Business Systems Research

A Systems View across Technology & Economics
Impressum

Focus and Scope

Business Systems Research Journal (BSR) is an international scientific journal focused on improving competitiveness of businesses and economic systems. BSR examines a wide variety of decisions, processes and activities within the actual business setting and the systems approach framework. Theoretical and empirical advances in business systems research are evaluated on a regular basis. Special attention is paid to educational, social, legal and managerial aspects of business systems research. In this respect, the BSR journal fosters the exchange of ideas, experience and knowledge between regions with different technological and cultural traditions, in particular in transition countries.

Papers submitted for publication should be original theoretical and practical papers. The journal also publishes case studies describing innovative applications and critical reviews of theory.

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Business Systems Research
A Systems View across Technology & Economics

Information Systems Research Articles

Organizational Learning Dimensions and Knowledge Management Capability
Lejla Turulja, Nijaz Bajgorić ................................................................. 1

Still Searching or Have You Found It Already? – Usability and Web Design of an Educational Institution Website
Julia Lamberz, Thorsten Litfin, Özlem Teckert, Gunther Meeh-Bunse................................. 19

LMS Solution: Evidence of Google Classroom Usage in Higher Education
Lejla Abazi-Bexheti, Arbana Kadriu, Marika Apostolova-Trpkovska, Edmond Jajaga, Hyrije Abazi-Alili .......................................................... 31

Economic and Business Systems Research Articles

Research Activities and their Relation to Economic Performance of Regions in the European Union
Vladimir Hiadlovsky, Jan Hunady, Marta Orviska, Peter Pisar................................. 44

Effects of Expenditures for Labour Market Policy on Unemployment Rate
Laura Južnik Rotar .................................................................................. 55

Estimation of Fixed Capital Investment in SMEs: the Existing Differentiation in the Russian Federation
Iuliia Pinkovetskaia, Vladislava Slepovala.................................................. 65

Consistency of Quality Management in Slovenian Organizations
Vinko Bogataj, Gordana Žurga .................................................................... 78

Impact of Leadership Style on Financial Performance of Enterprises
Ivan Miloloža ............................................................................................. 93

Going Entrepreneurial: Agro-tourism and Rural Development in Northern Montenegro
Tatjana Stanovčić, Sanja Peković, Jovana Vukčević, Djurdjica Perović......................... 107

The Effect of Government Subsidy on Non-Technological Innovation and Firm Performance in the Service Sector: Evidence from Germany
Shoaib Abdul Basit, Thomas Kuhn, Mumtaz Ahmed........................................ 118

The Possible Use of Akerlof and Kranton’s Utility Model in Higher Education
Nikolett Mihaly .......................................................................................... 138

Exploring the Motivation of Employees in a Firm: A Case-Study
Igor Klopotan, Trina Mjeda, Petar Kurečić .................................................. 151
Editorial Note

Notice of Redundant Publication and Erratum

Mirjana Pejić Bach

161
Knowing Means Existing: Organizational Learning Dimensions and Knowledge Management Capability

Lejla Turulja, Nijaz Bajgorić
School of Economics and Business Sarajevo, Sarajevo, Bosnia and Herzegovina

Abstract

Background: Many studies have considered knowledge as the most important strategic resource for ensuring firm’s competitiveness. Accordingly, learning is an important concept for firms whether it is individual or organizational learning. Objectives: To provide empirical support to the impact of individual organizational learning dimensions on a firm’s knowledge management. Methods/Approach: The questionnaire survey approach is used for data collection and structural equation modeling for hypotheses testing. Besides, PROCESS procedure is employed to estimate confidence intervals of indirect effects in the model. Results: Organizational learning dimensions are antecedents of knowledge management capability. Shared values and openness influence directly and positively knowledge management capability. However, the same was not found to be the case for managerial commitment and dialogue. On the other hand, the results suggest that managerial commitment and dialogue influence knowledge management capability indirectly over shared vision. Conclusions: While there has been an underlying assumption about the role of organizational learning for knowledge management, this study provides evidence on how organizational learning dimensions such as management commitment, shared vision, openness and experimentation, and dialogue may be adjusted to facilitate and enhance knowledge management processes.

Keywords: Knowledge Management; Organizational Learning; Managerial Commitment; Shared Vision; Experimentation; Dialogue

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Introduction

Business globalization and rapid technology development increase the pressure on firms to continuously change, improve and adapt to changing and dynamic
business environment. Because of the rapid globalization, the value of managing their intangible assets as a core ability for business success became of crucial importance for firms. Organizational business performance is increasingly a function of firm’s ability to develop and implement unique and valuable resources that cannot be easily imitated by competition. Barney (1991) has identified four characteristics of resources essential to gaining a sustainable competitive advantage: (1) the resource must be valuable (valuable - V); (2) must be rare (rare - R); (3) must be difficult to imitate (inimitable - I); (4) must be irreplaceable (non-substituted - N). This idea is known as the VRIN framework (Lockett et al., 2009). The theory whose basic idea lies in the contention that firm’s performance differentiate due to the different resources and their utilization is Resource-Based View – RBV. The recent studies emphasize the difference between tangible assets, i.e., firm’s physical capital and intangible assets, such as organizational routines and capabilities (Teece et al., 1997). Dynamic resources lie in the firm’s ability to generate additional values through continuous improvement of existing resources.

Many studies have considered knowledge as the most critical strategic resource for ensuring firm’s long-term survival and competitiveness since some forms of knowledge can be valuable, scarce and difficult to imitate (Donate et al., 2011). Knowledge may reside in people or firm’s business-related activities and products/services (Chuang et al., 2013). Thus, learning is an important concept for firms whether it is individual learning or processes of organizational learning. Organizational learning has long been considered as one of the antecedents and measures of organizational business performance (Qi et al., 2018). Consequently, literature recognizes organizational learning (OL) capability and knowledge management (KM) capability as two essential capabilities for firms doing business in the knowledge-based economy (Dayan et al., 2017; Celemín-Pedroche et al., 2017). In other words, knowledge is the main strategic resource and the main strategic mean is organizational learning (Liao et al., 2009). Thus, this study draws on dynamic capability view and organization theory to clarify the nature of the relationships between OL capability and KM capability. The main objective of this study is to analyze the theoretical and empirical relationship between OL and KM capability.

There are several contributions of this paper. First, this study develops a comprehensive model that features knowledge management capability and organizational learning capability as antecedents of organizational business performance considering the relationship between them. In addition, some authors analyzed KM as an antecedent of OL (Liao et al., 2009), while Noruzy et al. (2013) confirmed that organizational learning directly and positively influenced knowledge management. Therefore, the understanding of the rationale behind this relationship and its empirical confirmation will elucidate the gap in the literature. Second, the impact of individual OL processes on KM is addressed. While organizational learning-knowledge management relationship has been investigated, individual dimensions of OL as antecedents of KM have not previously been analyzed in a configurational model of organizational business performance. Since dimensions of OL capability could be implemented and exist separately, it is important to analyze whether separate OL constructs affect KM as well. By isolating their individual impacts on knowledge management capability, a better understanding of the relative significance of separate organizational learning processes is provided. Third, this study attempts to find the interplay between organizational learning capability dimensions, i.e., between managerial commitment, shared vision, openness and experimentation, and dialog in the same structural model with knowledge management. Confirming the interrelationships between dimensions of
organizational learning capability allows a better understanding of the antecedents of organizational knowledge acquisition. This helps to understand how firms can improve organizational learning processes and thus to advance its strategic resources. This model so far is one of the most comprehensive frameworks of the relationship between organizational learning and knowledge management.

The paper is structured as follows. First, theoretical foundations of the study are presented. Then, concepts of organizational learning and knowledge management are briefly explained, as well as proposed conceptual model and hypotheses. Third, methodological approach, as well as the process of data collection, are introduced. Finally, data analysis, discussion and study conclusions are presented.

**Literature Review**

**Theoretical Foundation**

The theoretical foundations for this study are Dynamic Capability View (DCV) and Organization Theory (OT). DCV is grounded in the research efforts to answer the question “What resources and capabilities have an impact on firm’s business performance?”. McKeown et al. (2003) stated that contemporary firms operate in a time of fundamental and accelerated changes that are characterized by business and market globalization and the ubiquity of information technology. They highlighted the quote that “It is not the strongest that survive, nor the most intelligent, but most adaptive” (McKeown et al., 2003). Teece et al. (1997) noted that only those firms that have the ability of efficient coordination and redistribution of internal and external capabilities and resources in order to timely respond to the needs and demands of the market could be competitive at the global market. Consequently, they presented a theory of dynamic capabilities based on the assumption that firms which own and continuously improve, expand and configure its resource base in creating dynamic capabilities will be able to achieve a sustainable competitive advantage. Literature recognizes different dynamic capabilities that are critical for contemporary firms with the knowledge being one of the most important for firms operating in knowledge-based economy (Pun et al., 2011; Apak et al., 2012; Nezam et al., 2016; Martinez-Conesa et al., 2017).

Organization theory is characterized by its diversity of approaches resulting in multiple schools of thought (Sailer et al., 2010; McKinley et al., 1999). There are many approaches to organization theory, but the primary object is broadly defined as “organization”, which includes different kinds of organizations as well as organizational activities and processes. Hatch et al. (2013) discussed three perspectives of organization theory. First, modern perspective focuses on discovering the universal principles and laws that govern organizations, and it emphasizes structure, rules, standardization, and routine. Second, symbolic perspective describes how life evolves within organizations in rituals and other activities and processes in order to gain insight into how organizing occur. Finally, postmodern perspective puts emphasis on the evaluation and deconstructing organizational texts in order to discover managerial ideologies and subvert modernist modes of organizing and theorizing. McKinley et al. (1999) pointed out that most of the theorists in organization theory focus on the way how firms perform the business; specifically, the processes that are used in generating organizational knowledge. Two management disciplines address the knowledge in the firm: i) organizational learning, and ii) knowledge management.

In the light of the discussion, this study draws on organization theory and its modern perspective, in order to discover and explain the principles regarding the
relationships between the processes of organizational learning and knowledge management. In addition, it draws on dynamic capability view to analyze the impact of OL and KM capabilities on the organizational business performance.

**Organizational Learning Capability**

Knowledge has been recognized as a critical resource of contemporary organizations where knowledge is seen as “a knowledge of the individual” or “collective knowledge”. Collective or organizational knowledge comes from the integration of knowledge; it is a combination of coordinated efforts by several individuals who have different but complementary skills (Grant, 1996). Organizational knowledge exists in firm’s documents and systems for data storage, as well as in the routines and processes. Therefore, organizational knowledge is the result of the organizational learning processes, which involves processes that range from the level of the individual to the level of the group and the firm, and back (Jerez-Gómez et al., 2005). In other words, organizational learning is a process through which firms learn (Alegre et al., 2008). Organizational learning is one of the key determinants of business performance of the contemporary firm. OL capability refers to a set of factors that influence the firm’s tendency to learn, i.e., organizational learning can be understood as set of processes, while learning capability refers to those characteristics that make it possible for firms to learn (Prieto et al., 2014; López-Cabrales et al., 2011). In other words, organizational learning capability refers to organizational and managerial attributes that ease and facilitate the organizational learning process or allow an organization to learn (Chiva et al., 2007).

OL capability is conceptualized as a multidimensional construct with the following dimensions: managerial commitment; shared vision; openness and experimentation; and dialog (Calantone et al., 2002; Chiva et al., 2007).

- **Managerial commitment** refers to the management attitudes that promote and motivate innovative organizational culture as well as individual learning that presents the first step towards organizational learning.
- **Shared vision/system perspective** relates to the gathering of all employees around a common identity and a shared vision.
- **Openness and experimentation** imply organizational culture and climate that promote acceptance of new ideas and attitudes as well as tolerance of ambiguity, uncertainty, and errors. It promotes creating an environment that allows risk-taking.
- **Dialog** relates to continuous collective involvement in the processes, assumptions, and beliefs that make every day experiences.

