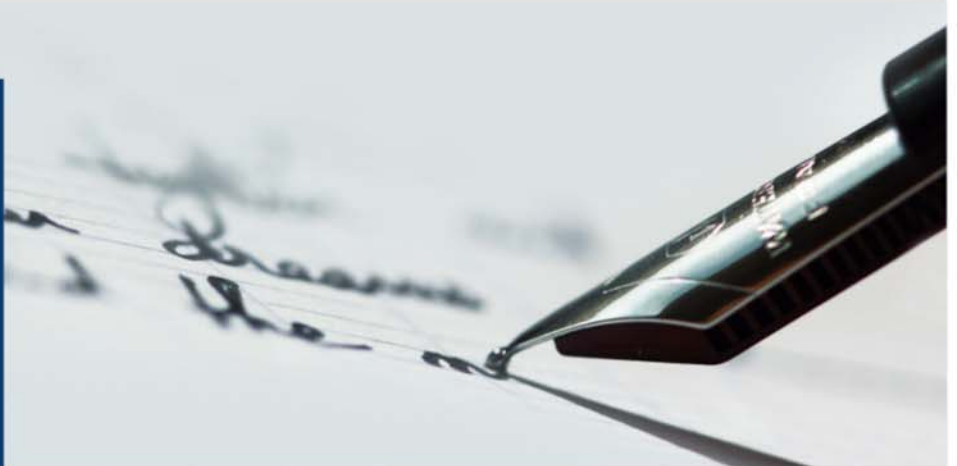


**BWL**



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### **Creating Value**

Conference Proceedings of the  
10<sup>th</sup> EPIEM/ESTIEM Conference

4<sup>th</sup> May 2018

Stefan O. Grbenic  
Amila Omazic



In cooperation with:  
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# Preface

Dear Conference Participant,

I am delighted to welcome you to the 10th EPIEM/ESTIEM Conference on “Creating Value” focusing the topic of Valuation, Graz University of Technology, Austria. It is a particular pleasure to see academics from many different institutions and different countries being represented at this conference. We are happy that you are joining us and are grateful for your trust and willingness to place your research into the public domain at this event.

The Conference is hosted by the Institute of Business Economics and Industrial Sociology, being divided into three different working groups engaged in research and teaching in the fields of “Management Control, Accounting and Finance”, “Human Resource Management and Industrial Sociology” and “Industrial Marketing, Purchasing and Supply Management”. It is embedded into the international EPIEM/ESTIEM (European Professors/Students of Industrial Engineering and Management) Network, co-organized by University POLITEHNICA of Bucharest and University of Novi Sad and supported by the Austrian Association of IEM called “WING”, UdEkoM Balkan and EBES (Eurasia Business and Economics Society). We give our greatest thanks to all of them.

In our earnest wish that all participants will feel fully engaged, every ready to ask searching yet constructive questions and eager to learn. Whether you be an academic with many years of experience or one in the early years of your academic journey, we trust that you find the conference stimulating and gain some welcome insights into new research.

Finally, I wish you a positive and productive time here in Graz.



Stefan O. Grbenic

# University POLITEHNICA of Bucharest



University POLITEHNICA of Bucharest (UPB) is the most important technical university in Romania. Its traditions are connected to the founding of the first higher technical school in 1818 by Gheorghe Lazar. University POLITEHNICA of Bucharest is the largest and the oldest technical university in the country and among the most prestigious universities in Romania. The tradition of our institution, developed in 200 years through the effort of the most important nation's schoolmasters and of the generations of students, is not the only convincing reason. Today, the POLITEHNICA University of Bucharest is undergoing a continuous modernization process, being involved in a permanent dialogue with great universities in Europe and all over the world. The mission of the University POLITEHNICA of Bucharest has been thought over as a blend of education, research and innovation, which represents a key towards a knowledge-based society and economy. Creating knowledge mainly by scientific research, giving it out by education and professional training, disseminating it by information technologies, as well as the use of technological innovation are elements that define the university distinctive profile.

# University of Novi Sad



Journal: IJIEM – International Journal of Industrial Engineering and Management

The aim of International Journal of Industrial Engineering and Management (IJIEM) is to contribute to advancing knowledge and understanding of both theory and practice in industrial engineering and management, by promoting high quality applied and theoretical research.

Topics of interest include, but are not limited to:

- 📖 Production Systems
- 📖 Automation, Robotics and Mechatronics
- 📖 Information and Communication Systems
- 📖 Quality, Maintenance and Logistics
- 📖 Safety and Reliability
- 📖 Organization and Human Resources
- 📖 Engineering Management
- 📖 Entrepreneurship and Innovation
- 📖 Project Management
- 📖 Marketing and Commerce
- 📖 Investment, Finance and Accounting
- 📖 Insurance Engineering and Management
- 📖 Media Engineering and Management
- 📖 Education and Practices in Industrial Engineering and Management

IJIEM is published four times a year (in March, June, September and December), on a three months basis. In some cases IJIEM publish issues devoted to specific research themes. These issues have specific editors and specific calls for papers. IJIEM provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Since 2012, IJIEM are both indexed in Scopus and Serbian Citation Index.

# Udekom Balkan



Association of Economists and Managers of the Balkans is a non-governmental and non-profit association, founded in 2014 for an indefinite period to support the development of scientific thought in the region, development of management and economics profession, as well as education of its members and the public.

Association of Economists and Managers of the Balkans currently has more than 250 members who came from more than 200 different institutions, more specifically, members from Balkans countries as associate members and honorary members from other countries (Slovakia, Czech Republic, Russia, Ukraine, Mexico, Austria, Switzerland, Turkey, Italy, Singapore, Hong Kong, India, Saudi Arabia etc.).

Among the members mostly are present university professors of all scientific ranks, postgraduate students and experts from various ministries, public administration, private and public companies, multinational companies, associations and similar.

Association of Economists and Managers of the Balkans has accomplished some form of cooperation with more than 150 different institutions from the Balkans region and beyond.

# EURASIA BUSINESS AND ECONOMICS SOCIETY



**Eurasia Business and Economics Society**  
[www.ebesweb.org](http://www.ebesweb.org) - [ebes@ebesweb.org](mailto:ebes@ebesweb.org)

EBES is a scholarly association for scholars involved in the practice and study of economics, finance, and business worldwide. EBES was founded in 2008 with the purpose of not only promoting academic research in the field of business and economics, but also encouraging the intellectual development of scholars. In spite of the term “Eurasia”, the scope should be understood in its broadest term as having a global emphasis.

EBES aims to bring worldwide researchers and professionals together through organizing conferences and publishing academic journals and increase economics, finance, and business knowledge through academic discussions. Any scholar or professional interested in economics, finance, and business is welcome to attend EBES conferences. Since its first conference in 2009, around 9,650 colleagues from 95 countries have joined EBES conferences and 5,541 academic papers have been presented. Also, in a short period of time, EBES has reached 1,840 members from 84 countries. Since 2011, EBES has been publishing two academic journals which are both indexed in Scopus and Emerging Sources Citation Index. One of those journals, Eurasian Business Review- EABR, is in the fields of industrial organization, innovation and management science, and the other one, Eurasian Economic Review- EAER, is in the fields of applied macroeconomics and finance. Eurasian Economic Review is published thrice a year and Eurasian Business Review is published quarterly and they have been published by Springer since 2014.

Furthermore, since 2014 Springer has started to publish a new conference proceedings series (Eurasian Studies in Business and Economics) which includes selected papers from the EBES conferences. The 10th, 11th, 12th, 13th, 14th, 15th, 16th, and 17th EBES Conference Proceedings have already been accepted for inclusion in the Thomson Reuters' Conference Proceedings Citation Index. The 18th and subsequent conference proceedings are in progress.

Eurasian Business Review – A Journal in Industrial Organization, Innovation and Management Science: The Eurasian Business Review (EABR) publishes articles in Industrial Organization, Innovation and Management Science. In particular, EABR is committed to publishing empirical or theoretical articles which provide significant contributions in the fields of industrial economics, business economics, the economics and management of innovation, competition policy and antitrust, corporate governance, organizational change, entrepreneurship, strategic management, accounting, marketing, human resources management, and information systems. While the main focus of EABR is on Europe and Asia, papers in the fields listed above on any region or country are highly encouraged. In a short period of time, the journal has been indexed in Emerging Sources Citation Index (Web of Science) and in SCOPUS, with a significant increase in the visibility and scientific reputation of the journal. Throughout the years, the number of submissions has increased rapidly while we maintain an acceptance rate of 15%. According to Google Scholar, EABR h-index is 13 whereas its g-index is 35. Therefore, in a short period of time, the journal has managed to have an important impact in its field and has started to play an important role in the region both among scholars, practitioners and policy makers. The Eurasian Business Review is one of the two official journals of the Eurasia Business and Economics Society (EBES). EABR is published by Springer on a quarterly basis.

# Conference Agenda

10<sup>th</sup> EPIEM/ESTIEM Conference  
"Creating Value"



Co-Organizers



Supporters



08:30-09:00

## Registration

### Opening and Inaugural Session

09:15-09:30

### Welcoming Speech

09:30-10:30

Editor's View: "How to set up a publication in a Scopus Journal"

1. Professor **Stevan Stankovski, University of Novi Sad, Serbia** .  
International Journal of Industrial Engineering and Management (IJIEM)
2. Associate Professor **Ender Demir, PhD – Conference Coordinator Eurasia Business and Economics Society (EBES), Turkey**  
Eurasian Economics Review (EAER) and Eurasian Business Review (EABR)

10:30-10:45

### Podium Discussion

10:45-11:15

### Break together with WING

### Session 1: Presentations on Valuation

11:15-11:30

**Presentation 1:** "Valuation Approaches for Corporate Investments and Takeovers in Medium-sized Enterprises: Comparative Case Study of Selected Enterprises in Montenegro and Serbia" (**Ljutić, Filipović - University Business Academia / Belgrade Business School - Serbia**)

11:30-11:45

**Presentation 2:** "Accounting for Internally Generated Intangible Assets by Companies Listed in the Austrian Stock Market" (**Fritz-Schmied, Paulitsch - Alpen-Adria-Universität Klagenfurt - Austria**)

11:45-12:00

**Presentation 3:** "The Shareholder Value Analysis of Hungarian Company Acquisitions in the period of 2007 and 2010" (**Kucséber - Budapest Business School, University of Applied Sciences - Hungary**)

12:00-13:30

### Lunch together with WING

13:30-13:45

**Presentation 4:** "End-of-period convention and expected asset life: Do two wrongs make a right?" (**Szallerné Sereg - Budapest University of Technology and Economics - Hungary**)

13:45-14:00

**Presentation 5:** "The utilisation of loyalty cards, CRM and big data as drivers of market share growth" (**Avdullahi, Avdullahi - University of Mitrovica, Sheffield University - Kosovo**)

14:00-14:15

**Presentation 6:** "Estimating the Discount for Lack of Liquidity using Trading Frictions of Thinly Traded Stocks: The Small Market (Austrian) Case" (**Grbenic - Graz University of Technology - Austria**)

14:15-14:45

### Break together with WING



10<sup>th</sup> EPIEM/ESTIEM Conference  
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**Session 2: Presentations on Valuation Related Topics**

- 14:45-15:00 **Presentation 7:** "Mergers & Acquisitions in Agricultural Sector: Potential Risks for Farmers and Agricultural Markets" (**Ciglovska, Veljanoska - International University of Struga - Macedonia**)
- 15:00-15:15 **Presentation 8:** "ERM-Maturity Assessment-Study 2017: Measuring and analyzing the quality of ERM systems in Austrian firms" (**Brandstätter, Raffaele, Schwaiger - Technische Universität Wien - Austria**)

**Session 3: Presentations on IEM in view of valuation**

- 15:15-15:30 **Presentation 9:** "Success Innovation Sourcing: a matter of Support plus Skills" (**Stek, Zunk University of Twente The Netherlands / Graz University of Technology Austria**)
- 15:30-15:45 **Presentation 10:** "Sustainable development of Value Creation within EPIEM/ESTIEM Cooperation" (**Mustata - University Politehnica of Bucharest - Romania**)
- 15:45-16:15 **Break**
- 16:15-16:30 **Presentation 11:** "Valuation of research work in academic organizations in public sector" (**Nikolić - University of Defence - Serbia**)
- 16:30-16:45 **Presentation 12:** "Influence of Open Innovations and Leadership on e-Commerce Model Success: Case Studies in Serbia" (**Jošanov, Jošanov-Vrgović, Živkucin - College for Management & Business Communications Novi Sad / Business School for Applied Studies - Serbia**)
- 16:45-17:00 **Presentation 13:** "Additive manufacturing in design inspired by biomimicry" (**Milinić-Bogdanović Belgrade Polytechnic Vocational college in Belgrade - Serbia**)
- 17:00-17:15 **Presentation 14:** "Determining different activities within experience economy model for cultural institution" (**Brzovska, Debarliev - Ss. Cyril and Methodius University in Skopje - Macedonia**)
- 17:15-17:30 **Closing**

# List of Participants

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Zoran Ćirić	University of Novi Sad	Serbia

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# Part I: Valuation

## 1 Valuation Approaches for Corporate Investments and Takeovers in Medium-sized Enterprises: Comparative Case Study of Selected Enterprises in Montenegro and Serbia

**Branko Z. Ljusic**

Institution Montenegro Audit, Podgorica, Montenegro & University Business Academia, Novi Sad, Serbia

**Luka M. Filipovic**

Institution EuroAudit, Belgrade, Serbia

**Keywords:** Corporate Valuation, SME, investments, takovers, Audit, Montenegro, Serbia

**JEL classification:** G3, G32, M4, M42

The practical non-existence of the functional and efficient stock-markets in Belgrade, Serbia and Podgorica-Montenegro, even for large corporation, is the evidence itself that even the most successful and growing mid-size companies are only relying primarily on internal sources of financing, and externally in a smaller part on the bank loans and financing by the suppliers and vendors. The transition from the socialist open economy to the market has being almost completed after two and a half decades of abrupt and unstable changes and with no clear cut financial system which is supporting the financing of the SME sector in both countries. The interest of foreign and in lesser part domestic investors has being increasing constantly to invest and dominantly to takeover the leading profitable medium sized firms in Montenegro and Serbia. The significant aspect which is implicitly hidden in the valuation process is the assessment of the specific country risk which is different for those two countries, Montenegro and Serbia, and still remaining for an open debate where country risk should be considered explicitly in valuation process, and how to adapt this approach to the concrete circumstances. Based on the series of our individual research and theoretical published papers and book monographs in the field of corporate valuation based on the framework of the International Financial Reporting Standards, and the application of the International Standards on Auditing by IFAC on the process of preparation of the due diligence and related company rough estimates for the clients, in two separate and independent of each other audit firms: Montenegro Audit-Podgorica, Montenegro and EuroAudit-Belgrade, Serbia, we are in position to observe the methodologies applied, and how the reports stood over the time test, e.g. their real information value for the owners and investors with the time passing by.

Although the most of valuers in their reports do not take into a strong consideration the influence of the country risk factor, that the valuers have accepted that notion implicitly, and with a different exposure levels depending on the medium sized firm foreign trade exposure, depending on the markets it trades, if dominantly on domestic the exposure is considerably lower, but for the exposed firms it is much higher. Market presents and perspectives are dominant factors in assessing and valuing the mid-sized firms' revenues.

The paper examines the theoretical foundation of the valuation methodology in Montenegro and Serbia, practical regulation and practice of due diligence and valuation reports of medium sized enterprises in two separate audit firms in two different states of West Balkans: Montenegro and Serbia. Based on the theoretical framework classification the paper is describing the four main groups used for medium-sized enterprises; balance sheet statement, income statement, mixed method of the previous two, and discounted cash flow, all based on the adequate and high quality audit assurance due diligence reporting based on the ISAs by IFAC. Experience and the data support as the appropriate the method based on the cash flow discounting. This method has also proven to be adequate for the group of firms which could be embodied in the medium sized enterprise. The practical experience also gave an insight into the common errors and mistakes which could be easily avoided in the future valuation consultancy services.

The study of the medium sized enterprises valuation reports done by the Montenegro Audit and EuroAudit has shown consistently that regardless of the selected methodology or mix of methodologies the resulted company values are almost the same of very close, the fact that is more than important for the future owners or investors.

The survey have shown that the cost of capital, capital budgeting, and capital structure are not the utmost important and relevant factors, since the real market value of assets and liabilities is a decisive one. For the medium sized firm the dominant methodological criteria could be very frequently the payback method, based on the conservatively forecasted higher discount rates, which are more realistically valuing the company future. In that approach it is highly recommended to incorporate the interest rate risk, and for practice it is much easier to apply that approach in Montenegro since the national currency is Euro, and the interest rates are higher than in EU, but lower and more stable than in Serbia with the domestic currency Serbian Dinar. The financial ratios analysis of the selected medium sized firms is giving the higher values of the debt-ratios, lower corporate finance flexibility and rather unstable credit rating. Audit companies have an advantage that in the most medium sized enterprises valuation reporting process there were their existing ore ex-clients, which is giving an advantage since the level of assurance in data is very high, and the data analytics is based on rather reliable sources of information. Errors in the selection and calculation of the discount rate is not a common type error since both audit firms have as their staff CPAs, financial analysts and consultants with a long professional experience and proven record of success, and consequently the errors of date interpretations, team work, and reporting are eliminated.

The specific aspect of valuation has being the valuation of previously owned socialist state owned companies, but since the privatization process is almost completed these valuation are extinct from the valuation practice. The paper is narrowly focusing on the appraisal process started by external investors, investment banks and investment funds, investing in perspective medium-sized enterprise, and having a preference for a significant discount of value, compared to a publicly traded or large corporation which are not listed at the local stock markets. Practice is proving that the privately held medium-sized firms valued in this sample in most cases due to the lack of stock market quotation and consequently the equity market liquidity have being always faced with a lover discounted values, something that the owners and managers of medium-sized enterprises in Montenegro and Serbia are aware o and accept as the reality of life. Monetary factors, e.g. money supply and interest rate policy of the national central banks in Montenegro and Serbia as well as the interest rates charged by the domestic commercial banks influence largely the medium—sized company's values.

Dynamic medium-sized enterprises in Montenegro and Serbia are the backbone of the economic and employment growth, contributing to the high business turnover ratios. This fact itself is proving that such enterprises are also the target for venture capitalists, business angels and institutional and private external investors. The relative slack availability of the bank loans is also a bottle neck for the future business expansion, and the reason why such firms are seeking to merge or are keen for the takeover operations. Firms of this

size are mostly relying on the internal generated funds as sources of financing, mainly from owners and proprietors, while the debt, loan and equity financing is only the complementary source of financing for the borrower. The evidence from the study is clearly demonstrating that the high quality valuation reports prepared on a due diligence background is a relevant one for the change of ownership and also some kind of assurance of the future growth and expansion, the main motive for the investors.

Experiences of valuers is useful practical guide encompassing the best practice, practical examples and advises of the adopted methodologies which have been applied in successful practice of the medium-sized enterprises valuation analysis. Based on the sound theoretical principles of corporate finance and financial management, applied the specific circumstances of the real economic, regulatory and social environment in Montenegro and Serbia is giving a rare but realistic insight into the applied concrete methodological scenarios focused narrowly to a high quality valuation reports. The valuation process is also heavily based on a number of subjective judgements, forecasts and assessments, something the authors have been involved as a practicing consultants for a long time. Proper understanding of the qualitative and quantitative aspects is equally important, since the soft valuation skills are more than a critical factor in this process, first of all full understanding of the business process of the medium-sized firm being valued with a focus to express judgement in the process of drawing conclusions from the quantitative financial analysis.

Valuation reports based on a rigorous quantitative approach are primarily forward looking, while the historic data are only useful if there is a prospective profits based on it. The non-existence of benchmarking standards, values and practice in both countries is a significant drawback of the valuation process. This is the reason while the transaction and real market values are better reflection of the value for the acquirer or existing owner wishing to expand operations, of the valued medium-sized enterprise. The fundamental value approach is also an excellent reflection of the value of future cash flows generated by the business.

This paper is focused to expand the practical application of the theoretical valuation methods on the growing medium-sized enterprises in Montenegro and Serbia, mostly acquired by the same size foreign private investors. Real business environment and problems in practice enable us to apply strictly speaking academic corporate finance into a rather complex, unstable and shaky business operations practice of medium-sized enterprises. The basics of this process is the capacity of such firms to create future value, and the managers mostly owners from the startup phase are fully aware of the fact that the only viable approach is a long-term strategic value creation process, something which is generating value for present and future owners. This approach is based on the fundamental principles of value creation: that only the rate of return on invested capital and corporate growth rate are generating and driving future cash-flow, which in turn is driving enterprise value up, vice-versa is not possible. In most cases valuation reports were based on the core valuation techniques using discounted cash flow to value enterprises. Based on the analysis of historical performance, forecasted and budgeted cash flows, estimated appropriate opportunity cost of capital, were exactly identified the sources of value, and conclusion of the reports.

We have adopted approach that the valuation process in both countries, e.g. Montenegro and Serbia should be centered on the pillar of emerging market economies, since the theory, practice and the quality of the regulatory regimes and institutions is not at par with the counterparts in the developed EU economies. The specific aspects of the valuation of the closely held private companies in emerging economies is for merger, takeover or acquisition purposes, which is our starting hypothesis in analysis of the valuation reports compiled by those two audit companies, Montenegro Audit and Euro Audit. The emerging markets of Montenegro and Serbia are rather volatile with their special sets of characteristics and challenges, while the need of the users of these reports is not on lower level than the need of their counterparts in the EU countries, just the opposite, since some specific local risks are evident and the consultant and the user/s of the report have more than high standard expectations.

Valuation and especially mid-sized enterprises valuation in Montenegro and Serbia is a situation where the tire touches the road, the point in which theoretical finance is facing the harsh reality of everyday business practice. Task of company valuation in developed market economies is not so complex, harsh, sensitive and risky, on the contrary in the economies which are not successfully finished the transition from the socialism to capitalism the road is more than bumpy, and each and every step, notion and conclusion should be and must be carefully considered and reconsidered, since the room for mistakes and maneuvering is less than narrow.

Successful medium-sized enterprises in Montenegro and Serbia are tremendously attractive to foreign investors, as well as mergers, acquisitions, joint ventures and strategic alliances are becoming dominant forms of investment inflow in those two national economies.

### **Acknowledgments**

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## 2 Accounting for Internally Generated Intangible Assets by Companies Listed in the Austrian Stock Market

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**Keywords:** research & development, internally generated intangible assets, optional capitalization of intangible assets, valuation of intangible assets, empirical evidence of the accounting behaviour of Austrian listed companies

**JEL classification:** --

As the “knowledge-based” economy becomes more important, the nature of investments made by companies has changed from tangible and financial assets to intangible assets. This means that intangible assets are now considered the main influential factor, which determines a company’s value (Müller, 2010; Naumann, 2017; Schmidbauer, 2004; Smalt & McComb, 2016; Wulf, 2009). By owning intangible assets, companies gain competitive advantages, but they are also facing new challenges due to the creation, development and control of intangible assets. Besides that, companies have to ensure that the documentation in their financial statements is complete (Arbeitskreis "Immaterielle Werte im Rechnungswesen" der Schmalenbach-Gesellschaft für Betriebswirtschaft e.V., 2001).

However, the recognition of intangible assets within the accounting framework raises several problems. The traditional accounting model is based on tangible assets, which are more standardised and therefore the identification and measurement is much easier (Picker et al., 2016; Schmidbauer, 2004). According to IFRS-standard IAS 38 (para. 8) intangible assets are defined as “an identifiable non-monetary asset without physical substance” (Lev, 2005; Picker et al., 2016).

As a general rule, the balance sheet must include all assets and liabilities. While acquired intangible assets have to be capitalized, the accounting treatment of internally generated intangible assets is difficult and therefore represents a controversially discussed topic. Moxter (1979, p. 1102) described them as the ‘problem children’ of the accounting law. While internally generated intangible assets may not be capitalized under the Austrian national law (section 197 (2) of Unternehmensgesetzbuch [Austrian Commercial Code]), German accounting standards provide an option to capitalize intangible assets (section 248 of Handelsgesetzbuch [German Commercial Code]), which has replaced the initial capitalization prohibition.

IAS/IFRS standards require an entity to recognize internally generated intangible assets only if certain criteria are met. Any expenditure incurred during the research phase must be recognized as an expense when it is incurred, while expenditure incurred during the development phase must be capitalized. The time of recognition (given the theoretical recognisability) depends on whether the actual recognisability is given, which is based on the cumulative fulfilment and proof of all criteria defined by IAS 38.57. These include the technical feasibility of completing the asset [IAS 38.57 (a)], the intention to complete the asset [IAS 38.57 (b)], the ability to sell or use the asset [IAS 38.57 (c)], the proof that the asset will generate probable future economic

benefits [IAS 38.57 (d)], the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset [IAS 38.57 (e)], and the reliable measurement of expenditure attributable to the development phase [IAS 38.57 (f)]. In addition to that, the reporting company is obliged to document numerous other disclosures in the notes.

The recognition of internally generated intangible assets is tied to numerous problems. These include, amongst others, the definition of intangible assets, the differentiation between tangible and intangible assets, the timely allocation, and the separation of development and research. Moreover, the criteria defined by IAS 38.57 grants entities a great level of discretion, because the regulations, with the requirement for an intended completion of the asset in particular, are more or less dependent on the norm addressee's subjective will. Consequently, the capitalization of the assets is qualified as an optional rather than a mandatory capitalization in the literature (Fritz-Schmied & Paulitsch, 2017; International accounting standards board, 2015; Lüdenbach, 2010; Naumann, 2017; Picker et al., 2016; Schuschnig & Fritz-Schmied, 2015).

The purpose of this extended abstract is to shed light on the accounting behaviour for intangible assets under IAS 38 by Austrian listed companies. Therefore we analyse the financial statement data with special regard to the reported values of R&D and intangible assets as well as the applied valuation methods.

Prior research focuses also on country-specific samples, mainly with listed (Hager & Hitz, 2007; Haller, Froschhammer, & Groß, 2010; Leibfried & Pflanzelt, 2004; Möller & Piwinger, 2009; Müller, 2010; Wulf, 2009) and non-listed (Eierle & Wencki, 2014; Oser, Hahn, Breitweg, & Eisenhardt, 2011; Quick & Hahn, 2017; Von Keitz, Wenk, & Jagosch, 2011) German companies. Since listed Austrian companies have – besides Höllerschmid (2006) and Hüttche (2005) – never been undertaken an investigation, the empirical evidence of our study makes a significant contribution to the literature. The Austrian context provides an interesting field because –as already mentioned- national Accounting standards (Unternehmensgesetzbuch) only allow research and development costs to be recognized as expenses.

The data for the empirical analysis is taken from 67 consolidated financial statements (german version) of companies that are listed in the equity market in the Austrian stock market (Wiener Börse) as of 01.08.2017. This ensures an investigation of the largest listed Austrian companies as they are more likely to have an interest in providing their investors with highly detailed information. In order to carry out our research we had to hand-collect the relevant data. We had to remove 8 companies because of language restrictions and because their consolidated financial statements were not in accordance with IAS/IFRS. Additionally 12 companies had to be removed because of missing data and 9 companies because they did not invest in R&D. The remaining population of 38 companies constitutes the basis for the statistical analysis.

**Table 1 classification of the sample into market segments**

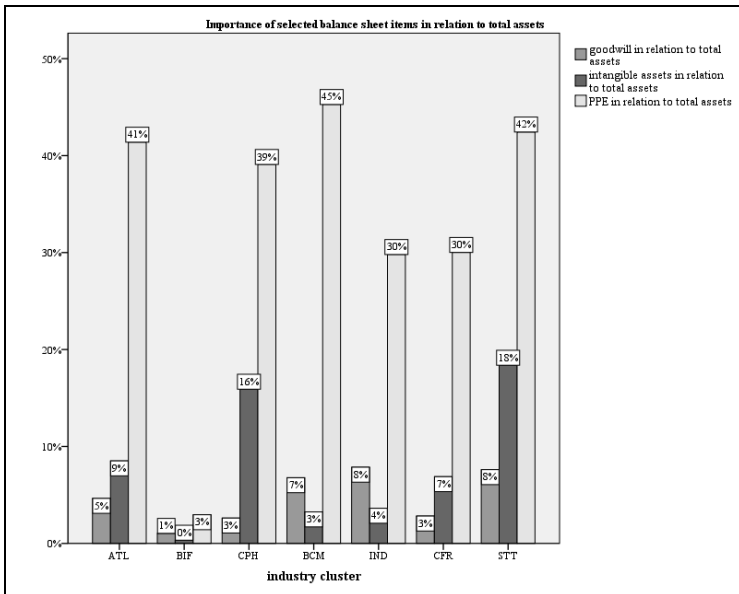
Market segment	Number of companies	Percentage
prime market	26	68.42 %
mid market	3	7.89%
standard market	9	23.68%
sum	38	100%

**Table 2: Derivation of industry clusters and classification of the sample into industry clusters**

Industry cluster			Industrial sub-cluster (Wiener Börse)
<b>ATL</b> (automobile, transport, logistics)	(5)	13.16%	automobile & suppliers (3) aeronautics & defence (1) transport (1)
<b>BIF</b> (banks, insurances, financial services)	(3)	7.89%	banks (2) other financial services (1) insurances
<b>CPH</b> (chemicals, pharma, healthcare)	(2)	5.26%	chemicals (1) pharmaceuticals (1)
<b>BCM</b> (basic resources, construction & materials, utilities)	(8)	21.05%	construction materials (1) building industry (1) mining & metals (2) mineral oil / natural gas (2) multi-provider (1) electric utilities (1)
<b>IND</b> (industrials)	(14)	36.84%	electrical devices (2) industrial conglomerate (1) industrial engineering & machinery (6) other industrial goods (2) other industrial services (2) packages (1)
<b>CFR</b> (consumer goods, food, retail)	(4)	10.53%	food, beverage & tobacco (2) personal goods (2)
<b>STT</b> (software, technology, telecommunication)	(2)	5.26%	hardware & equipment (1) telecommunication (1)
	(38)	~ 100%	

Table 1 and Table 2 show some descriptive statistics on the sample. The equity market of the Austrian stock market is divided into the 3 market segments (prime market, mid market and standard market). Table 2 illustrates the companies reallocated to 7 industry clusters (cf. Hager & Hitz, 2007; Leibfried & Pflanzelt, 2004).

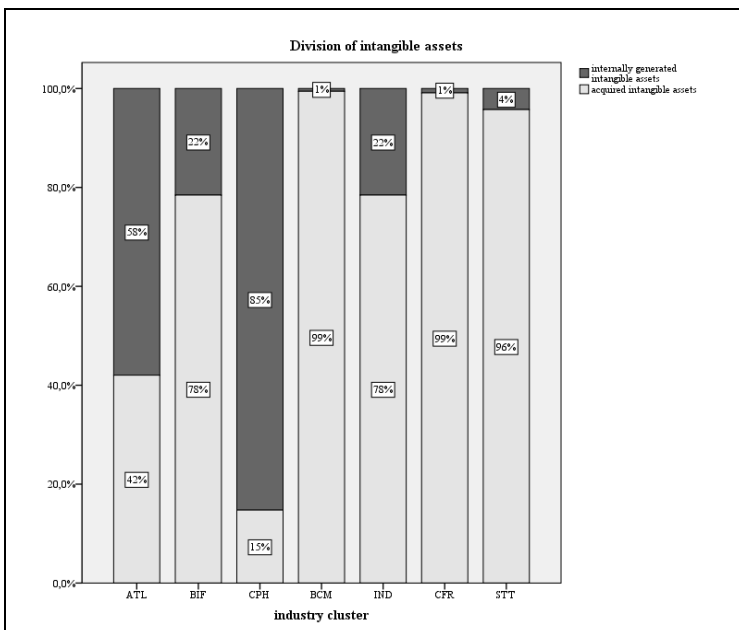
**Figure 1: Importance of selected balance sheet items in relation to total assets broken down by industry clusters (2015 & 2016)**



In a first step (Figure 1) the overall significance of intangible assets in comparison to other balance sheet items of Austrian listed companies should be analysed. Figure 1 gives an overview of the goodwill, the intangible assets and PPE (Property, Plant and Equipment) in relation to total assets. PPE makes up the largest portion of total assets; goodwill and intangibles assets generally account for a much smaller share.

Figure 2 shows the division of intangible assets into acquired intangible assets and internally generated intangible assets, organized by industry clusters.

**Figure 2: Division of intangible assets into acquired intangible assets and internally generated intangible assets, organized by industry clusters (2015 & 2016)<sup>1</sup>**



<sup>1</sup> For this analysis 4 companies (3 companies in the BCM cluster for 2015 and 2016 and 1 company in the IND cluster for 2016) had to be removed because of missing data.

Following the focus of the abstract, the intangible assets are subjected to a thorough investigation. In the cluster ATL (automobile, transportation & logistics) and in the CPH cluster (chemicals, pharma & healthcare) the amount of internally generated intangible assets is with values greater than 50% very high.

