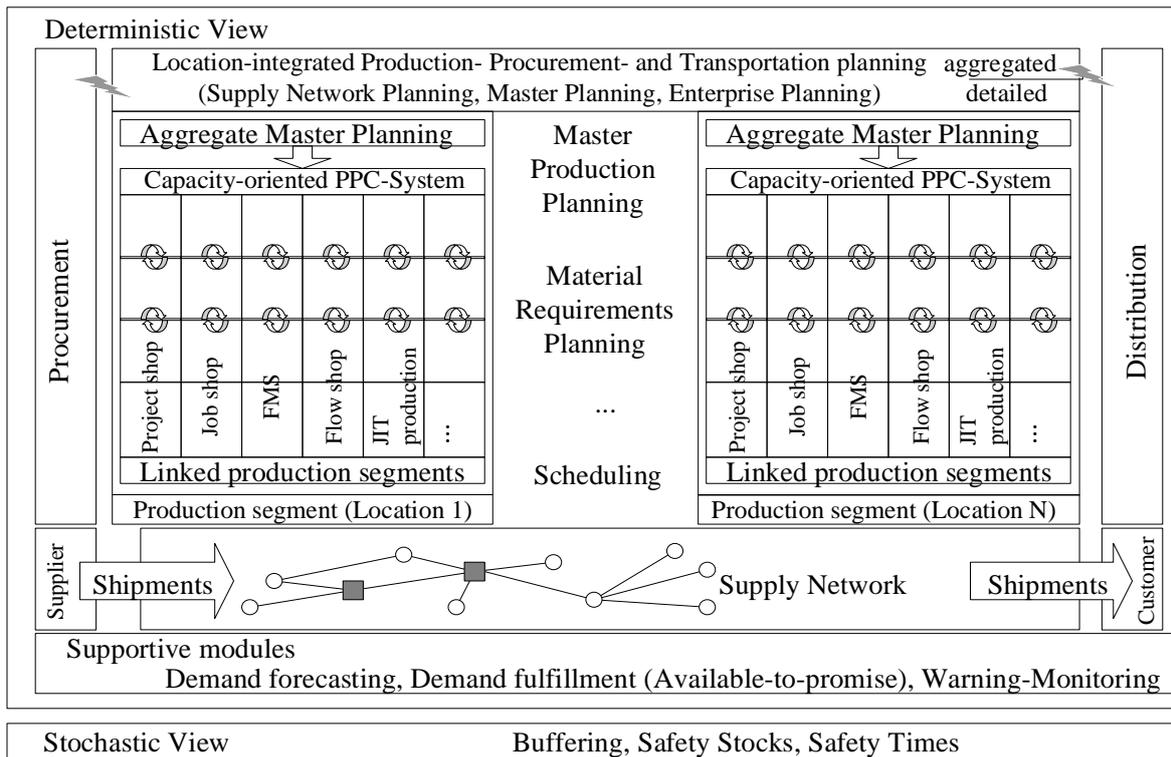
Keywords

Hierarchical production planning; Aggregate production planning (APP); Master production scheduling (MPS); Material requirement planning; Resource profiles.

Introduction

Production planning is a very complex. A high number of parameters and their multiple dependencies are simultaneously to be taken into account. This resulting planning problem can't be solved in an appropriate time even with most powerful computers and sophisticated software [1].

In the most commercial production planning and control systems, the complex planning of production planning is replaced by the hierarchical production planning approach [6]. In this case the complex singular problem is decomposed in several manageable problems. These problems are solved successively and the individual solutions are combined into one overall solution at the end. The hierarchical production planning approach is attributed to Hax and Meal in the year 1975 [5]. Drexl, Fleischmann, Günther and Stadler suggested in 1994 to expand this concept by limited capacities of resources [2]. On this planning concept, the paper is based. Typical hierarchical production planning is shown in Figure 1.