**Knowledge Management Capability**

Many authors have investigated the importance of successful knowledge management in a firm, and the general conclusion is that, in order to maintain their competitive advantage in a dynamic environment, firms must develop the knowledge management capability, i.e. the dynamic capability to create and modify knowledge over time (Chen et al., 2013). In other words, individual knowledge of employees is not a sufficient prerequisite for firm’s success. Employees should apply their knowledge to business processes in order to create additional value for a firm. In addition, individuals should share their knowledge to create conditions for the knowledge integration and its continuous upgrade. For this reason, KM represents set of processes critical for the knowledge acquisition, its integration, upgrade, and application. Davenport et al. (1997) state that most of the knowledge management processes have one of the following three objectives: (i) to make
knowledge visible and emphasize the role of knowledge in the firm; (ii) to develop a culture that will encourage the acquisition and sharing of knowledge; and (iii) to build a knowledge infrastructure, which includes the IT system and network to enable communication and encourage cooperation. Therefore, knowledge management refers to the processes of acquisition, conversion, and application of knowledge. The main objective of the knowledge management capability is to explore, assimilate, and exploit knowledge taking into account both internal and external knowledge sources (Chen et al., 2013).

KM capability is conceptualized as a multidimensional construct with following dimensions: knowledge acquisition; knowledge conversion; and knowledge application (Liao et al., 2009).

- **Knowledge acquisition** refers to the processes that seek and acquire knowledge and create new knowledge, i.e., processes of obtaining and accumulating knowledge (Cui et al., 2005).
- **Knowledge conversion** is related to the processes of making existing knowledge useful. Processes that are included in the conversion are organization, integration, coordination, and dissemination of knowledge (Cui et al., 2005).
- **Knowledge application** refers to the processes of using knowledge. Cui et al. (2005) noted that these processes include storage, retrieval, contribution, application, and knowledge sharing.

**Theoretical model and hypotheses**

**Organization Learning Capability and Knowledge Management Capability**

A literature review has been conducted in order to recognize the relationship between OL capability and KM capability. Organizational learning is grounded in individual learning (Pun et al., 2011). OL derives from the knowledge acquisition of the individual employees and grows through the exchange and integration of the knowledge until a collective knowledge corpus is established (Jerez-Gómez et al., 2005). These processes should be embedded in the organizational culture. Thus, management should be committed to the creation of such organizational culture that promotes learning, experimentation, dialogue and shared values. In other words, OL could be considered as a climate and culture that promote these values. At the other side, knowledge management refers to the processes that help organizations to find, select, organize, disseminate, transfer and use knowledge within the organization (Pun et al., 2011). In other words, OL supports and encourages employees' learning while KM identifies their knowledge and collects it into an organizational knowledge corpus. Organizations would not be able to manage knowledge if it does not exist, and the assumption of the existence of knowledge is the climate of organizational learning. This interaction between the OL and KM is presented in Figure 1.
Based on the discussion, following hypothesis is proposed:
H1. OL capability positively influences KM capability. However, when it comes to the individual constructs of OL capability, there is a research gap related to their separate importance for the efficient KM. In other words, managerial commitment, shared vision, openness and experimentation, and dialog are processes that represent the concept of organizational learning. However, these processes could be implemented separately. However, the question is: whether separate OL constructs affect KM positively as well? Since OL positively affects KM, it is reasonable to expect that all constructs individually would enhance KM as well.

Therefore, the following sub-hypotheses are suggested:
H1a. Managerial commitment positively influences KM capability.
H1b. Shared vision positively influences KM capability.
H1c. Openness and experimentation positively influence KM capability.
H1d. Dialog positively influences KM capability.

Organization Learning Capability / Knowledge Management Capability and Business Performance
Organizational learning supports both learning and innovative culture, which result in better organizational performance. OL is a critical antecedent of innovation in firms (Jerez-Gómez et al., 2005). The firms that learn faster and use knowledge most effectively are most likely to become and remain leaders (Pun et al., 2011). Knowledge is undoubtedly the most important resource of the knowledge-based economy and the most valuable resource that a firm can dispose of. The real differentiation among firms can be done based on learning and knowledge. Only firms that learn and generate knowledge can use it in the innovation of its products, services, and processes.

Following these premises, two hypotheses are proposed:
H2. OL capability positively influences organizational business performance.

In addition, some previous studies have discussed the dimensions of OL and proposed their interplay. So, the concept of shared vision is considered a fundamental for the firm’s success (Hodgkinson, 2002) and it is related to shared values and common goals and understanding in collective relationships. Managers should perceive the need for a shared vision and have the capacity to develop it amongst individuals within the organization. Thus, managerial commitment helps to
apprise the sense of identity in individuals and may create dedication and commitment to the organization and its goals (Hodgkinson, 2002). Managers continually share their own vision by communicating and supporting communication. That is how shared vision could be achieved through dialogue and communication (Hodgkinson, 2002). Consequently, we pose the following hypothesis:

H4. Managerial commitment and dialogue have a positive impact on organizational shared vision.

However, in order to get a better understanding of relationships between OL dimensions and KM, we have proposed following sub-hypotheses:
H4a. Managerial commitment positively influences shared vision.
H4b. Dialogue positively influences shared vision.

Research Methodology

Sample description
Primary data were collected using questionnaire methodology. The target population was small, medium and large firms operating in the market of Bosnia and Herzegovina. Respondents were general managers familiar with all organizational processes. The questionnaire consisted of indicators adopted from previous studies. After the first invitation to participate in the research sent by e-mail, we sent two reminders in the period of sixteen days. The e-mail included a link to a web-based survey and noted that results of the research would be presented summarily. The total number of observations to be analyzed by this paper is 403 (41.69% of small, 41.92 of the medium, and 16.38 of large firms), which is 13.59% of the total number of sent calls. This response rate is satisfactory if we consider that the respondents were firms’ managers, and previous research shows that the response rate in similar studies is in decline (Cycyota et al., 2002).

Research instrument
All multi-item measures used were based on seven-point Likert scales ranging from 1 – strongly disagree to 7 – strongly agree, with the following dimensions.

- **OL capability** is a reflective second order measurement model with four first-order dimensions: managerial commitment, shared vision, openness and experimentation, and dialog. It consists of fourteen indicators adopted from Calantone et al. (2002), Akgun et al. (2007) and Alegre et al. (2013).
- **KM capability** is a reflective second-order latent model with three first-order dimensions: knowledge acquisition, knowledge conversion, and knowledge application. It consists of thirteen indicators adopted from Liao et al. (2009).
- **Organizational business performance** is reflective first order construct of four indicators measuring organization’s profit, sale, and return on investment comparing to main competitors as well as the realization level of the planned market share. Indicators are adopted from Chen et al. (2009).
- **Firm size** was used as control variable since larger firms may have a higher potential for exploiting knowledge (Tanriverdi, 2011) and achieve business success.
### Table 1
Research instrument description (Likert scale 1-7)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Code</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Acquisition (KMA)</td>
<td>KMA1</td>
<td>Our firm has processes for acquiring knowledge about our suppliers (and customers).</td>
</tr>
<tr>
<td></td>
<td>KMA2</td>
<td>Our firm uses feedback from projects to improve subsequent projects.</td>
</tr>
<tr>
<td></td>
<td>KMA3</td>
<td>Our firm has processes for exchanging knowledge with our business partners.</td>
</tr>
<tr>
<td></td>
<td>KMA4</td>
<td>Our firm has processes for acquiring knowledge about new products/services within our industry.</td>
</tr>
<tr>
<td></td>
<td>KMA5</td>
<td>Our firm has processes for benchmarking performance.</td>
</tr>
<tr>
<td>Knowledge Conversion (KMK)</td>
<td>KMK1</td>
<td>Our firm has processes for absorbing knowledge from individuals into the organization.</td>
</tr>
<tr>
<td></td>
<td>KMK2</td>
<td>Our firm has processes for absorbing knowledge from business partners into the organization.</td>
</tr>
<tr>
<td></td>
<td>KMK3</td>
<td>Our firm has processes for integrating different sources and types of knowledge.</td>
</tr>
<tr>
<td></td>
<td>KMK4</td>
<td>Our firm has processes for replacing outdated knowledge.</td>
</tr>
<tr>
<td>Knowledge Application (KMP)</td>
<td>KMP1</td>
<td>Our firm uses knowledge to improve efficiency.</td>
</tr>
<tr>
<td></td>
<td>KMP2</td>
<td>Our firm is able to locate and apply knowledge to changing competitive conditions.</td>
</tr>
<tr>
<td></td>
<td>KMP3</td>
<td>Our firm makes knowledge accessible to those who need it.</td>
</tr>
<tr>
<td></td>
<td>KMP4</td>
<td>Our firm quickly links sources of knowledge in solving problems.</td>
</tr>
<tr>
<td>Managerial Commitment (LM)</td>
<td>LM1</td>
<td>Managers basically agree that our organization’s ability to learn is the key to our competitive advantage.</td>
</tr>
<tr>
<td></td>
<td>LM2</td>
<td>The basic values of this organization include learning as key to improvement.</td>
</tr>
<tr>
<td></td>
<td>LM3</td>
<td>The sense around here is that employee learning is an investment, not an expense.</td>
</tr>
<tr>
<td>Shared Vision (LV)</td>
<td>LV1</td>
<td>There is total agreement on our organizational vision across all levels, functions, and divisions.</td>
</tr>
<tr>
<td></td>
<td>LV2</td>
<td>All employees are committed to the goals of this organization.</td>
</tr>
<tr>
<td></td>
<td>LV3</td>
<td>Employees view themselves as partners in charting the direction of this organization.</td>
</tr>
<tr>
<td></td>
<td>LV4</td>
<td>All parts that make up this firm (departments, sections, work teams, and individuals) are well aware of how they contribute to achieving the overall objectives.</td>
</tr>
<tr>
<td>Openness and Experimentation (LE)</td>
<td>LE1</td>
<td>This firm promotes experimentation and innovation as a way of improving the work processes.</td>
</tr>
<tr>
<td></td>
<td>LE2</td>
<td>Experiences and ideas provided by external sources (advisors, customers, training firms, etc.) are considered as useful instrument for this firm’s learning.</td>
</tr>
<tr>
<td></td>
<td>LE3</td>
<td>Part of this firm’s culture is that employees can express their opinions and make suggestions regarding the procedures and methods in place for carrying out tasks.</td>
</tr>
<tr>
<td></td>
<td>LE4</td>
<td>Initiative often receives a favorable response here so people feel encouraged to generate new ideas.</td>
</tr>
<tr>
<td>Dialog (LD)</td>
<td>LD1</td>
<td>There is a free and open communication between employees.</td>
</tr>
<tr>
<td></td>
<td>LD2</td>
<td>Managers facilitate communication.</td>
</tr>
<tr>
<td></td>
<td>LD3</td>
<td>Cross-functional teamwork is a common practice here.</td>
</tr>
<tr>
<td>Organization Performance (OBP)</td>
<td>OBP1</td>
<td>We have enhanced return on investment, for the past few years.</td>
</tr>
<tr>
<td></td>
<td>OBP2</td>
<td>We have enhanced sales and profitability of the firm, for the past few years.</td>
</tr>
<tr>
<td></td>
<td>OBP3</td>
<td>For the past few years, we have been profitable.</td>
</tr>
<tr>
<td></td>
<td>OBP4</td>
<td>For the past few years, we have achieved profit objectives.</td>
</tr>
<tr>
<td></td>
<td>OBP5</td>
<td>For the past few years, we have achieved market share objectives.</td>
</tr>
<tr>
<td>Firm size</td>
<td>FS</td>
<td>Total number of firm’s employees (standardized value)</td>
</tr>
</tbody>
</table>

**Source:** Authors’ work

### Statistical methods

Data collected were analyzed using structural equation modeling (SEM) following six stages suggested by Hair et al. (2010).
First, individual constructs were defined, i.e., dimensions and indicators of measurement models and theoretical definition of constructs. The second step was a development of measurement models, which means the specification of links between dimensions and indicators in order to form measuring constructs. These two steps are carried out together because the indicators and theoretical definitions were adopted from the literature. Third, sampling and determination of an adequate sample size, as well as proper identification of the model to meet the order and rank conditions were conducted. The fourth step was an estimation of the reliability and validity of measurement models using Confirmatory Factor Analysis (CFA).