**Table 3: Capitalization of intangible assets organized by market segments and industry clusters (2015 & 2016)**

		internally generated intangible assets				sum
		yes	%	no	%	
prime market	ATL	1	33%	2	67%	3
	BIF	2	100%	0	0%	2
	CPH	1	100%	0	0%	1
	BCM	4	50%	4	50%	8
	IND	5	63%	3	38%	8
	CFR	1	33%	1	67%	2
	STT	2	100%	0	0%	2
	sum	16	62%	10	38%	26
mid market	BIF	0	0%	1	100%	1
	CPH	1	100%	0	0%	1
	IND	1	100%	0	0%	1
	sum	2	67%	1	33%	3
standard market	ATL	1	50%	1	50%	2
	IND	4	80%	1	20%	5
	CFR	0	0%	2	100%	2
	sum	5	56%	4	44%	9
total	ATL	2	40%	3	60%	5
	BIF	2	67%	1	33%	3
	CPH	2	100%	0	0%	2
	BCM	4	50%	4	50%	8
	IND	10	71%	4	29%	14
	CFR	1	14%	3	86%	4
	STT	2	100%	0	0%	2
	sum	23	61%	15	39%	38

Table 3 shows the accounting behaviour regarding the capitalization of R&D costs vs the recognition as an expense. We label companies as “non-capitalizers” if they have R&D activity but no capitalized internally generated intangibles assets; we label companies as “capitalizers” if they have capitalized internally generat-

ed intangible assets.

In total the study examines 38 companies over a 2-year-period. None of the companies has changed the accounting policies for intangible assets in these 2 years. 23 of 38 companies, which makes up a total of 61.1% capitalize their development costs. Compared to the results of a study that has previously been carried out in the Austrian stock market (Höllerschmid, 2006), the results of this study illustrate that the number of companies that opt for a capitalization of their development costs, has increased. In the periods 2003 and 2003/2004 only 29.7% of the analysed companies capitalized development costs. Another study (Hüttche, 2005) including financial statements of 2004 shows that 6 out of 15 listed Austrian companies reported development costs on the asset side.

In accordance with prior studies and the literature (e.g. EY International Financial Reporting Group, 2017) there are also industry-specific differences for the Austrian stock market. The two companies in the CPH (chemicals/ pharma/ healthcare) industry cluster as well as in the STT (software/ technologies/ telecommunication) industry cluster capitalize development costs. The BIF (banks/insurance/financial services) industry cluster and the IND (industrial) cluster also show a high percentage of capitalizers. Especially for the industrial companies this would not be expected but results from capitalized non-business-related development costs (especially software-costs; for further information see the section below).

A comparison of the different market segments shows no significant difference in the capitalization behaviour. In the prime market 62%, in the mid market 67% and in the standard market 56% of all companies capitalize development costs.

Moreover, the study has also examined qualitative aspects regarding the accounting behaviour of intangible assets. As previously mentioned, not a single company has changed the accounting behaviour and also the reporting behaviour is pretty similar with regard to the wording, the content and the scope reporting internally generated intangible assets.

Information on internally generated assets covers on average half an A4 page and is provided in several sections of the financial statement. Information on research and development costs is given in the general notes and/or in the accounting policies and in the notes to the income statement. Information on internally generated intangible assets is very often given at the fixed asset movement schedule. As a general rule, companies are very restrained in giving information about internally generated intangible assets probably because they hope to gain competitive advantages.

As shown in Table 3, 15 companies expense all their R&D outlays. Although IAS 38 does not require an explanation for non-capitalization of intangible assets, 12 companies justify the non-capitalization of development costs with the lack of meeting the recognition criteria of IAS 38.57 or with the missing significance of the expenses in amount. None of the companies points out which recognition criterion/criteria exactly prevented the capitalization.

Generally, all companies within the group of capitalizers obtain a movement schedule of intangible assets - however, 5 of 23 companies do not distinguish between acquired and internally generated intangible assets, but 2 of the 5 companies provide information on the book value and additions to the book value. In addition to the capitalization behaviour it was also examined whether the capitalized development costs of the companies are business-related or non-business-related. We label development costs as business-related when there is a link between the type of development costs and the company's main business activity (cf. eg. Leibfried & Pflanzelt, 2004). In our survey 7 companies capitalize business-related development-costs and 5 companies capitalize non-business-related development costs (in all cases this is internally generated software). 2 companies capitalize business-related as well as non-business-related development costs. The remaining 9 companies do not specify what kind of development-costs have been capitalized. The 5 highest

(absolute) book values are in both years obtained by the same companies, only the ranking varies. 2 of these companies capitalize business-related development costs, 2 non-business-related development costs and 1 company does not provide any information.

Regarding the subsequent valuation, all investigated companies apply the acquisition cost model when doing the subsequent valuation. 13 out of 23 companies indicate a concrete useful life. While 4 companies report an exact number of years, further three companies indicate a useful life with a maximum range of 4 years. The remaining companies have bandwidths of useful lives longer than 4 years.

**Table 4: Capitalization ratio of capitalizers organized by industry-clusters<sup>2</sup>**

			Expensed R&D outlays (t€) in the Profit and Loss Statement		Addition to internally generated intangible assets		Capitali- zation ratio
			sum	mean	sum	mean	mean
Industry cluster	ATL	2015	19,388	9,694	67,452	33,726	81.50%
		2016	42,658	21,329	74,208	37,104	72.08%
	CPH	2015	20,074	20,074	1,412	706	2.36%
		2016	25,520	25,520	1,481	741	2.88%
	BCM	2015	163,338	54,446	17,697	4,424	7.82%
		2016	168,078	56,026	19,663	4,916	10.71%
	IND	2015	163,426	16,343	40,734	4,073	29.43%
		2016	185,286	18,529	67,772	6,777	33.76%
	STT	2015	49,946	24,973	62,875	31,438	37.23%
		2016	57,950	57,950	6,365	3,183	7.68%
total	2015		423,556	21,178	277,641	12,620	33.38%
	2016		486,423	25,601	214,489	9,750	32.81%

In a further step we calculated the capitalization ratio, which relates the capitalized R&D costs to the overall R&D outlays (capitalized and expensed R&D expenditures) – incurred by capitalizers.

The investigated capitalizers recognize 33.38% in 2015 and 32.81% of their total R&D outlays as internally generated intangible assets. A very high capitalization rate could be found in the ATL (automobile, transportation, logistics) industry cluster with 81.50% in 2015 and 72.08% in 2016.

Two companies (industry cluster BIF/market segment prime market and industry cluster IND and market segment mid market) capitalize 100% of all R&D outlays. The company in the banking industry capitalizes non-business-related development costs (software), the other company doesn't specify the type of capitalized development costs. High capitalization rates of 91% (2015) and 85% (2016) as well as 72% (2015) and 59%

<sup>2</sup> 3 companies (industry clusters BIF, CPH, BCM) in 2015 & 2016 and 1 company (industry cluster STT) in 2016 don't offer disclosures in regard to expensed R&D outlays. Since there is data of only 1 company in the clusters BIF and CFR in 2015 and 2016, these clusters are not shown separately in the table. In the industry cluster STT in 2016 only 1 company makes disclosures regarding expensed R&D outlays.

For 1 company (industry cluster BIF) there is no reported addition to internally generated intangible assets in both years.

(2016) are reported by 2 companies in the industry cluster ATL (automotive, transport, logistics) as well as by 1 company in the industry cluster IND (industrials) with capitalization rates of 64% (2015) and 72% (2016). 2 of the companies capitalize business-related development costs, 1 company doesn't specify the type of costs.

Beside descriptive statistics we also used t-tests in order to compare capitalizers and non-capitalizers with respect to specific variables.

By exploiting the optional capitalization, companies improve their equity ratio over the useful life of the internally generated asset. We assume that capitalizers have a lower (adjusted) equity-ratio than non-capitalizers. In order to reverse any effects resulting from capitalization we use adjusted values to calculate the equity ratio. The adjusted equity (shown equity adjusted by the capitalized book value of internally generated intangible assets) is set in relation to the adjusted balance sheet total. Capitalizers show a median of 34%, the first quartile lies at 29%, the third quartile at 37%. The group of non-capitalizers has a median of 46% while 32% and 57% mark the first and third quartile. The t-test (independent) for heterogeneous variances in SPSS shows a significant result  $t(19.436) = -2.204$ ,  $p = .040$  (two-sided).

We also assumed that capitalizers differ from non-capitalizers due to their a) amount of acquired intangible assets, b) amount of investment in PPE and c) duration of listing at the Austrian stock market. In all cases we failed to reject the null hypotheses and hence assume that capitalizers and non-capitalizers are equal with regard to these variables.

This empirical study demonstrates that internally generated assets are of high importance for listed Austrian companies. Although the national Austrian law prohibits the capitalization of internally generated intangible assets, the majority of listed Austrian companies makes use of the option to capitalize the assets in their consolidated financial statements. As already shown by previous studies, we also found industry-specific differences in the Austrian stock market. Due to the additional recognition criteria of IAS 38.57 many development costs are not included in the companies' balance sheets. To conclude, the development towards a knowledge-based society will require adjustments to IAS 38 in the future, so that significant internally generated intangible assets are reflected in the companies' balance sheets.

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### 3 The Shareholder Value Analysis of Hungarian Company Acquisitions in the period of 2007 and 2010

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**Keywords:** Hungarian mergers and acquisitions, shareholder value

**JEL Classification:** G34, G38

In Hungary 784 M&A transactions occurred between 1997 and 2015, which required permission from the Hungarian Competition Authority. A permit is required for M&A if net sales of the companies concerned were over HUF 15 thousand million and there are a minimum two of the companies concerned whose net sales amounted to more than HUF 500 million in the previous business year. In my earlier studies I investigated the sectoral and geographical characteristic of the 784 M&As, because one can find the relevant decisions on the homepage of the Hungarian Competition Authority for this period.

Contrary to mergers, there are several ways to undertake corporate acquisitions. The acquiring company may purchase either the entire target company or only the majority shareholding of the target company (these are the management acquisitions, which means taking over the control in the target company), and also each asset (their properties, equipments) and plants of the target company. In Hungary, the number of company acquisitions between 2007 and 2010 was minimal, therefore management acquisitions prevailed on the M&A market. Asset acquisitions represent a significant group, too, with a share of 20 percent.

The basic goal of acquisitions – as with any investment – is value creation. In my work, I would like to examine whether the company acquisitions undertaken in Hungary between 2007 and 2010 have helped to increase shareholder value, that is, whether the undertaken M&A transactions have created or destroyed shareholder value. The calculation of the value generators and shareholder value is based on the database created from the date of the acquiring companies' balance sheets, profit and loss accounts and cash flow statements.

In Hungary, between 2007 and 2010, the present value of the FCF calculated by value generators by Rapaport and by the cash-flow statement prepared pursuant to the Hungarian Accounting Act declined after the transaction, which was verified by the negative SV values of the investigated companies.

## 4 End-of-period convention and expected asset life: Do two wrongs make a right?

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**Keywords:** present value calculation, end-of-period convention, uncertainty of the asset life, relative error

**JEL classification:** G32

There are several approaches to value an asset (i.e. cash flows generated by an asset) in finance, for example relative valuation, valuation based on real option models and the commonly used discounted cash flow (DCF) valuation. This research will put under the microscope the DCF valuation, because knowing it is basic requirement to understand the other two approaches.

The discounted cash flow valuation is based on present value calculation, whose essence is that the value of an asset can be determined by its future expected cash flows discounted to the present, considering the cost of capital as a discount rate which reflects the riskiness of the asset. There are two main forms of the present value calculation: discounting discrete cash flows occurring at specified times with a discrete discount factor for a period with given length or discounting cash flows in continuous time with a continuous discount factor for a given period. (Park and Sharpe-Bette, 1990; Remer, Tu, Carson, Gainy, 1984; Eschenbach, 2011) In the study, I will consider only the continuous case.

There is a well-known form of present value calculation, what is referred to further on as “textbook” method. According to the “textbook” method, the following inputs are needed to calculate the present value of an asset: length of the valuation time period (usually a year); the expected life of the valued asset (in the same unit as the valuation time period); the estimated cash flows aggregated to the end of the time period; and the value of the estimated discount factor. (Dülk, 2013) These are mostly simplifying assumptions, which make the calculation easier, but less accurate as well.

The question is, should we calculate the present value of an asset a more complex way and might get a better result, or the “textbook” method gives a reasonably accurate result considering its simplicity. To decide this, we should compare the “textbook” method to cases when some of its simplifying assumptions have been resolved. Luckily, the inaccuracy of such cases, i.e. errors can be measured, which is a key element of this study. Such errors could stem from, for example: the end-of-period convention (i.e., cash flows are aggregated to end of the period in which they occur); calculation according to expected life-span (i.e., negligence of the uncertainty of the asset's economic life); estimation errors in the expected cash flows and the discount rate, etc. (Dülk, 2013) From now on, I will also use the term error to the simplification itself which causes the error. It is also important, that the magnitude of errors depends on the cash flow pattern and the probability distribution of life of the asset, therefore I chose to examine the combination that may be regarded as the most typical in practice: continuous exponential cash flow pattern with exponentially distributed life.

Continuous exponential cash flow pattern mathematically means  $F(t) = Ce^{jt}$  and exponentially distributed lifespan means  $f(T) = \lambda e^{-\lambda T}$ . Then the theoretically accurate present value ( $P_a$ ) analytically can be calculated (e.g., Zinn, Lesso, Motazed, ,1977) as:

$$P_a = \int_0^{\infty} E[F(t)]e^{-rt} dt = \int_0^{\infty} Ce^{jt} [1 - (1 - e^{-\lambda t})] e^{-rt} dt =$$

$$= \int_0^{\infty} Ce^{(j-\lambda-r)t} dt = \frac{C}{-j + \lambda + r},$$

where  $C$  is a constant cash flow parameter,  $j$  is the continuous growth rate,  $r$  is the continuous discount factor,  $t$  is the time,  $T$  is the expected life of the asset as a variate and  $\lambda$  is the parameter of the exponential distribution (i.e.  $1/E(T)$ ). There is a convergence criterion,  $j < (r)$ , which must hold or else the improper integral would be divergent, i.e. the present value would be infinite. I will only examine the interval of the parameters where this inequality holds.

Based on previous studies examining the errors separately, it can be established for the above-mentioned pattern-life combination that, for non-negative discount rates exceeding the growth rate, the end-of-period convention leads to underestimation (Dülk, Andor 2013a), while in general the calculation according to expected life leads to overestimation (Dülk, Andor 2013b). The motivation of this research is that making the two errors in the same time (i.e. in case of the “textbook” method) may result in a more accurate approximation – considering the absolute value of the error – compared to making only one of the errors.

For all these reasons, this research aims to analyse the aggregate effect of errors from the end-of-period convention and calculation according to the expected life. First, I define three different cases to be examined, the “textbook” method, the correct cash flow pattern method and the probability weighted cash flow method.

The first case is the “textbook” method and the analytical estimation of the present value of the “textbook” method ( $\hat{P}_t$ ) is the following:

$$\hat{P}_t = \sum_{t=1}^{E(T)} F(t) e^{-rt}.$$

The second case is calculation according to the correct cash flow pattern ( $\hat{P}_p$ ).

$$\hat{P}_p = \int_0^{E(T)} Ce^{jt} e^{-rt} dt.$$

The third case is where I am weighting the end-of-period cash flows by the period ends' probability of occurrence associated with the life uncertainty ( $\hat{P}_w$ ), thereby approximately taking into account such uncertainty.

$$\hat{P}_w = \sum_{t=1}^{E(T)} F(t) \times p(t) \times e^{-rt}$$

Some formula cannot be interpreted when  $j=0$  and  $j=r$ , so these subcases need to be examined as well in every case to be able to compare them.

I will use the relative error to compare the different cases. The relative error ( $\varepsilon$ ) can be defined using the ratio of the estimated ( $\hat{P}$ ) and the theoretically accurate present value, such as:

$$\varepsilon = \frac{\hat{P}}{P_a} - 1.$$

The relative error depends on three main parameters: the growth rate, the discount rate and the expected life of the asset. As a preliminary point, it is important to say, that some restrictions must be made about the in-

terval of these parameters to get mathematically appropriate and interpretable result, but luckily these restrictions do not exclude the important interval of the parameters which are decisive in practice. The examined interval of the growth rate is between 0% and 20% and the examined interval of the discount rate is between 0% and 30%. The examined expected lifespan is 2, 5, 10, 15, 20 and 40 years.

After determining the relative error of each method, I analyse when the “textbook” method is more accurate than the calculation until the expected life with the correct cash flow pattern. Then, I examine if the accuracy of the “textbook” method can be improved by weighting the end-of-period cash flows by the period ends' probability of occurrence associated with the life uncertainty, thereby approximately taking into account such uncertainty.

When  $j < r$  (including the subcase when  $j = 0$ ) and the expected life of the asset is less than 14 years, then the “textbook” method is the most accurate approach, or at least it is really close to the most accurate approach, i.e. the absolute different between the two relative errors is less than 5%. When the expected life exceeding 13 years the probability weighted method is becoming more and more preferable. When  $j \geq r$  for each examined expected lifespan the case according to the correct cash flow pattern is the most accurate and the “textbook” method is only the second best, but if the growth rate is less than 10%, which is typical in practice, then the difference between the two methods is less than 5%, so we can say that the “textbook” method is preferable considering its simplicity.

Ergo based on the results, comparing the accuracy of the above three approaches, I conclude that for typical values of the parameters in practice, it is not worth to take either the correct cash flow pattern or the life uncertainty into account beyond the “textbook” method.

#### **About the author**

**Nikolett Szallerné Sereg** is a third year PhD student at Budapest University of Technology and Economics in Finance program. Simultaneously the author takes part in the Pallas Athéné Domus Educationis Foundation's talent program for PhD Students. The author has a master's degree in finance and a bachelor's degree in engineering economics from Budapest University of Technology and Economics.

# 5 The utilization of loyalty cards, CRM and big data as drivers of market share growth

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**Keywords:** Loyalty programs, competitive advantage, CRM, data mining, customer needs, market share.

**JEL classification:** M 3, M 37, C 8

Aiming to succeed in the today's competitive marketplace and strong competition, firms have no choice but to "be competitive". Thus, attempting to increase the market share firms are offering qualitative products and services endeavouring to identify and meet the needs of consumers and add value.

According to Kotler and Armstrong (2012), good customer relationship management can help marketers increase their share of customer—the share they get from the customer's purchasing in their product categories. Depending on the firm's sector Kotler and Armstrong (2012) stress that banks want to increase "share of wallet", Supermarkets and restaurants want to get more "share of stomach", car companies want to increase "share of the garage" and airlines want greater "share of travel."

Nowadays firms are using innovative methods and new technologies to increase the customer base and their market share.

Numerous firms worldwide use and invest in big data, Customer Relationship Management (CRM) and loyalty programmes ever more and more. According to Meyer-Waarden *et al.* (2013), loyalty or frequency reward programmes represent key marketing activities. For instance, French grocery retailer Carrefour devotes approximately € 80 million of its annual marketing expenditures to managing its loyalty program. These programmes are widely accepted, for instance, 90 percent of French customers, 85 percent of UK consumers, 81 percent of Canadians and 55 percent of the US population are enrolled in at least loyalty programme (Meyer-Waarden and Benavent, 2009). *Smart companies capture information at every possible customer touch point such as customer purchases, sales force contacts, service and support calls, Web site visits, satisfaction surveys, credit and payment interactions, market research studies—every contact between a customer and a company* (Kotler and Armstrong, 2012). Earlier this information has been distributed to the organization and ended in archives that mainly represented a cost to the company. Nowadays firms are using this data to investigate the customer behaviour. According to Kotler & Armstrong (2012), many companies are now turning to customer relationship management (CRM) to manage detailed information about individual customers and carefully manage customer touch points to maximize customer loyalty. The advancement of technology has enabled businesses to conduct almost all their business processes through the internet. The adoption of e-commerce has enabled the purchasing process to be conducted online. Firms now are more interested to build a close relationship with customers in order to understand their needs and preferences as well as buying habits. In today's business environment and strong competition, firms are using the data mining, to dig deeply into data obtained from customer loyalty cards. Hereby, firms use the customer insights gained for everything from targeting coupons to locating and stocking its stores.

The use of CRM enables the companies to better understand customers and their needs. Thus, companies can provide higher levels of customer service and develop deeper customer relationships. The data from CRM can be used to increase sales through cross-selling of company's products and create offers tailored to specific customer requirements (Kotler and Armstrong, 2012).

For example, the CRM system at phone and online gift retailer 1-800-Flowers gives customer-facing employees real-time access to customer information. When a repeat customer calls, the system immediately calls up data on previous transactions and other contacts, helping reps make the customer's experience easier and more relevant. In this way, firms get the information on the customer's purchase preferences and contact them and keep them updated with the newest product selection as well as with other similar products as per their preference and taste.

The utilization of loyalty cards differs both from the level of usability and from the quality of exploitation. Loyalty programmes comprise integrated systems of marketing actions and communications that aim to increase loyalty, repeat buying, and switching costs by providing economical, hedonist, informational, functional, and sociological or relational rewards (Gwinner et al., 1998; Gable et al., 2008). They are thought of as activities that offer incentives (rewards) to customers based on evidence of loyalty (purchase frequency or amounts). These rewards refer to any compendium such as points, discounts, incentives granted by the loyalty programme that launch consumers' internal cognitive efforts and strengthen the intensity of approved purchase behaviours, such as loyalty.

Firms in Kosovo have begun to use loyalty cards in order to be competitive in the market and to increase their market share. The aim of this paper is to investigate the adoption of loyalty programmes and cards, big data mining and Customer Relation Management (CRM) from firms in Kosovo. In addition, this paper explores the customer's benefits from the loyalty programmes. Special focus in this paper is devoted to the quality of the usage the obtained customer data (data mining) in order to understand the customer behaviour and their preferences and thus to offer customers the packages with their preferred products and other similar products for the purpose of increasing firms sales by cross-selling.

Our paper presents a qualitative research using in-depth interviews with marketing departments staff from the two investigated firms.

For our research purpose we have investigated two firms in Kosovo Meridian express and Bamex L.L.C. in order to compare the exploitation of loyalty programs, the rewards and benefits that these two firms are offering to their customers as well whether the data generated from the loyalty programmes are used in order to benefit from the customer preferences and needs and thus improve their services and products in order to satisfy the customer needs as well as increase sales and profits. The obtained results from these two firms in Kosovo are compared with the results of firms operating worldwide.

Meridian Express – the first firm that we have investigated was established in October 2012 as a network of neighbourhood stores. They are present in the seven main cities of Kosovo with the motto "at your doorstep". Their goal is to serve their customers in every neighbourhood, by saving their time, offering fresh products, a very enjoyable shopping environment, and very friendly service to each customer. The firm operates with 35 stores in seven (7) largest cities in Kosovo: Prishtina, Mitrovica, Peja, Prizren, Ferizaj, Gjilan and Gjakova. With such a concept the firm has attracted many customers. Currently, the firm has employed more than 400 employees – as the firm stress "we possess a team that quickly assess every critical situation, identify alternatives and implements solutions that meet customer demand promptly." The firm's goals and values of social responsibility are what define and guide them – and their commitment to innovation and continuous improvement is what differentiates Meridian express as a company in the entire Kosovo market. The firm has experienced growth by expanding their stores in all main cities of Kosovo. Meridian express presents a so-



cially responsible corporate leader in Kosovo. Now they are presented with the new concept of stores, where Meridian Kitchen and Buka Bakery are included, aiming to offer to their customers a stronger reason to shop in their stores, where there are a variety of groceries at affordable prices and a range of great products including Coffee, Sandwiches, Pastries and Food Service.

The firm continues to invest in their loyal customers by rewarding them for every purchase they make through the ME Loyalty Program.

Since from the beginning, Meridian express has continued to invest in their trusted customers by rewarding them for every purchase they make through the “My Card” Loyalty Program. This is the most successful Loyalty Card Program in Kosovo with over 40,000 cards issued.

During these years, the firm has launched two catalogues as well as two leaflets with gifts, with over 10,000 customers rewarded. To become part of this program, the procedure is very simple, free of charge, and includes only filling out the application with personal data at all Meridian Express, locations and ME Loyalty card will be issued immediately to the customers. The benefits of Loyalty Program are as follows:

- 📄 Get discounts and gifts for children,
- 📄 home furnishings,
- 📄 home appliances,
- 📄 gift coupons,
- 📄 basketball tickets,
- 📄 books,
- 📄 theatre tickets and
- 📄 many other bonuses;

Every customer for each purchase they make, they collect points. Depending on the number of accumulated points, they can select the gift with the points assigned in the catalogue.

The second firm that we have investigated is supermarket Bamex L.L.C the biggest supermarket in Mitrovica. The has its premises with around 4.000 m<sup>2</sup> and operates only in Mitrovica region.

In order to satisfy the needs of consumers, the supermarket offers a large car parking space, a restaurant and a children's corner. The supermarket also has a large green yard with big high trees and children's toys around, providing consumers with an environment to enjoy the purchase.

The firm is investing in their loyal customers by rewarding them for every purchase they make through the Loyalty Program with discounts.

Depending on the quantity of purchase, the firm offers different discount rates in every purchase they make. The discount rate varies from 1.5% -2%. Usually, the highest discount is offered to the business clients since they purchase large quantities of products are regular and loyal customers.

For our research purpose, we have contacted the marketing department of the two firms. The depth interviews are conducted with marketing staff from the investigated firms. Based on our results, both firms are using the loyalty programs only to reward them with gifts and discounts.

When asked whether the firms are using the obtained data from the loyalty programs to data mining in order to understand the customer behaviour and their preferences and thus to offer customers the packages with their preferred products and other similar products for the purpose of increasing firms sales by cross-selling, both firms both firms stated that they have not yet begun to use such data with the aim of increasing sales, profitability, as well as their market shares.

Both firms stressed that their aim was to increase the customer satisfaction and thus the level of customers

loyalty.

Both firms were very cooperative during the interviews and they stated that they had intended to start exploring the data of consumers (data mining) and to do something more concrete in order to be in step with the local competition and to be on the line with the global firms.

The interviewed firms claimed that our in-depth conducted interviews and the exchanged information served as a push device and a marketing tool for their firms toward utilisation of the customer data from their loyalty programs in order to investigate the consumers behaviour and their purchase preferences, attempt to meet and exceed the consumer expectations and thus having satisfied and delighted consumers.

Based to our research in our paper we can conclude that both firms in Kosovo are building competitive advantage through business-level strategy, which encompasses the business's overall competitive theme, the way they position themselves in the marketplace to gain a competitive advantage, and the different positioning strategies that can be used in various industry settings. Meridian express has successfully managed to focus since from the beginning in differentiation and to expand its stores all over the biggest cities of Kosovo. The ability of Meridian express to fit each particular market with their competitive advantage, with their team that quickly assess every critical situation, identify alternatives and implements solutions that meet customer demand promptly, and their commitment to innovation and continuous improvement is what differentiates this firm in the entire Kosovo market. Aiming to offer to their customers pleasant and stronger reason to shop the Meridian Kitchen and Buka Bakery are included, with a range of great products including Coffee, Sandwiches, Pastries and Food Service.

Both firms are driven by hard work, goodwill, and high commitment that have enabled them to operate successfully all over these years. As we are living in the information age we suggest to both firms, to accumulate and analyse information customers information in order to gain an in-depth understanding of their needs, preferences which are vital and is critical to businesses, as it allows them to make informed decisions with predictable outcomes. As Charles Darwin quote: "It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change". Therefore, changing strategies and adapting to business environment presents the strengths of nowadays companies and gives the conviction of a sustainable growth in the market.

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**Arind Avdullahi** is currently working as an AI and Blockchain developer for Matrics, while he has previously worked as a full-stack web developer for PECB. He finished his bachelor studies in computer science at the University of Sheffield receiving a first-class degree. He has participated in a research project funded by Sheffield Undergraduate Research Experience (SURE) and has published the work conducted during the research project. He is very enthusiastic about new developing technologies such artificial intelligence, machine learning and big data. In particular he is interested in the applications of such technologies in enterprises. He believes that in our current age, accumulating and analyzing information is critical to businesses, as it allows them to make informed decisions with predictable outcomes.

## 6 Estimating the Discount for Lack of Liquidity using Trading Frictions of Thinly Traded Stocks: The Small Market (Austrian) Case

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**Keywords:** Discount for Lack of Liquidity, Discount for Lack of Marketability, Illiquidity Discount, Marketability Discount, Intervalling Effect, Thin Trading, Business Valuation, Market Approach, Valuation of Privately Held Businesses

**JEL classification:** G34

### Introduction and Problem Setting

When using trading data to value privately held businesses (entire businesses, operating units of businesses or significant interests in businesses), according to the Levels of Value Model (independent of the old, the newer or the newest view), a Discount for Lack of Liquidity (Liquidity Discount) or Discount for Lack of Marketability (Marketability Discount) respectively, has to be deducted from the “As if freely traded Minority Interest Value” derived from public company data to take into consideration the differences in value between the minority interests of public companies and privately held businesses caused by their diverging liquidity.

### Literature Review

Several streams of either empirical or theoretical research have evolved to calculate the Liquidity Discount. The empirical stream of research is based on empirical data and primarily includes Benchmarking Studies (Restricted Stock and Restricted Stock Equivalent Studies, Pre-IPO Studies, Delisting Studies, Cross-Index Studies and Acquisition Studies), Cross-Section Studies as well as Blockage Studies, all using different proxies to measure the discount. The theoretical stream of research primarily includes Option Pricing Models and the LEAPS Model as well as Quantitative Computational Models.

Benchmarking Studies (Restricted Stock and Restricted Stock Equivalent Studies) estimate the Liquidity Discount by comparing the value of privately traded (restricted) stock and publicly traded stock of the identical company. Since the initial Securities and Exchange Commission Study in the early 1970s (SEC, 1971), many studies of this type have been conducted on the U. S. market. Important studies have been conducted (in chronological order) by Gelman, 1972, Moroney, 1973, Maher, 1976, Trout, 1977, Arneson, 1981, Pittock and Stryker, 1983, Hall and Polacek, 1994, Management Planning, 2000 & 2009 & 2011, Johnson, 1999, Aschwald, 2000, Oliver and Myers, 2000, Robak, 2001 & 2007 & 2011, Lerch, 2003, Willamette Management Associates, 2008, Harris, 2009 & 2011, Stumpf and Martinez, 2011 as well as FMV Opinions, annually.

Pre-IPO Studies estimate the Liquidity Discount by comparing the price of an interest in a company prior to an initial public offering to the trading price of common stock in the same company after the IPO. In doing so, it is assumed that stock sold prior to the IPO is nonmarketable and the same stock subsequent to the IPO is fully liquid and the change in price entirely reflects improvement in the liquidity of the stock. Important studies of this type conducted on the U. S. market are (in chronological order) the Emory-Studies (including ten studies covering the period 1982 through 2002), the Hitchner and Morris Studies (three studies covering the period 1980 through 1996), the Willamette Management Associates Studies (mostly yearly studies covering the

period 1975 through 2002) and the Valuation Advisors Studies (two studies covering the period 1995 through 2008).

Delisting Studies estimate the Liquidity Discount by comparing the difference in value of identical stock listed on a stock exchange and after delisting in a certain event period around the announcement date of the delisting. Important studies of this type have been conducted on the U. S. market (in chronological order) by Sanger and McConnell, 1986, Edelman and Baker, 1993, Abbott, 2004, Macey and O'Hara and Pompilio, 2008, and on the German market (in chronological order) by Eisele and Walter, 2006, Kemper 2007, Aders and Muxfeld and Lill, 2015, Karami and Schuster, 2016, Pils and Knoll, 2016 as well as Wessels and Röder, 2016.

Cross-Index Studies estimate the Liquidity Discount by measuring the difference in value of identical stocks listed on one stock exchange and after moving to another stock exchange. Important studies of this type have been conducted on the U. S. market (in chronological order) by Amihud and Mendelson, 1986 & 1991, Harris and Gruel, 1986, Shleifer, 1986, Kadlec and McConnell, 1994, Beneish and Whaley, 1996 & 2002 as well as Garvey, 2000.

Acquisition Studies estimate the Liquidity Discount relying on a comparison of the acquisition pricing multiples of privately held businesses to the acquisition pricing multiples of public companies. Important studies of this type have been conducted on the U. S. market (in chronological order) by Koeplin and Sharin and Shapiro, 2000, Kooli and Kortas and L'Her, 2003, Officer, 2007 as well as Paglia and Harjoto, 2010 and on the German market by Dodel, 2008.

Cross-Section Studies estimate the Liquidity Discount using a multivariate regression model to investigate the reasons for and to dynamize the calculation of the discount. The critical factors affecting the discount identified are, among others, volatility, holding period, registration rights, block size, placement size, firm size, profitability, dividend payment, distress, market reference price, market conditions and the type of the investor. Important studies of this type have been conducted on the U. S. market (in chronological order) by Myers and Majluf, 1984, Wruck, 1989, Silber, 1991, Hertz and Smith, 1993, McConaughy and Cary and Chen, 2000, Abrams, 2000 & 2010, Bajaj and Denis and Ferris and Sarin, 2001, Feldman, 2002, Kania, 2002, Abbott, 2003 & 2012, Lerch, 2008, Mitchell and Norwalk, 2008, Grabowski and McConaughy, 2010 as well as Angrist and Curtis and Kerrigan, 2011.

Blockage Studies (Market Impact Studies) estimate the Liquidity Discount measuring the price pressure resulting from the immediate reduction in a stock's price due to an increase in share volume brought to the market at a point in time. This one-time price increase in the order flow of stocks results in a price decline followed by a price reversion, i. e. an increase in price. Important studies of this type have been conducted on the U. S. market (in chronological order) by Amihud, 2002, Abbott, 2007, Barenbaum and Schubert, 2009 as well as Hall, 2010.