Source: [4]

Fig. 1: Typical hierarchical production planning

Aggregation plays an important role in this planning approach. There are three different types of aggregation. The aggregation of time especially the period size, decision variables like grouping of products or constraints like grouping of machines to work centers or production sites [3][7]. This planning concept consists of the following steps: Aggregate production planning (APP), master production scheduling (MPS), material requirements planning and scheduling.

APP predicts the planned independent requirements for one production site on a product group level based on demand forecasts. MPS predicts the planned independent requirements for final products for a production site. Therefore, product groups are disaggregated into final products. Through the use of resource profiles production lead time and the capacity requirements for each work center is considered [9].

In the paper Evidence of the relevance of master production Scheduling for hierarchical Production Planning [8] the relevance of MPS was demonstrated through a case study. MPS can avoid shortages through a closer examination of the capacity. It was suggested to introduce a capacity restriction and to consider the exact offset periods on APP level to possibly avoid shortages. This will be carried out. Capacity on APP level will be reduced by a capacity reduction factor (CRF).

The point of this paper is best illustrated by following a clear example from a case study. At the beginning of the case study solution and realization of APP and MPS are compared. In the next step, a CRF for APP is introduced and the exact offset periods are considered. In the end, it is examined what happens if total demand for all products is the same, but the demand for each product is different.

1 Case Study

One production site with two work centers is considered. The capacity of each work center is 500 hours per period. So, the production site has a capacity of 1000 hours per period. Human capacity is equal technical capacity and there is no additional capacity. In order to be able to compare results with each other, the period size of aggregate production planning (APP) and master production scheduling (MPS) is the same and it is assumed that the predicted planned independent requirements are identical to the real customer requirements. The derived requirements to all components are produced just in time. The model of a closed production is used. Closed production is characterized by the fact that each planned order must be finished and stored, before it can be further processed or shipped [6].

Two product groups which are produced in one production site are considered. Each product group consists of one final product. The final product (E) needs 3 hours of capacity per unit in work center (A) and the component (V) needs 7 hours of capacity per unit in work center (B). It follows that product group (P) needs 10 hours of capacity per unit in production site. The final product (F) needs 5 hours of capacity per unit in work center (A) and the component (V) needs 5 hours of capacity per unit in work center (B). It follows that product group (Q) needs also 10 hours of capacity per unit in production site. The estimated lead time for all products and components is 1 period. Set-up times and costs are not considered.

The planning horizon of the case study starts in period 1 and ends with the last customer demand in period 10. The demands of product group (P) respectively product (E) and product group (Q) respectively product (F) are shown in Table 1.

Tab. 1: Demand for the case study

Period (t)	1	2	3	4	5	6	7	8	9	10	Σ
Demand ($d_{E,t}^A$) [units]	0	0	0	0	40	50	60	50	40	60	300
Demand ($d_{F,t}^A$) [units]	0	0	0	0	40	50	60	50	40	60	300

Source: Own

As shown in [8] due to the aggregated consideration of capacity requirement for product groups, APP overestimates the number of products which can be produced into one period. This was shown for one product group which is related to one final product. To avoid this CRF of 0.83 is introduced in combination with the consideration of the lead time of 2 periods. The solution and the realization of this APP is as good as the one of MPS.

The Solution for APP with a CRF of 0.83 and MPS is shown in Table 2. The objective is €872.

Tab. 2: Solution of APP with capacity reduction factor 0.83 and MPS

Period (t)	1	2	3	4	5	6	7	8	9	10	Σ
$d_{E,t}^A$ [units]	0	0	0	0	80	100	120	100	80	120	600
$x_{E,t}^A$ [units]	0	19	83	83	83	83	83	83	83	0	600
$y_{E,t}^E$ [units]	0	0	19	102	105	88	51	34	37	0	436

Source: Own

The solution can be realized without exceeding the period capacity and no shortage occurs in the individual periods.