Content validity has been provided by using items adapted from previous studies and by employing a panel of six experts to check the questionnaire. Furthermore, convergent validity was tested by checking the value of standardized factor loading estimates (>0.7) and Average Variance Extracted (AVE) value (>0.5). Discriminate validity was tested comparing square root values of AVE with correlation values of a specific variable with all other variables. Fifth, the specification of the structural model was conducted based on the literature review on relationships between observed constructs. Sixth step was estimation of the structural model using the Goodness of Fit (GoF) indices: χ²/df (<5), standardized root mean residual (SRMR<0.1), root-mean-square-error (RMSEA <0.08), comparative-fit index (CFI>0.9), normed-fit index (NFI>0.95) Hair et al. (2010).

Results and Discussion

Validity Analysis

In order to test the hypotheses, three conceptual models are proposed. The first one with hypotheses H1, H2, and H3, which address the relationship between OL capability and KM capability as well as their impact on organizational business performance. Second model deals with hypotheses H1a, H1b, H1c, H1d, i.e., the relationship between individual constructs of OL capability and KM capability. Finally, the third model consists of H1a, H1b, H1c, H1d, H4a, and H4b. SPSS 22 and Lisrel 8.8 have been used for data analysis.

Prior to models testing, Confirmative Factor Analysis (CFA) has been used in order to assess the required psychometric properties for validity and reliability and establish its usefulness for later investigations. All Goodness of Fit (GoF) indices are above/below threshold values which indicates a good fit for all measurement models, i.e., χ²/df<5; RMSEA<0.1; SRMR<0.8; CFI>0.9; NFI>0.95.

Furthermore, Cronbach’s alpha for all measuring models and CR values are above 0.7 confirming the reliability of the constructs. In regards to validity, convergent and discriminant, validities have been assessed. Standardized loadings of all indicators are above 0.7, which together with AVE values of constructs that are above 0.5 implies convergent validity. Finally, we have Cronbach’s alpha values for each factor with its correlations with all other factors appearing in the research. Discriminant validity holds if Cronbach’s alpha is greater than any of the correlations (Lloria et al., 2014; Chiva et al., 2007).
Table 2
Validity testing

<table>
<thead>
<tr>
<th>Item</th>
<th>Standardized factor loadings</th>
<th>t-values</th>
<th>Cronbach’s alpha</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMA1</td>
<td>0.742</td>
<td></td>
<td>0.880</td>
<td>0.886</td>
<td>0.609</td>
</tr>
<tr>
<td>KMA2</td>
<td>0.759</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KMA3</td>
<td>0.816</td>
<td></td>
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<tr>
<td>KMA4</td>
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<tr>
<td>KMK1</td>
<td>0.871</td>
<td></td>
<td>0.939</td>
<td>0.939</td>
<td>0.794</td>
</tr>
<tr>
<td>KMK2</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>KMK3</td>
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<tr>
<td>KMP1</td>
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<td>0.903</td>
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<td>KMP2</td>
<td>0.794</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>KMP3</td>
<td>0.859</td>
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<td></td>
<td></td>
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<tr>
<td>KMP4</td>
<td>0.847</td>
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<tr>
<td>LM1</td>
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<td>LM2</td>
<td>0.872</td>
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<tr>
<td>LM3</td>
<td>0.842</td>
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<tr>
<td>LV1</td>
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<tr>
<td>LV2</td>
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<td>LV3</td>
<td>0.879</td>
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<tr>
<td>LV4</td>
<td>0.837</td>
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<tr>
<td>LE1</td>
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<tr>
<td>LE2</td>
<td>0.771</td>
<td></td>
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<td></td>
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<tr>
<td>LE3</td>
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<tr>
<td>LE4</td>
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<tr>
<td>LD1</td>
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<td>0.884</td>
<td>0.893</td>
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<td>LD2</td>
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<td>LD3</td>
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<tr>
<td>OBP1</td>
<td>0.616</td>
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<tr>
<td>OBP2</td>
<td>0.794</td>
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<td>0.892</td>
<td>0.896</td>
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<tr>
<td>OBP3</td>
<td>0.793</td>
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<tr>
<td>OBP4</td>
<td>0.889</td>
<td></td>
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<td>OBP5</td>
<td>0.868</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Source: Authors’ work

Table 3
Correlation between constructs and discriminant validity testing

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>KMA</th>
<th>KMK</th>
<th>KMP</th>
<th>LM</th>
<th>LV</th>
<th>LE</th>
<th>LD</th>
<th>OBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Acquisition (KMA)</td>
<td>0.880</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Conversion (KMK)</td>
<td>0.794</td>
<td>0.939</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Application (KMP)</td>
<td>0.740</td>
<td>0.660</td>
<td>0.901</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managerial Commitment (LM)</td>
<td>0.635</td>
<td>0.514</td>
<td>0.568</td>
<td>0.906</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Vision (LV)</td>
<td>0.665</td>
<td>0.543</td>
<td>0.679</td>
<td>0.596</td>
<td>0.909</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness and Experimentation (LE)</td>
<td>0.741</td>
<td>0.661</td>
<td>0.729</td>
<td>0.778</td>
<td>0.738</td>
<td>0.854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dialog (LD)</td>
<td>0.657</td>
<td>0.569</td>
<td>0.663</td>
<td>0.648</td>
<td>0.741</td>
<td>0.842</td>
<td>0.884</td>
<td></td>
</tr>
<tr>
<td>Organizational Business Performance (OBP)</td>
<td>0.446</td>
<td>0.331</td>
<td>0.450</td>
<td>0.402</td>
<td>0.470</td>
<td>0.475</td>
<td>0.441</td>
<td>0.892</td>
</tr>
</tbody>
</table>

Note: Cronbach alpha values are depicted on diagonal while below are presented Cronbach alpha values derived from a CFA model of all dimensions.
Source: Authors’ work
Hypotheses testing
Following confirmation of overall fit as well as reliability and validity of measurement models, Structural Equation Modelling (SEM) is utilized in order to test structural model proposed within this study. Results revealed acceptance of two hypotheses. Specifically, OL capability positively influences KM capability ($\beta=0.862; t=12.250; p<0.01$) and organizational business performance ($\beta=0.410; t=3.171; p<0.01$). However, this study failed to prove the significant relationship between KM capability and organizational business performance. This result could not be considered as unexpected. Many previous studies analyzed mediating and moderating effect of other organizational capabilities between KM and business performance. In other words, knowledge management should create additional value that will result in better business performance. Specifically, KM capability could enhance firm’s innovation (Ju et al., 2006; Lai et al., 2012), while innovation has a positive impact on business performance (Calantone et al., 2002; Kyrgidou et al., 2012). The proposed model fits the data and all the indices are within the required values ($\chi^2/df=2.54; \text{RMSEA}=0.0620; \text{SRMR}=0.0483; \text{CFI}=0.985; \text{NFI}=0.974$).

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>St. loadings</th>
<th>t-values</th>
<th>$R^2$</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1. OL capability $\rightarrow$ KM capability</td>
<td>0.862</td>
<td>12.250***</td>
<td>0.744</td>
<td>Supported</td>
</tr>
<tr>
<td>H2. OL capability $\rightarrow$ OBP</td>
<td>0.410</td>
<td>3.171***</td>
<td>0.271</td>
<td>Supported</td>
</tr>
<tr>
<td>H3. KM capability $\rightarrow$ OBP</td>
<td>0.123</td>
<td>0.972</td>
<td>0.271</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

Fit indices for the research model:
$\chi^2/df=2.54; \text{RMSEA}=0.0620; \text{SRMR}=0.0483; \text{CFI}=0.985; \text{NFI}=0.974$

Note: ***p<0.01; **p<0.05; *p<0.1
Source: Authors’ work

Firm’s size as the control variable is included in the model and the findings didn’t reveal its impact on OBP ($FS \rightarrow OBP: \beta=0.067, t=1.451, p>0.1$). This means that the firms’ size in the model has no significant contribution in explaining organizational business performance.

In addition, with the aim to clarify the nature of the relationships between OL and KM capability and to offer practical implication for managers regarding OL activities and dimensions that should be more encouraged to improve the KM capability, the relationship between the individual dimensions of OL and KM capability is analyzed. Results revealed acceptance of two hypotheses. Specifically, shared vision positively influence KM capability ($\beta=0.262; t=3.992; p<0.01$) and openness and experimentation is positively associated with the KM capability ($\beta=0.564; t=4.479; p<0.01$). That is, gathering of all employees around a common identity and a shared vision as well as organizational culture that promote acceptance of new ideas and attitudes as well as tolerance of ambiguity, uncertainty and errors will results in better KM processes of acquisition, conversion and application of knowledge.
Table 5
Hypotheses Testing

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>St. loadings</th>
<th>t-values</th>
<th>R²</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a. LM → KM capability</td>
<td>0.062</td>
<td>0.883</td>
<td>0.712</td>
<td>Rejected</td>
</tr>
<tr>
<td>H1b. LV → KM capability</td>
<td>0.262</td>
<td>3.992***</td>
<td>0.712</td>
<td>Supported</td>
</tr>
<tr>
<td>H1c. LE → KM capability</td>
<td>0.564</td>
<td>4.479***</td>
<td>0.712</td>
<td>Supported</td>
</tr>
<tr>
<td>H1d. LD → KM capability</td>
<td>0.020</td>
<td>0.218</td>
<td>0.712</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

Fit indices for the research model:
χ²/df=2.78; RMSEA=0.0666; SRMR=0.0449; CFI=0.986; NFI=0.977

Note: ***p<0.01; **p<0.05; *p<0.1
Source: Authors’ work

Firm’s size as the control variable is added to the model and the findings did not reveal its impact on KM (FS → KM capability: β=0.033, t=0.943, p>0.1). This means that the firms’ size in the model has no significant contribution in explaining knowledge management capability.

However, managerial commitment, as well as dialog, did not appear to have a significant impact on KM capability. Specifically, management attitudes that promote and motivate learning and communication among employees does not have a significant impact on the KM processes. Possible reasoning for the results lies in the fact that other organizational processes can moderate the relationship between the two activities and KM capability in order to strengthen these relationships. Thus, for example, HRM could facilitate organizational learning activities in order to strengthen the relationship between OL and KM capability. In order to understand the obtained result from a conceptual perspective, it is conducive to analyze the theoretical definition of the analyzed concepts. Thus, if management promotes individual learning, it would not significantly influence KM capability. The rationale for this result could be found in the logic that individual knowledge could be beneficial only if expressed and used in the organization. In addition, communication and dialogue among employees can be beneficial for KM processes if it creates some additional value, i.e., if employees communicate with the intention to share their knowledge and help others to learn. In other words, these processes could be beneficial if shared vision among employees is achieved. Consequently, H4 will be analyzed.

Table 6
Hypotheses Testing

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>St. loadings</th>
<th>t-values</th>
<th>R²</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a. LM → KM capability</td>
<td>0.052</td>
<td>0.709</td>
<td>0.711</td>
<td>Rejected</td>
</tr>
<tr>
<td>H1b. LV → KM capability</td>
<td>0.295</td>
<td>4.505***</td>
<td>0.711</td>
<td>Supported</td>
</tr>
<tr>
<td>H1c. LE → KM capability</td>
<td>0.576</td>
<td>4.408***</td>
<td>0.711</td>
<td>Supported</td>
</tr>
<tr>
<td>H1d. LD → KM capability</td>
<td>-0.007</td>
<td>-0.064</td>
<td>0.711</td>
<td>Rejected</td>
</tr>
<tr>
<td>H4a. LM → LV</td>
<td>0.194</td>
<td>3.521***</td>
<td>0.592</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b. LD → LV</td>
<td>0.630</td>
<td>10.123***</td>
<td>0.592</td>
<td>Supported</td>
</tr>
</tbody>
</table>

Fit indices for the research model:
χ²/df=2.81; RMSEA=0.0470; SRMR=0.0455; CFI=0.985; NFI=0.977

Note: ***p<0.01; **p<0.05; *p<0.1
Source: Authors’ work
Table 7 presents the total, indirect and direct effects in the model. A significant indirect effect enfolds that a significant amount of the independent variable’s total effect on the dependent variable occurs via the mediator (Lin et al., 2008). In this sense, shared vision represents a mediator in the relationship between managerial commitment and knowledge management capability, as well as between dialogue and knowledge management capability. In other words, the LM and LD influence KM capability over LV. In addition, we have conducted Sobel’s test (Sobel, 1982) for both indirect relationships. The Sobel’s test determines to test for the statistical significance of the indirect effects (Santos-Vijande et al., 2012). The indirect effect in the relationship LM → LV → KM capability, is found to be statistically significant (t-value=2.778; p<0.05). The second indirect effect considered LD → LV → KM capability was also significant (t-value=4.222; p<0.05). The Sobel test thus confirms that shared vision significantly mediates the effect of managerial commitment and dialogue on knowledge management capability.