Option Pricing Models estimate the Liquidity (Marketability) Discount based on the economic concept of opportunity cost, i. e. the concept of foregone alternatives. In theory, the investor could purchase a hypothetical put option to sell a nonmarketable stock. Important Option Pricing Models are the Option Pricing Model based on the Black-Scholes Option Pricing Model using an at-the-money European Put Option (Chaffee, 1993), the Shout Liquidity (Marketability) Put Option Model (Katsanis, 2012), the Upper Bound Lookback Put Option Model (Longstaff, 1995), the Average-Strike Put Option Model (Finnerty, 2012), the Adjusted Arithmetic Average-Strike Option Model (Chaidarov, 2009) correcting mathematical errors in the Average-Strike Put Option Model using an alternative analytical closed-end approximation, the Forward-Starting Put Option Model (Chaidarov, 2014) and the Perpetual Exchange Option Model (Chaidarov, 2010). The LEAPS Model (Trout, 2003, Seaman, 2010 & 2011) is a sub-type of the Option Pricing Models that uses long-term equity

anticipation securities to estimate the Liquidity Discount. LEAPS are long-term American-style options that allow the holder to protect the purchase value of his investment for a certain period.

Quantitative Computational Models (Shareholder Cash Flow Adjustment Models) adapt the traditional CAPM-based Discounted Cash Flow Models. The Quantitative Marketability Discount Model (Mercer, 1997) and the Time Value Model (Stockdale, 2006) both adjust the parameters of present value calculation by varying the required rate of return and the anticipated period of liquidation. The QMDM estimates a difference in value if immediately realizable versus the present value of the expected delayed realization. The Time Value Model explicitly incorporates the inherent uncertainty in the estimated liquidation period. A second set of models incorporate the notion of lack of diversification in addition to the time dimension of delayed liquidation and consequent ability to diversify. The Tabak Model (Tabak, 2002) treats the stockholder restricted from selling the security interest as an undiversified investor subject to an increased risk due to the lack of diversification, and treats this incremental cost of diversification as a proxy for the cost of liquidity (marketability). The Moelbroek Model (Moelbroek, 2002) alternatively uses the difference between the asset beta and the ratio of standard deviation of returns for the asset and the market as a measure of the incremental risk taken by the undiversified holder during the period of restriction. Finally, the Kahl and Liu and Longstaff Model (Kahl and Liu and Longstaff, 2001) views the value of restricted stock as a function of stock volatility, beta, the holder's risk aversion coefficient, the fraction of liquid wealth to total wealth and the time to hold the stock.

A test of several Option Pricing Models and quantitative Computational Models compared to real world restricted stock data (Stockdale, 2008) shows that all of the models have strengths and weaknesses. Some models produce results that appear representative on short time frame but unrealistic for longer time periods, others produce discounts that unrealistically decline at a longer time frame after reaching a peak. In summary, the Moelbroek Model seems to be most useful in both short- and long-term periods.

### Model Description

This paper presents an alternative model combining either elements of a computational model and impacts of empirical data.

The empirical part of the model is based on the intervalling effect in measuring betas with different liquidity due to trading frictions, i.e. betas of stocks with low liquidity are distorted because of the time lag of the stock price reaction caused by infrequent trading. The model is described in three steps.

In the first step, the intervalling effect is empirically measured. The degree of infection of the betas caused by infrequent trading is calculated based on the multifactor model of Dimson using the Aggregated Coefficients Method (Dimson, 1979; Dimson and Marsh 1983) created to adjust the beta estimate due to this infrequent trading. The calculation is based on a daily trading frequency (return data).

$$r_{t,k,i} = \alpha_{t,i} + \sum_{k=-t}^k \beta_{t,k,i} \cdot r_{t,t+k}^{index} + \varepsilon_{t,i} \quad [1]$$

$$\beta_{t,i}^{DIMSON} = \sum_{k=-t}^k \beta_{t,k,i} \quad [2]$$

In calculating the beta, two major specifications are made: (i) In case the company's stock is not traded on a day, the last price of the last day of trading  $t - d$  was used (Repetition of Last Quote Method) (Serra and Martelanc, 2013) and (ii) The index (market) is composed of the six most frequently traded stocks in the market; as their trading is very frequent compared to many of the other stocks in the market, only the lagged coeffi-

coefficients are of importance and therefore only lagged coefficients are used.

$$r_{t,i} = r_{t-d,i} \quad [3]$$

The calculation of the beta using the DIMSON-Method gives the “true” (unbiased) beta of an infrequently traded stock. DIMSON betas are usually higher than OLS betas because the OLS-Method underestimates the “true” beta of infrequently traded stocks. The Degree of Infection subsequently indicates the difference between an OLS beta estimate (infected beta) and the Dimson beta estimate (uninfected beta).

$$\phi_{t,i} = \beta_{t,i,\text{unlevered}}^{\text{DIMSON}} - \beta_{t,i,\text{unlevered}}^{\text{OLS}} \quad [4]$$

The Degree of Infection is used as an indicator (measure) of the effect on risk caused by diverging liquidity.

In order to avoid distortions caused by different D/E-Ratios of the companies, both beta estimates, DIMSON and OLS, are converted into their corresponding unlevered beta estimates using the Hamada conversion.

$$\beta_{t,i,\text{unlevered}}^{\text{DIMSON (Hamada)}} = \frac{\beta_{t,i,\text{levered}}^{\text{DIMSON}}}{1 + (1 - s_i) D_i/E_i} \quad [5]$$

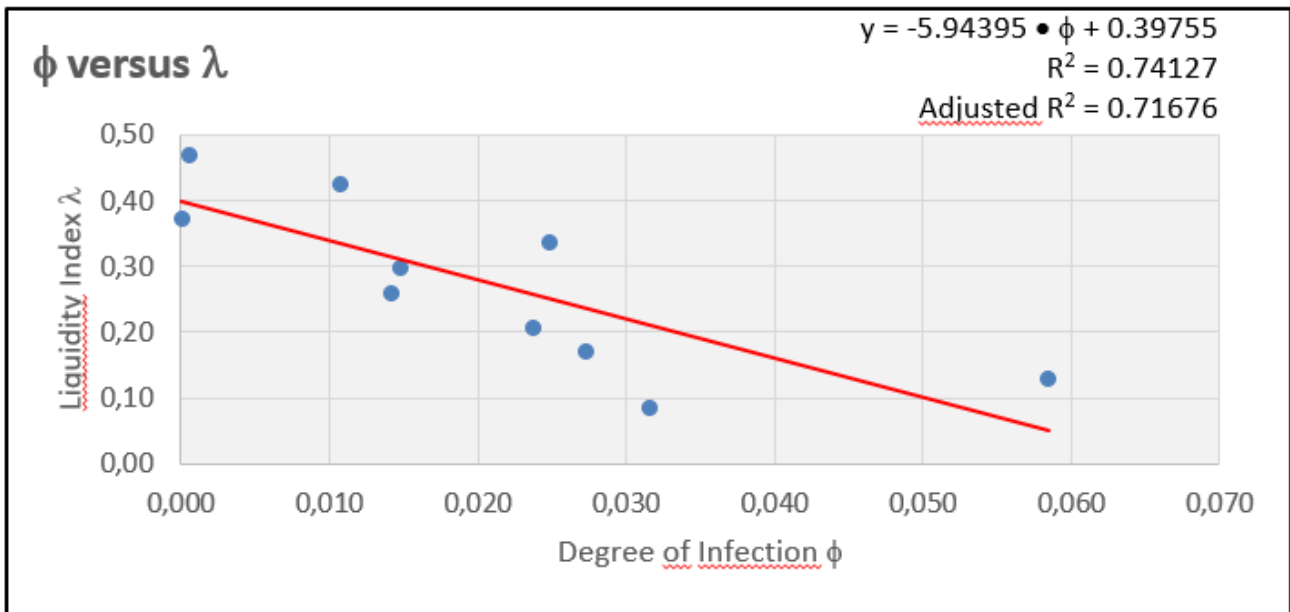
$$\beta_{t,i,\text{unlevered}}^{\text{OLS (Hamada)}} = \frac{\beta_{t,i,\text{levered}}^{\text{OLS}}}{1 + (1 - s_i) D_i/E_i} \quad [6]$$

In a second step the (virtual) degree of infection of a privately held business is assessed. Therefore, the degree of infection of the unlevered betas of all stocks is regressed against the level of liquidity of these stocks using a univariate linear regression model. This is measured by a liquidity index consisting of the trading volume, the trading turnover and the trading intensity in days.

$$\lambda_i = \frac{\frac{v_i}{v_{\max}} + \frac{\tau_i}{\tau_{\max}} + \frac{\exp(\delta_i)}{\exp(\delta_{\max})}}{3} \quad [7]$$

In doing so, the stocks are grouped into 10 size classes according to their market capitalization. As privately held businesses (entire businesses, operating units of businesses or significant interests in businesses) are not traded on a stock exchange and therefore their level of liquidity equals zero ( $\lambda_i = 0$ ), their (virtual) degree of infection can be assessed at the zero point of the regression line. The following figure shows an example of the regression line using 8 lag indicators.

Figure 1.



In the subsequent computational part of the model, following the general methodology of the Quantitative Marketability Discount Model (Mercer, 1997), in the final third step the Liquidity Discount is computed. The degree of infection is added to the average of all infected unlevered beta estimates. That means, the unlevered beta of a (virtual) privately held business (i. e. zero liquidity  $\lambda = 0$ ) is calculated by summing up the arithmetic mean of the unlevered OLS betas (infected betas) of all companies in the market and the degree of infection in case of zero liquidity.

$$\beta_{t,unlevered}^{\lambda=0} = \frac{\sum_{i=1}^i \beta_{t,i,unlevered}^{OLS}}{i} + \phi_{t,i} \quad [8]$$

Next, the required equity risk premium ERP for both the arithmetic mean of the infected betas and the uninfected beta of a (virtual) privately held business is calculated according to the Standard-CAPM Formula using the risk-free rate  $R_f$  for Austria as on Dec 31, 2015 and the arithmetic mean of the market risk premia MRP according to the Damodaran estimates for 2014 and 2015 for Austria  $\mu MRP$ .

$$ERP_{t,unlevered}^{infected} = R_f + \frac{\sum_{i=1}^i \beta_{t,i,unlevered}^{OLS}}{i} \cdot \sum_{j=1}^j \mu MRP \quad [9]$$

$$ERP_{t,unlevered}^{\lambda=0} = R_f + \beta_{t,unlevered}^{\lambda=0} \cdot \sum_{j=1}^j \mu MRP \quad [10]$$

Finally, the Liquidity Discount results from the difference of these two equity risk premia (converted into their corresponding trailing multiples) as a percentage deduction of the equity risk premium (trailing multiple) in terms of the uninfected beta estimate.



$$M_{t,unlevered}^{infected} = \frac{1}{ERP_{t,unlevered}^{infected}} \quad [11]$$

$$M_{t,unlevered}^{\lambda=0} = \frac{1}{ERP_{t,unlevered}^{\lambda=0}} \quad [12]$$

$$DLOM(DLOL)_{t,unlevered} = \frac{M_{t,unlevered}^{infected} - M_{t,unlevered}^{\lambda=0}}{M_{t,unlevered}^{infected}} \quad [13]$$

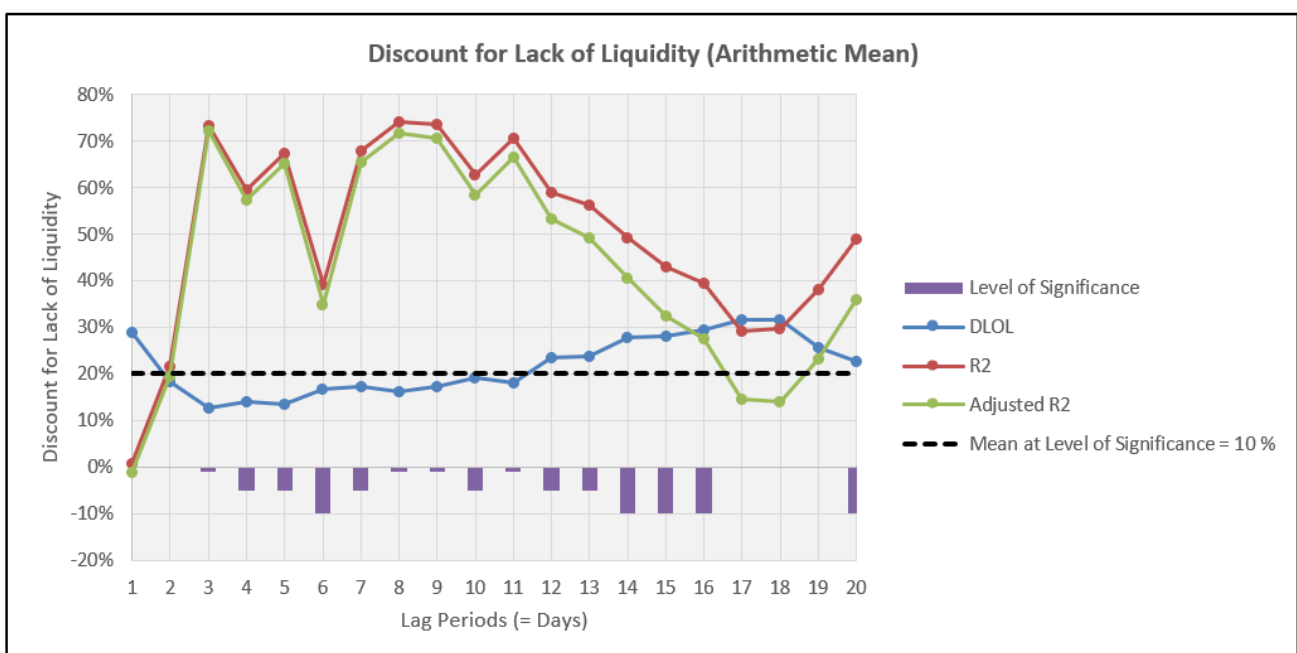
## Data

The beta estimates are based upon all stocks traded on the Vienna Stock Exchange in the Prime Market, the Mid Market and the Standard Market Continuous, fulfilling a minimum trading intensity requirement of 20 % of total trading days. In total, 55 stocks have been used, of them 26 having a trading intensity of 99 %, 4 having a trading intensity of 90 % and < 99 %, 7 having a trading intensity of 50 % and < 90 % and 18 having a trading intensity of 20 % and < 50 %. The time period taken into consideration is January 1, 2014 as to December 31, 2015.

## Findings

The mean of the Liquidity Discount is computed as the arithmetic mean of different intervallling time lags at a specified level of significance. At the 10 % level of significance, the discount averages 19.98 % (with a range of 12.59 % to 29.46 %; this is also indicated in the subsequent Figure 2. At the 5 % level of significance, the discount averages 17.48 % (with a range of 12.59 % to 23.51 %. Finally, at the 1 % level of significance, the discount averages 16.00 % (with a range of 12.59 % to 18.17 %.

Figure 2.



These findings can be validated comparing them with the results of other empirical research. In doing so, several restrictions have to be taken into consideration: (i) Most of the research results stem from the large U. S. stock market. Therefore, the differences in the results may not only be due to the model design, but in part be caused by general differences between small and large stock markets. (ii) The DIMSON Method regularly understates the “true” unbiased beta (Berglund and Liljeblom and Löflund, 1989). Therefore, this model produces, from a theoretical point of view, a lower bound of the Liquidity Discount.

The Benchmarking Studies (conducted on the U. S. market) result in a range of a Liquidity Discount between 8.7 % and 35.6 % (arithmetic mean) and 9.0 % and 34.6 % (median), respectively. The Pre-IPO Studies (conducted on the U. S. market) result in a range between 18.0 % and 59.0 % (arithmetic mean) and 19.0 % and 76.2 % (median), respectively. The Delisting Studies (conducted on the U. S. and the German market) considering event periods between [-1;+1] and [-40;+40] trading days result in a range of 3.6 % and 24,8 %. The Cross-Index Studies (conducted on the U. S. market) result in a range of 5.0 % and 10.0 %. The Acquisition Studies (conducted on the U. S. market) result in a range between 15.0 % and 70.0 % (arithmetic mean) and 6.0 % and 34.0 % (median), respectively, depending on the earnings measure used. The Cross-Section Studies (conducted on the U. S. market) result in a range between 7.0 % and 33.8 % (arithmetic mean) and 12.2 % and 21.0 % (median), respectively, depending on the earnings measure used. Finally, the Blockage Studies (conducted on the U. S. market) result in a range between 2.7 % and 11.8 %.

### Limitations and Further Research

The presented model faces some limitations that are due to further research efforts concerning the model design: (i) Including an increasing number of regression coefficients (beta) reduces the efficiency of the DIMSON-Method (Berglund and Liljeblom and Löflund, 1989). Therefore, different methods neutralizing trading frictions have to be examined (e. g. the Asymptotic Beta Coefficient Method invented by Scholes and Williams, 1977 and expanded by Cohen and Hawawini and Maier and Schwartz and Whitcomb, 1983, the Trade-to-Trade Method invented by Marsh, 1979 and Schwert, 1977 and expanded by Dimson and Marsh, 1983 and Maynes and Rumsey, 1993, or the Vasicek-Reduction invented by Vasicek, 1973). (ii) Using lag indicators on a daily trading basis does not always produce the most efficient estimator for the impact of trading frictions (Dimson, 1979, Serra and Martelanc, 2013). Alternatives to be examined are weekly or monthly lag indicators. (iii) Alternative proxies for liquidity have to be examined (e. g. singularly the trading volume, the trading turnover or the trading intensity; the bid-ask-spread; the correlation of liquidity and the standard deviation of stock returns). (iv) The influence of the grouping of stocks into size classes according to their liquidity as well as the fit of the linear regression have to be examined. (v) Alternative methods for the beta-conversion have to be examined. (vi) Outliers in the return calculations have to be identified and eliminated concerning the return (dependent variable).

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# 7 Investment Performance of the Industries by Using Economic Value Added

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**Keywords:** Economic value added, Return on investment, Sustainable value added, investment, investor, industry, government, cost, capital, value creation, performance evaluation

**JEL classification:** --

In today's global digital world, smart sustainable development, value and wealth creation for shareholders are among the most important goals of society. For achieving of the goals, the investor and government need some instruments in order to measure the potential value of each investment opportunity. It is clear that these instruments are not capable of predicting the exact future, they just provide some piece of information and advice that help the investor and government in the decisions they makes. Among these criteria, the most common types are Return on Investment (ROI), economic value added (EVA) and sustainable value added (SVA). These criteria follow the performance assessment with regard to the changes in the sustainable value and alongside maximizing the long-term shareholder and society returns.

Return on Investment (ROI) is the ratio between the net profit and cost of investment resulting from an investment of some resource. In short, it is one way of relating profits to capital invested. A high ROI means positive result in comparing the investment to its cost. Using ROI as a performance measure, we can evaluate the efficiency of an investment or to compare the efficiencies of several different investments.

Economic value added (EVA) is measure that compares net operating profit to total cost of capital. Better explained, EVA is an estimate of a firm's economic profit, or the value created in excess of the required return of the company's shareholders.

Sustainable value is a way of managing and measuring sustainability performance and it is primarily used to assess corporate sustainability performance.

In this paper, we will make an attempt to calculate Economic value added (EVA) as one of the most important criteria investigated from several viewpoints. Firstly, it is demonstrated the calculation of EVA at the industry level using aggregate indicators according to the common business methodology. For this we generally assume that economic value is created by investment in excess return compared to its cost. We adopted EVA indicator to Belarusian and Macedonian general economic conditions and specifics of available aggregate sector data by adjusting return on investment and cost of capital.

The main current strategy of development Europe 2020 (A strategy for smart, sustainable and inclusive growth) puts forward three mutually reinforcing priorities:

- 📖 Smart growth: developing an economy based on knowledge and innovation.
- 📖 Sustainable growth: promoting a more resource efficient, greener and more competitive economy.
- 📖 Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

But growth itself does not create value. Economic value is created by investment in excess return compared to its cost. This statement is one of the central in microeconomic theory and drives the development of a single firm through an industry to a country's economy. Principle of economic value added to invested capital is directly employed in Economic Value Added (EVA) indicator.

The objective of the paper is to propose a modified and more accurate model for measuring the industry economic and sustainability performance. The model integrates environmental, social, economic and corporate governance indicators. It aggregates different indicators from different frameworks and allows the industries to compare their performance effectively. Two main factors of sustainability assessment (EVA and SVA) are depicted. It is demonstrated the attempt to calculate EVA at the industry level using aggregate indicators according to the common business methodology [1].

Then, materials and methods used for sustainability assessment are described. This is done by presenting an overview about the used indicators. The method of sustainability value added calculation is suggested as the main indicator of industry performance.

All value indicators calculations respect the neoclassical theory of the behaviour of market subjects (The theory of rational expectations...) from microeconomics, suggesting the basic premise that the purpose of company is to maximize profits [2].

The idea behind EVA is rooted in economic income as opposed to accounting income. The concept of economic profit appeared a long time ago, around 1890 (Marshall). As economic income moves up or down, so goes the value of the business.

The theory of Economic Value Added has traditionally suggested that every company's primary goal is to maximize the wealth of its shareholders, which should be a given since it is the shareholders that own the company and any sensible investor expects a good return on his or her investment. In the past, however, other methods such as Return on Investment (ROI) and Earnings per Share (EPS) have been the most important performance measurement systems and have been used in determining bonus-based incentives even though they do not correlate well with shareholder value creation.

Economic Value Added (EVA) is probably the most widely used approach to measuring value-creation. The analytical tool called EVA, for Economic Value Added, was commercially developed in 1982 by the corporate advisory team from Stern Stewart & Co. of Joel M. Stern and G. Bennett Stewart [3].

The first person who used the term EVA in publication was Finegan in 1989, after him it was Walter in 1992, but the attention of the wider economic public EVA received after the publication of related article in Fortune magazine in 1993 (Tully) when it started to be used as a metric of business performance. Consequently, this issue handled a number of experts.

Large firms like Coca Cola, Diageo, Lilly (Eli), Guidant, and SPX have used EVA as a guide to creating economic value for their shareholders [4]. Bonuses and incentive pay schemes at these firms have been built around the manager's ability (or lack thereof) to generate positive EVA within the firm's operating divisions. Positive payments accrue to managers having divisional operating profits that on balance exceed the relevant "cost of capital," while negative incentive payments may occur if the longer-term divisional profits fall short of the overall capital costs. Thus, by accounting for both the cost of debt and equity capital, EVA gives managers the incentive to act like shareholders when making corporate investment decisions.

EVA is also gaining popularity in the investment community. Since June 1996 Conference on "Economic Value Added" at CS First Boston "buy side" investment firms like Global Asset Management and Oppenheimer Capital use EVA in their stock selection, portfolio construction, and risk control processes.

Economic Value Added is most generally calculated as the difference between net operating profit after tax

(NOPAT) less market money value of capital invested (MVC):

$$\text{EVA} = \text{NOPAT} - \text{MVC} \quad (1)$$

The crucial point of EVA estimating is calculating the market money value of invested capital:

$$\text{MVC} = \text{Weighted Average Cost of Capital (\%)} * \text{Capital Invested} \quad (2)$$

Since firms use both private equities (E) and debt (D) to finance their investment projects, it is important to use the weighted structure of cost of capital:

$$\text{WACC} = \%D * \text{Cost of Debt} + \%E * \text{Return on Equity} \quad (3)$$

where %D – share of debt invested in project; %E – share of equities invested in project; and %D + %E = 1

The calculation of EVA gives the same mathematical results as Discounted Cash Flow (DCF) or Net Present Value (NPV), both of which have historically been deemed the best analysis tools for determining shareholder value. However the equivalence with EVA and NPV/DCF holds only in valuation and not in performance measurement.

EVA is expressed as money value in currency of operation of a certain company. It estimates what amount of value is added to the invested capital. This value usually results in higher net economic profit of a firm and higher dividends. Negative EVA indicates that either: a) cost of capital is higher than return on capital (the firm is currently earning less than expected giving the its cost of capital) or b) capital invested does not create enough of value for specific investment projects.

EVA indicator of a firm is even more informative when considered in dynamic over certain period of time. Increasing EVA indicates either lower cost of capital, or higher returns (provided invested capital is the same over considered period). Diminishing EVA points to higher cost of capital or lower profit (if invested capital is the same over considered period).

EVA can be used as a qualitative indicator of growth at the level of industries and economy at general. EVA results are logically connected to specific operating conditions for a firm or an industry by considering debt and equity share in capital structure as well as specific risk premium for each industry.

Calculating EVA for industries, the structure of economy can become clearer revealing best performing and worst performing sectors in terms of their economic value added. In practice one can break down the economy into sectors with high EVA and little EVA for both positive and negative indicators. After close look at each of the best or worst performing sector taking into account their specifics recommendations for using high potential or improving sector's conditions might be drawn.

EVA allows watching development of industries and a country's economy in dynamic over chosen period of time. For instance, growing EVA for a country's economy might indicate its growing potential of further development and sustainability. Alternatively, diminishing EVA in chosen industry might be a signal for poor quality of investments, inadequate structure of capital invested or poor management.

Using EVA as performance indicator of economic sectors defined according to industrial classification system as opposed to traditional Soviet Union type division we get a possibility to make international comparisons.

Finally, economic value added (EVA) indicator calculated for Belarusian industries provides us with objective information about current situation at the market when no stock exchange information is available.

Basic indicators for Belarusian industries according to NACE are presented on ERES Conference and are available on internet [5]. A few important conclusions can be drawn according to EVA estimation results for Belarusian industries:

- a) six industries created more than 2/3 of economic value added in Belarusian economy: manufacture of chemicals, wholesale trade, transport and communication, agriculture, construction and manufacture of refined petroleum products and coke;
- b) almost 1/4 of the entire economic value was added in chemical industry (manufacture of chemicals, chemical products and man-made fibres);
- c) four sectors created no economic value and have negative EVA indicator: education, health, community, social and personal services, and real estate activities activities;
- d) the most striking finding of estimations was that the lowest EVA indicator showed the division called "Real estate activities".

Ranking of industries. Finding the "best" companies and industries in the marketplace is of primary importance to investment managers. With the proper financial tools, portfolio managers may be able to enhance their active performance over-and-above the returns available on similar risk indexed-passive strategies.

The ranking shows that top-10 investor attractive sectors in Belarusian economy were:

- ☒ Manufacture of coke and refined petroleum products;
- ☒ Manufacture of chemicals, chemical products and man-made fibres;
- ☒ Sale, maintenance and repair of motor vehicles and motorcycles;
- ☒ Wholesale trade and commission trade;
- ☒ Manufacture of leather and leather products;
- ☒ Computer and related activities;
- ☒ Mining and quarrying;
- ☒ Manufacture of basic metals and fabricated metal products;
- ☒ Manufacture of transport equipment.

The least attractive sectors are "social" ones: education, health, community, social and personal services, and real estate activities.

Industries with higher rank can attract more foreign investors.

Sustainability Value Added (SVA) is an effective method for sustainability assessment. It plays a strategic role in decision making [6]. It encourages the companies and industries to deal with resources more effectively and efficiently. Sustainable Value Added represents the extra value created as a result of using economic, environmental and social resources, compared to a benchmark. It expresses in absolute monetary terms. According to the method published by Figge and Hahn [7] the SVA value calculation can be expressed as follows: The gross value added of the company should be calculated (in unit €). After that, the amount of each environment or social resources should be determined (e.g. t, m<sup>3</sup>,... etc.). Then efficiency computed by dividing the gross value added on the amount of resources (unit €/t, €/m<sup>3</sup>). The same steps should be done for the benchmark. Finally, the last two values are subtracted from each other and the result multiplied by the amount of considered indicator.

Whereas the improvements should include several modifications, in order to achieve the following factors:

- ☒ Comprehensive sustainability assessment: we focused our efforts on developing a comprehensive smart sustainability assessment. Therefore, digital, environmental, social, economic and corporate governance indicators should be integrated. In this case, the proposed model won't only deal with financial indicators but should also include nonfinancial ones;
- ☒ Simplicity and suitability: The assessment should be done for different industries in Belarus and Macedonia to compare results. However, the model can't be universal, because the indicators should reflect the specifics of the industry in which the country operates. Therefore, different available sustainability

frameworks are used and specific set of indicators is chose for each sector (e.g. agriculture, manufacture ...);

- ☐ Applicability: The modified model should be easy, simple, suitable and accurate. It reflects not only three dimensions (digital, economic, environment, and social), but also the corporate governance pillar is added. As mentioned above, EVA is the most important and measured indicator which combines all the basic components required to describe the economic situation of the industry. For this reason, the gross value added (VA) is replaced by Economic Value Added to describe the financial situation of the companies more efficiently.

The data obtained in both SVA, EVA and foreign investor attractiveness rankings may be helpful for both foreign investors and governments.

Sustainability assessment is a comprehensive process to achieve the best performance and determine the weak points of the studied industries performance. The smart sustainable development and inclusive growth system is a model used for smart sustainability assessment.

This paper aims to propose an improved method of investment industry performance sustainability assessment. It employs important and widely used financial value (e.g. SVA, EVA) for evaluating the efficiency of industries development. This work can be extended by make it reflects the specifics requirements of the country and industry in which the company operates. Also, this can be implemented by calculating the weights and benchmark values for each sector (e.g. agriculture, bio-gas plants, manufacture, breweries...). And finally, the results visualization can be presented in the case study for specific sector.

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## 8 Role of Management of human resources in achieving better quality of business value

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**Keywords:** Human resources management, organizations business value, intellectual capital, organizational performance.

**JEL classification:** --

Any type of value that will add to the business success of any organization is in the range of Business value. Business value is more than economic value. It includes various forms such as employee satisfaction, managerial skills, customer good will, supplier value, experience and ethical value. Business value can include intangible as well as tangible assets, such as intellectual property but also the business plan of organization. Employees in any organization are its greatest value, making intellectual capital of organization. If the employees, in the context of their jobs are more educated, capable and satisfied with relationships in the organization, the managing of all organizational processes will be easier. Top management of each organization must pay attention to the development of human resources, as well as on the constantly taking care of the employees. Human resource management in the modern business is recognized as a science and its development is reflected in the development of scientific management. Hereinafter it will provide a review of management development through time. Classical School of Management was founded in the late nineteenth and early twentieth century. The bases of classical School are set by Frederick Taylor, Henri Fayol and Max Weber. Frederick Taylor (1856-1915) was born in a wealthy family in Philadelphia and is considered as the father of scientific management. Henri Fayol (1841-1925), the French mining engineer, is founder of the Classical organizational theory. He believed that the functioning of the administration is achieved through a system of planning, command, coordination and control in organization. Max Weber (1864-1920) was one of the leading scientists in the field of social sciences, whose theory was based on the management of labour and management organizations in a larger initiative of the workers. Mary Parker Follett gave contribution to the psychological basis of human activities and emotional reactions in the working groups. Based on the research conducted, she gave a new interpretation of conflicts and authority. Abraham Maslow was the founder of the Hierarchical model of human motivation, in which on the bottom of the scale are the basic physiological motives such as thirst and hunger, above the basic motives is the need for security, more than previously is the need for love and belonging, and on the highest level is need for prestige and respect. In Douglas McGregor's X and Y theory, Douglas studied what motivates employees for work and how managers can influence their motivation and dissatisfaction. Theory X has a negative attitude of employee on the work and company, while theory Y presents a positive attitude. According to Damanpour F. and Gopalakrishnan S. (2001), innovation in the organization is defined by the creation of new ideas and new ways of behaviour in the organization. It can be concluded that the classical school of management put products and processes of the organization in focus, while the later theories of management are based on the employees and on the software of organization. Modern management is reflected in providing the level and quality of leadership, which is particular important for the business success. Practice has shown that in managerial positions, there

are often people who are good professionals but who do not have enough quality managerial skills and leadership abilities. In modern management, it is important for leaders to be accountable for the results of the organization, not only controller of business processes. In the twenty-first century, modern management is academically recognized, implying a large range of knowledge and skills which manager must have in order to achieve the objective of the organization. Modern managers must have necessary skills, technique and informational knowledge as well as the knowledge of project management, business planning, human resources, job evaluation, strategic planning, and human resource development. The goal of effective leadership is the achievement of the set of goals through capacity and quality of employees. The learning process has the main role in improving of the knowledge that any organization has. These include the value of intellectual assets, such as the innovation capital, in which knowledge is acquired and applied. If the organization demonstrates competence of the knowledge management, it can be considered that it is oriented towards knowledge management. Schuler and Jackson (1987) defined human resource management as a system that attracts, develops and motivates employees and provides efficient performance of assigned tasks, with the aim of better functioning of the organization. Knowledge and learning organizations are the key of success in the nowadays market. Modern managers are tasked with the organization of implementing knowledge management. Cultural knowledge is created and developed by the top of the organization, from the highest levels of management and delegate to the lower levels. To survive in the modern business market, organization must be compared with its competitors, no matter what sphere of business range. The main tool for this, besides undertaken processes and actions is the successful management of human resources. Management of human resources includes the measures and activities of planning, recruitment, selection, motivation and taking care of employees, in order to ensure appropriate quality, potential employees, and their adequate training and motivation for achieving expected results. By achieving organizational goals, employees will realize personal goals. Modern management of each organization should be a new style of managing which primarily ensures the well-being of each individual, positive human development, and therefore the development of whole society. Knowledge is power, power can be anywhere, and it will be the biggest competitive struggle in the future. System approach to relationships with employees provides a high level of improvement in business performance. The importance of human capital is growing, employees have more knowledge, information and because of that, human resources management is more demanding. The employees are the driving force, they have a crucial role and they are the main carriers of the changes. The realization of the objectives and missions depends on the degree of work competence habits, creativity and motivation. Today's organizations are increasingly interested in investing in human resources, because they consider that is the way for reaching a competitive advantage. Intangible assets can have an effect on the organization competitive advantage, because they are difficult to copy. They affect business excellence and business value. So, is it possible to isolate specific factors that contribute to business excellence of an organization? According to the author Magiof (Lisa Magiof), these include the following: Fulfil the promise to customers and business partners, which refer to quality of the product (or service) and to delivery time. Compliance with the promised deadlines contributes to raising the organization's credibility in the market among business partners. If the organization keeps promise to employees it will gain their trust and loyalty to the organization. The key of good business of any organization is the reliability that the organization acquires the external and internal spheres of business, and this is the great intangible value of business excellence; in the modern business environment, organization should use modern technology, so-called IT technology. IT system is contributing to the speed of transactions, facility exchange of information and rapid developing new market areas. Increasing productivity, through rapid response to changes in the organization, leads to business excellence, and contributes to the increase of organizational value; another way of modern management and operations is involving employees in various programs, for their further development. Through leadership training programs, organization encourages employees to take control of their project; it is base of the modern management of human resources. The organization will have great business value by giving its employees progress

in their careers and chances for improving themselves. Because the Human resources management is very important in achieving the final goal of any modern organization, it is necessary for any organization to maximize developing of human resources; the organization improves their business performance through investment in research and development. Investment in research and development is especially important if the organization is planning to invest in new products or services and to introduce them into the market. This way of investment will help to increase investor confidence in the environment but it can also contribute to increase the loyalty of employees. This factors lead to business excellence of organizations; organizations focusing on attracting and retaining qualify and training employees is another way to increase the business organizations value. However, organization must pay attention that customers or business partners are satisfied with its performance. This can be achieved by applying appropriate procedures, encouraging cooperation and synergy of the employees, developing successful leadership that supports and motivates employees in the exercise of their tasks. Mixing all described factors, any organization can improve its business and get business values, which is the intangible component of business, but which also contribute organization long lasting over time, as well as its long lasting on the market.