2 Results of the Research

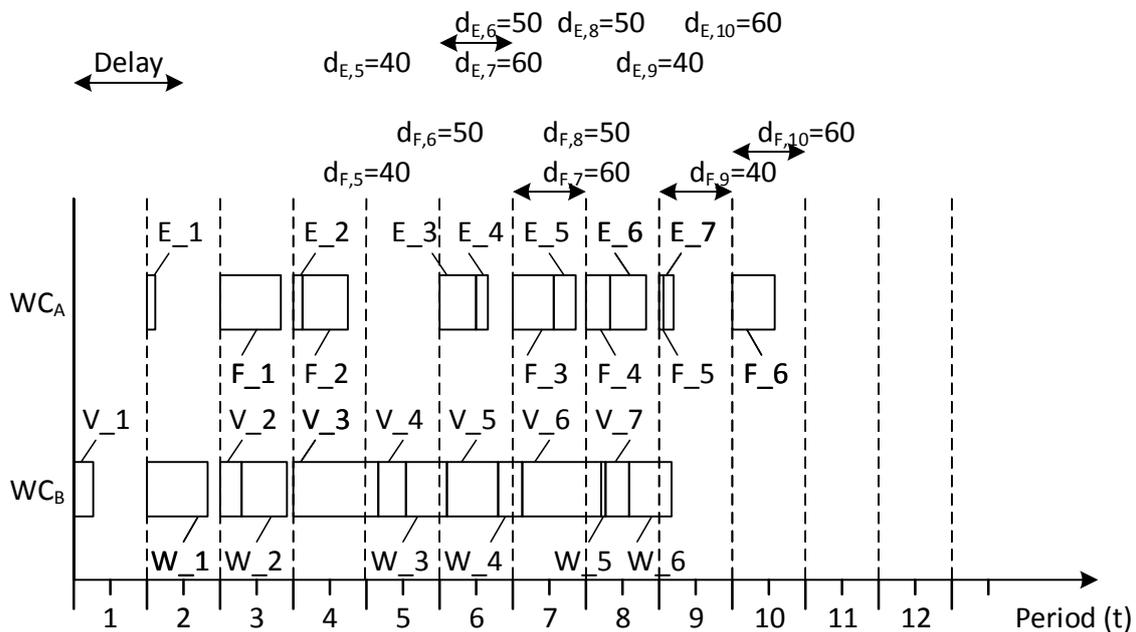
In this case study, the planning results for two product groups as described in the case study are compared. First the Solution for APP which is provided by ILOG is presented. Next, an

optimal solution for APP without shortages and delay is searched and presented. At the end the results are compared with the results of MPS.

Tab. 3: Solution of APP with CRF 0.83 (ILOG)

Period (t)	1	2	3	4	5	6	7	8	9	10	Σ
$d_{P,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{P,t}^A$ [units]	0	19	0	21	83	27	50	77	23	0	300
$y_{P,t}^E$ [units]	0	0	19	19	0	33	0	0	37	0	108
$d_{Q,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{Q,t}^A$ [units]	0	0	83	62	0	56	33	6	60	0	300
$y_{Q,t}^E$ [units]	0	0	0	83	105	55	51	34	0	0	328
Sum $x_{P,t}^A + x_{Q,t}^A$	0	19	83	83	83	83	83	83	83	0	600

Source: Own



Source: Own

Fig. 2: Realization of APP with CRF 0.83 (ILOG)