Table 7
Decomposition of Effects

<table>
<thead>
<tr>
<th>Path</th>
<th>Unstandardized coefficients (t-values)</th>
<th>Standardized coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Effect</td>
<td>Direct Effect</td>
</tr>
<tr>
<td>H1a. LM → KM capability</td>
<td>0.091 (1.493) 0.0435 (0.709) 0.048 (2.816***)</td>
<td>0.109 0.052 0.057</td>
</tr>
<tr>
<td>H1b. LV → KM capability</td>
<td>0.245 (4.505*** 0.245 (4.505*** 0.295 0.295</td>
<td></td>
</tr>
<tr>
<td>H1c. LE → KM capability</td>
<td>0.482 (4.408*** 0.482 (4.408*** 0.576 0.576</td>
<td></td>
</tr>
<tr>
<td>H1d. LD → KM capability</td>
<td>0.157 (1.871*) 0.006 (0.064 0.163 (4.232*** 0.179 -0.007 0.186</td>
<td></td>
</tr>
<tr>
<td>H4a. LM → LV</td>
<td>0.196 (3.521*** 0.196 (3.521*** 0.194 0.194</td>
<td></td>
</tr>
<tr>
<td>H4b. LD → LV</td>
<td>0.667 (10.123*** 0.667 (10.123*** 0.630 0.630</td>
<td></td>
</tr>
</tbody>
</table>

Note: ***p<0.01; **p<0.05; *p<0.1
Source: Authors’ work

The results of Preacher et al. (2004) PROCESS procedure for “model 4” imply that shared vision is significant mediator in driving the effect of managerial commitment on knowledge management capability (β=0.251, CI=(0.176, 0.338)) and the effect of dialogue on KM capability (β=0.241, CI=(0.164, 0.323)).

The main goal of this paper was to analyze the empirical relationship between OL dimensions and KM capability. In the light of this goal and as a concluding remark, the results obtained indicate the links between the dimensions of OL and KM as shown in Figure 2.

Figure 2
The relationship between OL dimensions and KM supported by the findings

Source: Authors’ work
Conclusion

The paper aimed at analyzing the relations between organizational learning capability and knowledge management capability. In this respect, the theoretical foundation identified is organization theory revealing the principles that govern organizations’ processes. The results confirm that OL dimensions are antecedents of knowledge management capability. Shared values and openness influence directly and positively KM capability. However, the same was not found to be the case for managerial commitment and dialogue. However, the results suggest that managerial commitment and dialog influence KM capability indirectly over shared vision. In other words, while KMC is directly affected by LV and LE, contrary to our expectations, the results indicated that LM and LD do not exert a significant direct effect on KMC but require the mediating effect of LV. This practically means that firms can enhance their KM processes through promoting of innovation and experimentation as a way of improving the business activities and through the consideration of experiences and ideas provided by external sources as useful instruments for firm’s learning. In addition, firm’s culture that promotes expression of opinion among employees would be beneficial for the improvement of KM capability. Similarly, a unique understanding of organizational vision through all levels, functions, and divisions, as well as the dedication of employees’ to the organization’s goals would have a positive impact on organizational KM. In addition, if employees consider themselves as partners in mapping the direction of the organization’s actions and are aware of how they contribute to achieving the overall objectives, it will enhance KM processes. In order to achieve an understanding of organizational vision among employees and their commitment, management should promote individual learning, encourage, and facilitate communication and dialogue. The results concordance findings of Noruzy et al. (2013) who confirmed that organizational learning directly and positively influenced knowledge management and organizational performance.

In addition, drawing on with the dynamic capability view, relationships between organizational learning, knowledge management, and organizational business performance were analyzed. The results show that OL capability positively influences KM capability and organizational business performance. However, knowledge management capability did not appear to have a significant positive influence on organizational business performance. Similarly, Darroch (2005) didn’t find sufficient arguments to support the premise that firms with well-developed knowledge management practices would perform better and concluded that firms with higher KM capability are more likely to develop incremental innovations. In other words, it is more likely that KM influences organizational business performance indirectly, over other dynamic capabilities. Noruzy et al. (2013) that found knowledge management affected organizational performance indirectly through organizational innovation as well.

The study provides advances in the field of organizational learning and knowledge management literature by offering empirical analysis that confirms the importance of individual constructs of organizational learning capability for successful knowledge management. While there has been an underlying assumption about the role of organizational learning for knowledge management, this study provides evidence on how OL dimensions such as management commitment, shared vision, openness and experimentation, and dialog may be adjusted to facilitate and promote the enhancement of KM processes. Contrary to previous studies, this paper presents an analysis of simultaneous impacts of a set of OL practices on KM capability. First, firms must support individual learning and
encourage dialogue as a necessary requisite to obtaining shared vision among employees. Achieving shared vision becomes a vital capability that together with openness and experimentation enhance knowledge management. Besides, organizational learning capability directly influences organizational business performance. The study is cross-sectional, and the data are collected in a single transitional economy country, which can be considered the main limitation of the study. Future research should include in the model capabilities that drive the effect of KM capability on organizational business performance.

In spite of the implications, this study has several limitations that the interpretation of the results should take into consideration. First, the results of this survey were limited to BH firms. Although this study has the contribution to the analysis of the observed constructs on the example of a transitional economy, future research should test the OL-KM model in developed and other transitional countries. Second, utilizing cross-sectional research with questionnaires is also one of the limitations of this study. Future research may overcome this limitation involving longitudinal studies in which KM and OL can be followed over time. Third, using objective measures may give results that are more objective, especially in organizational performance. Finally, future research should test the proposed conceptual model considering the specificities of different industries, which is not the subject of an analysis of this paper.

References
About the authors

Lejla Turulja is an Assistant Professor at the Department of Management and Information Technology of the School of Economics and Business Sarajevo, University of Sarajevo. She is USA State Department Professional Fellow for 2017. Her main research interests are information technology management, technology transfer, innovation, knowledge management, innovation management, HR and KM information systems, e-business. She was actively engaged in number of science projects. Lejla Turulja published several scientific papers in recognized journals and participated in many scientific international conferences. Also, she is a reviewer for several international peer-review journals. The author can be contacted at lejla.turulja@efsa.unsa.ba

Nijaz Bajgorić is a Professor of Business Computing and Information Technology Management at the School of Economics and Business Sarajevo, B&H. He has a PhD from the University of Sarajevo. He teaches and conduct research in information technology, business computing, information technology management and operating systems. He has published papers in the following peer-reviewed journals: International Journal of Enterprise Information Systems, Kybernetes, Information Management and Computer Security, Information Systems Management, Industrial Management and Data Systems etc., and has authored and co-authored chapters in the edited books published by: Elsevier Science, Kluwer Academic Publisher, CRC Press and Auerbach Publications. Author can be contacted at nijaz.bajgoric@efsa.unsa.ba.
Still Searching or Have You Found It Already? – Usability and Web Design of an Educational Website

Julia Lamberz, Thorsten Litfin, Özlem Teckert, Gunther Meeh-Bunse
University of Applied Sciences Osnabruück, Faculty of Management, Culture and Technology (Lingen Campus), Lingen, Germany

Abstract

Background: Apart from a straightforward and intuitive operability an appealing design determines the success of a website equally well. For this reason, the selection of images and navigation bars plays a determining role. The eye tracking method proved to be appropriate in order to verify the usability of websites. Objectives: The aim of the study was to improve the usability of the website of an educational institute for trainees as target group. Methods/Approach: For this purpose, the use of an eye-tracking technology was combined with a survey. The eye-tracking study was implemented task-oriented. Test persons were asked to search for particular courses within this institute. Results: This approach in combination with a subsequent questionnaire resulted in tangible indications of search patterns of the test group. Furthermore, their perception and their appraisal of the usability as well as the web design was analysed. Even though most tasks were accomplished effectively and efficiently with a positive user feedback, a potential for improvement was detected, in particular with regard to the images and the location of the search field. Conclusions: The selected choice of methods enables researchers and web designers to derive recommendations for the orientation, structure, optimisation and comprehensibility of a website.

Keywords: eye-tracking, usability evaluation, website usability, web design, images, perception
JEL classification: M15, M31
Paper type: Research article

Introduction
Ideally, the design of a website should be geared to the user requirements of its specific target group. In practise, however, website user often have to struggle with misinterpretative menus, hidden information and complicated ordering procedures (Vogt, 2002). In order to support the search process both a target group oriented
structure and images are helpful, especially, if goods and services are presented and distributed (Küster et al., 2011). Images not only attract attention but also have the potential to provide orientation during the search process (Riegelsberger et al., 2003). Moreover, images are processed with little cognitive effort and evoke direct affective reactions in form of emotions (Kroeber-Riel, 1996). In addition, images are processed faster than text during a search effort. Furthermore, together with the related text they ideally aggregate into a conceptual association. If an image shows little complexity, users recognise the theme within 20ms (Madigan, 2014). Other studies demonstrate that images with medium complexity are recognised after one to two seconds. However, images that display inconsistent content may trigger confusion and disorientation among users. This also applies to websites with too many images.

Already in the 1990s Nielsen realised the significant prominence of usability for the development of websites. He defined the criteria: effectiveness, efficiency, and user satisfaction as determining factors for usability. In doing so, he describes the effect of websites with little usability as following: “Usability rules the Web. Simply stated, if the customer can’t find a product, then he or she will not buy it.” (Nielsen, 2000). Furthermore, he emphasizes the relevance of a user-friendly web presence that should be tailored to the demand of a particular target group. The success of a website depends on the requirements of their customers. In addition, web designers must consider the dependency of the usability on the task list of the users (Shackel, 2009). For this reason, a task-oriented analysis enables the identification of sales patterns and, if appropriate, of usability problems. This should be accomplished in a way that users including their requirements, expectations and desires are the focus of a usability evaluation of a website (Ehmke et al., 2007, Mich et al., 2003).

The objective of this empirical study is examining the usability of the website of an educational establishment including their main target group, “trainees”. The focus was on the analysis of three different search procedures. For this reason, a task-based eye-tracking study was combined with a subsequent questionnaire. The goal of the eye-tracking study was to identify usability problems in terms of their effectiveness, efficiency and user satisfaction. For this reason the duration of each search request and the scan path of subjects on the initial website “courses offered” were analysed, followed by a computer-based questionnaire. Therefore, the results of the duration measurements were compared to the results of the questionnaire.

Our study provides a variety of contributions for further research: firstly, our research aims at analysing the usability of a website focussed on specified target groups. Although numerous usability studies examine websites applying eye-tracking approaches, the focus is in many cases on recognition and evaluation of the search process, in order to appraise its efficiency and effectiveness (Jacob et al., 2003). However, in our study we combine the eye-tracking approach with a survey in order to analyse the usability of a website in terms of its effectiveness, efficiency, contentness and web design simultaneously. Only the comparison of both approaches delivers sufficient results. Secondly, our study has the potential to serve as a companion for future web usability studies. The reason is the application of a generic methodological design including typical metrics for eye-tracking methods (Ehmke et al., 2007, Jacob et al., 2003). Moreover, a task-based analysis of a website suitable for educational institutes is envisaged. In this way valuable findings for the web design of providers from the education sector for the specific target group ‘trainees’ are expected.