From a financial point of view, it is considered that valuable asset is achieved when business brings profit or gain exceeds the cost. However, modern theories give new dimensions of business value, and they can be considered separately from the traditional financial measures. Traditional methods for assessing organizational performance are obsolete in modern economy and management theories. Nowadays performance organizations are intangible and they include people, ideas, innovation and brand. The broad definition of value creation considered that good and successful management is the key for achieving business performance. Cost reduction leads to short-term results, but investments in research and innovation provide long-term results. They affect the improvement of competitive advantage and long-term growth of the organization. Some experts believe that the creation of value and business excellence organizations must be a priority for all employees. If business excellence is on the first place, managers will know where and how to allocate capital, much better than the competition. Managers will seek to develop and create more talented employed staff than competition. Organization's ability to achieve profitable and durable growth is an enormous advantage in the development and progress of its operations. So, the effective functioning of knowledge-based organization depends on how the organization understands the process of creating and adding value. In organizations that are based on knowledge, the client is in the centre of all its activities. The process of creating value is compliance with the requirements of clients and expanded in various stages of added value. Therefore, the knowledge-based organization great attention pays to customer relationship management (customer relationship management - CRM). The goal of customer relationship management is to establish long-term and profitable relationships with customers. "If customers value consistent quality and timely delivery, then the skills, systems, and processes that produce and deliver quality products and services are highly valuable to the organization," Robert S. Kaplan and David P. Norton wrote in their book *Strategy Maps: Converting Intangible Assets into Tangible Outcomes*. "If customers value innovation and high performance, then the skills, systems, and processes that create new products and services with superior functionality take on high value. Consistent alignment of actions and capabilities with the customer value proposition is the core of strategy execution."

The most important resources of an organization seen as a system based on knowledge, are information, skills and business and social competencies of employees. Only human beings can transfer non-codified knowledge, the knowledge that is not manifested, and only humans can use their own knowledge to create new knowledge. Therefore, the key resource of a knowledge-based company is its employees. However, the key resources of these companies may be located in its physical resources, because the machines also have input knowledge. They represent a materialized form of codified knowledge, which means that they can perform only those activities for which they are designed and programmed. Although compared to human beings

machines may be superior in terms of accuracy and speed, they are generally inferior to humans, particularly in terms of flexibility, range of activities, creativity and capability of a holistic approach to the problem or task. Also, significant resources are also those which constitute technical and administrative systems of the company. These systems are made up of both codified and non-codified knowledge. Within these systems, people and machines work together in space and time in order to perform specific activities. As long as people are parts of the system, there is a possibility of numerous variations of the system in the manner of execution of programmed activities. Also, another important resource represents codified knowledge of a company in the form of documents, manuals, procedures, software programs and so on. Abstract titled "Role of Management of human resources in achieving better quality of business value" presents only a part of the research of the doctoral thesis titled "HUMAN RESOURCE MANAGEMENT IN ELEMENTARY EDUCATION" co-author Grujovic, point to the fact, how great is role that Human resources have in the creation of business excellence in organizations. Research has applied to the case of elementary schools and their business operating in the city of Kragujevac, Serbia. Based on the results from doctoral thesis, the authors have presented important guidelines of business operations, which are essential in the achieving better business performance of the organizations. Some of modern indicators that have important role in successful business of organization have been proven in the doctoral thesis and presented in this summary.

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# Part II: Valuation – Related Topics

## 9 Mergers & Acquisitions in Agricultural Sector: Potential Risks for Farmers and Agricultural Markets

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**JEL classification:** G340; Q130

### Abstract

With the believe that two companies together are more valuable than when existing separately, individual companies often consolidate in order to achieve greater efficiency and market share through Mergers & Acquisitions deals. M&A regularly allow firms to enhance efficiencies, but also leads to numerous concerns for all stakeholders and for the affected sectors and markets. M&A have happened in history in the last 100 years or more in waves and in different sectors, but most of the deals happen in the industrial sector. The agricultural sector was not spared from this process and it has already undergone huge consolidation which culminated in 2017. The main objective of this research is to present the main benefits and advantages of M&A deals in agricultural sector and also to address the potential risks of such deals for global agricultural markets, for farmers and consumers. The research will show that there are significant potential risks from these deals that affect the global agricultural market and the agribusinesses worldwide.

### Introduction

Each company wants the optimum market share over its competitors, so companies are trying to get optimum growth by using the popular common idea that “one plus one makes three”. Mergers and acquisitions (M&A) is an important branch of corporate strategy which deals with the combining, buying and selling of companies with the aim of helping to promote the growth of the enterprise in its particular sector. M&A are undertaken by companies to achieve certain strategic and financial objectives. They involve the bringing together of two companies with often disparate corporate personalities, cultures and value systems, which sometimes lead to incomplete integration and failure of merger. Therefore, the success of the merger may depend on how well the organizations are integrated. In a merger, the corporations come together to combine and share their resources to achieve common objectives, and the shareholders often remain as joint owners of the combined entity or a new entity established (Sudarsanam, 2003). Acquisition occurs when one company takes a controlling ownership interest in another firm, a legal subsidiary of another firm, or selected assets (e.g., a manufacturing facility) of another firm. An acquisition may involve the purchase of another firm’s assets or

stock, with the acquired firm continuing to exist as a legally owned subsidiary (DePamphilis, 2011).

In the last decade, M&A are the dominant means of organization's globalization (Weber, Shenkar and Raveh 1996). M&A have happened in history in the last 100 years or more in waves and in different sectors, but most of the deals happen in the industrial sector.

The agricultural sector was not spared from this process and it has already undergone huge consolidation which culminated in 2017. This research will present the main benefits and advantages of M&A deals in agricultural sector and will also address the potential risks of such deals for global agricultural markets, for farmers and consumers.

Recently implemented mergers between agricultural chemical companies promise to change the industry. The "Big Six" in the agricultural seed, chemical, and traits area – BASF, Monsanto, Bayer, Dow, Syngenta, and DuPont – are rapidly becoming the "big four"—BASF, Bayer-Monsanto, DowDuPont, and ChemChina-Syngenta. These deals allow firms to enhance efficiencies, but lead to numerous concerns for farmers, because fewer players will mean less farmers choice when it comes to products and raised prices for farmers and consumers.

Therefore, each merger is subject to review by antitrust authorities in the United States and the European Union; those reviews, and the financing requirements of the transactions, can slow their completion (James M. MacDonald, 2016). The antitrust investigations evaluate the effects of the mergers on specific seeds and agricultural chemical markets, prices, competition and innovation. Would the mergers reduce competition in sales of seeds and chemical products so that surviving firms could raise prices for these products? Would the mergers reduce competition in research, leading surviving firms to reduce investments in R&D and therefore generate fewer innovations in the future? These issues are of interest not only to antitrust agencies, but to all stakeholders in the concerned sector.

### **Methodology**

The chosen research problem is located in a field of limited preliminary research. The data collection needs to draw on primary sources, or secondary sources. In order to answer the proposed research question, I needed to collect information from mergers and acquisitions, which led to selecting M&A deals in agricultural sector serving as illustrative examples. The scientific theoretical basis is a combination of inductive and deductive method. When examining the Ag mergers/acquisitions, several issues led the analysis; (1) whether the agricultural seed and chemical market becomes an oligopoly? (2) Could the mergers reshape the global food production and lead to higher costs for farmers and higher food prices for consumers? (3) Could the mergers stifle the innovation if the new corporations spend less on research and development? (4) Could the mergers have impact on biodiversity since the even-larger corporations will promote genetically modified seeds and the pesticides and herbicides that make them effective?

I have chosen mergers and acquisitions that date at least five to ten years back in time in order to gain enough time-span that documentation and information exist. This allows me to analyze events that have changed over time.

### **Findings and Argument**

According to the Institute of Mergers and Acquisitions and Alliances (IMAA), in 2017 the value of Mergers and Acquisitions worldwide amounted to more than 3.5 trillion U.S. dollars, which compared to 2016 the value of M&A declined by 2%. M&A deals in agriculture culminated in 2017, when until the end of this year 10 mergers and purchases were either finalized or initiated (such as: DowDuPont; Bayer & Monsanto; ChemChina & Syngenta; AGCO & Precision Planting; DuPont and Granular; John Deere and Blue River Technology; Sumitomo Chemical and Botanical Resources Australia; Linamar & Macdon; Cooperative Mergers; Potash Corpo-

ration & Agrium). Regarding this huge consolidation process Sen. Charles Grassley (R-IA) had said “it looks like this consolidation wave has become a tsunami”. The table below shows the “Big Six” agricultural chemical companies that by the end of 2017 became “Big Four” due to this wave of consolidation.

**Table 1.** The world’s “Big Six” agricultural chemical companies

Company	Country	2015 sales: Seeds and biotech (\$ millions)	2015 sales: Agricultural chemicals (\$ millions)	Proposed merger partner
BASF	Germany	Small	6,211	None
Bayer	Germany	819	9,548	Monsanto
Dow Chemical	U.S.	1,409	4,977	DuPont
DuPont	U.S.	6,785	3,013	Dow Chemical
Monsanto	U.S.	10,243	4,758	Bayer
Syngenta	Switzerland	2,838	10,005	ChemChina

Note: BASF does not separately report seed sales, placing them under an “other” category.  
Source: USDA, Economic Research Service using data from Company Annual Reports.

The main aim of consolidation process is, consolidated companies to combine seeds, traits, crop protection biologics and digital farming into a single globally integrated agricultural platform, which will provide benefits and strengths for merged companies. M&A deals strengthen the position of merged companies on the market and increase their bargaining power which allows for increased value efficiencies of the new entity. Also, the economies of scale are formed by sharing the resources and services. According to James C. Collins Jr. – DuPont executive vice president, merged companies will be able to respond faster and more effectively to the changing conditions that impact farmers, by combining their complementary strengths. Beside these benefits and positive effects of M&A deals for participating companies, a lot of concerns and issues are rising regarding their impact on farmers and the global agricultural markets.

The research and analysis conducted to the M&A deals in agricultural sector, gave concrete answers to the issues set at the beginning of this research. (1) Regarding the first issue, whether the agricultural seed and chemical market becomes an oligopoly, considering the fact that with the latest wave of consolidation over 70% of commercial seeds and agrochemical products supplies will be centralized in the hands of just four corporations, the fear of establishing an oligopoly is undeniable. At higher levels of concentration, with only a few rivals in a market, farmers have fewer alternatives if a seller raised seed or chemical prices. Moreover, those few rivals might likely draw the conclusion that each could benefit if they all raised prices (James M. MacDonald, 2016). Mergers could make it much harder for smaller companies to break into agriculture with new innovations. Big vertically integrated firms that sell both seeds and pesticides can create integrated products that require farmers to buy the full package and lock out small competitors.

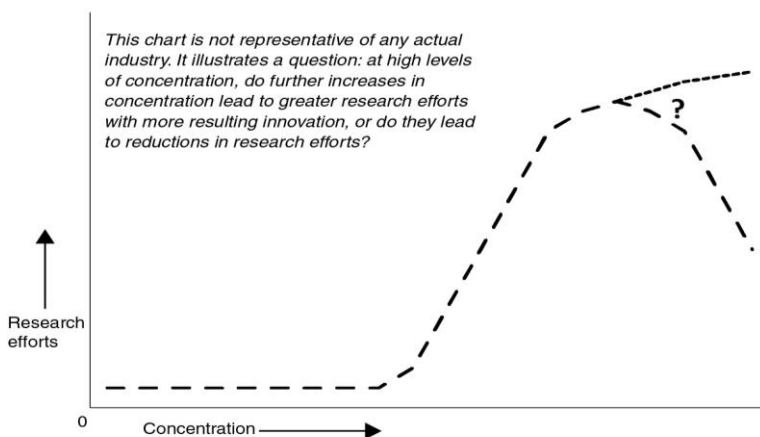
(2) As far as the costs for farmers and higher food prices are concerned, history shows that market concentration comes at the expense of farmers. According to the “White Paper” from the group “Farmers and Families first”, mergers and especially The Monsanto-Bayer merger will raise the price of agricultural inputs, reduce choice and increase costs for farmers through: unprecedented integration, of the seed, seed trait and agrochemical markets; anti-competitive market concentration; exploitation of cross-licensing agreements; using “tying and bundling” to create a vertical monopoly; reducing agricultural innovation. Also, is projected that mergers will raise aggregate seed prices by 5.5%, but could raise cottonseed prices by more than 20%. As stated before, the possibility for creating an oligopoly in this sector would lead to less competition, which is likely to result in ultimately higher prices for consumers.

(3) Regarding the innovation issue within the consolidate agricultural and chemical market, according to the



analysts the mergers would likely concentrate Research & Development (R&D) efforts on enhancing existing technologies rather than groundbreaking innovations. This trend of M&A deals could promote agriculture that is dependent on their patented chemicals rather than focusing on innovation. Also, the lack of competition could stifle the innovation process due to the “relaxed” business environment in which only four corporations will operate. A study by the U.S. Federal Trade Commission (FTC) suggests that high levels of market concentration strongly correlate to lower industry innovation (as shown in Figure 1) and eliminates head-to-head R&D competition, because currently five companies are responsible for over 74% of all agrochemical R&D (Maurice E., Stucke and Allen P. Grimes, 2016).

**Figure 1. The trend of R&D efforts at high levels of concentration**



Sources: USDA, Economic Research Service.

(4) As far as genetically modified seeds are concerned, evidence shows that the rapid consolidation in the commercial seed market coincided with a transition among farmers around the world from conventional seeds to seed with genetically-engineered traits. The first “traited” seeds were sold in 1995 and rapidly became the seeds of choice for many commercial farmers (Maurice E., Stucke and Allen P. Grimes, 2016).

Since 2006, traited seeds have constituted more than 40% of all proprietary seeds sold worldwide. The following years the market for seed traits has consolidate almost as rapidly as the seed market itself and resulted with drastically increase of seed price for farmers (Keith O. Fuglie, et.al., 2011). Therefore, undeniable is the concern that the mergers could have a great impact on biodiversity, considering the rapidly growing production and use of genetically modified seeds and the pesticides and herbicides that should make them effective.

## Conclusion

M&A deals are the dominant means of organization's globalization as a way to expand business boundaries and attain significant growth. The growth main motive is financial stability of a business and also the shareholders wealth maximization. M&A provide a business with a potentially bigger market share and it opens the business up to a more diversified market. M&A have happened in history in the last 100 years or more in waves and in different sectors, but most of the deals happen in the industrial sector. The agricultural sector was not left aside from this process and it has already undergone huge consolidation which culminated in 2017. Beside the benefits and positive effects of M&A deals for participating companies, a lot of concerns and issues are rising regarding their impact on farmers and the global agricultural market.

M&A deals strengthen the position of merged companies on the market and increase their bargaining power which allows for increased value efficiencies of the new entity. But, the company market share doesn't give

the full picture of corporate power. According to the ETC Group analysis, it's important to examine the combined power and influence of the Big Six because these corporations aren't just competitors – they are also cartel-like collaborators – in tightly concentrated markets. The Big Six companies use a variety of inter-firm agreements to create barriers to entry and reinforce their top-tier market power. However, history demonstrates and the research confirmed that, further consolidation of agrochemical and seeds companies could substantially increase the prices of agricultural inputs, reduce innovation, cut choices, reduce competition and diminish diversity. It is hard to insinuate, but higher prices and lower returns could threaten the survival of many farmers. Therefore, action is urgently needed to monitor, examine, regulate and curb this corporate concentration in food & agriculture before food sovereignty and climate justice are further compromised.

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# 10 ERM-Maturity Assessment-Study 2017: Measuring and analyzing the quality of ERM systems in Austrian firms

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**Keywords:** --

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## Introduction

Enterprise Risk Management (ERM) is a complex and not directly measurable construct. In the research project “Measuring and analyzing the quality of ERM systems in Austrian firms“, which was sponsored by the Funk Foundation (Hamburg) and performed by the Institute of Management Science at the TU Wien, a multi-perspective approach was taken to define ERM systems in three dimensions and to include five stages that measure the systems’ maturity levels.

According to the predictive validity framework (PVF) within the theory-based empirical research approach, a classification schema for the conceptual modelling of the maturity model – called “ERMMA classification schema” – was established first. Thereof, the 3-dimensional/5-stage “ERM system” maturity model – called “ERMMA model” – was deductively derived, i.e. operationalized by specifying attributes, i.e. observable indicators for each dimension of the model – called “binary ERMMA attribute schema” – and translating them into a valid and reliable questionnaire – called “ERMMA questionnaire”. In the next step, this questionnaire was implemented in an intelligent, web-based application – called “ERMMA online”.

With the online application the ERMMA survey was performed to collect the maturity levels of the ERM systems from Austrian, non-financial industry firms for the year 2017. In the last section of this article the results of the ERMMA study are shown. In the previous sections the problems and the applied solution methodologies are elaborated in order to show the scientific contributions that were achieved by setting up and performing the ERMMA study.

## Background and conceptual frameworks

In this section a literature review upon articles in the empirical (E)RM maturity assessment (MA) research will be given that are of importance for the ERM-MA-study (2017) elaborated and presented in this article. Next to that, additional conceptual frameworks will be presented which are important for this article as well. Finally, for the linguistically streamlining of the article a clear language is important. For this reason the terminology of Bisbe et al. (2007, p.790) will be followed quite closely, i.e. *we use the term construct to refer to a theoretical creation that can be defined in conceptual terms but cannot be observed and therefore is anchored to observable reality by means of indicators ... We use indicator (observables) to refer to an observable variable*

*that represents an observable manifestation or an observable facet of a construct ... Operationalization is the process of developing operational definitions of indicators. Operational definitions are empirical referents that specify the exact operations to be carried out in measuring such indicators ... Operational variables (attributes, items) are the variables that result from such operational definitions ... Finally, we use the term measure to refer to an observed score of an operational variable ...*

### **Literature Review upon (E)RM Implementation Maturity Models**

Maturity models are characterized by two peculiarities: Firstly, each maturity model relates to a specifically measured construct which is defined in one or more dimensions and secondly, each maturity model has at least two different maturity levels which represent different quality levels. Accordingly, maturity models are classifiable via its one (1-dim.) or more (n-dim.) dimensional construct and its two or more (n-stage) maturity levels. E.g., in the Enterprise Risk Management (ERM) research domain 1-/n-dimensional “ERM” maturity models are investigated mostly with respect to n-stage implementation maturity levels.

With this terminology five maturity models in the (enterprise) risk management domain, which are considered as relevant for this article, are reviewed with respect to their construct’s dimensionalities and maturity’s stage numbers.

- Hillson (1997) introduces a 4-dimensional/4-stage “risk (management)” implementation maturity model by defining in each of the 4 dimensions, i.e. culture, process, experience and application, 4 maturity levels, i.e. naïve, novice, normalized and natural. Furthermore, he specifies the contents of the construct’s four dimensions via specific indicators that are called attributes.
- Beasley et al. (2005) define a n-dimensional/5-stage “ERM” implementation maturity model, where the implementation maturity stages 1 to 5 are defined in an ordinally increasing way from “(1) no plans exist to implement ERM” up to “(5) complete ERM is in place”. In contrast to Hillson, whether the dimensionality nor the indicators of the ERM construct are clearly defined. He defines ERM in the generic way of the CO-SO ERM framework (2004) and leaves its interpretation to the survey’s participants.
- Monda/Giorgino (2013) improve the measurement of the ERM’s implementation quality levels by specifying a 3-dimensional/continuous-stage “ERM” implementation maturity model via best practices in the 3 dimensions, i.e. risk culture, organization and process. Instead of having a discrete stage model for the ERM implementation quality, they develop a continuous ERM index (ERMi). In order to specify their 3-dimensional ERM maturity model and the calibration of its model parameters they run a Delphi procedure. The implementation maturity levels for the different ERM indicators are assessed by the respondents of the survey via questions with 2 to 4 answer options. For aggregating the question responses to the ERM index the “Delphi” weightings for the answer options are used.
- Cienfuegos (2013) establishes a 5-dimensional/5-stage “risk (management process)” implementation maturity model for municipalities that is explicitly referenced to the stage model literature developed in the organizational change research domain (Stubbart & Smalley 1999; Damsgaard & Scheepers 1999). Confusing is that he uses the stage modeling for defining the five “stages” in the risk management process, i.e. context and objectives, identification, analysis and measurement, decision or control as well as implementation, review and feedback. The five maturity level stages he defines as initial, repeatable, defined, managed and optimized, and they are asked for in the survey by having a 5-point answer scale.
- Lundqvist (2015) develops a 2-dimensional/4-stage “ERM” implementation maturity model by assuming that the ERM is driven by the two latent dimensions (components), i.e. traditional risk management and risk governance. The 4 implementation stages are defined on a range from zero to three, i.e. from “non-existent” (zero) up to “robustly implemented” (three). For analyzing the drivers of the implementation maturity levels she uses an explanatory factor analysis. The resulting factor loadings are analyzed with re-

spect to the additionally measured “environmental/contingent” variables (e.g. size of the firm) in order to determine the drivers of the implementation maturities.

### **Multi-Perspective View upon ERM Systems and Risk Types**

*The few studies available generally report positive correlation between ERM adoption and firm value, but all suffer from the lack of a measure of the quality of the ERM implementation, which forces the authors to consider ERM implementation as a binary variable. This paper aims to fill the gap in literature by building a rigorous and robust measure of the quality, or maturity, of ERM implementation. (Monda & Giorgino 2013, p.3). As mentioned above, Monda/Giorgino solve the specification problem by using a 3-dimensional modeling approach for the ERM specification with the 3 dimensions in form of risk culture, organization and process. In the case of multidimensional constructs, the process of specifying the exact meaning encompasses describing both the dimensions and the indicators of these dimensions. Through the description of dimensions and indicators, it is possible to specify clearly what is included in the meaning of a construct, and therefore its domain is explicitly established. (Bisbe et al. 2007, pp.791–792).*

The multi-dimensional construct specification corresponds to multi-perspective view. This view will be important for the modeling of the ERM construct. In the ERM context people are working in different domains (e.g. managers and operators who perform and are responsible for different tasks) and consequently they have different perspectives. For this reason an ERM system has to be constructed in the light of the multi-perspective view as a multi-dimensional construct. Mikes/Kaplan (2014) introduce such a multi-dimensional view on risks by introducing the following risk typification (2014, p. 26-27):

- *Preventable (Category I) risks arise from routine operational breakdowns or from employees' unauthorized, illegal, unethical, incorrect, or inappropriate actions. Companies gain nothing by tolerating such risks; they are inherently undesirable.*
- *In contrast, organizations voluntarily take on strategy execution (Category II) risks in order to generate superior returns... Managers can influence both the likelihood and the impact of their strategy execution risks, but some residual strategy risk will always remain.*
- *External (Category III) risks arise from events that the company cannot influence... Managers are often unaware of these external risks and, even when made aware, are unable to plausibly assess their likelihood. But that should not be the control objective for this category of risk. As external risks are, by definition, unavoidable and impossible to predict, the concern should be with the organization's resilience, should they occur.*

### **Theory-based Empirical Research: Predictive Validity Framework and Stage Modelling**

*Theory-based empirical research aims to refine general problems down to clear, unambiguous and testable research questions. The predictive validity framework (PVF) is a framework that provides a description of the process by which these research questions are specified, operationalized and tested. Within the PVF, two levels are distinguished: the conceptual level and the operational level. At the conceptual level ..., theory identifies the constructs of interest and specifies their meaning ... Theory subsequently develops a model that represents the expected relationships between the identified constructs ... Research moves from the conceptual to the operational level ... by engaging in an operationalization process by which constructs are translated into operational variables that measure the variability associated with constructs .... Data are then obtained from observation and subjected to statistical analysis to indirectly test theory by testing the extent to which the data are consistent with the modelled relationships between constructs ... (Bisbe et al. 2007, pp.790–791).*

De Bruin et al. (2005) explicitly deal with the maturity modeling context. They develop a generic (standard)

model development framework and apply it to the development of maturity models. In this framework six maturity model development phases are distinguished, i.e. scope, design, populate, test, deploy and maintain. In connection with the theory-based empirical research the scope and design phases are of special importance.

In the scope phase (2005, p.3), the one of the most crucial decisions in the modeling process has to be taken by specifying the maturity model's purpose *including whether the resulting maturity assessment is descriptive, prescriptive or comparative in nature. If a model is purely descriptive, the application of the model would be seen as single point encounters with no provision for improving maturity or providing relationships to performance. This type of model is good for assessing the here-and-now i.e. the as-is situation. A prescriptive model provides emphasis on the domain relationships to business performance and indicates how to approach maturity improvement in order to positively affect business value i.e. enables the development of a road-map for improvement. A comparative model enables benchmarking across industries or regions. A model of this nature would be able to compare similar practices across organizations in order to benchmark maturity within disparate industries.* (de Bruin et al. 2005, p.2).

Cienfuegos (2013) explicitly references to the organizational change literature although he does not use it for the modeling of the maturity levels. In this article his approach is not followed as the stage model will be used for the modeling of the different maturity, i.e. quality levels. For this purpose it will be important to avoid the problems often found in stage model applications: *Many of the published stage models were presented without defining their stages, without showing evidence of transformations, without explaining the use of stages, and apparently without understanding fully the pitfalls of stage models.* (Stubbart & Smalley 1999, p.284).

The avoidance of the circular reasoning pitfall that arises in the causal stage model types is of special importance later on. *A causal model goes beyond merely detecting patterns of activity or behavior that imply descriptive stages... The main challenge for scholars lies in identifying and explaining the underlying processes that account for stages without resorting to circular reasoning. A tautology occurs when stages are used to "explain" observations, which are actually features of the stages themselves. For example, you can't explain your son's "defiance of authority" by the fact that he is a teenager, if defiance of authority is one of the characteristics that defines "teenager".* (Stubbart & Smalley 1999, pp.278–279).

In the design phase of the generic model development framework from De Bruin et al. (2005) the concept of cumulative stages is elaborated. *Within existing maturity models a common design principle is to represent maturity as a number of cumulative stages where higher stages build on the requirements of lower stages with 5 representing high maturity and 1 low. This practice was made popular by the CMM and appears to have wide practical acceptance. ... Stages should also be named with short labels that give a clear indication of the intent of the stage.* (de Bruin et al. 2005, p.4).

### **ERM-System: Multi-dimensional Perspective and Stage Modelling of Maturity Levels**

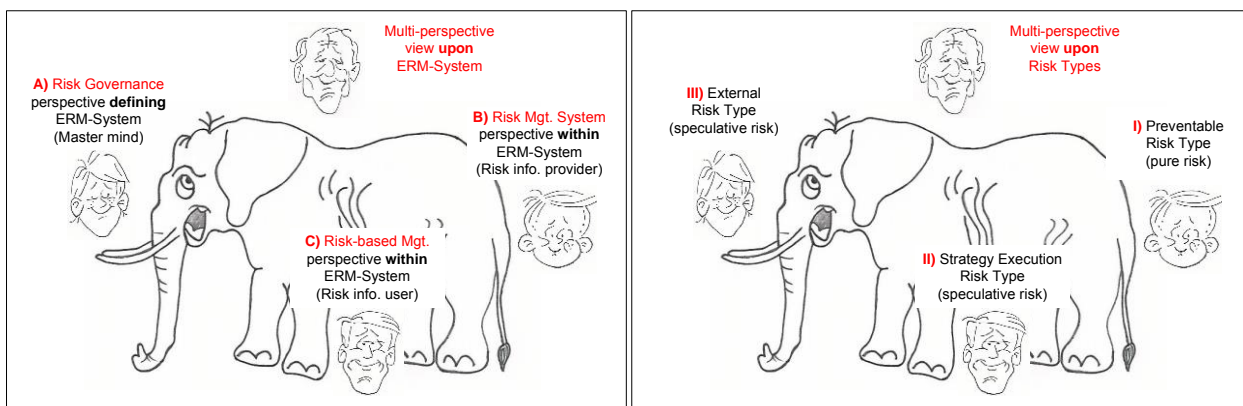
Following the predictive validity framework, the first task in building a survey is not to start with the specification of questions. Instead of this, the conceptual model underlying the construct to be measured has to be specified first. In order to be able to specify a conceptual model the requirements of the model have to be determined. This happens in the scope phase and the design phases of the maturity model development framework from De Bruin et al. (2005). After having performed these stages, it has been clarified that the ERM system maturity model to be specified should:

- be based upon a comprehensive, i.e. multi-perspective view upon the ERM system that has as primary audience the top management (including the top supervisory entity) of all firms in the non-financial industry,
- be a layered model in the sense of as stage-gate model, so that more granular maturity assessments can be derived for other audiences as well,

- relate to all three model types, i.e. descriptive, prescriptive and comparative, so that it can be used by the firm to diagnostically assess its current *as-is* maturity level (descriptive), to get a roadmap for improvement to the *to-be* level (prescriptive) and to allow a comparative benchmarking with other firms (comparative),
- avoid the circular reasoning pitfall, so that it can be used for causal investigations in explorative statistical analyses to find drivers of the maturity levels,
- implement a cumulative stage maturity model,
- define cumulative attributes within each stage, so that the meaning of the progressions in the maturity levels are determined by design and not interpreted by the respondents of the survey and
- define binary attributes for better understanding and increased answering stability.

Note that the inclusion of binary attributes constitutes an important deviation from the traditional maturity assessment approach. All before mentioned maturity models from the literature – with Hillson as only exception – are *latent model types* as defined in the predictive validity framework. That means that the (E)RM constructs defined there are seen as underlying constructs that appear in form of the correspondingly defined indicators. With the attribute-based approach taken in the survey study of this paper the ERM system construct gets explicitly defined via the indicators specified in its dimensions. As such the ERM system construct is not a latent, but an explicitly defined construct and correspondingly of an *emergent model type*.

**Figure 1.** Multi-Perspective View upon ERM-Systems (left) and Risk Types (right)



The comprehensiveness of the developed ERM system maturity assessment (MA) model – called “ERMMA model” – is incorporated by taking a multi-perspective view. For better understanding this view a pictorial representation of the metaphor “The blind men and the elephant” is shown in Figure 1. Applied to the ERMMA model this means that the constructor (king perspective) of the conceptual model oversees three distinct dimensions, i.e. the risk management system itself (B), its master mind in form of the risk governance (A) and the risk-based management systems (C). Comprehensiveness means that the risk information provider, i.e. the B-dimension, which is governed by the A-dimension, generates and distributes risk information that is used in the C-dimension (risk information user) by establishing and running the planning and control systems at the operational process level, the financial business level and the strategic corporate enterprise level.

Due to the enterprise context of the ERM system the multi-perspective view has also to be taken for a distinguished definition of risks. In the right panel of Figure 1 the 3-dimensional approach from Mikes/Kaplan (2014) is shown metaphorically.

Figure 2 contains the 3-dimensional/5-stage ERMMA classification schema that was developed by including best practices from risk management standards and frameworks, e.g. ISO 31000 Risk Management (2009), IIR 3-Lines-of-Defense model (2013) and COSO ERM framework (2016) in the dimensions A and B. Furthermore, in dimension B two more sub-dimensions (in form of training and information system aspects) are



considered, so that the schema goes beyond just enterprise risk management and its governance. Next to the risk information providing systems in the dimensions A and B, the dimension C incorporates the systems that are using the risk information.

**Figure 2.** ERMMA-Classification Schema – 5-Stage Maturity Model (Causal)

		Maturity Level				
		ML 1	ML 2	ML 3	ML 4	ML 5
Dimension	A. ERM-Governance-Model A1: Risk Strategy A2: Risk Understanding A3: Risk Organisation	Partial, i.e. silo-oriented process perspective	Process perspective incl. review and management	Enterprise-wide perspective	Corporate perspective	Interactive usage by top management
	B. RM System B1: RM System B2: RM Training System B3: RM Information System	Risk management process	Risk management system	Enterprise-wide risk management system	Holistic, double loop risk management system	
	C. Risk(based) Planning and Control Systems C1: Strategic Mgt. System C2: Performance Mgt. System C3: Process Mgt. System	Risk limit systems	Key risk-based strategy and objective setting	Key risk-based performance management systems	Management systems with risk-adjusted performance measures	

The next step in the predictive validity framework is the translation of the ERMMA classification schema, which explicitly specifies the observable and named indicators, into operational variables. The result of this transformation step is the corresponding ERMMA attribute schema. This schema contains the binary, cumulative attributes for all nine sub-dimensions of the ERMMA classification schema. Exemplarily, the transformation from the risk management process (ML1) in the RM-System (B1) to the risk management systems (ML2) is taken for illustration purposes. This transformation is defined according to the distinction between the risk management process and the risk management framework in the ISO 31000 Risk Management standard (2009), where the framework governs the risk management process by monitoring and adjusting it over time to ensure its effectiveness. In order to assure independency from specific industry requirements, only functional (e.g. management function) and conceptual (e.g. risk aggregation) attributes and no institutional (e.g. manager) and technical (e.g. Monte Carlo simulation) attributes are used.