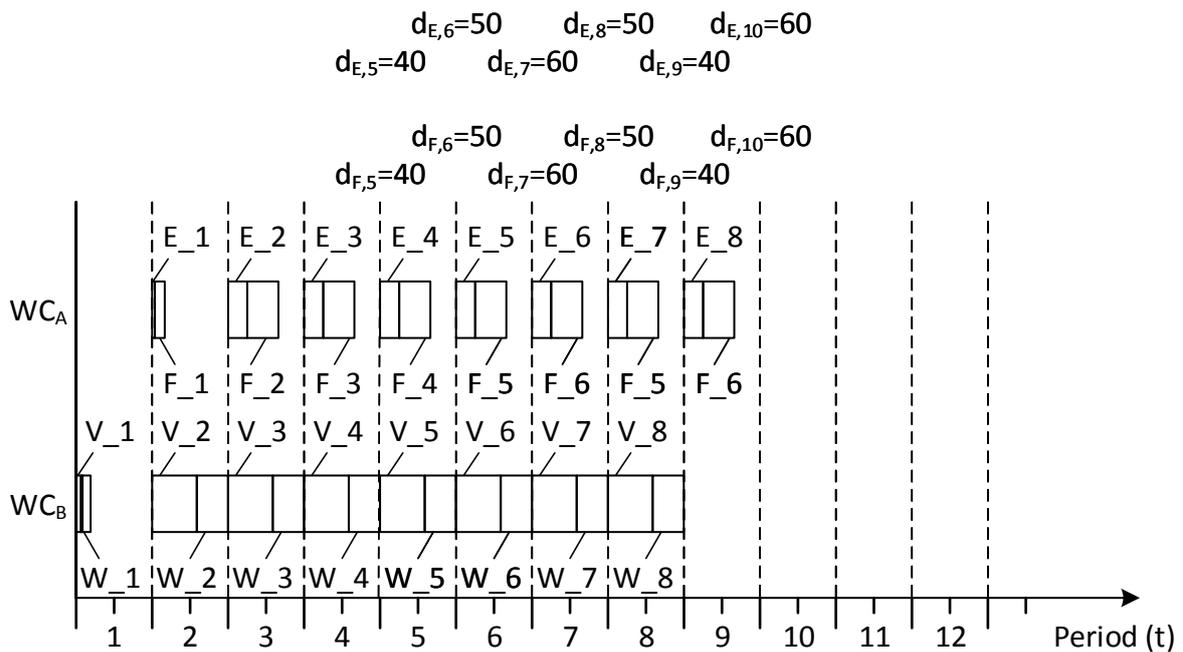
In Figure 2 the realization of Table 3 is illustrated as Gantt chart. The lead time is taken into account during the realization. Figure 2 shows that the demand of product (E) of period 6 is fulfilled with 1 period delay. The same behavior can be seen for the demand of product (F) of the periods 7, 9 and 10. The total delay in periods is 4. Besides the total shortage of 510 units the inventory holding costs increase from €872 to €1266. ILOG finds an optimal solution. This may not be the only solution, there may be other solutions. Another solution is shown in Table 4 and the realization is illustrated in Figure 3. This solution can be realized without shortage and delay. The inventory holding costs correspond to the objective of €872. Both solutions have in common that a maximum of 83 units of both products can be produced per period. The exact production quantities can be found in tables under “Sum $x_{P,t}^A + x_{Q,t}^A$ ”.

Furthermore, the results are compared with the solution and realization of the case study with one product group shown in the paper of Vitzthum & Herrmann [8]. We see that in this case study we have the same production quantities and the same inventory holding costs of €872.

Tab. 4: Solution of APP with CRF 0.83 (alternative)

Period (t)	1	2	3	4	5	6	7	8	9	10	Σ
$d_{P,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{P,t}^A$ [units]	0	6	42	42	42	42	42	42	42	0	300
$y_{P,t}^E$ [units]	0	0	6	48	50	42	24	16	18	0	204
$d_{Q,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{Q,t}^A$ [units]	0	13	41	41	41	41	41	41	41	0	300
$y_{Q,t}^E$ [units]	0	0	13	43	55	46	27	18	19	0	232
Sum $x_{P,t}^A + x_{Q,t}^A$	0	19	83	83	83	83	83	83	83	0	600