In order to achieve this objective the article is divided into six different sections: following the introduction a literature review provides an overview of the state of the
art of usability and web usability studies. Research questions are derived based upon this review. Especially, the opportunity of eye-tracking in general and web usability research in particular are discussed in this article. In this way criteria and methods for the evaluation of websites are derived and provided. This is followed by the presentation of the research methodology where the sample description and research instruments are presented. In the fourth part of the paper, research data analyses and main findings are provided. These results are analysed and discussed both from a theoretical and an applied perspective. In the final section limitations of the study together with future research opportunities and implications are explicated and discussed.

**Literature Review**

**Usability und Web-Usability**

The literature provides numerous definitions for usability, invariably related to the usability of software systems. Usability is generally classified by means of various parameters defining the user-friendliness of software systems as a quality criterion (Speicher, 2015). Hereby, the international and widespread Norm EN ISO 9241-11 is applicable and describes the notion of “usability” in three dimensions (DIN EN ISO 9241-11, 2006):

- Effectiveness in solving problems;
- Efficiency in system handling;
- User satisfaction in relation to the software.

Effectiveness means a user achieves his or her goal entirely and accurately. Furthermore, a user is efficient if he or she reaches his or her goal with little effort. If these goals are achieved, then the user is not impaired during his or her activities and he or she is satisfied (Schweibenz et al., 2003).

On the one hand the definition of DIN ISO 9241-11 assigns usability criteria to the software system (efficiency of operation) and the user (user satisfaction), respectively. On the other hand, the definition includes task fulfilment in an efficient way which is the responsibility of the user. All important aspects of the usability of websites are included in this definition. For this reason, the three criteria of the ISO norm served as the basis for this eye-tracking study.

Yet, the question arises: what are the implications for the usability of web pages (subsequently referred to as ‘web usability’)? Numerous studies conclude that web usability and, at the same time, user satisfaction depend on the following points:

1) Display of information and images according to the target-groups;
2) Instant allocation of information and comprehensibility of the web content (McCarthy et al., 2004, Schweibenz et al., 2003).

**Eye-Tracking**

The analysis of scan paths with the eye-tracking approach is motivated in particular by the eye-mind hypothesis. According to the eye-mind hypothesis humans exclusively process visible information. For this reason, the assumption is made that scan paths are closely related to human-cognitive processes (Just et al., 1976).

The eye-mind hypothesis fosters the application of the eye-tracking approach for a scan path analysis. Scan paths can be assigned to patterns. In an early study Yarbus (1967) detected that fixation patterns and fixation intensity both depend on the task assigned to the test person. In follow-up studies, scan path patterns based upon tasks such as “please, obtain an overview of this announcement” where compared to closed questionnaires, and subsequently analysed. The results confirm...
the phenomenon that open-ended questionnaires result in a variety of scan path data that do not accumulate any pattern. In contrary, closed questionnaires enable the test person to control his or her attention as well as the selection processes. For this reason, results can be easier analysed and compared because of the accumulation of fixation processes of single elements such as images or navigation bars within particular areas (Bucher et al., 2006. Jacob et al., 2003). However, the degree of attention for images and other graphical elements recognized is not measurable, which characterizes the limits of the eye-tracking method (Bucher et al, 2006).

From a technical point of view, eye-tracking measures the individual scan paths of subjects. In doing so, a user looks at a stimulus. The retention time of an eye on a particular point is indicated by a visual fixation. A fixation is defined by a length of 150 to 300ms (Leven, 2013). Volckmann et al. (2006) ascertained that the fixation duration influences the attention and information uptake of a user. A longer fixation duration implies more attention and a longer time period for the information uptake of a user. The duration of a fixation within a particular location can be visualized with so-called heat maps. In this way, the elements with the longest fixation duration are indicated with red and elements with the shortest fixation duration with green. While looking at a stimulus, eyes do not focus on a single position for an extended time. Rather, they jump back and forth within a short period of time. These visual jumps among fixation locations are called ‘sakkade’. These sakkades help users to orient themselves within a website. Hence, conclusions may be drawn about guidance devices in a website (Ehmke et al., 2007). Equipment for scan path recording determines the ocular alignment of a subject with the support of an infrared camera. In this way, gazing (looks) can be recorded and analysed. Contemporary technical equipment and the most recent image processing software enable scientists to video-record gazing in real time (Duchowski, 2007).

**Web-Usability in Eye-Tracking Studies**

The methodology of eye-tracking has been established as a support for web usability tests. Numerous studies demonstrate that various eye-tracking approaches such as time to first fixation on target, fixation duration and fixation length help to identify web usability problems (Ehmke et al., 2007).

A literature study of Jacob et al. (2003) summarises 21 usability studies that analyse usability problems employing eye-tracking systems. In these studies the metrics of eye-tracking were directly linked to usability problems. Byrne et al. (1999), Goldberg et al. (1999) und Cowen et al. (2001) conducted the first task-based studies. The authors linked the number of fixations with the task duration. In a follow-up study Goldberg et al. (2002) applied eye-tracking methods in order to identify search patterns on various websites. They discovered a general tendency towards horizontal instead of vertical search. Even conspicuous headings did not violate that rule. While analysing web designs McCarthy et al. (2004) examined the magnitude of impact of navigation bars on the search behaviour on various websites. The results demonstrate that users are capable of adapting a new website architecture instantly, while the position of navigation bars has little influence on the duration of task accomplishment (McCarthy et al., 2004). All studies illustrate that the determining factors for the recognition and the assessment of a search process are 1) efficiency (the duration until goal achievement) and 2) effectiveness (flawless and complete goal achievement).

In order to detect how users perceive, comprehend and interpret fixated pictures and information, measured values (measured by technical equipment) must be
supplemented by survey-data (Cooke, 2006). These surveys might include questions about the perception and assessment of websites in order to detect the level of satisfaction.

**Methodology**

The objective of the eye-tracking study was to analyse the web design and the usability of the website of the educational institute “Bildungswerk Grafschafter Wirtschaft” (www.bildungswerk-grafschaft.de), (Lamberz et al., 2017). In particular, the search procedures were inspected. At first, it was analysed how the search procedure for events offered by the association was perceived and applied. To this end, specific tasks were formulated for selected target groups. Subsequently, goal achievement (effectiveness), duration (efficiency) and user satisfaction were identified. In addition, the influence of website images on the search procedure was analysed. For this reason, the following questions were pivotal for the empirical research:

- **Effectiveness**: was the search process finalized successfully?
- **Efficiency**: was the search process finalized quickly and straight-forwardly?
- **Satisfaction**: was the search process perceived as convenient and structured?
- **Web design**: did the available images influence the search procedure?

Effectiveness and efficiency were analysed with the help of eye-tracking approaches. The analysis software of the eye-tracking system was applied to measure the duration of search requests (see table 1 and 2). Furthermore, the same system analysed the scan paths on the landing site and the site “courses offered” in order to interpret both effectiveness and efficiency of the search request (see table 3 and 4). For this reason, so-called areas of interest (AOI) were generated for the horizontal and left navigation bar as well as for the search box. These elements are believed to support search requests. The metric “time to first fixation” provides information about the scan path direction at the beginning of the search process.

In order to allocate the desired courses test persons hit the site “courses offered” (Kursangebot) after a few clicks. This site is endowed with topical images supporting the search for a suitable course. To detect whether images are recognised next to the navigation bar the duration of the metrics “total fixation duration” per AOI were compared (see table 4).

The stationary eye-tracking system, “Tobii X60 – 60 Hz”, enabling the actimetry and analysis of individual gaze behaviour, was employed for the documentation of the study. A computer-based questionnaire was applied as a supplementary method to elicit the subjective perception and appraisal of the search process and of the web design. Subjects had to rate this process and the used web design on a Likert scale (see table 5). Yet, the data of gazing duration measurements are compared with responses in the satisfaction survey.

In order to assess the website of the educational institute “Bildungswerkes Grafschafter Wirtschaft”, 30 subjects from the main target group, the trainees, were selected. The selection process was entirely random in collaboration with the vocational schools of the region who allowed the selection of the potential subjects during classes. None of the subjects was acquainted with the website prior to the test period of the eye-tracking study. The subjects were asked to undertake a search request for a particular course, where three courses were randomly allocated to the trainees. These courses are typical mandatory classes for trainees intending to undertake further training. They should reflect the three core offerings of the educational work. In the follow-up session, trainees were asked to complete a
computer-based questionnaire in order to identify their satisfaction with the website while undertaking typical tasks.

Table 1
Tasks of an eye-tracking exercise

<table>
<thead>
<tr>
<th>Nb.</th>
<th>Task/search request</th>
<th># of subjects</th>
<th>Measured value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course: “Industrial clerks – preparation for final exams”</td>
<td>10</td>
<td>Duration from landing page to target site</td>
</tr>
<tr>
<td>2</td>
<td>Course: “English for commercial trainees”</td>
<td>12</td>
<td>Duration from landing page to target site</td>
</tr>
<tr>
<td>3</td>
<td>Course: “Contemporary etiquettes in the professional environment and day-to-day life for trainees, 2017”</td>
<td>8</td>
<td>Duration from landing page to target site</td>
</tr>
</tbody>
</table>

Note: number of subjects per search request  
Source: Authors’ work

Results

The applied methodology was successful in terms of reconstructing and analysing the search and browsing behaviour of the participants. All participants used the navigation boards of the landing page as a reference after a short orientation. This means the search behaviour may be referred to as targeted.

Figure 1
Comparison of the landing page and heat map for the search request “etiquettes”

Note: Absolute duration is calculated by the duration of fixations, whereas the warmest colour represents the highest value.  
Source: Authors’ work

In order to verify the effectiveness of search behaviour the scientists examined how many subjects were able to fulfil their tasks successfully. As a result, 27 out of 30 subjects were able to successfully finalize the search process (see table 2). This complies with a 90% success rate. Three subjects did not find the course “etiquettes”. A reason for this might be the fact that this course was not explicitly listed in the submenu of the top navigation bar as in the case of the other courses offered. In this way, an indication for locating that course was missing. In addition, the search box was not prominently located in the upper left corner of the site and less colourful with the consequence that none of the eight subjects who registered for the course “etiquettes” recognized the search box (see table 3). In the beginning of the search process, courses were searched for using two distinct paths on the landing page. The analysis of the gaze plots revealed that after a short orientation phase the first view landed either on the horizontal or the left navigation bar. The heat map (figure 1)
displays the intensity with which subjects looked at particular elements of the website. The analysis of this gazing behaviour supported the results of the gaze plot. Both display a clear concentration of views on both of the navigation bars.

Table 2
Duration of the search request and number of search interruptions

<table>
<thead>
<tr>
<th>Duration in seconds</th>
<th>Task 1: Industrial clerks</th>
<th>Task 2: English</th>
<th>Task 3: Manners</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>25.09</td>
<td>12.55</td>
<td>37.64</td>
<td>12.55</td>
</tr>
<tr>
<td>Maximum</td>
<td>112.21</td>
<td>82.94</td>
<td>47.16</td>
<td>112.21</td>
</tr>
<tr>
<td>Mean</td>
<td>64.02</td>
<td>40.22</td>
<td>43.54</td>
<td>49.65</td>
</tr>
<tr>
<td>SD</td>
<td>29.28</td>
<td>19.53</td>
<td>3.82</td>
<td>24.25</td>
</tr>
<tr>
<td>Cancellation</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Authors' work

The efficiency analysis requires the duration of task fulfilment (table 2). The average duration of each of the accomplished tasks was 49.7 seconds. Whereas three subjects were not able to find the course, the other subjects accomplished task 3 ("manners") surprisingly quickly in 43.5 seconds. Task 1 ("industrial clerk") was accomplished in the relatively slow time of 64.0 sec. This may be attributed to the individual queries during the exercise.