The usage of binary, cumulative attributes assures that the multi-dimensional ERMMA attribute schema constitutes an explicitly defined layered (stage-gate) maturity model. The binary measurement of dichotomous indicator variables also allows a more precise measurement with respect to the intended indicators and gives a lower base level instability (Dolnicar & Grün 2007, p.1304) as in the case of polytomously defined variable like e.g. traditional Likert-scales.

The cumulative attribute arrangement allows the precise setting of attribute sets for delineating the 5 maturity stages and henceforth establishing a stage-gate maturity model that ... *enables the provision of more differentiated maturity assessments within complex domains. A stage-gate approach is achieved by providing additional layers of detail that enable separate maturity assessments for a number of discrete areas, in addition to an overall assessment for the entity. These layers can be represented by the domain, domain components (dimensions) and sub-components (sub-dimensions).* (de Bruin et al. 2005, p.4).

### Survey Methodology: Translating Binary Attributes into an Intelligent Questionnaire

After having explicitly defined the binary ERMMA attribute schema, it can be translated into questions to build the questionnaire for the ERMMA survey. In this transformation the multi-dimensional layered structure of the ERMMA attribute schema gets preserved, so that the resulting ERMMA questionnaire can be flexibly navigated through. This flexibility property is important as it allows the building of intelligent questionnaires, where the questions posted depend on the answers given. Such an intelligent questionnaire contrasts to traditional questionnaire design, where all respondents get the same questions in the same order.

For the IT implementation of the ERMMA questionnaire into the ERMMA online application modern web-based 3-tier information technology is used. The intelligence of the questionnaire is implemented by a branch-and-cut mechanism that is used for the hierarchical single label classification that guides the application intelligently through the questions by taking into account the answers given. The ERMMA online application is hosted at a TU Wien server what is in the meantime also an important aspect concerning IT security and privacy issues.

Figure 3. ERMMA-Online Application

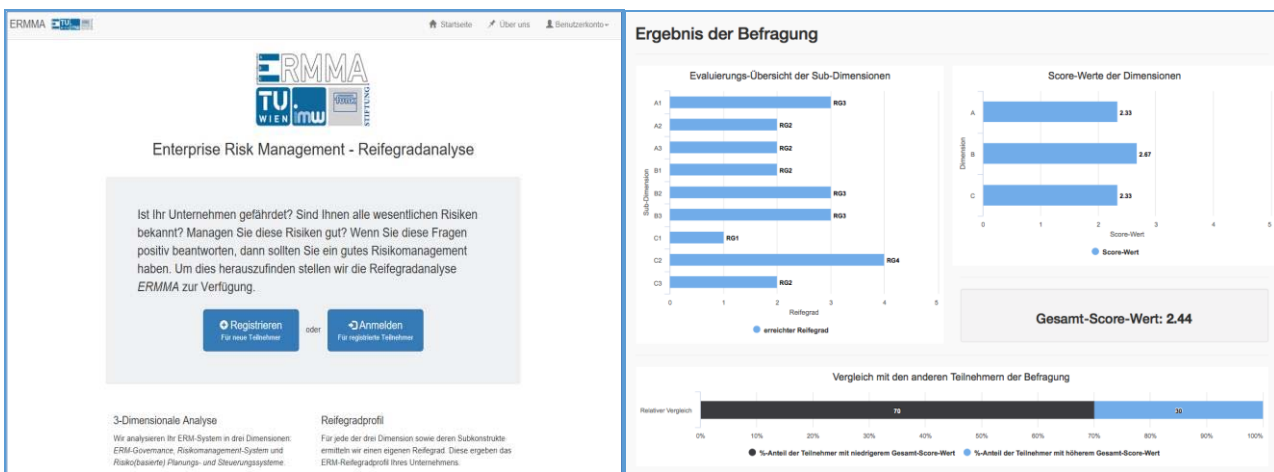


Figure 3 shows in the panel to the left the homepage of the ERMMA online application. With the left-sided button the registration can be started. After registration the survey can be started by pressing the right-side button. The panel on the right in Figure 3 shows the feedback, which is given to the participants after they finish the survey.

Exemplarily, a firm is taken for illustration that has a quite good overall ERMMA maturity score of 2.44. This is the most aggregated feedback information the participants get. It indicates an average *as-is* maturity stage. This information can be used by the firm for making comparisons over time (*temporal benchmark*) as well as comparisons compared to the other participants. The *comparison benchmark*, i.e. the comparison against the others, is given in the diagram at the bottom. From this it can be seen that 70 % of the survey participants have a lower score.

The three bars above the overall ERMMA score are the scores that the firm reached in the three dimensions. Compared to the overall score they deliver additional information by showing the ERMMA scoring results in less condensed form. The finest granularity of score information is given in the nine bars to the right of the three dimension scores. They are called “ERMMA profile” and they give the most complete picture of the *as-is* maturity stages. As firms differ among each other, they might have different *to-be* plans for the specific shape of the ERMMA profile, i.e. *ERMMA profile target*. So when monitored the profile over time, the focus might lie on the development of only specific and not all sub-dimensions. The *roadmap information* for im-

provements in all nine sub-dimensions is given to the participants as well. This information specifies all reached attributes as well as the attributes to be achieved in order to progress to the next maturity stage.

### Survey Results: Descriptive and Explanatory Analyses

The ERMMA survey closed at the end of September 2017. In the ERMMA questionnaire also exploratory questions with respect to exploratory variables (e.g. size of the firm measured via number of employees) were included next to the attribute questions used to measure the ERM system maturity levels. The inclusion of the exploratory questions is needed to allow next to descriptive also explorative statistical analyses upon the data collected in the ERMMA survey.

### Sample Description

71 firms participated in the ERMMA survey in the year 2017. About half of them come from the manufacturing industry and the rest almost equally distributes over the other non-financial industries. The sample mainly contains incorporated firms (91.55 %) in form of limited liability companies (about  $\frac{3}{4}$ ) and public joint-stock companies ( $\frac{1}{4}$ ). 85.92 % of the firms have a public auditing. More than half of the firms are owner-managed (59.15 %). With respect to the number of employees there is an about equal distribution over all grouping classes, i.e. 26.76 % (<49), 18.31 % (<499), 16.90 % (<999), 18.31 % (<4999), 19.72 % (5000+). Hence, the sample gives insights into the ERM system quality of incorporated Austrian firms, but the representativity cannot be assured. The reason is that it is not known how many firms were actually invited to participate in the ERMMA study, as the invitations were sent out electronically by the supporting partners in form of Funk Austria, Creditreform Austria, IIA Austria and EY Austria.

### Descriptive Statistics

Figure 4 shows the distribution of overall ERMMA maturity score in form of a box plot. The bolded line in the middle of the box indicates the median (50 % quantile) amounting to 1.33. The 1<sup>st</sup> quartile (25 % quantile) is 0.73 and the 4<sup>th</sup> quartile (75 % quantile) is 1.95. The minimum and maximum scores reached are 0.11 and 4.67. From the plot it can be seen that the distribution is skewed to the right as the dispersion from the median is larger on the right hand side than on the left. The small circles in the plot indicate the outliers. They come from the large firms that have substantially higher overall ERMMA maturity scores.

**Figure 4.** ERMMA Scores – Descriptive Analysis

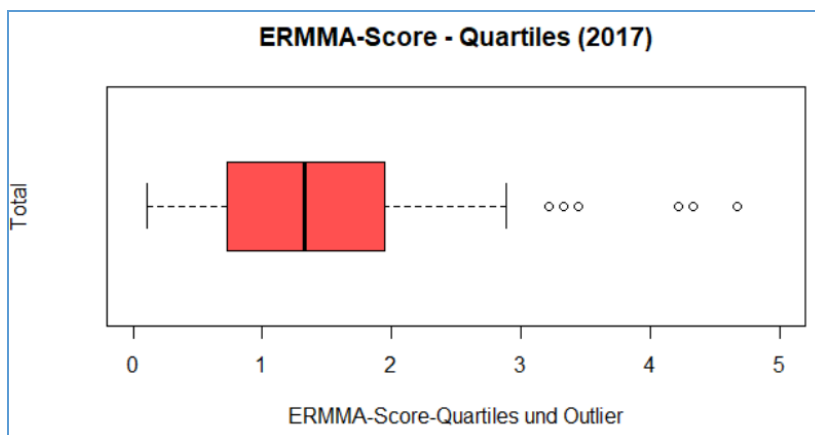
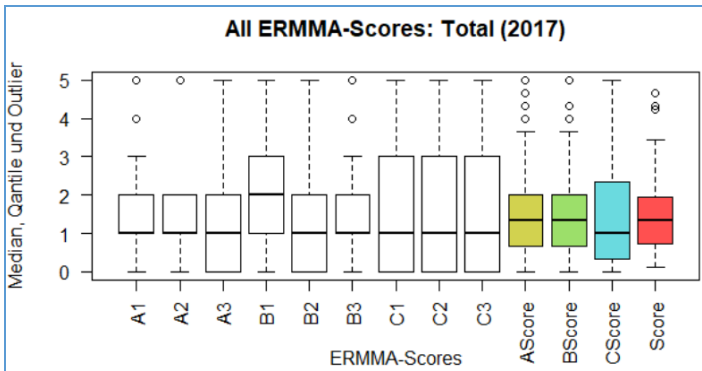


Figure 5 contains next to the overall maturity score at the right hand side also the scores for the three dimensions (A-, B-, C-Score) located to its left. Next to that also the nine scores for the sub-dimensions (A1 ... C3) are shown. This distribution of the ERMMA profile gives interesting insights: The B1 sub-dimension is the best as it has the highest median and 3<sup>rd</sup> quartile. This should be caused by the fact that most survey re-

spondents undergo public audits where normally a strong focus is given upon the risk management system. The worst sub-dimensions are reached in the risk organization (A3) and the risk management training system (B2), where the 1<sup>st</sup> quartiles are zero. This indicates deficiencies in the organizational implementation of the risk governance and weaknesses in the risk communication within the firms.

**Figure 5.** ERMMA Profile – Descriptive Analysis

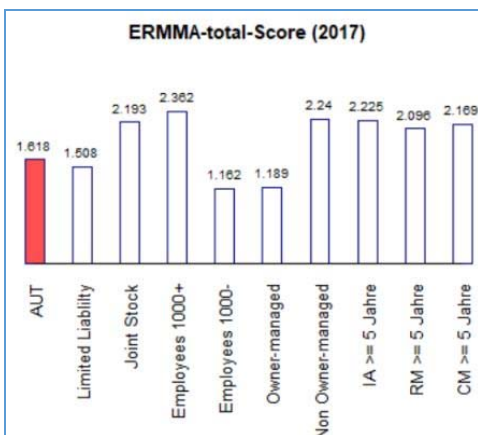


**Exploratory Statistics**

Figure 6 shows the mean values of the overall ERMMA score (coloured at the left hand side) and for different sub-samples that were based upon the firms legal entity, i.e. limited liability and public joint-stock firms, employees above (1000+) and below (1000-) 1.000, (non-)owner-managed firms and firms that have institutionally implemented internal audit (IA), risk management (RM) and compliance management (CM) for more than five years.

It should be noted that the mean values differ from the median in the case of skewed distributions. For the overall ERMMA maturity score the mean value is 1.62 which is higher than the median of 1.33 due to the right skewness of the underlying distribution. Furthermore, the last three groupings in the figure relate to institutional aspects that were collected by the specified exploratory survey variables. As these variables were not used in the attribute variables, with which the ERM systems maturity levels are measured, the circular reasoning pitfall has been avoided.

**Figure 6.** ERMMA Scores – Explanatory Analysis



Statistical testing shows that all displayed groupings are statistically significantly different from their complementary groups. Consequently the ERMMA survey gives statistical evidence that the overall ERMMA maturity score is driven by the size of the firms, the owner-management, the form of the legal entity and the quality of the internal audit/risk management/compliance management institutions measured by the years of their existence.

## Conclusions and Outlook

In the final section of this article the results of the ERMMA study 2017 were presented. The overall ERMMA maturity score, which can be seen as the top of the ERMMA “iceberg” model, shows a right skewed distribution due to the high scores of the large Austrian firm. The remaining scores look pretty much normally distributed. The ERMMA profile gives insights into the third layer of the ERMMA model, i.e. into its nine sub-dimensions. There, it can be seen that the *risk management system* (B1) is the best sub-dimension, whereas the *risk organization* (A3) and the *risk management training* (B2) are the worst sub-dimensions. On the search for maturity drivers, exploratory variables were used that were not considered as attribute variables in the construction of the ERM maturity levels in order to avoid the circular reasoning pitfall. The exploratory analysis with respect to the exploratory variables showed that the ERM overall score is in a positive way and statistically significantly driven by the size of the firms and by the facts that the firm is a public joint-stock company, it is not owner-managed and that it has internal audit, risk management und compliance management institutions for at least five years.

Concerning the scientific contributions, two different research objectives were followed and reached. Firstly, the problem of inadequate definitions of ERM (systems) maturity levels was solved by following the standardized research process prescribed in the predictive validity framework. By using binary attributes for the specification of the different maturity levels a *layered stage-gate* ERM system maturity model could be established for the first time. In this model, the *evidence of the transformation* from one stage to another is explicitly specified by fulfilling all attributes of the preceding stage. Furthermore, this model has the advantage of a more precise measurement of the maturity stages compared to polynomial (Likert) scales due to limiting the decision discretion of the respondents to yes/no decisions (survey answers). As the specification of this model happened at the conceptual level and by following the predictive validity framework, the advantage of the model directly carries over to quality of the operational model as well as to the quality of the questionnaire and the thereof measured results. By preventing the circular reasoning pitfall, also qualitatively sound drivers of the ERM systems maturity levels could be identified, which solves the second research problem, i.e. the identification of the maturity drivers.

By implementing the ERMMA questionnaire in the intelligent ERMMA online application, the ERMMA study is not a one-shot event. Instead, the application allows the study to be run several times. Each time, additional information will be collected in order to determine the development of the overall ERMMA score distribution over time. This information is not only interesting for academic purposes, but also for the participating firms as they can monitor their individual development over time and comparatively benchmark this with the other participants. Accordingly, the ERMMA online application can be used by firms as a tool for diagnostic control and improvement by monitoring the maturity performance of its ERM system over time. Due to the theoretically sound foundation and the practical usefulness, a further grant was already sponsored by the Funk Foundation in order to enroll the ERMMA survey in Germany as well.

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# 11 Knowledge flows and added value

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**Keywords:** knowledge based economy, investment in people, added value, intangibles,

**JEL classification:** Accounting, Business Administration, Business Economics, Marketing, Personnel Economics/Accounting and auditing

For employment, productivity and long-term growth effects driven by science, research development and innovation involvement, numerous actors as firms, corporations and SMEs, academia, public sector and civil society - are involved in creation of added value. In 2017 Lab Fab App European Commission document exposed: »Europe can have the most impressive talent pool on earth, but it will fail to capitalise on this if the education system does not foster a more innovative and risk-friendly culture« (Lab Fab App, pp. 13).

In 2000, Lisbon Agenda declared knowledge based economy. Also EU research area was put in EU documents and EU employment strategy, productivity and growth. First of all, it was based on knowledge and Bologna reform was implemented. Lab Fab App is a document prepared by High level group. EC launched it in July 3 2017 having in mind investing in the European future we want. Its 11 recommendations serve European institutions, national governments, companies, universities, research institutes, non-governmental organisations and others for innovative solutions needed in nowadays digitised and global world. Report of the independent High Level Group on maximising the impact of EU Research & Innovation Programmes LAB-FAB-APP document sets the scene for a public and political debate on R&I in the Multiannual Financial Framework post-2020 wider audience: EU institutions as well as the broad range of stakeholders are involved.

To capitalise knowledge and know how it is to make transparent to be well seen and understood the invisible part of knowledge based economy: that is how cost of teaching and learning of people are turning to real investment in people, how human and social capital turn to capital as an economic category. Still, in 2000 there was more research and development (R&D) as research and innovation (R&I) era. In next ten years innovations exploded within all economy due to intense global competition. Innovations are different of research. Innovation brings far more to added value and growth as research. Innovation realises idea to be business and to bring to added value. When investing in innovation there is more and more a possibilities to perform intangible property and its capitalisation, real economic added value.

What is not well seen and understood is a path from knowledge to intangibles and added value. As a path I think about activities and processes and interim outputs from education and training for competences and skills to final capitalisation of added value and real capital based on human and social potential.

There are three key phases: Knowledge production, knowledge transmission and knowledge transfer. Knowledge production means developing and providing knowledge. Knowledge transmission is educating and developing human resources and knowledge transfer is disseminating knowledge and providing inputs in problem solving.

OECD since decades has been doing an excellent job; they prepared a lot of literature about competences, intangibles, etc. It is still awareness to rise and knowledge to bring to all stakeholders; first of all to public sector and SMEs. As stakeholders are to act accountable for sustainable goals, they must have a basic

knowledge of accounting and its link with R&I in regional context. More and more authors are turning the attention that the weight of accounting in the economy of different areas should be considered and the possible vulnerability may cause a decline in added value production. Industry 4.0 pushes innovation as the first driver of growth and the main productive factor of added value. That is why the potential of human capital is to be properly considered: all potentials are input to perform result.

When preparing new competences needed for industry 4.0, Academia should take special attention to skills of creativity, team building, different qualifications for analysis data etc. Academia should instruct all levels of life-long learning about a new teachers role as a teacher is the first authority in creation of human capital. Knowledge-based economy building is transforming human resources into skilled workforce equipped with innovative and creative abilities; creating knowledge capital is replacing physical capital.

To come to added value of R&I also commercialisation is needed. It is based on the organisation's business objectives, the form of intellectual property, the economic resources at its disposal, management accountancy and risk management to take into account. Developing the country as a knowledge based economy depends on the key contribution from higher education institutions. For this, special emphasis needs to be placed on the development of educational infrastructure, curriculum, research, innovation, as well as on the improvement of communication, intercultural fluency, teamwork, management competency, analytical thinking and enterprise performing. Method of teaching needs a relook. Teachers need to encourage logical thinking and creativity in students. Also performance based assessment is over traditional assessment. Strategic plans should address relevant issues and quality ex-ante evaluation of plans. The goals should bring higher education in line with the social, cultural and economic needs of the country, ensure quality curriculum is in place so for the knowledge economy, increase role of higher education institutions as strategic partners in socio-economic development. Disciplines of science and engineering, business and management, social sciences should assist the job market and human capital needs within the context of lifelong learning.

In the process of creating knowledge based economy it is to create relevant knowledge as competences and skills. It is performing from knowledge embedded in people (human and intellectual capital) to know how. Innovation is a realisation of idea. Know how then can become intangible asset, it can be formally or informally identified.

### **Acknowledgments**

Why I present this paper? As one of 12 members of HLG (picture and Report) we put down:

»Our society should increasingly become a living laboratory for innovative solutions to the many challenges we face in Europe – be they economic, environmental or social. Through broad-based, impact-focused research and innovation policy and investments, we can turn these challenges into innovation opportunities. This requires action and participation by many, if not all of us« (Lab Fab App, pp. 5).





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As an associated professor, PhD in Economy, a retired dean of Faculty of Business and Management Sciences in Novo mesto, with knowledge about business, research, innovation, development, services and entrepreneurship, **Nevenka Maher** became in 2016 a member of European Commission High Level Group. I am one of authors of the EU significant research & innovation development document LAB-FAB-APP Future we want (Report of the High level group on maximizing the impact of EU research and innovation programmes, EC DG Research and innovation). As an invited guest she spoke about Research and Innovation in Slovenian Parliament and Trade commerce in Slovenia.

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# 12 Estimation of value principle in reverse logistic domain by applying fuzzy logic

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**JEL classification:** C61

In recent decades, lean concept has become one of the most applied concepts for managing business processes in companies that exist in different economic sectors. The application of the lean concept implies, inter alia, the analysis of the business process and the application of appropriate methods in order to eliminate the losses that may occur during the business process. In the literature, there is no single classification of a lean concept. Although, all the authors in this field suggest that the basic principle is the value concept. According to (Ueda et al, 2009) the creation of an artifact begins with acquisition of knowledge about existing things; i.e. it begins with obtaining knowledge about the existing environment (natural and social), knowledge about human beings, and existing artifacts. Ueda et al. (2009) pointed out that creation of value must be obtained under assumption that artifacts, human beings, and society are closely interrelated. Therefore, it must be understood that value is created through their mutual interaction. It is assumed that it is necessary to recognize and define the value from the perspective of the buyer (ISO 9000: 2008). In this way, it can be possible to reduce process faults and facilitate efficient and effective engineering changes (Maropoulos and Ceglarek, 2010). In accordance with the defined value, management should take measures to eliminate all activities that do not lead to the product value creation from the customers' point of view. On the other hand, if the estimated value is not significantly large, the management should take measures that should lead to the improvement of this lean concept principle.

In the literature, some papers can be found in which the problem of determining the values in different economic fields is considered (Ueda et al, 2009; Olugu et al, 2011). As it is known, during the last few decades, reverse logistic management has become very interesting research area both for researchers and practitioners. It can be said that in the domain of reverse logistic there are almost no papers dealing with the problem of introducing a lean concept, as well as the problem of improving the measurement and management of the lean principle. Authors of this paper state that the considered problem is very important, since its solution provides better environmental protection, while reducing the use of natural resources, which is further propagated on both the profit increase of any enterprise and the economic sustainability of each country. In literature and especially in practice, value determination is based on subjective assessments of the decision-makers. The problem is significantly more complicated, if it is assumed that the value is influenced by a number of factors that have a hierarchical structure and that their relative importance is not the same. Within this assumption, it is almost impossible for the decision-makers to accurately assess the value from the custom-

ers' point of view.

In this paper, the value definition issue of the new detoxification engine oil equipment presented in (Pavlović et al, 2015d) is considered. The highest amount of oil comes from motor vehicles at the end of the life cycle. Based on statistical data, it is known that around 1.5 million liters of engine oil annually can be considered as waste. The development of an oil recycling and detoxification equipment has both economic and environmental significance. In economic terms, recycling of oil produces new recycled oil, which can be used to reduce the consumption of natural resources. From the aspect of environmental protection, oil can be considered as hazardous waste whose landfilling unfavourably affects all elements of the environment.

There are no literature recommendations to determine the factors that influence the market value of the recycling equipment. As this paper discusses the End-of-Life Vehicles (ELV) engine oil recycling equipment, it can be considered that the management team determines the factors of the product under consideration according to the motor vehicles performance. Olugu et al. (et al. 2011) have considered performance referring to green automotive industry and in this paper special attention is focused on performance related to ELV recycling capabilities. For instance, recycling costs which should be considered when designing a recycling device, made of: cost associated with returning of ELVs that vital for effective recycling (if ELV do not reach the recycling center, it may negatively affect the environment); disposal for hazardous and unprocessed waste (hazardous waste generated should be properly disposed.); level of waste generated (quantity of waste that is generated per ELV at the end of the recycling process); level of customers' motivation on ELVs; availability of recycling standards etc. Đapan et al. (2015) have considered factors that affect safety at work. These factors are classified into three groups: human factors (personal characteristics, experience, training level, behavior, and relations), organizational factors (work pace, organization and schedule of work tasks, information, procedures and documentation, workplace ergonomics, and safety system), and technical/technological factors (technical characteristics of equipment, level of automatization, characteristics of safety, equipment and devices, maintenance level of equipment, characteristics of personal and protective equipment). Respecting the presented researches in (Olugu et al., 2011) and in (Đapan et al., 2015), as well as the results of a good practice in this paper are considered the following factors and their sub-factors for determination of the oil recycling devices value: (1) the marketing factor (delivery time, the ratio of marketing costs and production costs, the speed of conquering the market, the level of satisfaction of the recycling center); 2) the environmental factor (the level of fulfilment of requirements for environmental protection, the percentage of non-recyclable materials, the level of sustainability of recycling devices), and (3) the safety factor at work (level of safety, maintenance ability, the ability to use different fluids).

Since many of the identified factors and/or their sub-factors are not measurable, their values can be determined based on the assessment of decision makers. Also, the relative importance of the sub-factors under each identified factors is determined on the basis of the subjective decision maker assessment. It is a well-known fact that decision makers may better express their views if they are using natural language rather than measuring scales. Hence, in this paper, all existing uncertainties within the relative importance of sub-factors and their values are described by pre-defined linguistic expressions. These linguistic terms are modelled by type-1 fuzzy sets (Klir and Folger, 1988; Zimmermann, 2001). The fuzzy set theory provides a strict mathematical framework within which vague conceptual phenomena can be precisely and rigorously studied (Zimmermann, 2001). Uncertainties are described by the linguistic expressions modelled by fuzzy sets which are represented by their membership functions (Dubois and Prade, 1980, Zimmermann, 2001). Creating the membership function is based on one's experience, and assessment of decision makers. In the literature, many authors suggest the use of triangular membership functions, since they offer a good compromise between descriptive power and computational simplicity. In this paper, the all uncertainties are modelled by triangular fuzzy numbers (TFNs), such as in (Torfi et al, 2010; Tadić et al, 2017).

It is reasonable to assume that these identified factors and their sub-factors don't have equal relative importance. Many authors suggest that the relative importance of sub-factors are more reliably determined when they are obtained by application of pairwise comparisons, than when they are directly obtained. In this paper, the estimation of the relative importance of the sub-factor within each factor is set by the fuzzy pairwise comparison matrix. The elements of this matrix are set as the problem of fuzzy group decision making problem. Each decision-maker can describe the relative importance of each pair of sub-factors under each factor using one of three predefined linguistic terms: low importance, medium importance, and high importance that are modelled with TFNs. Domains of these TFNs are defined on real line into interval [1-5]. The value 1, i.e. value 5 denotes the smallest, i.e. the greatest importance of sub-factor in relation to other sub-factors inside within considered factor, respectively. Aggregation of decision makers' estimates is performed by applying fuzzy averaging method. Determining of weights vector can be obtained in different fashions. Trofi et al (2010) suggest that the weights vector should be calculated as the average of the each row elements from the constructed fuzzy pair-wise comparison matrix, the best-worst method (Rezaei, 2015), i.e. DEMETEL in (Wu and Lee, 2007; Pamučar et al, 2017), respectively. The widely used procedure for handling of fuzzy AHP is proposed in (Chang, 1996) and applied in (Paskoy et al 2012, Tadić et al, 2014). This procedure does not require complex mathematics calculation and at the same time it is clear for understanding and application. In this paper, weights of sub-factors are calculated by means of procedure developed in (Chang, 1996). Extent analysis (Chang, 1996) application provides for the obtained weights vector values to be a crisp numbers (Kahraman et al., 2006; Büyükožkan et al., 2008).

Fuzzy rating of sub-factors values are modelled by using one of five pre-defined linguistic terms: very low, low, medium, high, and very high. These linguistic variables are modelled by TFNs whose domains are defined on the measurement scale  $[0-1]$ . The value 0, i.e. value 1 marks that the sub-factor has the smallest, i.e. the highest value, respectively. Since sub-factors can be of a benefit type and a cost-type, decision makers must take into account the type of criteria when assessing their values.

The authors of these paper opinion is that in any organizational system the values determination should be based on the application of exact methods. The proposed model has a hierarchical structure, where the output of one interference system is used as an input, with other variables for each next interference step.

The first interference system is based on calculated crisp values, by applying fuzzy rules the value for each identified factor is calculated. Determination of the weighted normalized values of identified factors is based on fuzzy union application (Zimmermann, 2001). The representative scalars of fuzzy numbers used to describe the weighted normalized factor values are determined by means of defuzzified procedure. The most commonly used defuzzification procedure is moment method (Dubosi and Prade, 1980) and it is applied in this paper. The final value of each factor is determined by applying IF-THAN rules by analogy with (Heikkila et al, 1996; Tadić et al, 2012).

In the second interference system, the fuzzy IF-THEN rules must describe the relation among all identified factors, simultaneously. That is why, this approach requires fewer and simpler rules. The system can be simplified by discarding the least significant rules. In general, there are a number ways for determining the IF-THEN rules, for instance: a fuzzy-based evidential reasoning approach (Liu, et al, 2004), Adaptive Network Fuzzy Interference (Mathworks, 2000), etc. In this paper, the rules are built from the knowledge, experience and from data of decision makers from reverse logistic.

The main contribution of proposed model are: (1) determining the value of the ELV engine oil recycling device to be described by a formal language that enables the calculation of a solution by a precise method; it is assumed that any solution obtained in an exact manner is less affected by the subjective attitudes of the decision-makers and, therefore, it is more accurate; (2) the uncertainties which exist in the model can be described in a sufficiently good way by type-1 TFNs; (3) all the changes, as with the changes in the number of

factors/sub-factors, their values and the relative importance can be easily incorporated into the model, and (4) the developed model is understandable and can be easily applied in practice.

The subjectivity in the factor selection according to which the value of the product in the domain of recycling is assessed can be designated as the main constraint of the proposed model.

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# 13 Creating new values through innovations: restaurant industry in Serbia

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**Keywords:** Innovations, new value, service sector, restaurants, managers

**JEL classification:** Q13, Q18, Q5

Innovations can be achieved in many ways, by adding novel activities (through forward or backward integration), by linking activities in novel ways, or by changing one or more parties that perform any of the activities. Which way a company will choose depends on its aims, the available financial, technical and human resources, the market environment and partly on government policies. However, it is advisable to involve all departments (within a company) and stakeholders in process of generating new ideas. Some of the great innovations can be based on an idea that comes from customers, employees at low hierarchical level or from suppliers. On the other hand, it is useful to follow leaders on the market and their good example of how to stay relevant among competition. Some authors classify innovations into product innovations, process innovations, management innovations (innovation related to human resources, i.e. training methods, staff empowerment, etc.), and logistics innovations. On the other hand, some researchers recognize marketing as another type of innovation in the hospitality industry which brings new perspectives in the relationship between employees and customers. However, innovation in pricing is rarely discussed although it can be a source of competitive advantage and an opportunity for value capture.

Innovations in the restaurant sector appear as conceptual solutions in five main areas: Design and atmosphere (e.g. interior and exterior appearance, colors, music, etc.), Food and beverages (e.g. portion size, new ingredients, allergen free, etc.), Technology (e.g. PMS, POS terminals, online reservations, smart phone applications, social media, etc.), Social responsibility (e.g. ethics, eco-friendly packages, waste recycling, etc.), and Human resources (customer orientation, service climate, etc.).

The aim of this research was to identify attitudes of restaurant managers towards innovations as an adapting strategy, and to reveal their perceptions of future trends in the restaurant sector.

The study relies on research conducted among managers of full-service casual dining restaurants in Serbia. Managers (n=29) were interviewed in person after they had been explained how to form their answers correctly. The managers were asked to rank the most important areas of innovation by allocating the points (1=least important, 5=most important), to reveal recent innovations of their company and to forecast dominant trends in the restaurant sector in the next 10 years. Additionally, they were asked to fulfill short questionnaire

in order to acquire socio-demographic data. ANOVA was used to reveal differences between managers' attitudes towards the area of innovation.

The results of socio-demographic analysis reveal the following important facts: (1) most of the restaurant managers are males (93.1%), (2) they are mainly younger than 40 years (62.1%), (3) more than half of them (65.5%) have only high school education, (4) majority (82.76%) of all managers do not have professional education in hospitality.

During the interviews, different attitudes towards areas of innovation were noticed, and therefore ANOVA analysis was performed to reveal those differences. The results indicate that the older respondents (over 41 years) are less likely to innovate in the area of Design and atmosphere and Technology than younger respondents. In other words, younger restaurant managers (up to 41 years) recognize the importance of technology use and a pleasant restaurant atmosphere for delivering quality service. These findings suggest that age of the manager affects their decision in terms of innovation area. Particularly, younger managers are more likely to implement technological innovations and to pay attention to restaurant design.

Additionally, the results reveal that managers with higher education and broader experience give significantly higher marks to the innovation areas of Human resources and Social responsibility.

### **Design and Atmosphere**

During the interviews some of the answers were: "Design of a restaurant is the first thing that draws customer attention and we try to make it unique by periodical refurbishments", "We noticed that many customers who come for breakfast, brunch or just a coffee and drink, asked for newspapers and TVs. Recently we have installed two TV sets and a newspaper stand by the door".

A study conducted in 2007 revealed the increase in importance of the customer's perception of restaurant design and surroundings, while the newer ones finds design innovations as a key for service quality improvement and further development in the restaurant industry. Being innovative in the area of design and atmosphere has a positive effect on customer behavior. All of the interviewed managers agreed that pleasant atmosphere positively influences customers' mood and profit: "Waiting staff say that many customers discussed our interior design and that they are delighted, some of them are regulars now". Additionally, they agree that music is the key element for a great atmosphere and dining experience (79.3%).