Source: Own



Source: Own

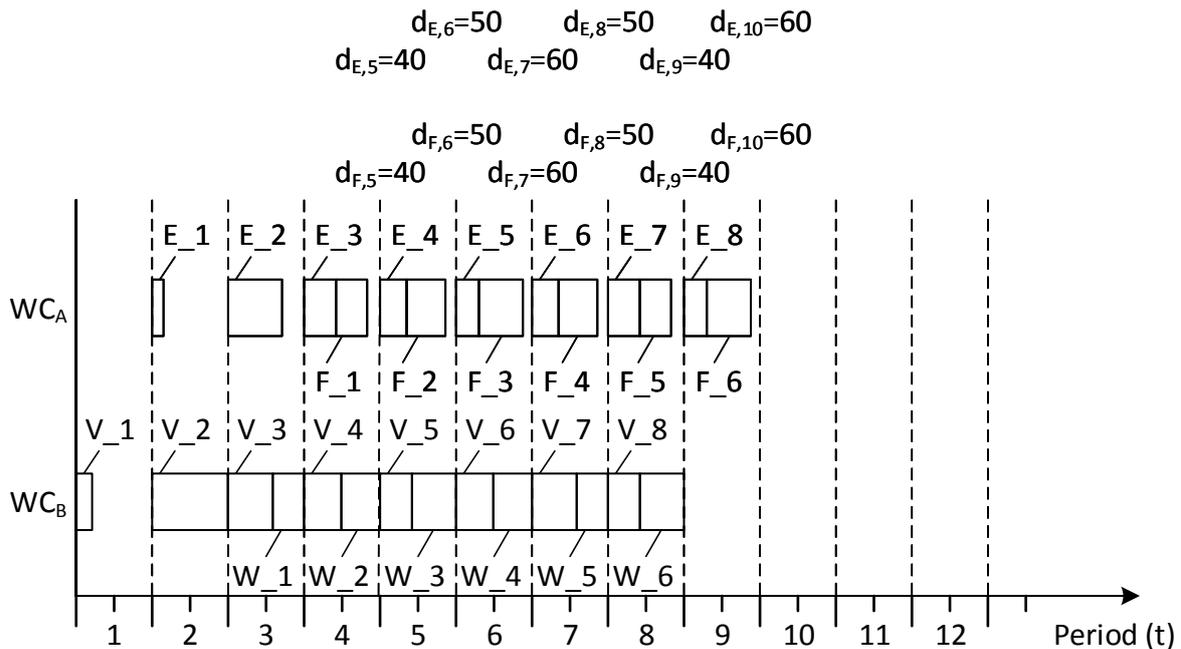
Fig. 3: Realization of APP with CRF 0.83 (alternative)

Finally, the results of the APP are compared with the results of the MPS. The results of the MPS are shown in Table 5 and illustrated in Figure 4.

Tab. 5: Solution of MPS

Period (t)	1	2	3	4	5	6	7	8	9	10	Σ
$d_{E,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{E,t}^A$ [units]	0	15	71	42	35	30	35	42	30	0	300
$y_{E,t}^E$ [units]	0	0	15	86	88	73	43	28	30	0	363
$d_{F,t}^A$ [units]	0	0	0	0	40	50	60	50	40	60	300
$x_{F,t}^A$ [units]	0	0	0	41	51	58	51	41	58	0	300
$y_{F,t}^E$ [units]	0	0	0	0	1	2	0	1	2	0	6
Sum $x_{E,t}^A + x_{F,t}^A$	0	15	71	83	86	88	86	83	88	0	600

Source: Own



Source: Own

Fig. 4: Realization of MPS

The realization can be done without shortage and delay. The inventory holding costs are €738. Compared to the APP, the storage costs have decreased by €134. This means a saving of 15.37%. In order to understand the differences, the planned independent requirements of APP and MPS have to be compared. APP has a maximum of 83 units which can be produced independently of the product which is produced. MPS has a maximum of 88 units, but it depends on the product mix, which is produced.

3 Discussion

One advantage of MPS is the consideration of lead time. But even if APP takes lead time into account, we do not get any plans that can be realized without shortages and delay. APP estimates the available capacity of the work center wrongly, because of the aggregated planning for the production site. Normally APP overestimates the available capacity. One way to correct this is CRF. A good chosen CRF will provide feasible plans. Due to the general reduction, a rough estimate is made. There is no differentiation of capacity requirements by products. The main advantage of the MPS is the use of resource profiles. A resource profile gives information about the capacity requirements for final products in terms of work centers and offset periods. For this reason, the capacity for the production program is taken into account more precisely. The fact is best demonstrated in comparison of the maximum production rate by product. While APP doesn't differ between product (E) and product (F) and has maximum production rate of 83 units the MPS differs and has a maximum production rate of 71 units for product (E) and a maximum production rate of 100 for product (F).