Table 3
Time to first fixation: navigation bars (left/horizontal), search field and image per task

<table>
<thead>
<tr>
<th>Time to first fixation (in sec.)</th>
<th>Task 1: Industrial clerks</th>
<th>Task 2: English</th>
<th>Task 3: Manners</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation board left &quot;general information&quot;</td>
<td>1.99</td>
<td>2.79</td>
<td>2.17</td>
<td>2.36</td>
</tr>
<tr>
<td>Navigation board horizontal &quot;Courses offered&quot;</td>
<td>6.29</td>
<td>15.20</td>
<td>0.96</td>
<td>0.73</td>
</tr>
<tr>
<td>Search field top left &quot;Courses offered&quot;</td>
<td>41.51</td>
<td>37.05</td>
<td>21.63</td>
<td>29.28</td>
</tr>
<tr>
<td>Central Image &quot;Courses offered&quot;</td>
<td>3.57</td>
<td>4.30</td>
<td>11.18</td>
<td>16.10</td>
</tr>
</tbody>
</table>

Note: Duration in seconds "time to first fixation to AOI" of the landing page
Source: Authors' work

The detailed analysis of scan paths in relationship to the previously defined AOIs on the landing page demonstrates that the time to first fixation of 2.3 sec is the lowest (table 3). However, the navigation box only contains general information about the school. No information about the task of finding a particular course offer can be found. The link "course offerings" is located in the horizontal navigation bar. However, this bar is recognized on average 0.5 seconds later than the left navigation box. It is remarkable that the time to first fixation in task 2 "English" and task 3 "etiquettes" is lowest (< 1sec) on the horizontal bar and other AOIs. Here, relevant information for the solution of the task was quickly identified. However, the search field was only recognized by six subjects after an average time of 28.3 seconds. In
addition, the Image “Kursangebot” (courses offered) in the centre of the site was recognized after 9.9 sec in average, which is relatively slow. An explanation might be the fast orientation of trainees with the navigation bar on this site.

Figure 2
Areas of Interest (AOIs) (left) und heat map (right) of the site “Kursangebot“ (courses offered)

Note: left: representation of the three AOIs, right: absolute duration is calculated by the duration of fixations, whereas the warmest colour represents the highest value.
Source: Authors’ work

Table 4
Total fixation duration: image “foreign languages”, image “courses for trainees”, navigation bar horizontal “courses offered” per task

<table>
<thead>
<tr>
<th>Total fixation duration (in sec.)</th>
<th>Image “foreign languages”</th>
<th>Image “Seminars for trainees”</th>
<th>Navigation horizontal “Course offer”</th>
<th>Navigation board left “general information”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Task 1: Industrial clerks</td>
<td>0.58</td>
<td>0.64</td>
<td>0.76</td>
<td>0.50</td>
</tr>
<tr>
<td>Task 2: English</td>
<td>0.76</td>
<td>0.50</td>
<td>1.04</td>
<td>0.52</td>
</tr>
<tr>
<td>Task 3: Manners</td>
<td>0.87</td>
<td>0.43</td>
<td>2.25</td>
<td>1.88</td>
</tr>
<tr>
<td>All</td>
<td>0.85</td>
<td>0.60</td>
<td>1.40</td>
<td>1.22</td>
</tr>
</tbody>
</table>

Note: Duration in seconds “Total fixation duration to AOI” of the site “courses offered”
Source: Authors’ work

On the site „Kursangebot“ (courses offered) the scan path analysis within the AOIs demonstrates that images are fixated with more attention than the navigation bars (see also table 4). The trainees oriented quickly on this site as well. The metric “total fixation duration” displays that looks did not remain on particular images nor on navigation bars for a long period of time (see also table 2). The image “Seminare für Auszubildende” (courses for trainees) were observed with an average duration of 1.40 sec, and that was the longest time. Whereas, the horizontal navigation bar was observed by only six trainees with an average duration of 0.3 sec. The heat map
(figure 2) confirms the results and demonstrates that looks prevailingly focus on images. Both of the navigation bars were fixated briefly or they were omitted.

The results of the duration to first fixation were compared to the results of the questionnaire in order to assess the satisfaction with the search process. The subjects evaluated the search requests as fast, straightforward and supportive for the navigation process. On the whole, the subjects were satisfied since they were able to accomplish the task effectively and efficiently. Only the search field was slightly difficult to find from the point of view of the subjects. The assessments of the subjects was consistent with the results of the eye-tracking exercise.

In comparison to the navigation bars the images on the site “Kursangebot” (courses offered) were fixated with a longer duration. The interpretation of the perception of images resulted in the observation that trainees disliked some of the images. For this reason, the web design must be revised in order to improve the topical relevance in relationship to the content linked. Furthermore, the target group had no desire to increase the number of images and videos. In total, the trainees were satisfied with the websites, and the layout was rated as clearly structured. These results confirm the short duration of task fulfilment as analysed by the eye-tracking approach.

**Table 5**
Evaluation of the perception of search requests and the web design

<table>
<thead>
<tr>
<th>Questions</th>
<th>All</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Search requests</strong></td>
<td>Mean</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>The path was clearly recognizable</td>
<td>2.07</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>I was able to orient myself quickly</td>
<td>1.67</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>The menu is clearly structured</td>
<td>1.62</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>The design is well arranged</td>
<td>1.87</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>I perceive the navigation as structured</td>
<td>1.87</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>I was able to find the search field instantly</td>
<td>2.70</td>
<td>1.59</td>
<td></td>
</tr>
<tr>
<td>Information browsing is time-consuming</td>
<td>4.00</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td>Information browsing is complicated</td>
<td>4.00</td>
<td>1.02</td>
<td></td>
</tr>
<tr>
<td><strong>Web design</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoyed the visual appearance of the website</td>
<td>2.06</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>The layout of the site is clearly structured</td>
<td>1.09</td>
<td>0.84</td>
<td></td>
</tr>
<tr>
<td>I like the images on the website</td>
<td>2.53</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>I want more images and videos on the website</td>
<td>3.50</td>
<td>1.13</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Likert scale where 1 = totally agree, 5 = totally disagree*

*Source: Authors’ work*

**Discussion**

The combined eye-tracking/survey study provides insights into the usability of the website of the educational institute “Bildungswerk Grafschafter Wirtschaft”. The study revealed that measured durations of search requests cannot be viewed in isolation. Only after combining the analysis of scan paths on the landing page and the site “courses offered” with a subsequent questionnaire an indication for an instant orientation of the trainees on the website was found. The difficulties in orientation are due to the search field arrangement. Notwithstanding this the target group is content with the search process and the web design. The search field on the landing page should be highlighted in a better way, and not placed in the upper left corner. As in the case of many other websites the placement of the search field should be above the horizontal navigation bar.
Images on the site “Kursangebot” (courses offered) were fixated longer in comparison to the navigation bar. Moreover, these images yielded a high degree of attention. The images support the message of the content linked, which enables the user to assign topics instantly, and this way enhance the search procedure.

In addition, the search behaviour of trainees shows specific patterns confirming the importance of navigation bars, images and the designation of menu items. For this reason, important objects must be conform to a logical structure and include intuitive key terms. The combined eye-tracking/questionnaire approach confirmed the results: the specific search requests were accomplished in an effective and efficient way for the most part, whereby subjects were satisfied. The implementation of suggestions for improvement may help to optimise the usability and the web design for the related target group.

Conclusion
This study of a combined eye-tracking and survey approach demonstrates the validity of this methodology for the analysis of the usability of an educational establishment including their main target group, ‘trainees’.

A unilateral focus of the usability analysis in terms of effectiveness and efficiency – as demonstrated in other studies – is thus not suitable. In addition, a holistic analysis of usability including the factors contentness and web design delivers meaningful results.

The results of this eye-tracking study may serve as a basis for further studies of this kind. For example, eye-tracking metrics can be applied in order to improve the analysis of the search process, and develop recommendations for an appropriate web design aimed at specific target groups (Ehmke et al., 2007, Jacob et al., 2003). The search behaviour can be supported by a logical structure of navigation bars and menu items as well as a positioning of the search box at an accustomed place, above the horizontal navigation bar. A number of key concepts support an instant orientation. Moreover, illustrations suited to the content have a positive influence on the search process and in this way on the contentness of the users.

However, a number of limitations should be taken into consideration when applying this approach: in particular, the number of assignments, types and numbers of subjects as well as the integration of the “back buttons” into the analysis must be factored in. This study merely developed one specific task and verified it. Future studies must request more assignments in order to depict the variety of requirements for the websites better. In addition, the entirety of relevant target groups of the related websites must participate in future studies to capture multiple necessities and requests of users. This approach has the potential to provide further results of relevance for web usability problems (Goldberg et al., 2002). Moreover, the application of “back buttons” and the analyses of sources of errors hampering the search procedure must be taken into consideration (Lee et al., 2010).

References


About the authors

Julia Lamberz is currently a Research Assistant at Osnabrueck University of Applied Sciences with a focus on marketing research. She received her Master’s degree in Science Marketing from the Technische Universität Berlin. She can be contacted at j.lamberz@hs-osnabrueck.de

Thorsten Litfin is a Professor of Marketing, Service and Innovation Management at the University of Applied Sciences at Osnabrueck. He received his PhD from the Institute of Innovation Management at Christian-Albrechts-University of Kiel. His research interests include product and pricing strategies for innovative products and services. He can be contacted at: t.litfin@hs-osnabrueck.de

Özlem Teckert is currently a Research Assistant at Osnabrueck University of Applied Sciences with a focus on marketing research. She received her Master’s degree in Economics and Laws from the University of Oldenburg and is currently a PhD candidate in the Department of Business Administration, Economics, and Law. She can be contacted at: o.teckert@hs-osnabrueck.de

Gunter Meeh-Bunse is a Professor of Finance and Accounting at the University of Applied Sciences at Osnabrueck. He studied business administration at the University of Saarland and received his PhD from the University of German Armed Forces in Munich. His research interests include managerial accounting and corporate social responsibility. He can be contacted at: g.meeh-bunse@hs-osnabrueck.de
LMS Solution: Evidence of Google Classroom Usage in Higher Education

Lejla Abazi-Bexheti, Arbana Kadriu, Marika Apostolova-Trpkovska
South East European University, Tetovo, Macedonia
Edmond Jajaga
University for Business and Technology, Pristina, Kosovo
Hyrije Abazi-Alili
Affiliate Fellow at CERGE-EI, Prague, Czech Republic

Abstract

**Background:** Learning Management Systems (LMS) represent one of the main technology to support learning in HE institutions. However, every educational institution differs in its experience with the usage of these systems. South East European University’s LMS experience is longer than a decade. From last year SEE – University is adopting Google Classroom (GC) as an LMS solution. **Objectives:** Identifying factors which encourage LMS activities, with special emphasis on SEEU, might be of crucial importance for Higher Education academic leaders as well as software developers who design tools related to fostering LMS. **Methods/Approach:** This paper introduces new approach of investigating the usage of LMS, i.e. identifying the determinants of increasing usage of LMS activities, by conducting empirical analysis for the case of SEEU. We apply appropriate estimation technique such as OLS methodology. **Results:** Using SEEU Usage Google Classroom Report & Analysis Data for spring semester (2016–2017) and winter semester (2017–2018) - SUGCR dataset 2017, we argue that (i) LMS activities are affected by demographic characteristics and (ii) the students’ LMS usage is affected by level and resources of instructors’ LMS usage. **Conclusions:** The empirical results show positive relationship between student and instructors’ LMS usage.

**Keywords:** e-learning, LMS, learning content, HE, Google Classroom, LMS usage

**JEL classification:** O30, D83, I21

**Paper type:** Research article, Case Study

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Introduction

The most important issue about e-Learning is the technology that makes it possible. The major aim of this research is about the effectual application of that technology. In this direction, LMS maybe are not the latest innovative technology in recent years, but they are one of the most pervasive in higher education.
The traditional mode of education was shifted forward towards new approaches in teaching and learning with the application of e-learning tools. This shift was mainly carried out by the implementation of LMS (Bersin et al., 2009). LMSs are web-based technologies that provide to the instructors and the students the possibility to share materials, submit assignments as well as connect and chat online (Lonn et al., 2009). In other words, an LMS provides an online folder for the course management, where the instructor can post the teaching materials and assignments whilst the students can access the learning content, submit the assignments as well as participate in any other online learning activities.