### **Food and Beverages**

The top rated innovation area in the restaurant sector offers the widest range of possibilities to innovate and it is the best way to differentiate retail establishment among competitors (69%): "We do listen to the market demand and that is why we have more dishes that come in two sizes". Other respondents indicate: "Our customers do not spend much time in the restaurant; they want quick meal during their break. For that reason, we offer a variety of salad meals and sandwiches", "Healthy options are gaining popularity, but such meals are still not profitable enough to be a central theme in our menu. The majority (62%) of the respondents noticed an increased number of customers' special requests when ordering a food or drinks. For example, they ask for: "Pancakes without whipped cream on top", and "Mashed potatoes instead of chips".

Innovations are mainly conditioned by customer's food preference and eating habits. Therefore, restaurants are trying to attract specific market segments often by differentiating their offer: "healthy food", "low calorie food", "organic food", etc. Severe competition forced some restaurants to go even further with innovations, so they base their offer on raw food or blood-type dietary recommendations. Some of the major trends are local food, hyper-local sourcing, healthy menu items and sustainability. It is evident that customers prefer to customize their meal, and according to the responses of 75.9% of the managers, restaurant employees usually do not have problems meeting such requirements.



As for the beverages, the respondents agree that fresh juices/smoothies are one of the major trends (72.4%), followed by different coffees (62%) and local wines (58.6%): “Last year we had frequent requests for decaffeinated coffees and now when we have it, we sell only few such coffees a month – we should have reacted faster”.

### **Technology**

This area of innovation has become a must (75.9%). The Internet has become very important channel for business transactions and activities. Technology is more used for innovation of the service delivery process than to service or product itself: “We offer our customer to follow us on Facebook, Twitter and Instagram”. All sampled restaurants are equipped with property management system (PMS) but none of them with touch-screen menus or a wireless ordering system: “There is still no need to install a wireless ordering system, if we grow bigger in next year or two we probably will”. The managers were asked about applications for smart phones and some responses were: “We are not thinking about it at the moment since we are focused on social media”.

All managers agree with the fact that customers are more demanding and have less tolerance. They seek additional information about meals, ingredients or allergens, or simply want to know more about the food they order. The authors proposed managers to implement Quick Response Code (QRC) in the menus and on restaurant websites. By scanning the code a customer would be able to obtain additional information about menu items (ingredients, allergen info, nutritive and energy information, etc.). The majority of the managers (62%) positively reacted to the idea: “It could save some time”, “I know our waiting staff sometimes have to go to the kitchen to check with chefs before giving an answer to the customers, it could be useful”. On the other hand, some responses were negative towards it: “Guests usually do not ask those types of questions, and when they do, staff can deal with it” or “I do not think guests really care about nutritive information, they go for taste instead”.

### **Human Resources**

Some of the studies show that human resources are very important to the service sector - hospitality industry, and also that competency of manager and employees can positively affect innovation. In this regard, one of the managers stated: “A smile and kindness make the people beautiful. Our staff is beautiful indeed. We recognize the importance of our employees and we even point out on our website that we have a smiling staff”.

During the interviews a certain lack of creativity among the managers in terms of human resource innovations was noticed. Unfortunately, less than a third of the managers (31%) practice on-site training, and only 24.1% of them organized official performance improvement trainings for staff. Innovation can be achieved through motivation policy: “Motivation is a delicate process; money is not always a right choice. I have noticed that employees are more willing to stay overtime and work harder after receiving official bonus or good tips”.

The main reason managers do not organize training is the lack of money and a cost-saving policy (93.1%). Those who do organize state: “I know that investment in our employees is the investment in service quality and a way how to improve customers’ satisfaction”, “I found it necessary for kitchen staff to know food hygiene procedures, and it can cost us much more if something goes wrong due to untrained staff”. Those managers who organized sommelier training for their employees reported an increase in wine sales: “You must know what you sell in order to sell it”.

### **Social Responsibility**

Innovations can help restaurateurs to reduce food, materials and energy waste, and also to help others and become recognizable for green practice and social care. Interviewed managers have little experience with

recycle; they mainly recycle/sell used cooking oil (48.3%): “At the moment we cannot afford cooling containers for biological waste and we simply throw it away”. Regarding the cost savings, some respondents noted: “We have switched from table cloths to recycled paper mats, in terms of the costs it is better option for our restaurant”, or “For take away food we now use recycled paper bags”.

Since the modern consumer is more educated and recognizes the importance of sustainable development as a concept of the future restaurant sector, restaurateurs should pay more attention to this issue, especially because some researchers found positive effects on energy consumption, the customer’s readiness to pay more for “green” restaurants, and on operational tasks which implies profit increase and higher customer satisfaction.

### **Foreseeing the Future**

Prior to asking for future trends and predictions, we wanted to examine on what managers ground their opinions and strategic decisions. Two main categories were experience and competitors’ advances. Moreover, none of the interviewed managers read published scientific papers related to hospitality industry, and only 6.9% of them occasionally check online results of relevant surveys conducted by Chamber of Commerce or similar institutions. This situation can be overcome by more frequent market research and a constant desire to learn since education positively affects attitudes towards innovations.

Answers regarding dominant trends in the restaurant sector in the next 10 years are classified into the following categories: 1) Quick service/Fast food, 2) Social media, 3) Technology application, 4) Customized service, and 5) Healthy menu items.

Additionally, this research reveals that most of the examined restaurants still have a lot of traditional approach elements incorporated in business activities and policies. By switching to the modern approach, companies can become market leaders and positively affect profits and customer satisfaction. However, switching to modern approach does not mean necessary abandoning all traditional values, but offering them in a different way.

The results generally indicate a lack of creativity and innovative ideas among the managers. The main reason for that could be found in absence of professional education, a low level of general education, a young age, and lack of experience. Additionally, managers do not conduct surveys among customers often enough.

From a practical point of view, it is suggested that socio-demographic profile of managers can indicate and predict the direction of current and future business activities. Most restaurants struggle with being innovative and have difficulties coming up with fresh ideas continually, especially ones that customers are willing to pay for. Therefore, managers must consider the significance of staying competitive by prompt response to customers’ demand. Moreover, they should stay well informed about the trends within the industry by following relevant publications or through contact with faculties, educational centers and similar institutions and associations and facilitate the innovation process in that regard. Before beginning major innovation programs, managers may need to think about internal capability, staff training and collaboration with external partners (faculties, suppliers, distributors, customers etc.).

Finally, in the highly competitive and dynamically changing restaurant sector, managers’ proactive behavior and ability to create a unique experience with personal signature on it will be crucial. Being able to offer value based customized service may define who will stay competitive and profitable.

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# 14 ICO profit forecast based on consumer added Value

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**Keywords:** ICO, Blockchain, Ethereum, Crowd funding, Crowd sales, Crowd investing, Value

**JEL classification:** --

This paper is an attempt to create scientific based segmentation of initial coin offerings as a newly used crowd-sale model which is getting increased significance. The number of ICOs (Initial Coin Offering) is rising as well as number of participants and the amount of gathered funds. But ICOs differ from crowd funding in the way that the backers of the former are motivated by a prospective return in their investments, while the funds raised in the latter campaign are basically donations. ICO gathers crypto coins rather than conventional currencies called „fiat money“ in the crypto community. Crypto coins or crypto currencies are representation of unique digital structures called “block chains”. “Blockchain” is an indivisible and indestructible journal in which data cannot be compromised. Blockchain can be freely distributed but cannot be compromised. It was originally designed to make the world's most famous and first crypto currency Bitcoin. The most of the developed countries in the world, banks and corporations are working hard to develop their own Blockchain projects. The most developed countries of the world begin to use these technologies to improve their fiscal policies, primarily in the field of fiscal policy and social assistance, where they have significant results - UN, China, Great Britain, Australia, Canada, Japan. The technology shows remarkable results in the creation of public registers of data whose integrity cannot be challenged, some countries use it for the register of issued invoices. The legal regulation of crypts allows the real sector of the economy to operate abroad without bank fees and with almost instantaneous transfer of money, which increases the competitiveness of the economy and attracts capital from all over the world because the pioneers of this technology are looking for countries in which they can work freely in accordance with the law. New development projects based on these “new” technologies often create ICOs in order to finance the project and gather required community attention and support. Many ICOs are fraudulent and often end in loss of invested assets. On the other hand some of them proved to represent a real pillar of community or great product with rapid adoption and brought great added value to the consumers and profit to the creators and investors in the initial coin offering. This paper attempts to study ICO's in order to provide increased insight and base for further analysis in order to determine ICO success rate and correlation between factors influencing ICO success.

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**Stojan Ivanisevic** graduated at the Economic Faculty of the University of Novi Sad in Business Information Systems. He completed his Master studies in 2011, as M Sc in Business Information Systems - Information Engineering. The main focuses of his doctoral studies started in 2014 are applied information technologies, block-chain technologies and Smart Cities. Stojan is a dedicated IT specialist with over 10 years of experience in the IT sector and management. Since 2008 he has performed a number of responsible functions in the government, public and private sector and has been a participant in numerous domestic and international projects. Currently employed at JKP "Informatika" Novi Sad as Senior System Architect and engaged as a consultant for Information Technology and Block-chain technologies.

# Part III: IEM in view of valuation

## 15 Successful Innovation Sourcing: a matter of Support plus Skills

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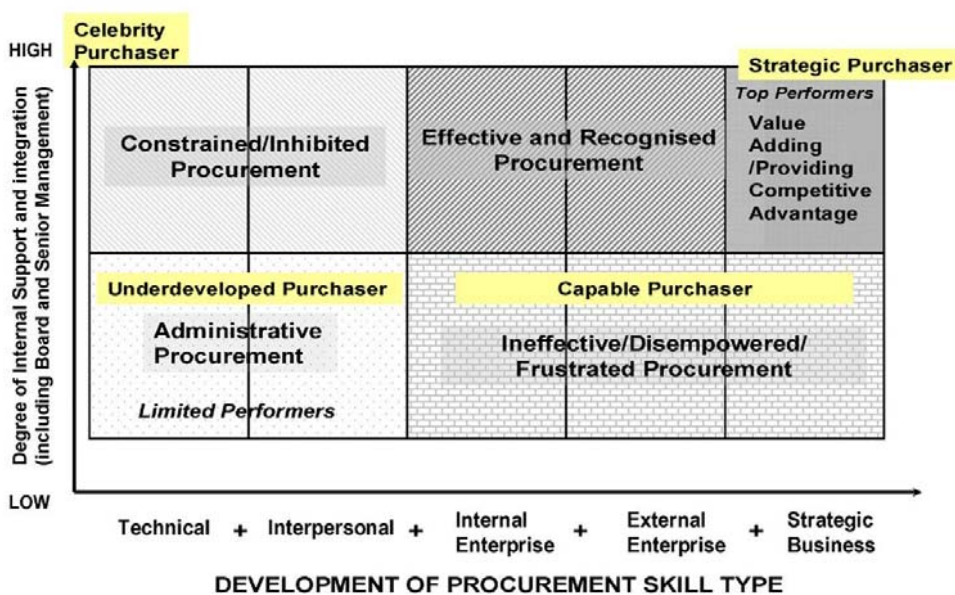
**Keywords:** Procurement skills, innovation sourcing

**JEL classification:** M11

### Abstract

Procurement or Purchasing and Supply Management plays an important role in the development of the overall organizational competitiveness. Up to sixty to eighty percent of their total costs are being paid to suppliers (Monczka, Handfield, Giunipero, Patterson, & Waters, 2010; Van Weele, 2009). The role of procurement has become increasingly important and more strategic (Van Weele & Van Raaij, 2014).

**Figure 1 Procurement Effectiveness Matrix of Tassabehji and Moorhouse (2008, p. 65)**



The level of the skills of individual procurement professionals relates positively to the success in innovation sourcing (Feisel, Hartmann, & Giunipero, 2011). Tassabehji and Moorhouse (2008) state that: '(...) Before procurement can be elevated to strategic, the professional first needs to possess a strong set of these underlying skills and competencies (...). While skills related to processes and technology (i.e. technical and internal

enterprise) are important, by themselves they are not enough to improve a company's procurement performance (...). The (...) skills (...) (are) largely cumulative where one builds on the core procurement skills, to reach the ultimate level of skills to be able to operate strategically. In order to optimize the role of procurement to achieve added value and competitive advantage for the organization (...), the procurement professional must develop technical (including advanced procurement process skills), interpersonal, internal and external enterprise and strategic business skills coupled with a high degree of support and internal recognition' (see fig. 1) (Tassabehji & Moorhouse, 2008, p. 65).

Tassabehji and Moorhouse (2008) present a matrix consisting of two axes without a clear scale. It is mostly an illustrative 'two-by-two' management model to explain the concept that higher levels of skills and management support together lead to success. This study is taking this matrix as a starting point and is aiming to test it empirically with quantitative data. The focus of this research is on the procurement activities in innovation sourcing. Innovation sourcing professionals need to acquire access to the innovations of suppliers in order to implement these in the own products, services or processes. These strategic activities are associated with gaining sustained competitive advantage. 'Innovation is by far one of the most important competitive priorities in the current business context. Companies increasingly rely on their supply base to support their innovation potential. As a consequence, the purchasing department might dramatically affect the firm's innovation capability' (Luzzini & Ronchi, 2011, p. 14).

This study aims to test the matrix and it aims to extend the model with a third axis. The x-axis of the existing matrix represents the level of the different skills and the y-axis of the original matrix represents the level of support and internal recognition. This study projects the purchasing skills, significantly belonging to innovation sourcing professionals, on the x-axis. On the y-axis, it projects the management support for innovation sourcing. The z-axis represents the level of self-rated individual success in innovation sourcing and implementation on the same scale.

The research question therefore is:

RQ1: What is the (visual 3D) relationship between:

1. Significant distinct skills of innovation focussed purchasing professionals
2. A high degree of support and internal recognition of the innovation sourcing focussed purchasing function and,
3. The individual skills of innovation focussed purchasing professionals?

### **Methodology – polynomial regression**

To come to the answering of the research questions three steps have to be taken: first the purchasing professionals with an innovative focus (n=102) were isolated from the results of purchasing skills survey (n=581). Second, with an analysis of variance the means on the 87 survey skills items of the purchasing professionals with an innovative focus are compared with those of the other survey participants and formed to a construct. Parallel the management support items on innovation were formed to a construct for this group (n=102). The third stage aims to find the relationship between the three variables via polynomial regression with response surface analysis. Polynomial regression was performed according Shanock, Baran, Gentry, Pattison, and Heggstad (2010).

### **Results – empirical evidence**

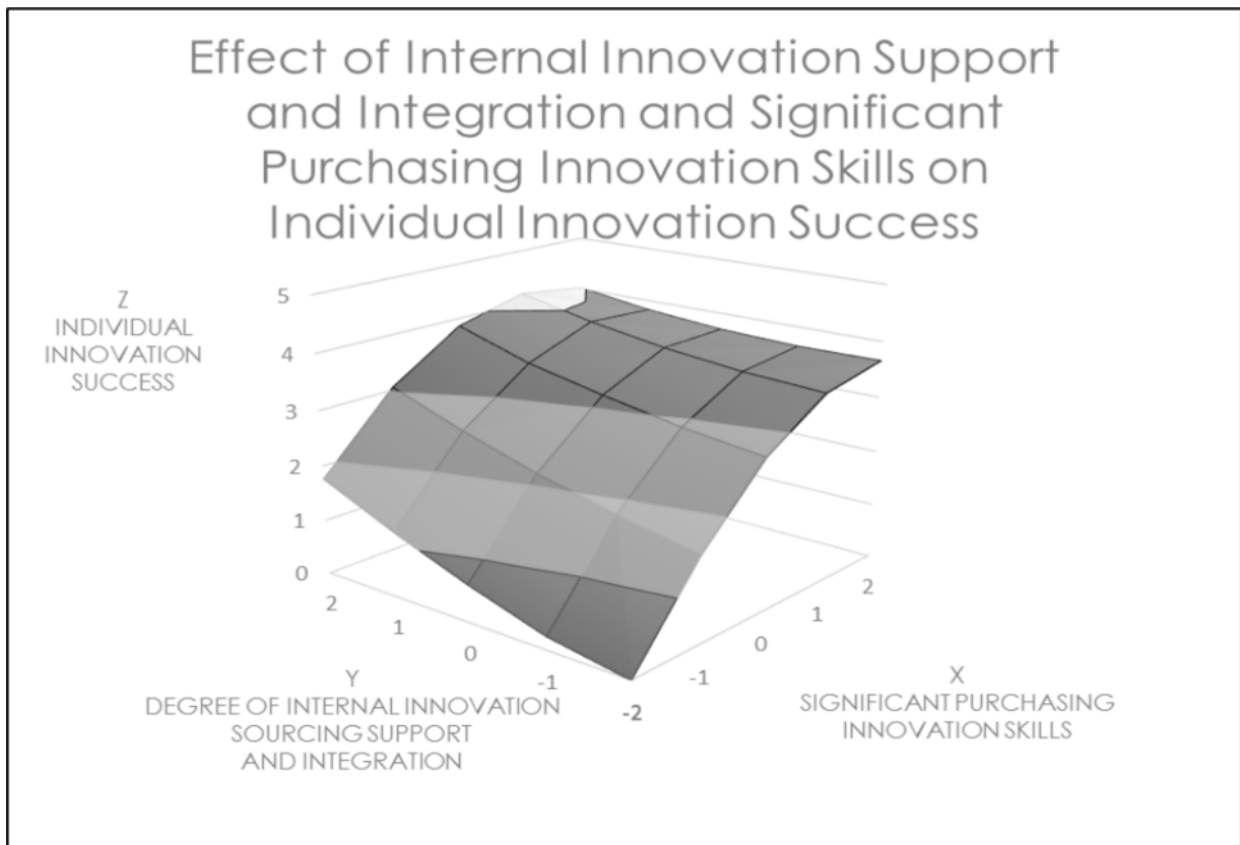
The polynomial regression leads to a 3D-image as displayed in figure 2. Table 1 shows that (only) the slope on the diagonal  $x$  equals  $y$  is significant. The slope is ascending from (-2, -2, -0.13) to (2, 2, 4.02) (see table 1). This means that the assumption of Tassabehji and Moorhouse (2008) is supported: a higher level of sig-

nificant purchasing innovation skills if and only if combined with a higher degree of internal support and integration leads to an increase of individual innovation success. On the x-axis appear the skills levels on a 5-point Likert (centred around zero) of all innovation focused procurement professionals: from low skilled (-2) to highly skilled (+2). The y-axis presents (5-point Likert centred around zero): from low support (-2) to high support (+2).

**Table 1: Testing Slopes and Curves of figure 2**

Testing Slopes and Curves – Total set of skills					
Effect	Coefficient	Standard Error	Stat (t) p-value		Sig!
			a1: Slope along x = y (as related to z)	1,04	
a2: Curvature on x = y (as related to z)	-0,30	0,21	1,433	0,155	
a3: Slope along x = -y (as related to z)	0,47	0,52	0,904	0,368	
a4: Curvature on x = -y (as related to z)	-0,11	0,34	-0,325	0,746	

**Figure 2: Effect of Internal Innovation Sourcing Support & Integration and Significant Purchasing Innovation Skills on the level of Individual Innovation Success**



Discussion – Innovation-sourcing success has two sides of a coin: purchasing innovation skills development and internal purchasing innovation support

This study found evidence that the assumptions of Tassabehji and Moorhouse (2008) are supported: a higher level of skills significantly belonging to innovation sourcing professionals in combination with in support from top management for innovation sourcing lead to a higher level of success of individual purchasing professionals in the field of innovation sourcing and innovation implementation. This research has taken innovation-



focussed professionals in consideration and contributes to the knowledge on innovation-related skills of purchasing professionals. The main take-away for managerial use is that innovation-sourcing success is reached via distinct, significant individual skills and via top management support for innovation sourcing.

### Acknowledgment

This research is a part of Project PERFECT (Purchasing Education and Research for European Competence Transfer), which has been set up and funded by the European Union to become the first worldwide region to establish an empirically validated pan-European PSM higher education curriculum. The project is embedded into the ERASMUS+ 2015 KA2 program (Cooperation for Innovation and the Exchange of Good Practices Strategic Partnerships for Higher Education) with the project number 2015-1-DE01-KA203-002174.

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# 16 Sustainable development of Value Creation within the EPIEM-ESTIEM cooperation

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**Keywords:** Value, Sustainable Development, Cooperation

**JEL classification:** O15

## Introduction

The development of cooperation projects often holds great potential for success as well as for failure. The main success criterion can be reduced to the capacity of the cooperation to generate enough value for the cooperating partners and beyond them, related to the needed effort for making the cooperation functional. But value is a subjective concept and different cooperation partners might experience large differences when assessing the value of cooperation outputs. An aspect of great value to one partner might be unimportant for the other and vice-versa.

The paper aims to explore and emphasize the potential and the sustainability of value creation within the cooperation between the Association of European Students of Industrial Engineering and Management (ESTIEM) and the corresponding professor branch of European Professors of Industrial Engineering and Management (EPIEM). In order to achieve that aim it uses the case study method and describes value from the point of view of the potentially involved partners and the differences that might arise, relying on discussions and observations. [1] The inherent risk of self bias related to the case study method represent a limitation of the concept. [2]

Based on these findings, a concept for potential sustainable development of the cooperation between ESTIEM and EPIEM is created.

The cooperation actors and their values

In order to assess potentials ways to create value for the cooperation partners it is useful to understand their mission and their values, as well as other circumstances of involved individuals.

## ESTIEM

ESTIEM is a students' association and its assumed mission is "To foster relations and mutual understanding among European Industrial Engineering and Management Students while supporting them in their personal and professional development" and their vision is about its members growing and developing into future leaders that tackle society's problems and share European values by interacting and challenging the status-quo [3].

The values linked to ESTIEM's mission and vision, are synthesized in four elements: Diversity, Development, Participation and Ambition [3]:

Diversity stands for being aware of the coexistence of multiple cultures in Europe and the world, and for embracing this cultural diversity as strength derived from the chance to see chances and challenges from different points of view and use different insights when searching for solutions. In this context respect for other cultures is at the heart of ESTIEM's philosophy.

Development points to the engagement of ESTIEMers to undergo a personal development process, to learn from successful projects as well as from mistakes, in order to gain practical experience as well as soft skills that are important in today's world.

Participation is also a central value: ESTIEM as organisation is democratic and has flat hierarchy, thus encouraging all of its members to bring new ideas and participate in ESTIEM's activities.

Ambition shows that ESTIEMers wish to be proactive, step out of their comfort zones and develop an entrepreneurial spirit aiming for good, interesting results and the sharing of best practices and experiences.

On individual level all ESTIEMers are students. Despite the fact that each individual is unique there are some common traits that most ESTIEMers share:

- ▣ they are willing to invest their time for personal development and for building up friendships,
- ▣ they face time pressure because of their study, but most of them are willing to prolong their study time with 2 semesters in order to have a year with major engagement in ESTIEM, if they discover interesting projects where they can involve themselves.

From the ESTIEM perspective a close cooperation with EPIEM would have the potential of creating value, because EPIEM professors could offer key know how and intellectual resources for enabling development and personal growth of ESTIEMers.

## EPIEM

EPIEM is a collaborative European network of professors in the field of Industrial Engineering and Management (IEM) and its assumed mission is "fostering collaboration between IEM professors across Europe to enhance the field of IEM"[3] Derived from it further stated objectives are to:

- ▣ Create a common and well-known understanding of the IEM field across Europe,
- ▣ Develop and promote IEM academic education and share best practices,
- ▣ Enhance cooperation between academia and industry,
- ▣ Encourage the engagement of IEM community in joint researches,
- ▣ Characterization of IEM professional demands and to
- ▣ Facilitate international education of IEM students. [4]

So there is one objective that clearly states that cooperation with ESTIEM students is wishful and necessary.

On individual level all EPIEMers are professors in the field of IEM. They face time pressure because of their job, which often stretches beyond normal time borders. The wish to spend time helping students' growth and personal development beyond normal curricular means is one reason why they joint EPIEM. But this wish is partially countered by the fact that this time needs to cut in the time span of research and partnership with the industry which is generating additional financial resources or that of free time for privacy and breaks which is also a very important ingredient in order to preserve creative thinking and enthusiasm.

From the EPIEM perspective a close cooperation with ESTIEM would rely on altruistic reasons in the first place, as well as on the belief that this cooperation is closely linked to the deeper meaning of EPIEM and the vocation of professors.

## A Concept of sustainable value creation within the EPIEM-ESTIEM cooperation

At this moment there are three identified pillars for value creation within the EPIEM-ESTIEM cooperation:

- ▣ Pillar 1: Direct interaction
- ▣ Pillar 2: Trainings for competence transfer towards students and professors
- ▣ Pillar 3: Joint IEM projects

Direct interaction through meetings, trainings, discussions and other joint activities where people meet face to face has a good potential to generate value for all involved persons as it can fuel friendship, inspiration and enthusiasm beyond the exchange of information. Therefore the EPIEM Conferences where professors and students meet are a good chance to establish and develop a good relationship between ESTIEM and EPIEM as well as between the involved participants. Such a friendly environment full of trust can generate new ideas that in addition fuel the other two pillars.

For topics that are of great importance to the students like leadership, sustainability, entrepreneurship it is always an excellent chance if the corresponding competence is identified within the EPIEM network in a form that can be shared, either by direct trainings, or by online-courses and webinars.

Last but not least, joint IEM research including professors, PhD students as well as master or bachelor students could bring benefits, thus value for all engaged parties.

The three pillars offer a good potential for value creation within the ESTIEM-EPIEM cooperation. The challenges consist in identifying the right elements within the three pillars and implement them in order to really create this potential value.

In order to make such a development sustainable, a driving group formed by professors and students could be useful, that correctly maps the elements with a high potential and bring them to a real implementation by promoting them within the ESTIEM and EPIEM networks in order to attract the right people and develop the needed enthusiasm.

## Conclusions

Direct meetings such as the EPIEM Conference are of paramount importance for creating value within the ESTIEM-EPIEM cooperation. Such meeting should have spaces for workshops designed to identify value creating elements and to plan their implementation.

Trainings and joint projects on topics that arise interest on both sides could also further increase the value output of the cooperation.

Finding the right design for direct meetings, trainings or joint research projects and doing it systematically would ensure a sustainable value creation. Therefore a driving group with members from ESTIEM and EPIEM could be the solution to jointly identify and implement elements of the three mentioned pillars, which hold a great value potential. The three identified pillars do not necessarily represent a complete solution, but rather important steps towards a solution, that can be further improved with new elements.

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# 17 Valuation of research work in academic organizations in public sector

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**Keywords:** Valuation, science, education, relevance, quality, standardization, productivity, public sector

**JEL classification:** I2

Scientific research is the second central component of academic education. It supports education process in the sense of long-term development of educator's competence and involving students in the field of scientific work particularly at master and doctoral levels. Research centres, laboratories and institutes incorporated in the organizational structure of the university, have to be the spearhead of scientific research at university. Scientific research is highly creative, very demanding, and uncertain kind of business. Almost every scientific result could be perceived as a creation of a new value.

However, high demands in scientific research and uncertainty factor particularly may be misused sometime, somewhere by some researchers, as an excuse for their low productivity and a lack of scientific results. As a consequence of that there are some negative tendencies, as follows: organizational self-isolation from wider academic community; subjective and biased instead of objective and unbiased evaluation and valuation of individual and group results; ignoring of academic standards and at the end a rise of phenomenon known as a toxic leadership which degrade productive working atmosphere. Because of those risks and challenges it is very important to pay attention on a proper and adequate valuation of research work at academic organizations particularly those in public sector which are, by definition, far from other kinds of check, control or verification on market.

In this work we will start from some postulates from strategic documents which are related to the scientific research and academic education (Strategy for scientific and technological development of the Republic of Serbia 2016-2020; and, Strategy for education development in the Republic of Serbia up to 2020).

Long term vision of science and technology development point-out following strategic goals: establishing new efficient system for management in science and innovation; stimulating excellence and relevance of scientific research; obtain relevance of science for industry and economy; improve international cooperation in science and innovation; and support investment in science (Strategy for scientific and technological development of the Republic of Serbia 2016-2020). In the other hand long-term vision of academic education development point-out few crucial characteristics: quality, relevance, efficiency, internationalization, mobility, scope and modernization (Strategy for education development in the Republic of Serbia up to 2020).

This paper explores valuation of research work by considering two aspects which are related to the relevance and quality (or excellence, as it is marked in the strategy for science development) of research conducted through a scientific project. Other characteristics are mentioned by the way.

Relevance and quality are two important characteristics for valuating any kind of activities and particularly scientific research. Due to their importance, relevance and quality are often highlighted in a strategic documents related to the science and academic education. Aspect of relevance indicates the purposefulness and applicability for some practical needs, and consequently overall importance. Aspect of quality could be perceived as a measure of achieving the highest standards prescribed for some branch, in this case for scientific

work.

Large organizations have complex structure and many sub-organizations. With a passage of time, initial concept of internal cooperation may vanish and sub-organizations tend to conduct their own partial agenda and values on account of parent-organization main agenda. This phenomenon is known as organizational silos and it is an open question for modern business, management and public administration. Due to the growing complexity of challenges in a globalized world, respond to the problem of the organizational silos usually leads across inter-organizational, interagency, interdepartmental, whole-of-government, etc. approach.

First aspect is searching for answer on next question: "Who needs that research". The research topic should be distilled from practical needs of organizations from real world. A market company or public sector organization may point out some specific problem which they want to be considered, described and/or solved in an objective, unbiased, effective and comprehensive manner, by experts in the scientific field. In other words, the research topics and consequently scientific results should be relevant and purposeful for somebody or something. There are certainly more variation in answering the question. One of them could be as follows: "mapping the needs" of real world organizations and their suggestions of the list of problems as candidates for research topics.

Second aspect of valuation in this paper is related to the quality of scientific research, that is, to answering the question: "How good is that research". Various approaches may be applied in order to achieve adequate valuation, comparability and quantification. In Serbia, this task is resolved with one policy document issued by the Ministry of education and science, under title: "Rulebook for procedures, valuation and quantification of scientific research results of researchers" (<http://www.mpn.gov.rs/wp-content/uploads/2017/03/Pravilnik-2017-preciscen-tekst.pdf>). This fifty pages document defines, classify and quantify nine general classes of scientific results. They are as follows: Scientific monographs and chapters of international importance (denotation class: M10); Papers in scientific journals of international importance (denotation class: M20); Book of proceedings from international scientific conference (denotation: M30); Scientific monographs and chapters of national importance (denotation class: M40); Papers in scientific journals of national importance (denotation class: M50); Book of proceedings from national scientific conference (denotation: M60); Doctoral (PhD) thesis (M70); Technical solutions (M80); and Patents (M90). Each class is further divided in appropriate number of subclasses with appropriate denotation (for example: M21, M22, M23).

In the Republic of Serbia there are about sixty research institutes in public sector (state funding institutes) which are accredited as scientific research organizations (<http://www.mpn.gov.rs/wp-content/uploads/2015/08/Akreditovani-instituti-adrese.pdf>). If include other (non-state, non-public) forms of funding and property the number is more than eighty accredited research institutes (<http://www.kombeg.org.rs/Slike/CeTranIRazvojTehnologija/2016/Februar/Akreditovani-instituti.pdf>).

General principles of academic work (freedom and autonomy of research work, transparency, scientific critics, standardization of result valuation, ethics, connection with academic education, international cooperation, environment protection, etc) are respected and implemented in the law which regulate scientific work (<http://www.mpn.gov.rs/wp-content/uploads/2015/09/Zakon-o-NID-iz-Paragrafa-sl-gl.-112-iz-2015-preciscen-tekst.pdf>).

Strategy for science and technology development ([http://aler.rs/files/STRATEGIJA\\_naucnog\\_i\\_tehnoloskog\\_razvoja\\_Republike\\_Srbije\\_za\\_period\\_od\\_2016\\_do\\_2020\\_godine\\_Istrazivanja\\_za\\_inovacije\\_Sl\\_gl\\_RS\\_br\\_25\\_2016.pdf](http://aler.rs/files/STRATEGIJA_naucnog_i_tehnoloskog_razvoja_Republike_Srbije_za_period_od_2016_do_2020_godine_Istrazivanja_za_inovacije_Sl_gl_RS_br_25_2016.pdf)) pointed out that there is no appropriate financial mechanism nor institutional framework for connecting science with industry and public sector. This fact, combined with autonomy principle, leads to a potentially weak relevancy of scientific research, that is, scientific institutes may conduct research according their own agenda while research topics are rarely distilled from practical

needs of industry, market, public or other non-scientific organizations. In other words, there is no clear answer to the question: “who needs that research”. Of course, this sharp statement is not a general conclusion for all scientific institutes. Rather, it is an indicator of a potential problem which may arise.