Conclusion

MPS is superior to APP due to the detailed consideration of the capacity requirement. Through the use of resource profiles an allocation of the capacity requirement by work center and period based on products is made, while APP has a fixed production rate for all products. MPS has a variable production rate for the products which differs by the product mix of the production program. For this reason MPS can use the available capacity more efficiently than APP.

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MŮŽE BÝT AGREGOVANÉ PLÁNOVÁNÍ PRODUKCE MODIFIKOVÁNO TAK, ABY BYLO TAK DOBRÉ JAKO PLÁNOVÁNÍ PROGRAMU HLAVNÍ PRODUKCE?

V tomto příspěvku je pomocí případové studie zdůrazněn význam plánování programu hlavní produkce pro hierarchické plánování produkce. Je učiněn pokus o zlepšení výsledku agregovaného celkového plánování změnou jednotlivých parametrů tak, aby to odpovídalo výsledku plánování programu hlavní produkce. V rámci šetření se tak docílilo některých zlepšení jednotlivých situací plánování, avšak obecné řešení se ještě nepodařilo nalézt. Zvláště použití vhodného faktoru k redukcí kapacity ve spojení se zohledněním průběhu vede ke zlepšení výsledku. Při plánování více produktů je však těžké najít vhodný faktor pro redukcí kapacity, protože ten je odvislý od poptávky.

KANN DIE AGGREGIERTE GESAMTPLANUNG SO MODIFIZIERT WERDEN, DASS DAS PLANUNGSERGEBNIS DEM DER HAUPTPRODUKTIONSPROGRAMMPLANUNG ENTSPRICHT?

In diesem Beitrag wird anhand einer Fallstudie die Bedeutung der Hauptproduktionsprogrammplanung (HPPLAN) für die hierarchische Produktionsplanung herausgearbeitet werden. Dazu wird versucht das Ergebnis der aggregierten Gesamtplanung (AGGRPLAN) durch Veränderung einzelner Parameter so zu verbessern, dass es dem Ergebnis der HPPLAN entspricht. Im Rahmen der Untersuchungen konnten dabei Verbesserungen für einzelne Planungssituationen erzielt werden, eine generelle Lösung konnte jedoch nicht gefunden werden. Insbesondere der Einsatz eines geeigneten Kapazitätsreduktionsfaktors in Verbindung mit der Berücksichtigung der Durchlaufzeit führt zu einer Verbesserung der Lösung. Bei der Planung von mehr als einem Produkt ist allerdings schwierig einen geeigneten Kapazitätsreduktionsfaktor zu finden, da dieser abhängig von der Nachfrage ist.

CZY ZAGREGOWANE PLANOWANIE PRODUKCJI MOŻE ZOSTAĆ ZMODYFIKOWANE TAK, BY BYŁO TAK DOBRE JAK PLANOWANIE PROGRAMU GŁÓWNEJ PRODUKCJI?

W niniejszym opracowaniu na podstawie studium przypadku wskazano znaczenie planowania programu głównej produkcji w hierarchicznym planowaniu produkcji. Podjęto próbę poprawienia wyniku zagregowanego ogólnego planowania poprzez zmianę poszczególnych parametrów, by odpowiadało to wynikowi planowania programu głównej produkcji. W ramach przeprowadzonych badań osiągnięto pewne udoskonalenia poszczególnych sytuacji planowania, jednak nie udało się na razie znaleźć kompleksowego rozwiązania. Wynik poprawia w szczególności zastosowanie odpowiedniego czynnika do zmniejszenia wielkości w połączeniu z uwzględnieniem przebiegu. Podczas planowania kilku produktów trudno jednak znaleźć odpowiedni czynnik do zmniejszenia wielkości, ponieważ zależny jest on od popytu.

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