The primary aim of LMSs was support learning management and consequently mostly were promoted tools for learning content management, student schedule, and attendance grading and similar. Many research studies and reports from the early period of LMS use raise the importance of the management functions of an LMS (Woolley, 1994; Nicholson, 2007). The later research is more and more focused on the student perspective, practices and their evaluation of the efficiency of the LMS features (Dyson et al., 2003; Aberdeen Group, 2008).

LMS’s value was significantly increased especially as e-Learning is becoming one of the main activities in higher education institutions and for many of them crucial element in their strategy. The existing LMS practices and their use present an important practice in terms of education and technology. These practices among others show that it is the LMS usage that enables the users to identify the opportunities off the system and to require more from the system and in this way they actually became the key drivers of the LMS further development. Evaluating and monitoring the usability of an e-learning system is an important task to ensure the efficacy of the system (Shehu et al., 2009; Orfanou et al., 2015).

As Learning Management Systems keep evolving and being more and more accepted, further study and analysis are required in order to support the users in identifying the most efficient paths in the usage of these system and enhancement of the HE educational process.

Hence, in this study, quantitative data gathered from the LMS usage at South East European University were analysed. The data were analysed with linear regression method to find the impact of independent variables on enhanced LMS usage and to determine whether certain elements have influence on usage behaviour. This method was also used in earlier studies (Abazi-Bexheti et al., 2010; Mohd Ayub et al., 2010; Pardamean et al., 2012).

South East European University’s LMS experience

South East European University’s LMS experience can be divided in three phases. First phase includes the initial LMS usage at SEEU (2006-2008). This period a commercial LMS with a very reach menu of learning and managing features was in use. The system was used for more than three years at SEEU and this period was very important since it enhanced the e-learning culture among staff and students and helped us gather lot of data regarding the users’ preferences on LMS (Abazi-Bexheti et al., 2009). Even though the system was very well excepted and used by the instructors and the students, due to its commercial model it was not possible to upgrade, extend or integrate with other University systems. Also because of the high costs, it was decided to switch towards in-house solution.

The main idea behind the in-house solution was to design and develop a system that could be integrated easily with other existing SEEU systems. The main advantage of the system would be that it could be enhanced based on user preferences and at the same time it could be integrated with other university systems such as roster,
grading and similar. Therefore, in the second phase an in-house solution (Libri) was
designed, developed and integrated with other existing University e-systems (Abazi-
Bexheti et al., 2008). This phase lasted from 2008-2016. The initial version of Libri
consisted of the tools that staff and students found as most important for their
teaching and learning experience in the first phase (Abazi-Bexheti et al., 2009).

This is in fact one of the main reasons for the in-house approach: to design a LMS
that would be in step with the up-to-date technologies and further on to explore,
analyse and enhance it, based on users’ experiences (Shehu et al., 2009).

The third phase of the LMS experience at SEEU started by the end of 2016, when
on one side the LMS storage expenses started to increase and on the other side the
in-house advancement and development of the system could not reach the pace
of tools and developments that are coming from manufacturers and huge
companies offered for free. The first advancement was done by integrating Libri with
Google Drive. The purpose for this change was the issue that SEEU was dealing with
the lack of storage for the learning contents. When it comes to storing data, cloud
storage, more precisely Google Drive file repository system, was quickly seen as one
of the best possible solution.

Google Classroom - LMS solution is in use at SEEU from sept 2016 to present, as a
solution for the financial barriers and user’ requirements in the past decade. In
addition to this, the developed tool at SEEU, tracks the activity of the instructors in the
system and on the system usage. Moreover, it generates reports which are further on
analysed to identify the factors that maximize its usage.

Assessment of a LMS usage
Another perspective which raises considerable attention in HE institutions is how to
be able to evaluate the actual level of LMS usage by the teaching staff. Actually,
although the students are seen as the main drivers of the further system
development, still the research shows that the teachers are the main drivers of the
system usage (Alshamari, 2015). Hence, it’s normal the focus of HE institutions on
evaluation of the LMS usage by the teaching staff. The evaluation of the extend of
LMS usage is complex process and in this direction, there are many research papers
that study and analyse variety of aspects of LMS usage and employment
(McQuiggan, 2007). The assessment method that we used is built upon the metric
model for LMS evaluation proposed by Janossy, in which different value (level) is
assigned for each certain group of activities on a LMS (Janossy, 2008). The metric
model is simplified in four basic levels of usage based on the history of LMS usage
data that we had at SEEU. The metric level model uses a different value for each
certain group of activities on a LMS. In the proposed model:

Level 0, is the null situation of LMS use. This level actually is the level of non-use of
the system. It is the situation when the teaching staff does not post learning content
on the system and the doesn’t invite the students to enrol on the course, unless the
course is created automatically for the students based on their schedule.

Level 1, is identified if the teacher is using the system for basic activities in terms of
uploading Syllabi, lesson contents and assignments. At this level, students use the
system for downloading learning materials and submitting assignments.

Level 2, includes the elements from the previous level and in addition to this the
use of communication and assessment tools is identified. This level of LMS usage
includes the usage of features such as quizzes, tests, surveys and similar by both
teachers and students in this level.
Level 3, covers more advanced use of the LMS which includes recording lessons and applying more innovative methodologies in course delivery such as flipping classroom.

Research objectives
SEEU Usage Google Classroom Report & Analysis Data has been developed as a tool for two purposes: (i) to track the activity of the instructors in the system and (ii) to analyse the factors that maximize its usage. The data generated from this tool, SUGCR dataset 2017, will be employed to empirically investigate the issue of the level of LMS usage, in order to identify the factors that enhance the LMS (GC) usage. Hence, Table 1 presents the identified factors employed in the model as determinants affecting level of LMS engagement.

Table 1
Description of the identified factors employed in the model

<table>
<thead>
<tr>
<th>List of Variables</th>
<th>Definition of the Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>Number of students enrolled</td>
</tr>
<tr>
<td>Level</td>
<td>Level 0, 1 and 2</td>
</tr>
<tr>
<td>Resources</td>
<td>Number of resources published</td>
</tr>
<tr>
<td>Title</td>
<td>Academic title of the teaching staff</td>
</tr>
<tr>
<td>Age</td>
<td>Instructors’ Age</td>
</tr>
<tr>
<td>Age square</td>
<td>Square of Age variable</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Instructors’ ethnicity</td>
</tr>
<tr>
<td>Gender</td>
<td>Instructors’ Gender</td>
</tr>
<tr>
<td>Semester</td>
<td>Dummy = 1 if Summer semester and 0 otherwise.</td>
</tr>
<tr>
<td>Students’ Semester</td>
<td>Semesters 1-9</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Methodology
The methodology section consists of two parts: (i) system design and implementation – presents the developed tool and its possibilities; and (ii) identifying factors that enhance LMS (GC) usage.

System Design and Implementation
The conceptual design of the proposed approach includes three main modules:

- dashboard, which displays individual instructors’ course records
- reporting and analysis module, which is used to generate real-time and accurate reports about the activities within courses, and
- management module, which allows privileged system users to manage courses, course users’ delegation and system users.

The solution was implemented as ASP.NET MVC application using Entity Framework (version 6) for dynamic management of database design and Google Classroom API for .NET for Classroom courses management. To have a single point of interaction between our server and Google servers, the Google OAuth 2.0 service account scenario was approached. Namely, a G Suite domain administrator account was used to access user data on behalf of users in the SEEU Classroom domain.

In UI perspective, the application was designated to include a page for the user’s Dashboard (Figure 1), Reporting & Analysis (Figure 2) and Course Management (Figure 3). The system can also provide data for reports such as the one shown in Figure 1a. In this report can be compared the start of uploading contents by the
instructors between the initial summer semester and the second semester of the LMS (GC) usage.

Figure 1
The Application’s UI Pages for an Administrator Account: Dashboard

![Dashboard Image]

Source: Authors’ work

Figure 1.a
Number of courses started to publish content

![Course Publishing Chart]

Source: Authors’ work
Figure 2
The Application’s UI Pages for an Administrator Account: Reporting & Analysis

Source: Authors’ work

Figure 3
The Application’s UI Pages for an Administrator Account: Course Management

Source: Authors’ work
The system is used by three kinds of users: administrators, university academic leaders and faculty deans or directors of specific departments. Based on user role, the:

**Dashboard page** is divided into three columns, where the first one lists the instructor names, the second one the course list and the third one the course works (feeds) list or course stats. On first page load the three columns are populated based on specific user e.g. if the logged user is a dean of a faculty he/she will see the list of the instructor names on the first column, the list of the registered courses of the faculty on the second column and the list of published feeds of the faculty courses. After loading the initial lists, whenever a user clicks on an instructor name the course lists becomes populated with his/her courses and the course works list includes the instructor’s works across all course engagements. Moreover, if one wants to see the instructor’s work on a specific course, he/she may click on the course name and the feeds list will become updated with only the records published within that particular course. Moreover, a link is provided for each course which displays the most current statistics of the selected course on the third column.

**Reporting & Analysis page** consists of a set of reporting diagrams that enables deeper insight of course works for high management, deans and directors. Moreover, these users can observe course activities in near real-time. In the previous version of our system user requests were performed directly through Classroom API to consume real-time data. Because of the quotas for Google Services and for improving system performance, it was decided to build a local database with “offline” data i.e. data with maximum one-day delay. The synchronization algorithms run every night to update implicit and explicit course information. Moreover, a grid view of course level statistics within every department is also displayed for admins and university’s high management, while deans and directors see only their department related information.

**Identifying factors that enhance LMS usage**

Since there are few studies investigating empirically the usage of LMS, this exploratory paper uses research questions (rather than hypotheses) to examine LMS Usage and its determinants:

- **RQ1**: What are the determinants that influence the decision of students’ enrolment in LMS (GC) at SEEU?
- **RQ2**: How can these determinants be reflected in enhanced usage of LMS (GC) by both students and instructors?

The effects of the identified factors employed in the previous research (Abazi-Bexheti et al., 2009), of LMS level of usage will be estimated using data generated from the tool, i.e. SUGCR dataset 2017. The data consists of 1011 observations, which at the same time presents the number of courses created on the GC. Out of these data, 74 courses that were 'tutoring' with no learning contents were deleted from the sample, thus the final sample consist of 937 courses.

The empirical methodology involves Ordinary Least Square (OLS) Regression model, where Yi is an unobserved continuous variable, described as dependent variable, and Xi are described as the explanatory variables (Menard, 2009):

\[
Y_i = \beta_0 + \beta_1 X_{i1} + \epsilon
\]

In the context of this research Yi is the dependent defined by the enrolled students in GC, whereas Xi, are the explanatory variables presented at Table 1. The program
used for the estimation is STATA 11 and the respective command for the estimation of this model is reg.

The unobserved continuous variable used in the model is enrolled students in GC, which takes values of minimum 0, and maximum 30 students. Whereas the independent variables are resources, instructors’ age, level of LMS usage, ethnicity, academic staff title, students’ semester and gender. The summary statistics of the variables employed are presented in Table 2a and 2b.

This research employs the OLS model to investigate the usage of LMS (GC) at SEEU, using SUGCR data 2017, by identifying the categorical variables in the model. The results provide evidence on the LMS (GC) learning activities and estimates their joint impact on GC usage.