Organizations in a public sector, in general, sometimes have a problem of valuation of their work and performances. In order to contribute towards solution finding, there is simple idea as follows. Proposal of general approach for selection of research topic, conducting research process, verification and validation of research results may be seen in a few steps:

- 1. Selection of research topic. First step is crucial, particularly for aspect of relevance. This is about connecting theory and practice. The main point is searching for connection between theory (science) and practice. In order to obtain relevance of research for practical problems, the simplest way is to ask “practice” side to give a proposal (or a set of proposal) for research. That is they are expected to formulate a problem (or a set of problems) which they want to be solved by use of scientific resources. In that way, the relevance aspect is assured in advance: proposer of the research topic is identified and it is logically to expect that he will be a main user of future scientific results. Importance of connecting research and practice was stressed as well recently (Baastrup, 2017) at the conference “Military Sciences – The Backbone of Military Educational Institutions” at Norwegian Defence University (<http://www.isofms.org/pagina/isms-conference-2017.html>).
- 2. Conducting research process. Crucial thing in this phase is capability of research organization to produce research plan, to find resources needed for research, to define proper timelines, to prescribe indicators of success, and to motivate, lead, control, support and guide research staff towards successful realization of a research plan. As mentioned at the beginning, scientific work is a creative activity but also uncertain one, and because of that research way is not a straight line but rather an oscillatory movement between hits and misses. Due to such character of scientific research processes, scientific organizations as well as individual researchers have to be resilient, flexible, persistent and self-critical in doing their research job.
- 3. Verification and validation of research results. Publishing research results in scientific journals and proceedings of scientific conferences is a “modus operandi” in the business of scientific work. In order to be published, an article has to be read and accepted by journal’s editor and peer reviewers. After being published, the paper is exposed to critics and review by wider readership public. So, the paper has to be good enough in order to fulfil scientific standards. Scientific monographs (books) should arise from several journal articles and are dedicated to a particular scientific problem or application. Patents, innovations and technical solutions arise directly from scientific research and are directly applicable into the practice of real world. In short, a collection of scientific publications of various types is a main shop-window of the scientific project conducted at academic institutions. Publishing for International scientific journals has a very important place in valuating project’s success, as well as in valuing of individual contributions of researchers. In practice however, many problem may arise as follows: unbalanced production of individual researchers, reluctance towards publishing at international scientific scene, weak proficiency in foreign languages, thin reading and monitoring of relevant literature (particularly those in foreign languages), poor computer proficiency (particularly among the social scientists), lack of research capabilities (many individuals entered research and academic organizations because of good working conditions and not because of propensity towards creative but demanding scientific work), etc.

Particular importance and obligations have scientific institutes and centres incorporated in the structures of Universities of Defences. They should be a spearhead in recognizing and dealing with contemporary complex practice in defence business, by furthering both military education and research (Dalgaard-Nielsen, 2017, <http://www.isofms.org/pagina/isms-conference-2017.html>). Due to the complex environment and its dynamic



nature, as well as because of the obligation of the military to be prepared for the uncertain future, military education is sometimes perceived as a “cornerstone of a military’s capabilities” (Yong-De, 2017, <http://www.isofms.org/pagina/isms-conference-2017.html>). Few successful cases in realization of research projects with established links between science and practice are as follows (country case Serbia).

(1.) Strategic Research Institute finished a year ago one scientific project which was externally ordered. It was a project titled as “Propensity to Serve in Military Active Reserve” (<http://www.isi.mod.gov.rs/eng/289/zainteresovanost-za-sluzbu-u-aktivnoj-rezervi-završen-289> ). An extensive empirical research was done in order to obtain rough data for further analysis. One step forward was undertaken, comparing with similar research in the past, with implementing idea of electronic fulfilment of the survey by wider public. Results of the project research was prepared according to scientific standards and launched at scientific conferences and journals. So, the overall result was twofold: scientific (a set of scientific articles produced) and practical (external client who initiate research and suggested the topic got his technical report on the subject). Additional benefits from the project were: recognition of the Institute as a useful organization of MoD, as well as development of internal research capacities of the Institute through better production of scientific work (efficiency) and improved transparency of results (effectiveness).

(2.) At the moment, Strategic Research Institute works on the project titled as “Hybrid Warfare – Experiences and Perspective” (<http://www.isi.mod.gov.rs/eng/36/hibridno-ratovanje-iskustva-i-perspektive-aktuelan-36> ). Similarly as previous, the research topic was suggested by few external organizational entities, who demanded whole research. Besides the regular project activities and due to actuality of the topic for defence and security community, a scientific and expert meeting was organized and held in December 2017 in SRI. Participants came from very different organizations with wide spectra of research topics, what will be presented in the Proceedings before the end of the year.

(3.) University of Defence recently (in March 2018) launch two important documents: a Strategy of internationalization and Strategy of mobility for students and academic staff. Both of them are expected to contribute to the following goals: improvement of academic curriculum, enlargement of academic mobility for students and academic staff (professors, researchers and instructors), and advancement of international cooperation with universities, research institutes and partner institutions (<http://www.uo.mod.gov.rs/sr/o-univerzitetu/dokumenta-propisi#.WrY2XNTwZdj>).

Besides the strategy, there are few additional documents aimed to support implementation of the strategy in the real life, as follows:

- ☐ First and most important supporting document class are two Action plans for implementation of two strategies. Those are detailed plans projected for mid-term period (2018-2023) with defined activities, sub-phases, results, indicators of achievements, and subject responsible for realization.
- ☐ Second document class are rulebooks which define precise rules, criteria and procedures needed for planning, support and realization of activities from action plans.

Whole this set of documents is a key enabler for successful implementation of strategies for internationalization and mobility in the academic domain. Its systemic approach will give a powerful momentum towards better education and research at the University of Defence.

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# 18 Influence of Open Innovations and Leadership on e-Commerce Model Success: Case Studies in Serbia

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**Keywords:** innovation, leadership, Serbia, case study, e-commerce.

**JEL classification:** M13

The purpose of this paper is to present main information about open innovations, leadership approach, and e-business models, analyzed through the important e-business cases in Serbia. According to this, authors describe an important strategic document called Europe 2020, the vision of Europe's social market economy for the 21st century, followed by the Digital Agenda for Europe. After that, authors discuss the Living Lab model, which is created to support the competitiveness of enterprises, to invest in people and skills and to develop the knowledge society through research, education and information technologies. This paper brings the essential information about strategic approach to the open innovation strategy and leadership in Serbia, analyzed in 6 leading e-business cases, leaders in different areas. Open innovation resumes learning by doing with new skills about technologies during the development of products and learning while waiting with the knowledge about the product that has been developed. Each of these two stages creates important sources of information that could be included in further development. An important role in open innovations is reserved for ICT and their infrastructures, making another significant aspect for the success of e-business companies. Those aspects are implicitly discussed in these 6 case studies, which are e-business leaders in different areas: e-market (eLakolije), e-auctions and e-trade ((Limundo), information portal (B92), entertainment (EXIT), services (Key-to-Metals) and education and business portal (Infostud).

Univerexport is one of the largest retailing systems in Serbia established in 1991, selling goods in 39 mega markets. Their project eLakolije (eng. e-It-is-easy) is not the first in the field of e-ordering & delivery in Serbia, following two less successful solutions of Maximarket and Idea. Creating their business model, they defined main goals of the project in the first step. The first of them was to cover wider territory, where Univerexport does not have their markets. This leads them to the new group of customers for the company. This new business model has high level of services, where spreading the field of selling and promotion of the company are more important than the level of profit in this field, putting it in the long-term goals. The important goal is to have better conditions from the concurrent companies. Finally, main goal is to have the highest rate of e-ordering & delivery in Serbia. Univerexport is a well-known brand among retailing systems in Serbia. Their e-ordering investment eLakolije was built on the same strategic ideas of the company, trying to be the best in this area in the country. Their offer is the same as in their mega markets, but they are offering the chance to order all goods from home, this is the new value of eLakolije. Another new value is the offer through eLakolije

in some places where Univerexport does not have any shop. After conducting the careful study of the competition, they created the business model based on the Univerexport's brand and the trust to the company. They are taking e-orders in the wider area, with lower level of order, and with the shorter periods of the delivery from their competition.

Great success of eBay influenced a group of companies in Serbia, where the results of Limundo is obvious, making it the most successful internet company in Serbia and the auction market leader in the region. After seven years of work, they have more than 400,000 registered members, with more than 200,000 visits and more than 9,000 sales every day. Success with internet auctions was an initial occasion for company to create Kupindo, e-trading Web site, a kind of e-auction with fixed prices. There is a new registered member in Limundo every 2.5 minutes. Company employs 35 people working in Limundo, 13 of them as the user's security and satisfaction service. Limundo takes first on the list of most visited Serbian e-shops in 2013. Their marketing message says that Limundo population is the third largest city in Serbia, making them extremely successful company. Main advantage of this company is their precise and transparent business model, leaving their competition in Serbia far behind. The company is an example of high quality in technical solutions and human relations with their employees. They are widely recognized for their rules in working with their external users.

Innovative and open approach is obvious in Limundo business model and it could be easily recognized in the flexible relation with employees, who has a chance to open their own, child company which is selling products that are not in the niche of Limundo. This is real win-win situation, where Limundo is spreading their niche, while employees have a chance to begin with their own business using all the resources of their mother company.

Content provider is the most popular organization model in Serbia's virtual market. B92 has the highest rank among content providers for a long period of years the traffic of the Web site (without their blogs, forums and streams) is more than 12TB for a month. It is an important entry point to the Internet in Serbia, with blogs that are prestige in Serbian younger intellectual part of the society. B92.net is one of the most visited sites in Serbia for a long period, while excellent journalists and constantly new ideas in company's work are the guarantee for their future work. B92.net is a part of a large private media organization, which also owns one of the most popular TV stations in Serbia, and very popular radio station. Still, main interest of the site visitors are political contents (38.9%) and sport information (34.3%), while each of business information, blogs, forums, social information and culture pages of the site are under 8% of the visit numbers. The costs of this Web site are on the level of 80% of incomes from the advertisements published on the site. There is also the department for real estate selling and SMS information service as a part of this Web site, which bring additional incomes to the company, while probably the most important extension of this site, created for mobile platform with almost all information contents intelligently adjusted for users of mobile devices. The advertising concept of the company is to bring a lot of interesting information in different areas and to connect appropriate advertisements to this text. Content management of the whole B92 system relies on the principle called "convergence of all platforms. Each editorial board is supplying with information contents all platforms in the company: TV, radio, Web, WAP and teletext. This unique product is differentiating them from the other media, helping to come immediately with information to all of them with the lower internal costs. This solution differentiates B92 as a system, giving it a new dimension of integrated media.

One of well-known Serbia's brands today is EXIT (also known as State of Exit), an award winning summer music festival, which is held at the Petrovaradin Fortress in the city of Novi Sad. EXIT was officially proclaimed as the the world best festival in 2017. The EXIT official Web site is deeply integrated in the organization of the festival and strongly oriented in their work with the full functionality of Web. The most of basic aspects of festival's organization are implemented in the digital world: marketing of the festival, selling tickets,

bands applications, different competitions, social projects and all the information, and facilities important for the visitors of the festival that are integrated in the site of this successful company. Logical step in the growth of this site is EXIT Mobile. Web storefront is selling tickets worldwide, where the partner from Great Britain plays the role of the payment gateway. The mailing list of the festival has tens of thousands of the participants. As the most of the visitors are coming to the festival for years, this list is very important for the work of marketing department. There are between 2,000 and 3,000 daily visitors of the sight in the calm periods, but in the peaks (selling the low-priced tickets, announcements of the performers, short period before the festival) the number of the site visitors grows to the tens of thousands each day. The importance of communication with the fans is the top priority for EXIT. That is why they created their own social network myexit.org with personal pages, blogs, forum, parliament and gallery. For the communication with the potential visitors, EXIT is also using the most popular social networks: Facebook, Twitter YouTube, Instagram and Flickr. World success of EXIT rock festival among the younger generation has to be followed in the world of bits and bytes. Mandatory business part of the festival's site is the system for selling tickets and the extension for the mobile platforms. However, the focus of the EXIT management is on the information part of the site, because they are aware of the fact that e-marketing through this gateway is the best way to bring more people to the festival. That is why, beside the main information of the next festival, they are offering a lot of other information important to their target group in the relaxing atmosphere of the festival, well shifted forward to the site.






The concept of vertical information provider, which sells industry-related information, is implemented in Key-to-Metals solution. The largest database from the metallurgic branches in the world was developed by Industrijski inženjering (INI), software integrator from Belgrade. The appropriate database was created including steel material properties and steel specifications from 57 countries more than 5 million property records for more than 220,000 materials (metals, polymers, ceramics and composites) from 59 countries/standards. It comprises the standardized information and presents a very useful tool for engineers of different profiles. The company continues with permanent and intensive development of this comprehensive resource, with the focus on new datasets, new functionalities and above all quality of products and customer support. As it was founded in Serbia, the problem of trust in Serbian brands was so large that company was officially located in Switzerland under the name Key-to-Metals AG, with the international board. Company's mission is simple: to make the one-stop place and first choice with information about materials for engineers worldwide. In the core of company's business model are their main principals: sustainable organic growth, full global reach with localization and presence worldwide, strong investment into development of products and customer support, and the commitment to listen, serve and help our customers in their daily work. Their reference list includes some world largest companies like Lufthansa Technik AG, General Electric, Bentley Motors Ltd, Yamaha Motor Co, Siemens AG, Husqvarna AB, Ford, China Steel Corporation, Doosan Škoda Power, Walt Disney Imagineering, Honda, Stanley Black & Decker, IKEA, Olympus, Kawasaki Heavy Industries, Mitsubishi, and many others.

Great international success authors found in Key-to-Metals AG, the company created as the vertical information service in Serbia, which had to move to Switzerland because it is very difficult to achieve international recognition of Serbian brand. CEO of the company it commented with the question: would you buy a new car in Moldova? Their success was built around the excellent product – the world's largest database with information about materials. Of course, great product is not enough. That is why the company made collaboration with internationally recognized marketing partners. On the other hand, they realized that the success is not permanent situation. The company is innovatively opening their work, spreading the niche in new areas, where they are offering information of the same type.

Infostud is the company that operates through the Internet and runs its own Internet sites in the area of services, information, trade, and other fields. It was established as a company that operates through the internet

and runs its own Web sites in the area of services, information, trade and other fields. It is focused on expansion and development of a strong group of successful Web sites, leaders in their business fields and examples of good business practice. Business model of the company was built on the values of innovations, development, quality, results, openness, flexibility, responsibility, fair relations, team spirit, and positive attitudes. Infostud solutions were created in the period longer than a decade. Their first solution concerned with the employment. Business model presumes paid advertisements from the employers that are looking for new employees. In addition to this model, company has two groups of Web sites that are dedicated to the human resource management – project that helps managers in getting higher job satisfaction among the employees and a group of educational articles in main disciplines of human resource management that is offered to the subscribers. The idea to form larger group of their Web site visitors among the students was implemented with the information about conditions for studies in higher education in Serbia, with many paid advertisements on the site. As the work in software engineering in Serbia with foreign companies is an important part for employing, Infostud reacted with the site HelloWorld.rs, offering their intermediation in finding appropriate jobs for employees and free lancers. In the same year, Infostud also made new acquisition, buying the company for online insurance in six different fields. Next acquisition of Infostud was the solution for the purchasing of used cars. This application was expanded with the site for trading with car tires. The next extension in the same direction is the site with the information where drivers exchange their experiences about their cars, with various advertisements in addition. One of the most popular extensions of Infostud group of Web sites is Putovanja.info, an important tool for the promotion and selling of tourist arrangements, hotel capacities and private accommodation with a lot of proprietary information. Every step of their growth is strictly planned and implemented gradually. Their main concept in that development is to create an interesting place for a target group of potential visitors first, following that by a specific information e-market. Another important conclusion about Infostud is the fact that they are building systematically their business model, each time fully focused on the part of the market they are coming to.

As a final conclusion, we found five common preferences in all these solutions:

-  clear vision of development,
-  well-recognized market segment,
-  precisely created business model,
-  constant research and changes, and
-  innovative openness for their implementation.

Opposite to these core strategy settings, we found different diversifications in selection of e-business models, ways how to reach their customers, create a business leader in their market segment, and earn money.

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Borislav Jošanov works as professor for professional studies with basic degree in Mathematics and doctor thesis in Computer Sciences. He authored or coauthored 75 research papers. He focus his research activities on different aspects of e-business models and practice, software engineering on Internet and social aspects of e-learning. He also worked on software development for 12 years, mostly in computer factory, as a member of teams which authored 70 software products.. As a professor he worked on project of integral business system in the cable factory and on the international project for eInvoicing in small and medium sized companies. He is in charge for department for informatic sciences in his school.

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Slobodan Živkucin works as professor for professional studies with basic degree in Management. His doctor thesis was in interdisciplinary field of Management and Marketing. His main engagement is deputy director in College for Management & Business Communications, with the authorites of director. His main angament for more than 20 years was in Regional Chamber of Commerce in Vojvodina, with the authorities for cooperation with production companies in the region. His main research interest is the finding of successful business models for new production companies in different fields of business. He teaches marketing and management and he is leading the practice of students in different fields.

# 19 Additive manufacturing in design inspired by biomimicry

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**Keywords:** additive manufacturing, FDM Technology, design, digital art, biomimicry

**JEL classification:** O3, O33

Additive manufacturing continues to take an increasing share in the world of design and art. As the additive manufacturing gives a lot of freedom in creativity there is an almost endless array of possibilities and as the technique is developing more and more will be possible. 3D technologies enable the production process to accelerate. In contemporary design, digital arts are increasingly being used by artists to express their ideas. With the application of computer programs, today, the design solutions of designers and artists are realized faster. Ever since the 1970s, there have been attempts to define the term digital art as well as the terms computer art and multimedia art. In addition to the progress that has taken place in the way of expressing contemporary design through the digitization of conceptual solutions, the application of additive production has also improved the production processes of the finished product. A large number of additive processes are available. The main differences between processes are in the way layers are deposited to create parts and in the materials that are used. Each method has its own advantages and drawbacks, which is why some companies offer a choice of powder and polymer for the material used to build the object. There are five basic additive production technologies today. These are: Inkjet, Stereolithography (STL), Selective Laser Sintering (SLS), Laminated Object Manufacturing (LOM), Fused Deposition Modeling (FDM). Additive production is used in many industries. It is evident that the largest share is taken by the customer's products (making shoes and sneakers for individuals, spectacles, diving equipment, etc.) and the automotive industry (parts manufacture - gear box, steering mechanism, mold making for castings of titanium of complex shapes. Following these branches, the medicine follows (the production of elements for correcting teeth, hearing aids, implants, etc.), machine building, aircraft industry and space objects), academic institutions, military industry as well as the rest.

The term 3D printing was originally referred to as a process that deposited a binder material onto a powder bed with ink-jet printing heads layer by layer. The more exact term of the 3D printing is additive manufacturing, which is still adopted in verbal terminology as such. Today global technical standards use this as the official term -additive manufacturing- for this broader sense, since the final goal of additive manufacturing is to achieve mass-production, which is very different from 3D printing for Rapid prototyping.

Additive production is increasingly available especially with FDM Technology (Fused Deposition Modeling), production on the principle of melting deposit modeling by heating and extruding thermoplastic filaments, proved to be very affordable and efficient. The materials used are different and can be biodegradable or not, flexible or solid. FDM process is clean, simple and suitable for operation in a small space. Thermoplastic parts can withstand exposure to heat, chemicals, moist or dry condition and mechanical efforts. Digital technology has transformed traditional approaches in contemporary design and art and will bring it to completely new forms. The development of digital art is flowing along with the development of computer technology. In digital painting, new results and effects are generated through computers and using specific algorithms, as well as using traditional painting techniques. Digital visual art consists of 2D visual information displayed on



an electronic visual display of information that are mathematically translated into 3D information observed through the perspective projection on an electronic visual display. Digital technology has transformed traditional approaches in contemporary design and art and has led to completely new forms.

Software programs in digital art are diverse. Some of them are Cura, Repetier, 3D studiomax, Shoemaster, Adobe, Corel Draw, Maya and many others. Indeed, today contemporary design, and all the rest, can not do without the knowledge of some of the programs that we can be helpful in developing solutions design or art. Certainly the traditional approach to developing conceptual designs is recommended, but if the hand-drawn motifs imported into design software programs realization repeating motif is rapid, precise and assist the work of designers and artists.

In the future, the development of design will take part in the advancement and linking of multidisciplinary areas by monitoring new technologies through the concept of work and the contemporary term, which are key elements with a starting point that aims at artistic thinking in supporting the separated or unified attitude between applied and fine arts.

Biomimicry, as the practice of designing based on the nature, is the inexhaustible inspiration source of contemporary design that applied using additive manufacturing in all branches of design. Unmatched is the ability to bring the beauty of nature, economy and functionality, but it is no coincidence that the great inventions throughout history have their sources in the analog elements of nature. The concept of biomimicry, which wide access to modern science and art, consists of analyzing the principles of natural elements and their transfer to individual solutions in the field of technology. The nature of man is the source of inspiration inspiring work of art, design and architecture. Nature has found numerous solutions to the problems that we are still struggling with. Modern designers have realized this, by using nature, they apply its principles in their design solutions.

Through numerous examples of 3D printing, it can be seen that a design inspired by biomimicry creates stronger structures, smarter technology and creative aesthetics. Digital art has already won the designers and artists inspired by biomimicry relies on proven solutions that provided us with nature, and with the help of new technology manufacturing finished products design will be tailored to fit each customer.

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*SPECIAL AWARD FOR INTERNATIONAL SALON OF COMICS, 2010.*

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# 20 Determining Different Activities within Experience Economy Model for Cultural Institution

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**Keywords:** cultural institution, experience economy, different experience activities

**JEL classification:** M31

## **Abstract**

The experience economy as an emerging concept is implemented across a wide range of industries, but still there is no existing research within cultural institutions. This indicates the need and importance of implementing the model in certain consumption situation, while visiting and experiencing cultural institution.

The present study suggests certain activities within the experience economy model to explain the experiential nature of main cultural institutions. The study contributes new information to research and advances the growing theory in experiential cultural consumption. Examination of different activities of the experience economy in creating and delivering visitor's experience within cultural institutions will lead to contemporary applications for all the involved parties.

## **Introduction**

The experience economy has recently emerged as a relevant framework for understanding how to improve the consumers' experience across different industries. Cultural institutions are facing new challenges where tourists are in search for exiting, unique and memorable experiences. Bernstein, J. S. (2014). Therefore, cultural institutions should strive to develop and offer a distinct, engaging and unique offerings in order to improve their current offers and to maintain the competitiveness on the market.

The purpose of the present study is to determine pertinent activities of the experiential – based model as proposed by Pine and Gilmore (1999) within cultural institutions. The authors proposed different activities within experience economy framework as a foundation for augmenting cultural experience with authentic experience and for employing the qualitative research methods.

## **Literature review**

The relevance to a cultural institutions is increased due to emerged visitors' need for the new authentic and memorable experience. The content of the activities of the cultural institutions plays key role in social cohesion and in building trust for a better society. Therefore, cultural institutions should develop innovative approaches and extended the main repertoire in order to elicit the interest of new audiences. The use of new technologies and non-formal educational activities may help to address and engage younger audiences. Wide range of activities within cultural institutions should be integrated and interconnected with the intention

of creating holistic approach for experience - seeking visitors. Consequently, cultural institutions should interact and be open to audiences' needs and interests (European Union, 2014). Due to increased tendency for tourists to seek experiences that are subjective and meaningful, cultural institutions should strive to promote different type of entertaining and educational activities (Lord, 2002).

The cultural institution are facing with great competitive challenge where formal and basic cultural products are now extended and transformed into the authentic experiences. Prentice (2001, p.10) confirms that "experiential cultural tourism is therefore diverse in forms but singular in purpose: namely, sampling what is imagined to be personal and authentic experience."

Pine and Gilmore (2000) describe and explain the progression of economic value and define the experience as distinct economic offer built on top of services, goods, and commodities. The present study utilizes pertinent constructs of the experience economy model to explore the importance of different items for visiting cultural institutions. Pine and Gilmore (1998) identify four dimensions of consumer experiences divided by the degree of customer participation and connection within the performance. The four types of experiences are entertainment, educational, escapist and esthetic. Educational and escapist dimensions reflect active participation, whereas entertainment and esthetic dimensions are characterized by the passive participation of the customer, in this case, wine tourist. Consequently, during the educational and escapist experience, the visitor will directly affect or influence the performance of the specific cultural institutions. On the other hand, visitors are immersed in the esthetic or escapist experiences; they absorb entertaining and educational offerings within cultural institutions. Each dimension in the experience economy framework engages individual customers in a way that creates a memorable and perception-changing experience. Esthetic dimension occurs when visitors are immersed passively in the experience, specifically when they are indulged in sensorial environments. The esthetics dimension refers to visitors' interpretation of the physical environment around them. Educational experiences engage the mind of the consumers and play a vital role in co-determining their experience. Visitors strive to enhance their knowledge during the.

Escapism experiences occur when visitors are actively immersed in the experience, and it requires their participation. Most scholars examined the experience economy framework within wine tourism remains scarce (e.g., Ali-Knight and Carlsen, 2003; Pikkemaat et al., 2009, Quadri-Felitti and Fiore, 2012, Quadri-Felitti and Fiore, 2013, Brzovska, 2017, Brzovska, Ozretic-Dosen and Simjanovska, 2017). Ali-Knight and Carlsen (2003) emphasize the necessity for creating a memorable and compelling experience in the wine industry. Therefore, winery operator must provide memorable and sensory experience, which will have enduring novelty, and a visitor will be engaged and entertained through different targeted events and will be offered with unrivaled sampling opportunities. The article was criticized due to lack of aligning the suggested activities within the 4Es framework (Quadri-Felitti and Fiore, 2012). Pikkemaat et al., (2009) applied the experience setting model to measure the potential of experience-orientation of South Tyrolean wine routes. They emphasize the necessity to create multi-optional attractions and to stage experiences for wine tourists. The four dimensions of the experience realm of Pine and Gilmore were employed for analyzing the expectations and the degree of visitors' satisfaction. Results have indicated that esthetic dimension, such as landscape and information about wine, is the most significant regarding visitors' expectations and satisfaction. In terms of expectation, education was noted as a least important dimension, while escape was ranked as lowest concerning visitors' satisfaction. Each dimension of 4Es was comprised of three items which did not fully capture the constructs. The authors excluded outdoor architecture from measuring esthetic dimension and did not provide clear distinguishing for all the items (Quadri-Felitti and Fiore, 2012). Brzovska (2017) emphasized the need for extending the basic wine offers with personalized activities and additional services in order to improve the current wine offers. Therefore wineries should broaden their offerings by including a diversity of appealing esthetic, educational, entertaining and escapist experiences, and gain lasting competitive ad-

vantage (Brzovska, Ozretic-Dosen and Simjanovska, 2017).

Very few studies empirically tested the 4Es and expanded understanding of the experience economy by examining how tourists' memories operate together with the 4Es and whether satisfaction has influence on their destination loyalty in different tourism settings (Quadri-Felitti and Fiore, 2013; Hosany and Witham, 2010; Oh et al., 2007). Four realms of experience offer not only conceptual but also a practical measurement framework for analyzing the tourist experience. Quadri-Felitti and Fiore (2013) measured the experience economy's 4Es by adapting Oh et al.'s (2007) validated 16-item scale and structural equation modeling. The results demonstrate the supremacy of the esthetic experience in predicting positive memories and destination loyalty in the wine tourism context. Hosany and Witham (2010) have employed the four dimensions for understanding cruisers' onboard experiences. Esthetics has appeared to be a dominant determinant in predicting satisfaction and intention to recommend. Oh et al. (2007) constructed a measurement scale and they empirically tested experience economy conceptual model using customers' lodging experiences with bed-and-breakfasts, and the results have proved that the esthetic dimension was of the high importance of the experiential outcomes. All the studies demonstrate the need of implementing the experience economy framework as the consumers across wide industries seek for diversity of activities and unique experience. The measurement model of the experience economy awaits for further validation across different consumption situation (Oh et al., 2007) Hence, the authors proposed different activities within experience economy model and suggest the need for a more encompassing view of the experiential nature of visiting cultural institutions.

### **Methodology**

Although the experience economy is model is employed in different consumption situation, there is no evidence in the current literature for applying this framework within cultural institutions. Following the experience economy framework (Pine and Gilmore, 2011), the authors proposed different activities within cultural institutions. It was employed qualitative research approach, conducting focus groups, in order to gather initial association and visitors opinion regarding cultural institutions. The 5 focus group were consist of seven members, and as a precondition they should have visited at least two cultural institutions or performances in the last two months. The mentor gave them initial instruction and started discussion for the activities that might part of the holistic cultural experience within specific cultural institution. As a second part of the study, the survey was carried out, where 50 students on postgraduates study proposed different types of activities for improving the whole experience while being part of specific cultural performance. The analysed data in these two complementary method are shown in Table 1.

**Table 1: Different activities within the 4E model of experience economy**

<p><b>Entertainment</b> Visitors are engaged by performances</p> <ul style="list-style-type: none"> <li>☐ Great and outstanding performance</li> <li>☐ Organized activities for children</li> <li>☐ Special effect during the performance</li> <li>☐ Possibility for engagement with audience</li> <li>☐ Shops within cultural institution</li> <li>☐ visitors can also dine or have a drink at the bar and restaurant of the opera house, located under an impressive glass roof</li> <li>☐ Having possibility to be photograph with the main characters</li> </ul>	<p><b>Educational</b> Visitors enhanced their knowledge</p> <ul style="list-style-type: none"> <li>☐ Extensive variety of frequent tours, events and exhibitions to explore,</li> <li>☐ Organized different thematic event</li> <li>☐ Educational manual, brochures and print materials</li> <li>☐ Interactive mediums for announcement and educational activities</li> </ul>
<p><b>Esthetics</b> Visitors are enriched by sensual environment</p> <ul style="list-style-type: none"> <li>☐ Superb acoustic qualities</li> <li>☐ Great costume and scenic construction (stage)</li> <li>☐ Beautiful interiors</li> <li>☐ A well organized parking lots</li> <li>☐ Modern object</li> <li>☐ Graphic design of tickets</li> </ul>	<p><b>Escapist</b> Visitors become engrossed by participating in a different time or place</p> <ul style="list-style-type: none"> <li>☐ Possibility to explore the halls, stages and various collections of costumes, photographs and paintings.</li> <li>☐ Being part of performance rehearsals</li> <li>☐ guided tours enable to have a glimpse behind the scenes - access to the backstage,</li> </ul>

Source: Adapted from Fellitti and Fiore (2012)

The proposed activities within experience economy model should increase the degree of awareness of cultural institutions among potential audience. Experiential cultural tourism is about the search for authentic experience and therefore be embraced (Prentice, 2001).

**Conclusion and future recommendation**

Cultural institution should employ the experience economy model and create innovative approaches around presentation and interpretation to become more relevant for wider audiences. Defining and understanding the different dimensions of the experience economy model within cultural institution will contribute for creating unique and memorable offerings, which consequently leads to increased visitors satisfaction. Hence, as our future work we will investigate how these dimensions within experience economy model influence post consumption evaluation in certain cultural institutions. The future research should examine whether defined experiences play an important role in creation of visitors’ memories, satisfaction and loyalty.

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# 21 Retail Mobile Applications Design

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**Keywords:** retailers mobile applications, responsive web design, social commerce, native applications, mobile websites

**JEL classification:** L81

## Introduction

The average time we spend on the internet is growing year after year. Since 2014, time spent on internet on mobile devices is dominant compared to the time spent on the internet on computers. This trend will be continued in the coming years significantly increasing the difference. Retailers and service providers who have recognized this trend are introducing their own mobile applications. The trend of retailers dedicated to mobile applications can no longer be ignored. The most important is to recognize mobile application features as the most interesting for buyers/clients or retailers/service providers.

## Mobile Website vs. Native App

Retailers of 21st century are faced with a number of challenges: how to become competitive, how to remain competitive, how to position themselves in consumer awareness, how to increase service quality and cut costs, etc.

In the context of the achievement of these goals, a number of instruments are available to retailers, which need to be aligned with their own capacities and strategies. On the one hand, big retailers, in accordance with their market share, use expensive instruments for differentiation and positioning. While, on the other hand, small retailers find it harder to find cheap instruments, which will still make them different from the competition and they will stand out from the competition. Thus, for big retailers and major players among service providers, it was not a problem to create both, mobile applications and websites, optimized for display on mobile devices. Big retailers were supposed to spend more funds for development and adaptation. However, for small and medium retailers and service providers, for all of them with limited budget and resources, the allocation of additional significant funds for both approaches, i.e. development of mobile application and web sites optimized to be displayed on mobile devices, may be a major, even insurmountable obstacle. They need to be more careful to weigh their options.

If a retailer understands the essence of a problem, this obstacle can be overcome. Understanding the basic differences between webpages that are customized to be shown on mobile devices and the so-called 'native' applications can be of crucial importance and help us decide whether a webpage adapted to display on mobile devices can replace the 'native' mobile application at the same quality level, i.e. whether it is justified to invest in the design and development of dedicated mobile application or the same or similar market effects can be accessed using websites that are customized to display on mobile devices. That is why we will outline the most important differences between mobile websites and native apps.

Websites and web locations that are customized to display on mobile devices have proven to be a usable tool



to achieve a simple and universal view no matter which devices are installed on which browsers and on which platforms for the data access posted on the web site. What needs to be taken into account and what should be kept in mind is that the retailer has to take the position and make a decision at the very beginning whether to access a "dedicated" website or data access a unique site using responsive web design.

The term responsive web design (RWD) includes those websites designed to adapt to the device currently used by the client and accessing the site, and accordingly adapt to the device, i.e. the size of the device screen. This ensures excellent user experience, no matter which device is used, and instead of using different mobile site variants (for desktop and mobile devices), the same web pages on the web site automatically adjust to devices that often have different screen sizes.

Web pages designed to be displayed on smart devices have the advantage over other pages (and this advantage will increase).

There are various sources suggesting that studies predict that there will be more pages accessed from mobile devices than from desktop computers, which is another confirmation of the justification for adapting existing and future pages to mobile devices, not just desktop applications.

Literature dealing with the subject of responsive design appears in 2010. [1], after which most of the big players accepted this approach, so in 2012, responsive design appeared as Google's recommendation for SEO best practices [2].

Users have received this 'novelty' great, and an excellent user experience has been reflected in a larger site visit, where merchants were sure that all site visitors had a chance to view the content that was released; they were not disadvantaged by displaying the page in incorrect resolution or incorrect letter size.

We can conclude that making RWD (responsive web design) sites, though time-consuming and expensive, represents a 'de-facto' standard much better solution than the development of separate mobile platform sites, with two separate designs: for users who access websites from mobile devices and users who access sites from desktop computers.

One of the approaches to create websites customized to be displayed on mobile devices is the use of a 'fluid grid'. Although this approach gives great results when used for blogs or news, you should be very careful when using it for the needs of a shopping or e-commerce site: often its load time is longer than usual, which usually leads to abandonment of purchase and higher bounce rates and lower conversions.

On the other hand, so-called 'dedicated mobile web sites' can assume all the outcomes and optimize user experience.

It is also possible to manage various aspects of the site such as load time, context menu and page layout, and everything else that contributes to enhancing customer satisfaction.

When we talk about a web site for retailers, it is necessary to create dedicated websites.

### **Native mobile applications**

Creating native mobile applications is a great way for both retailers and service providers to increase customer loyalty and to keep consumers and users more and more interested, for example, by updating product catalogues all without limitations imposed by a browser on mobile device.

With native mobile applications, retailers and service providers can easily achieve additional value by offering location-based services or push notifications services.

In the mobile applications that Amazon has designed for its needs [4], a user is offered a possibility to scan bar-code or photo to find the product in the product catalogue and to be provided additional descriptions and

information. This functionality can not be performed on a site that's customizable on a mobile device.

Also, customers use mobile applications to compare prices and specifications of the same or similar products, with one merchant or with a competitor. In this way a retailer can achieve that users get more information without leaving a store or application.

And finally, as native mobile applications have no restrictions on using the browser, apps are much faster and more comfortable to work with than accessing sites that are mobile-friendly.

A survey that included customers [5] found that average end-users completed transactions within 72 seconds when using native applications and they needed more than twice as much, i.e. 180 seconds if they accessed customized mobile site by mobile device. To be clear, both times are extremely short and the user needs to be satisfied because traditional buying would make him loose significantly more time, but every second is important. If the retailer succeeds in providing the customer with a very fast transactions, then he can expect a customer to make more transactions.

The same research [5] conducted on more than 100 online retailers, found that 40% of retailers are planning or have already introduced a native mobile app for iOS or Android. And what is more important, 90% of retailers believe it's essential to create dedicated sites for mobile access.

For retailers and service providers, regardless of their size and importance, it is significant to properly assess the budget and decide how much to invest in e-commerce so it is very important to know the differences between native mobile apps and websites that are customizable on mobile devices. Regardless of how large they are, strong brand retailers with very big number of social network followers should consider making native mobile apps. Native applications with its speed and additional functionality best suit the customer's needs. However, if there is a lack of resources (budgets and/ or employees), the less complicated and convenient option is the site adapted to access from mobile devices. Although in today's 'app-centric world' this may look surprising, some studies [3] suggest users/buyers prefer buying on mobile sites than using e-Commerce applications. This means that owning a high-performance site customized for display on mobile devices is as important as investing in making mobile apps. This data [3] also proposes that:

- "51% of consumers prefer shopping on the mobile web vs. using a smartphone app
- 58% of mobile retail revenue is predicted to come from the Web this year
- 82% of smartphone shoppers use their mobile browser to search for products in-store
- 62% of shoppers say they visit a mobile website directly vs. 21% who say they use a retailer's app in-store
- The majority of retailers under-utilize their opportunity to sell through a responsive e-Commerce website"

Social commerce, as a segment of mobile commerce in which users rely on other users to recommend known products is also of great importance so number of companies has created "social commerce" mobile applications with support to stated way of selling. In some cases, merchants can also use their own mobile applications to provide and start photo contests, which add a certain aspect of relaxation that can additionally drive word-of-mouth marketing. It is clear that trade in the 21st century can not achieve market growth and can not survive without IT sector as its integral part. Obviously, the retailers themselves have recognized it and they respect their new consumer.

A modern consumer, especially one who will enter into the period of his greatest purchasing power [6], will be the consumer to whom these applications will be of value. This value is measured in time savings, ease of search for information and purchasing efficiency. Retailers, regardless of their size, will have to find ways to create this value for the consumer. Using cost-cutting strategy of some other activity, this instrument should

no longer be seen as an expensive instrument, rather than the one that is the source of creating good relationships with the customers.

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## 22 Psychological Risks Management on Lean Manufacturing System

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### Abstract

Recent researches show that one of the most important occupational risk in an organization is psychological risk. More and more organizations take care of the human resources in order to decrease the psychological risks and disorders. In the lean manufacturing area, the adaptation is the first step. Any kind of change has a psychological risk, is a stressful factor. This paper aims to identify and why not, try to eliminate the factors linked to psychological risks of the human resources on the lean manufacturing system. The role of an efficient psychological risk management is to increase the lean manufacturing system, to have an unstressed and a better vision and performance in any organization. Furthermore, the paper will present the part of the advantageous lean manufacturing system, in order to encourage this kind of improvement.

### Introduction

An organization is composed from a human collective and a few machines where appropriate. Human resources are the most important element in an organization. The connection between human- machine- environment has to be adequate and in the right direction. For a healthy mind and work, firstly, employees should take care of them or their colleagues and secondly, workers should collaborate with the organization for all the existing issues.

According to EU-OSHA the changes have affected the world of work: employment and working patterns have undergone significant change, resulting in an increased exposure of workers to psychosocial hazards. In general, when compared with professional inactivity or unemployment, work is good for physical and mental health. There is a strong evidence base showing that work is generally good for physical and mental health and well-being and that professional inactivity is associated with poorer physical and mental health and well-being. Work can be therapeutic and reverse the adverse health effects of unemployment. That is true for healthy people of working age, for many disabled people, for most people with common health problems and for social security beneficiaries. The provisos are that quality and the nature of work and its social context must be taken into account; jobs should be safe and accommodating.

Occupational health psychology has focused on risk factors in the workplace and their adverse health effects, and the vast majority of intervention research concerns the detection and management of occupational health problems rather than the reinforcement of positive aspects of work. No commonly accepted definition exists for the concept of 'well-being at work'. It can be described as a 'worker's experience of the safety and healthiness of work, good leadership, competence, change management, the organization of work, support of the individual from the work community, and how meaningful and rewarding a person finds the work'. This implies

that organizational factors and workplace relationships have an important impact on workers' well-being, but that individual resources may also contribute to it (EU-OSHA, 2013).

In lean manufacturing system the role of a safety and healthy way of work can change quickly if employees risk management is not adapted and focused on their needs. Starting from this overview and the information below, the paper will present the causes of psychological risks in an organization and the afferent recommendations.

### **General delimitations of psychological risk management**

Risk is an unpleasant and harmful happening, which appears through some causes and have some effects for human resources.

Risk is constitutive of the human condition, as it has been from the beginning of human existence. While we are worried about the risk of a nuclear disaster, our ancestors worried about the risk of being devoured by other species. How have things changed? There are few differences of the risks concept perception and definition during the last years. In the past, most risks were proximate and local in impact, while today many risks are "eco-systemic" risks. In addition, most risks were geographically circumscribed, while today many risks are global; and in the past, many risks were likely thought of in terms of a group's unique circumstances, while today there is growing public awareness of common risks around the globe. Because all risks carry with them danger or opportunity – potential for loss or gain – the notion of risk adds incentive to make causal connections between present actions and future outcomes. The task of risk management is to anticipate outcomes of risk situations and to incorporate uncertainty into decision-making. Risk management implies that undesirable outcomes can sometimes be avoided, and where unavoidable, can be mitigated if connections between cause and effect are made properly. Humans everywhere seek to identify and understand risks. This involves perception, investigation, judgment, evaluation, and claims about our knowledge of risk (Jaeger, 2013).

On the other hand, research carried out over the past few decades have found that a poor psychosocial work environment may lead to work-related stress and to negative health and well-being outcomes, as well as dissatisfaction with the job and absenteeism. The phrase 'psychosocial risks at work' refers to the likelihood that certain aspects of work design and the organization and management of work, and their social contexts, may lead to negative physical, psychological and social outcomes.

The European social partners' Framework Agreement on Work-related Stress defines work related stress as 'a state, which is accompanied by physical, psychological or social complaints or dysfunctions and which results from individuals feeling unable to bridge a gap with the requirements or expectations placed on them'. It adds that 'stress is not a disease but prolonged exposure to it may reduce effectiveness at work and may cause ill-health (EU-OSHA, 2014). The Psychosocial Risk Management guide identified the most relevant psychosocial factors that have great risk to workers' health (WHO, 2010). These are shown in Table 1.

**Table 1. Potential psychological factors or sources (WHO, 2010)**

#	Psychosocial factors	Description of their actions
1	Job content	Lack of variety, short work cycles, fragmented or meaningless work, underuse of skills, uncertainty
2	Workload and work pace	Work overload or under load, machine pacing, time pressure
3	Work schedule	Shift work, night shifts, inflexible schedules, unpredictable hours, long or unsociable hours
4	Control	Low participation in decision making, lack of control over workload, pacing, shifts
5	Environment and equipment	Inadequate equipment availability, suitability or maintenance, poor environmental conditions such as lack of space, light, excessive noise
6	Organizational culture and function	Poor communication, lack of support for problem-solving and personal development
7	Interpersonal relationships at work	Social or physical isolation, interpersonal conflict, poor relations with supervisor or co-workers, lack of social support
8	Role in organization	Role ambiguity, role conflict, responsibility for people
9	Home-work interface	Conflicting demands of work and home, low support at home, dual career problems

**Aspects of OHS intervention**

Occupational health and safety (OHS) represent a modern and important concept which has been discussed more and more in the current world. Through other, this important concept includes psychological risks, psychosocial factors.

According to current EU legislation, work must be organized in such a way that it does not involve the risk of endangering a person’s health, the risk of aggravating an existing illness, or the risk of work overload (Aaltonen, 2011).

An OHS intervention is an attempt to change something to improve the level of OHS. The literature on occupational health and safety (OHS) interventions has often focused on features of an ideal intervention process. This means that researchers have provided extensive observation and analysis of how interventions should be designed, implemented and evaluated (Masi et al., 2014).

In Table 2, from below, are presented 2 categories of oriented activities, from worker and organisation side. Interpreting the table, this basic occupational health services (BOHS), are different for workers than the organisation. The workers-oriented activities are based on health and safety security, risks information, risks and activities assessment, their health promotion. The organisation is based on health, environment risks prevention, ergonomics and necessity of feedback.

**Table 2. Basic Occupational Health Services (BOHS) service activities (Rantanen, 2011)**

Worker or employer-oriented activities	Organization and work environment-oriented activities
Surveillance of workers’ health	Orientation to the workplace and planning of BOHS
Assessing psychosocial risks	Surveillance of the work environment
Diagnosis of occupational and work-related diseases	Control technology
First aid readiness and emergency preparedness	Ergonomics
General health care, curative and rehabilitation services	Prevention of accidents
Assessment of health and safety risks	Environmental health
Information and education on risks	Record-keeping by BOHS on occupational risks, diseases and injuries
Advice on the need for preventive and control actions	Evaluation and auditing of BOHS activities and impact
Health promotion	Prevention, well-being

### Occupational health profiles

Occupational health profiles are sets of quantitative and qualitative indicators, which describe the status of occupational health at various levels. Profiles can be valuable indicators of occupational health trends and functional monitors of efficacy and progress of occupational health programmes and their implementation. Importantly, profiles have informative value for decisions on policymaking, advocacy and awareness rising, and the planning of actions and interventions. Indicators are essential tools in occupational health surveillance of both workers and the environment. The WHO proposes the use of the following indicators: health policy, social and economic parameters, health status, and health care delivery. Some examples of health surveillance indicators are: work ability, life-style factors, occupational diseases and injuries, symptom occurrence, and mortality. The following are examples of indicators for the surveillance of work environments: accident and disease prevention, workplace occupational hygiene, ergonomics, work organization, and psychosocial factors.

The relevance of occupational health and safety issues varies by countries and times. The priorities of industrialized countries often include the ageing workforce and work ability/disability; work organization and workplace management; stress and other psychosocial factors; ergonomics and musculoskeletal disorders; preventive occupational health services; health promotion and healthy workplaces (safety, health, environment); and the management of new technologies. In contrast, the priorities of countries in transition have a different focus: hazardous sectors – mining, agriculture, construction; traditional hazards – physical, chemical, safety issues; workplace accidents and injuries; vulnerable groups – child labour, migrant workers; and technology transfer (Nogueira, et al., 2011).

### Overview of lean manufacturing system

The word 'lean' was first introduced to interpret Toyota's new production system that does away with mass production, to describe the highly efficient production system which uses less of every resource to produce the same number of products with competitive quality and cost (Behrouzi and Wong, 2011).

There are many different definitions and according to perspectives of Lean manufacturing, depending upon the industry, the source, how long the organization has been learning about Lean and what that organization's real objectives are for adopting Lean. Lean manufacturing refers to an evolving dynamic new process of production covering the total enterprise, embracing all aspects of industrial operations (product development, manufacturing, organization and human resources, customer support) and including customer-supplier networks, which is governed by a systemic set of principles, methods and practices. Key Lean principles are perfect first-time quality, waste minimization by removing all activities that do not add value, continuous improvement, flexibility and long-term relationships.

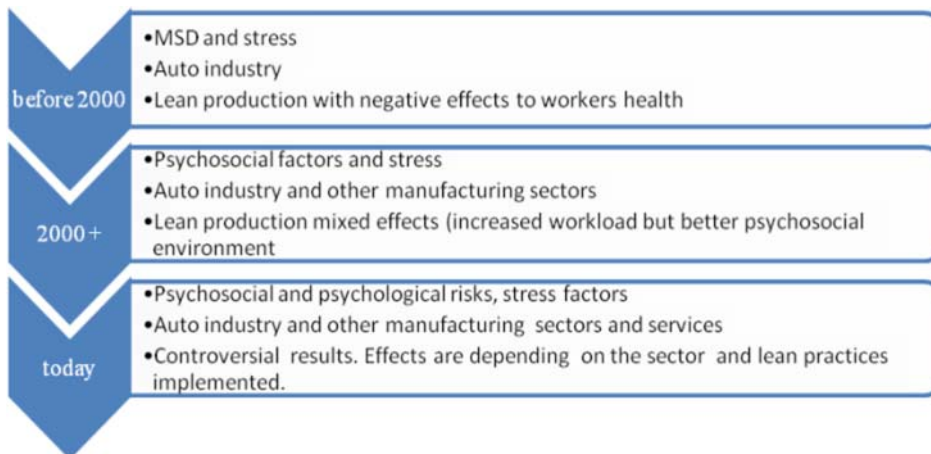
LP (Lean Production) can be considered to be an essential element of all the main improvement approaches with the theme of eliminating seven types of Muda (waste: excess production, waiting, conveyance, motion, the process itself, inventory and effects) (Anvari et al., 2011).

### Historical briefing of lean manufacturing aspects

Over the years this concept of 'lean' was adapted and transformed for organization and worker's needs. In Figure 1 from below, are presented the main risks, the sectors and the effects that have changed with years.

Before 2000, were known as risks only MSD and stress and lean production had negative effects to workers health. After a decade, appeared the psychosocial risks and mixed effects of lean production. Nowadays, the risks have increased with psychological risks too, the sectors are more interested on services and the effects are depending on the sector and lean practices implementation.

**Figure 1 Historical analysis on lean effects literature (Koukoulaki, 2013)**



**Concept of seven types of Muda (wastes) in lean manufacturing**

Industry faces some losses during performing all the activities. These losses are harmful and risky for the company and workers as it can decrease the rate of performance. The seven wastes are: excess production (is one of biggest loss that companies face as incurs lot of cost), stock (the basic reason for the surplus stock is improper planning, so the plan should be made properly in order to minimize the stock and cost for stocking), defects (if any company wants to improve the efficiency then it should minimize the defects), transportation (sometime it can be unprofitable from companies point of view as incurs extra cost for shipment), waiting (sometimes worker waits for the material while machine is continuous run or worker waits because machine is not working properly), motion (to avoid such a loss there should be proper arrangement that can reduce the extra motion of the operator), work itself (work should be finished in the manner another one wants to be finished) (Ingle, 2015).

For each of this lean waste, workers could feel and live psychological or any kind of risks. The risk management has to deal and ensure the workers for their health and safety security.

**A lean manufacturing approach for psychological risks**

Starting from the seven wastes of lean manufacturing and the possible individual risks, the psychological ones, the authors tried to combine all the aspects and concepts and built some recommendations. After a quick research and from our experience, in Table 3 are illustrated the actions which causes psychological risks through lean wastes. The actions which cause psychological risks are individual issues (for example, phobia, stress, body injures, fatigue) and organization issues (for example, supplemental costs, deadlines, wrong communication).



**Table 3. A relation between the 7 wastes and actions which causes psychological risks**

Seven losses (wastes) of lean manufacturing	Actions which causes psychological risks	Recommendations
Excess production	Strain, stress of the overproduction, lack of space	Production only for real customers
Stock	Lack of attention, space phobia	Storage only for demands
Defects	Time pressure, body injures and disorders	Signalizing every issue and stop the inappropriate work
Transportation	Supplemental costs, overwhelming	Avoiding the traffic, manage a low-cost vehicle
Waiting	Stress, stirred, disappointment, deadlines	Having patient, arranging in order all the tools
Motion	Unnecessary physical activity, fatigue	Doing only necessary moves, without fatigue
Work itself	Inadequate collaboration, wrong communication	Having all the right answers

The adaptation to a change is the first step and the hardest. In lean manufacturing having, a cursive functionality brings sometimes-possible risks or a slow adaptation of human resources. Psychological risks are created from others causes, like above, and for a healthy and efficient work, employees should evaluate and discuss all their issues and misunderstandings.

### Conclusions

A risk management is always a direction of preventing and protecting in order to eliminate the consequences and a tragedy. Workers should be in a continuous learning and practicing in order to improve and develop a harmonious workplace and work life.

According to EU-OSHA good working conditions and prevention of psychosocial risk contribute to a healthy workforce, which in turn will help to support the financial sustainability of all the societies. Working conditions are the product of the interaction between a job, the work, the company and the individual. Psychosocial risk factors are at work in this context. The 'psychosocial work environment' is a collective way of referring to work-related psychological and social influences on health such as time pressure, monotonous work, social reciprocity, job control and autonomy, fairness, work demands and job security, as well as social contact with co-workers and supervisors. The nature of work and the types of tasks involved might represent a challenge for workers or be the origin of stress at work if they cannot cope with demands. Individual differences play a role in how workers cope with those demands.

The intrinsic content of a job involves elements that can constitute risks for the well-being of workers. Creative work and task variation contribute to self-development at work, as well as being traditionally considered important intrinsic to work motivation when workers have the knowledge and skills to take up new challenges. Jobs involving repetitive and monotonous tasks could be de-motivating and could contribute to psychosocial problems. On the other hand, very complex tasks might contribute to stressful situations for the worker involved unless they have the skills and job design necessary to cope with them (EU-OSHA, 2014).

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## 23 Industrial Emergencies Involving Hazardous Materials

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**JEL classification:** A12 Relation of Economics to Other Disciplines

Throughout his history, man has become accustomed to natural disasters and their consequences. With the development of technique and technology, technical and technological emergencies emerged. Within this development, industrial development takes a prominent place, with which industrial emergencies arise, representing emergencies that are the cause of industrial production.

Aspects of industrial production that can lead to loss of life and property damage can be considered in two categories.<sup>1</sup> The first category is fast-growing situations, which lead to "acute" problems, mainly in industrial plants. The second category is "chronic" difficulties (wastewater discharge, exposure to hazardous agents), which significantly affect the occurrence of ecological emergency situations. Industrial emergencies are beginning to attract more attention in the 1970s, following the explosion at Flixborough (UK) in 1974 and discovery of toxic substances in Seveso (Italy) in 1976, and especially after the 1984 accidents – a gas explosion in Mexico and chemical factory disaster in Bhopal (India).

The explosion at a cyclohexane factory in English village Flixborough, on June 1, 1974, killed 28 people and injured 89 people, causing great material damage.<sup>2</sup> In the Italian town of Seveso, near Milan, 10 July 1976 there was a defect in the installation of the chemical industry, which has resulted in the spread of dioxin at Seveso and surrounding areas. This accident did not have any deaths, but about 250 people suffered from the influence of the chlorine on the skin, while 450 people received burns of sodium hydroxide (so-called caustic soda). About 17 km<sup>2</sup> of soil has been infected, and 4 km<sup>2</sup> of land has become uninhabitable.<sup>3</sup> In tragedy (the gas explosion) that occurred on 19 November 1984 in the Mexican suburb of San Juanico, 650 people were killed and several thousand were injured.<sup>4</sup> On December 3, 1984, in the early morning hours, 42 tons of methyl isocyanides from the underground pesticide storage facility in the Indian city of Bhopal leaked out. The accident happened because of a defective valve. Within 40 minutes, the toxic cloud spread to an area of about 250,000 people. A large number of people died in sleep, and most survivors remained blind. In the accident, 2,500 people were directly injured and 16,000 more people died from poisoning. Over 200,000 people were injured and almost all animals died in the affected area.<sup>5</sup>

Industrial emergencies can be classified into emergency situations related to hazardous materials (hazardous substances in industry, household hazardous substances, nuclear accidents), mining emergency situations and emergencies related to failures in the industry. Emergency situations related to hazardous substances do

<sup>1</sup> Banerjee, Sanjoy: *Industrial hazards and plant safety*, Taylor & Francis, 2003, p. 1

<sup>2</sup> *Prevention of industrial disasters*, International Labour Office, Geneva, 1992, p. 3

<sup>3</sup> Kletz, Trevor A.: *Learning from accidents*, Gulf Professional Publishing, 2001, p. 103

<sup>4</sup> Arturson, Gösta: *The tragedy of San Juanico – The most severe LPG disaster in history*, PubMed, National Center for Biotechnology Information, U.S. National Library of Medicine; *Prevention of industrial disasters*, International Labour Office, Geneva, 1992, p. 3

<sup>5</sup> Gunn, Angus M.: *Encyclopedia of Disasters – Environmental Catastrophes and Human Tragedies*, Greenwood Press, Westport, Connecticut – London, 2008, pp. 572–576

not have to be exclusively related to industrial production and transport, but can also occur in households. As a special subcategory within industrial emergency situations, we can distinguish industrial fires, explosions and implosions that occur in all segments of the industry, radiation (electromagnetic, X-ray, radioactive), as well as accidents at work, which, in part, can coincide with individual accidents within social emergency situations.

Hazardous materials (primarily chemicals) are everywhere. They purify drinking water, increase crop yields, and simplify housework. However, chemicals can be hazardous if they are improperly used or are wrongly disposed of. The community is at risk if chemicals are used in an irregular manner or are disposed of and released into the living and working environment in harmful quantities.<sup>6</sup>

Hazardous materials can be in a solid, liquid or gaseous state. Based on the existing definitions,<sup>7 8 9 10</sup> we can give a definition that hazardous materials are solids, liquids and gases of radiological, biological, chemical or physical origins, which, due to wrong transportation, production, packaging, storage or handling, can harm the life and health of people, damage property, endanger the plant and animal world and cause damage to the environment. A large part of industrial production rests on the use of hazardous materials. Losing control over them leads to the danger of people, property and the environment.

In accordance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), the United Nations International System and the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR - Accord européen relatif au transport international des marchandises Dangereuses par Route), the United Nations treaty signed by 49 countries, dangerous substances are classified into nine classes: Class 1 – Explosive substances; Class 2 – Gases; Class 3 – Flammable liquids; Class 4 – Flammable solids; Class 5 – Oxidizing substances; Class 6 – Toxic and infectious substances; Class 7 – Radioactive material; Class 8 – Corrosive substances; and Class 9 – Miscellaneous dangerous substances. For each of these classes there is also an appropriate label (sticker) that is caught on a vehicle that transports dangerous goods.

Regarding poisons, we can define poisons as substances of natural or synthetic origin and products produced from these substances, which are introduced into the human organism or in contact with the human body can endanger the life and health of people, or are harmful to the environment as well as substances whose degradation or destruction creates poisonous products. Toxic substances are chemical elements or chemical compounds, and mixtures of chemical elements of natural or synthetic origin.<sup>11</sup>

Signs of danger for poisons that are put into circulation and which are in daily use (so-called household chemistry) were also standardized in accordance with the GHS in 2008. Previous signs of danger were determined by the European Dangerous Substances Directive (67/548/EEC) and the European Commission Directive 2001 (Directive 2001/59/EC).

Hazardous materials emergencies can occur during the production, storage, transport, use or disposal of hazardous materials. With this in mind, we can classify emergency situations with hazardous materials in several categories. Part of the emergency situation with hazardous materials occurs during the transport of dangerous goods (in road, rail, air and water transport, and in pipelines). Accidents related to the transport of

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<sup>6</sup> Schaefer-Jones, James: *Preparing for the Worst: A Comprehensive Guide to Protecting Your Family from Terrorist Attacks, Natural Disasters and Other Catastrophes*, Praeger Security International, Westport, Connecticut – London, 2007, pp. 76–77

<sup>7</sup> *What Is Hazardous Material?*, Institute of Hazardous Materials Management, 2010

<sup>8</sup> *Hazardous Materials*, Federal Emergency Management Agency, 11 August 2010

<sup>9</sup> De Lisi, S. M.: *Hazardous Materials Incidents: Surviving the Initial Response*, PennWell Books, Tulsa 2006, p. 7

<sup>10</sup> Schnepf, R.: *Hazardous Materials: Awareness and Operations*, Jones & Bartlett Learning – International Association of Fire Chiefs – National Fire Protection Association 2009, p. 5

<sup>11</sup> Zakon o otrovima, "Službeni glasnik Republike Srpske", No. 70/06

dangerous goods, depending on volume and strength, can also be referred to as infrastructure (pipeline) emergencies, traffic emergencies or ecological emergencies of an acute character, which indicates that there is no a simple division of emergency situations but they interpenetrate each other. The second part of emergencies with hazardous materials refers to industry and industrial plants (chemical industry, nuclear power plants – disaster in Chernobyl),<sup>12</sup> military and civil warehouses, and the like. The third part of emergencies with hazardous materials refers to dangerous substances in the household.

Accidents in the transport of dangerous goods relate to tanks in road, rail and air traffic, tankers in water transport (oil spills), as well as to pipelines used for the transport of dangerous goods (oil pipelines, gas pipelines, and the like). These accidents are usually the consequences of leakage or explosion of dangerous goods. In the most developed industrial country of the world – the United States (and the same is in Europe), the most commonly monitored and analyzed are accidents related to transportation by trucks, railways and pipelines; or accidents related to gasoline, natural gas, LPG (liquefied petroleum gas), ammonia and chlorine. The natural gas primarily consists of methane, while LPG is a mixture of propane and butane. A similar way of monitoring is also in Europe. These accidents often take human lives. One way to prevent this type of accident is the qualitative training of drivers and operators on pipelines.<sup>13</sup>

Accidents with hazardous materials in industrial plants involve accidents in industrial production, storage and disposal of hazardous materials, and special types of accidents are accidents in nuclear facilities. Usually, hazardous material accidents in industrial plants are preceded by a poor warning or the warning does not exist at all. In many cases, victims find out that they were hit only a few years later. For example, health problems caused by secret landfills of toxic substances, as in the case of Love Canal, show a few years after the exposure to harmful substances. The number of accidents with hazardous materials is constantly increasing, primarily due to the increased number of new hazardous materials and the possibility of human error, which is an integral part of every work with new substances. Accidents with hazardous materials in industrial plants are most commonly related to the chemical industry, but may also be related to other industries.<sup>14</sup> On the other hand, these accidents are most often associated with industrial production. They can also be linked to warehouses, gas stations, hospitals, landfills, etc.

Special subtypes of this type of accident are accidents in nuclear facilities. These accidents can be related to the production of nuclear power plants and other plants, as well as to the transportation, storage, use and disposal of nuclear material. They are most frequently associated with the production of electricity in nuclear power plants. Nuclear power plants use heat generated by nuclear fission in a closed environment to convert water into steam that drives generators, which then generate electricity. In the US, nuclear power plants<sup>15</sup> produce more than a fifth of electricity, and around 3 million Americans live near nuclear power plants (In the United States, local authorities and authorities in federal states, federal agencies and utility companies have plans to respond to emergency situations in the event of an accident at nuclear power plants. Plans define two "emergency situations". One zone covers an area of 10 miles (about 16 km) from the power plant, where people may suffer due to direct exposure to radiation. The second zone covers a wider area, usually within a 50-mile (about 80 km) radius from the headquarters, where radioactive materials could contaminate water and crops, and harm the livestock).<sup>16</sup>

<sup>12</sup> Some sources state that the Chernobyl disaster (explosion of a nuclear reactor, which led to the release of radioactive material) resulted in 31 direct casualties and 32,000 indirect victims. [Low, N.: *Global Ethics and Environment*, Routledge, London – New York 1999, p. 70]

<sup>13</sup> Banerjee, Sanjoy: *Industrial hazards and plant safety*, Taylor & Francis, 2003, pp. 5–8

<sup>14</sup> Schaefer-Jones, James: *Preparing for the Worst: A Comprehensive Guide to Protecting Your Family from Terrorist Attacks, Natural Disasters and Other Catastrophes*, Praeger Security International, Westport, Connecticut – London, 2007, pp. 75–77

<sup>15</sup> The USA has 99 nuclear reactors.

<sup>16</sup> Ibid, p. 81

Although the construction and operation of nuclear installations in the world are constantly monitored and regulated by special acts, accidents are possible. Nuclear accidents can produce a dangerous level of radiation that can damage the life and health of the population living near nuclear power plants. Therefore, the potential danger from accidents at nuclear power plants is radiation exposure. This exposure may be the result of the release of radioactive material into the environment, usually through clouds of radioactive gases and particles. The greatest danger to humans near radioactive substances is the exposure of the body to radioactive radiation of radioactive clouds or radioactive residues in the soil, inhalation and ingestion of radioactive materials. It is known that radioactive materials are composed of atoms that are unstable. An unstable atom releases excess energy until it becomes stable. Emitted energy is radiation. Each of us is exposed to radiation from natural sources, such as the Sun and Earth, on a daily basis. Small traces of radiation are present in food and water. Radiation is also released from artificial sources, such as x-ray machines, televisions and microwaves. Radiation has a cumulative effect. The longer the person is exposed to radiation, the greater the effect of radiation. High exposure to radiation can cause serious illness or death.<sup>17</sup>

Accidents with hazardous materials in the household are related to the so-called household chemicals. Almost every household uses products containing hazardous substances and various chemicals. Especially dangerous can be gas cylinders. Although the risk of suffering from household chemicals is low, knowledge of these products (how to handle and how to react when something unpleasant happens) can significantly reduce the risk of injury. Hazardous substances in the household can be divided into several groups:<sup>18</sup> 1) Cleaning products (oven cleaners, drain cleaners, wood and metal cleaners, toilet cleaners, bath, tile and shower cleaners, bleaches, pool chemicals); 2) Indoor pesticides (ant sprays and baits, cockroach sprays and baits, flea repellents and flea shampoos, insect sprays, houseplant insecticides, moth repellents, mouse and rat poisons and baits); 3) Garden products (herbicides, insecticides, fungicides and wood preservatives); 4) Workshop supplies (adhesives, glues, furniture strippers, stains and varnishes, thinners and turpentine, paint strippers and removers, photographic chemicals, fixatives and other solvents); 5) Automotive products (gasoline, motor oil, fuel additives, carburettor and fuel-injection cleaners, air-conditioning refrigerants, starter fluids, automotive batteries, transmission and brake fluids, antifreeze etc.); 6) Flammable products (propane tanks, kerosene, home heating oil, diesel fuel, gas and oil mixtures, lighter fluid); 7) Other household products (batteries, mercury thermostats and thermometers, fluorescent light bulbs, driveway sealers). Each of these products can cause an accident if you do not watch out when using it, if it is not kept out of the reach of children, and if you do not take care of their durability.

### **About the author**

Žarko Čulibrk has a PhD in security and protection. He is an expert in the field of terrorism, emergency management and crisis management. He is the author of scientific papers, textbook author, a coordinator of a series of international meetings and scientific research projects and an editor of numerous proceedings. He has participated in a number of national and international symposiums, conferences and scientific meetings and several scientific research projects. He is an editor and a reviewer of several books and an encyclopedia. He is the author of the textbook *Emergency Management*, the first of its kind in Bosnia and Herzegovina, and the initiator of the introduction of this subject into higher education. He is also the author of the textbook *Supranational Systems of Security*. As a lecturer, in the title of associate professor, he is engaged at the Faculty of Security and Protection in Banja Luka, where he teaches *Emergency Management*, *Terrorism*, *Crisis Management* and *Industrial Security and Protection*.

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<sup>17</sup> Ibid, p. 82

<sup>18</sup> Ibid, pp. 78–79



# Austrian Association of Industrial Engineering and Management (WING)



„*Industrial engineers are engineers educated and trained in economic sciences with an academic degree who integrate their technical and economic expertise in their professional activities.*“

## ► WING Facts

1964 Establishment of the **WING**

1984 **WINGnet** - the WING student group was founded

2018 **WING** has approx. 1.400 members

## ► WING Purpose

**WING** is a **non-political** association with the purpose of **perceiving** and **promoting** the **scientific, social** and **cultural** interests of its members.

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- transfer of knowledge,
- supporting universities in design of the **WING** curriculum,
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- representation of interests of the members and nourishing association's image
- strengthening the link between economy and science.

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In 2010, the **Austrian Association of Industrial Engineering and Management**, the **German Association of Industrial Engineers** and the **Swiss Association of Business and Industrial Engineers** signed the following “**three-country declaration**”:

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