Table 2a
Description of the Variables

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>937</td>
<td>13.99</td>
<td>10.78</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Resources</td>
<td>937</td>
<td>7.12</td>
<td>9.71</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Instructors’ Age</td>
<td>937</td>
<td>45.09</td>
<td>8.98</td>
<td>25</td>
<td>68</td>
</tr>
<tr>
<td>Age square</td>
<td>937</td>
<td>2114.57</td>
<td>861.97</td>
<td>625</td>
<td>4624</td>
</tr>
<tr>
<td>Students’ semester</td>
<td>937</td>
<td>3.88</td>
<td>2.25</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Table 2b
Descriptive statistics of dichotomous variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs.</th>
<th>Categories</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>937</td>
<td>Male</td>
<td>64.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
<td>35.97</td>
</tr>
<tr>
<td>Semester</td>
<td>937</td>
<td>Winter</td>
<td>59.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summer</td>
<td>40.98</td>
</tr>
<tr>
<td>Level</td>
<td>937</td>
<td>Level 0</td>
<td>36.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Level 1</td>
<td>40.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Level 2</td>
<td>23.05</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>937</td>
<td>Albanian</td>
<td>81.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Macedonian</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign</td>
<td>3.09</td>
</tr>
<tr>
<td>Title</td>
<td>937</td>
<td>Part-time Lecturers</td>
<td>18.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lector</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PhD Assistant</td>
<td>5.55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Lector</td>
<td>15.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Docent</td>
<td>13.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associate Professor</td>
<td>27.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Full Professor</td>
<td>19.32</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Results

The results of the OLS regression estimations are presented in the following Table (Table 3). The results presented include regression coefficient estimations of the the independent variables employed in the model. The variables level, ethnicity, title and students’ semester are treated as categorical variables.
Table 3
The Results of the Ordinary Least Square Regression

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>OLS regression model</th>
<th>Dependent Variable: Number of students enrolled in google classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Std. Err</td>
</tr>
<tr>
<td>Resources</td>
<td>0.265***</td>
<td>(0.039)</td>
</tr>
<tr>
<td>Age</td>
<td>0.201*</td>
<td>(0.328)</td>
</tr>
<tr>
<td>Age square</td>
<td>-0.003**</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1</td>
<td>6.573***</td>
<td>(0.762)</td>
</tr>
<tr>
<td>Level 2</td>
<td>6.779***</td>
<td>(0.921)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Macedonian</td>
<td>-2.273***</td>
<td>(0.871)</td>
</tr>
<tr>
<td>Foreign</td>
<td>-3.559**</td>
<td>(1.587)</td>
</tr>
<tr>
<td>Title</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lector</td>
<td>5.473**</td>
<td>(2.889)</td>
</tr>
<tr>
<td>PhD Assistant</td>
<td>2.117</td>
<td>(1.447)</td>
</tr>
<tr>
<td>High Lector</td>
<td>3.287***</td>
<td>(1.082)</td>
</tr>
<tr>
<td>Docent</td>
<td>0.372</td>
<td>(1.096)</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>2.425**</td>
<td>(0.996)</td>
</tr>
<tr>
<td>Full Professor</td>
<td>0.392</td>
<td>(1.085)</td>
</tr>
<tr>
<td>Students’ Semester</td>
<td>-0.555***</td>
<td>(0.136)</td>
</tr>
<tr>
<td>Gender</td>
<td>-1.948***</td>
<td>(0.7333)</td>
</tr>
<tr>
<td>cons</td>
<td>11.212</td>
<td>(7.903)</td>
</tr>
<tr>
<td>Observations</td>
<td>937</td>
<td></td>
</tr>
<tr>
<td>F (9, 1001)</td>
<td>30.85</td>
<td></td>
</tr>
<tr>
<td>Prob&gt; F</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>R squared</td>
<td>30.33%</td>
<td></td>
</tr>
</tbody>
</table>

Statistical Significance Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Source: Authors’ work

The regression results can be reflected in the model as follows:

\[
\text{students} = -2.271 + 0.265\text{Resources} + 0.201\text{Age} - 0.003\text{Age}sq + 6.673\text{level1} \\
+ 6.779\text{level2} - 2.273\text{Macedonian} - 3.559\text{Foreign} + 5.473\text{Lector} \\
+ 2.117\text{PhD Assistant} + 3.287\text{High Lector} + 0.372\text{Docent} \\
+ 2.425\text{Associate Professor} + 0.392\text{Full Professor} - 0.555\text{Semester} \\
- 1.948\text{Gender}
\]

(2)

Discussion

After generating the OLS regression model for number of students the interpretation of the statistically significant variables, such as resources, age, age square, level, ethnicity, title, students’ semester and gender, is as follows.

The coefficient of the variable resources is positive and statistically significant at 1% level of significance suggesting that instructors who are more active users of LMS, i.e., post more often learning content, seem to have higher student enrolment.

The relationship of the variables student enrolment and instructors’ age is found to be statistically significant at 10% level of significance with non-linear i.e., inverse U shaped relationship, as suggested by positive coefficient of age variable and...
negative coefficient of the age variable squared. In particular, student enrolment initially rises with instructors’ age and reaches a maximum at the age of 39 (the turning point is calculated using the approach of Wooldridge (2002). In the estimated equation with $B>0$ (age in our case) and $B<0$ (age squared), the turning point is calculated as follows: $X^* = |B_1/(2B_2)| = |0.201/(2*0.0026)| = 39$. Amongst the instructors who are aged more than thirty nine, the age effect is negative. The findings are reliable with our expectations of having younger generations of instructors being more IT literate. Even though age is found to be proxy of IT literacy, the findings of different studies diverge from positive result (Coşkunçay et al., 2013), through insignificant findings (Alghamdi et al., 2016), to those that found negative effect of age on LMS usage (Morris et al., 2000). Their findings indicate that with age the self-confidence of the technology usage is decreasing.

The coefficients of level 1 and level 2 are positive and significant. This indicates that instructors’ enhanced usage of LMS (GC) increases the student enrolment.

The coefficients of different faculty titles are statistically significant. The base category is Part-Time engagement. As the positive and significant coefficients of lector, high lector, and associate professor suggest, given title of full-time engaged staff brings to better student enrolment.

The coefficient of the variable students’ semester is negative and significant, thus suggests that earlier semesters tend to have higher enrolment of students in GC rather than the later ones.

The results show negative and statistically significant coefficient for gender. This means that the usage of GC i.e. number of students enrolled is better for female than for male. Study by Wichadee (2015), found no difference among instructors’ gender differences in their attitude toward LMS, no matter what subject they were teaching. The following section provides the concluding remarks of the paper.

**Conclusion**

E-learning is equally treated as reason and outcome of important changes in the nature of the education concept, as well as changes in the understanding of how it should be successfully established. With the e-learning arrival and progress, SEEU started to deal with diverse activities to address emerging challenges that go beyond educational issues. The new advanced LMS solution included all the elements in respect to learning, teaching, communication, creation and management. It was a planned process that required digital skills, competences and techniques of designing the course and course instruction, communication methods through electronic and other technologies, along with crucial organizational and administrative procedures.

In this paper was introduced a new approach of investigating the usage of GC (LMS), i.e. identifying the determinants of the usage of GC activities, by conducting empirical analysis for the case of SEEU.

Using OLS Regression model we found that: (i) the level of usage GC has positive impact on the number of students enrolled; (ii) the resources posted by the academic staff also confirm the appropriateness of the usage of GC, where without significant number of resources there is no increase in the student enrolment; (iii) there is an inverse U-shaped relationship between age and the usage of LMS reaching a maximum at the age of 39, which is in accordance with our expectations due to the IT literacy needed for the use of technologies. Older members of the academic staff have lower level in IT literacy; (iv) females are more prone to the LMS usage. Thus, in order to enhance LMS usage by students, instructors should consider adding additional resources and increase their Level of LMS usage.
This study limitation is the time span of the data. These data reflect two semester observation and usage which is limited time period. Once the data for the next academic year will be generated, one can consider trend and suggestions for further developments.

References
About the authors

Lejla Abazi-Bexheti is Associate Professor at the Faculty of Contemporary Sciences and Technologies at South East European University in Macedonia. She holds a PhD Degree in Computer Science and has been part of the CST teaching staff since 2002. Her main research activity is in the area of Learning Systems and eLearning and she has been involved in many international projects and research activities from this area. At SEE University she was involved on resolving issue of the Learning Management System. Currently she is Pro-rector for academic issues at SEEU. The author can be contacted at l.abazi@seeu.edu.mk

Edmond Jajaga is an assistant professor at the Department of Computer Engineering of the University of Business and Technology in Kosovo. He received his PhD in 2017 in Computer Science from South East European University, Macedonia. He has published in renowned international venues in the areas of Semantic Web, eLearning, Stream Reasoning and Databases. He has been involved on a couple of international projects including InWaterSense and DISCO. Since 2011, he has been working as a software engineer at the eLearning Center of the South East European University. In the past he has worked as a teaching assistant at the State University of Tetova and University of Pristina. The author can be contacted at edmond.jajaga@ubt-uni.net

Dr. Hyrije Abazi-Allili is a Lecturer Assistant of Economics, Quantitative Methods and Corporate Finance modules at the Faculty of Business and Economics at South East European University since 2005. She finished her PhD at Staffordshire University in 2013. She is affiliate fellow at CERGE-EI, Prague since 2014. Her field of research is on microeconomics such as ownership change, innovation, entrepreneurship, education, gender issues, etc., in transition economies. She has participated in numerous international projects (EU projects, UNDP, RRPP, etc) as project manager, senior researcher, and other engagements. She is also active in publishing her academic research work. The author can be contacted at h.abazi@seeu.edu.mk

Arbana Kadriu holds a PhD degree in Computer Sciences from Ss. Cyril and Methodius University in Skopje from 2008, with focus on natural language processing and information retrieval. She is associate professor at the Faculty of Contemporary Sciences and Technologies at SEE University in Macedonia. She has also background in artificial intelligence, machine learning, programming paradigms, software engineering and e-learning. Also, she is mentoring several master theses that involve the web information retrieval and e-learning. She is author of more than 30 research papers. The author can be contacted at a.kadriu@seeu.edu.mk

Marika Apostolova-Trpkovska, Assist. Professor at the Faculty of Contemporary Sciences and Technologies, SEE University in Macedonia. She has been part of the CST teaching staff since 2006. During her teaching experience, she has taught courses from the area of Data structures and algorithms, C++ programming, Web programming, Software Engineering, Strategic Information Technology Project Management, Interactive system design and Microsoft IT courses. Her main PHD research activity was in the area of e-Medical services based on Semantic web and eLearning. She acted as coordinator of DISCO - Erasmus+ international project, and senior researcher on several national and international projects. She was also coordinator of integrated study programmes that were part of a valuable project between German Federal Government of Development Cooperation and SEEU. The author can be contacted at m.apostolova@seeu.edu.mk
Research Activities and their Relation to Economic Performance of Regions in the European Union

Vladimir Hiadlovsky, Jan Hunady, Marta Orviska, Peter Pisar
Faculty of Economics, Matej Bel University in Banska Bystrica, Banska Bystrica, Slovakia

Abstract

Background: The intensity of innovation could often be crucial for further economic development of the regions. Science and technology are often seen as the key factor supporting innovation in the regions. Furthermore, we can assume that higher intensity of research activities could lead to better economic performance. Objectives: Research aims to examine the link between the economic performance of the region and the intensity of science and technology activities, proxied by the share of employees in science and technology. Methods/Approach: The analysis is based on panel data for NUTS2 regions of the European Union (EU) member states. We conducted correlation analysis, panel Granger causality tests and regression analysis. Results: Our results suggest the existence of a significant positive correlation between GDP per capita and the share of employees in science and technology. Moreover, the regions with a higher intensity of science and technology activities are mostly characterized by relatively low unemployment rates. Conclusions: Research activities are positive correlated with regional GDP and negatively correlated with unemployment. However, increasing the share of employment in science and technology beyond a certain turning point would not lead to any further positive effects on regional economic performance.

Keywords: science and technology, regional development, university education, innovation, economic development

JEL classification: I23, R59

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Introduction

Based on the theory of endogenous economic growth, science, research and knowledge play a key role in maintaining growth. However, the positive externalities resulting from knowledge have a geographically limited impact. Thus, they are an important source of sustainable economic growth especially at the regional level (Audretsch, 1998). The accumulation of intellectual capital is one of the main factors that create differences in the productivity of individual regions (Fischer et al., 2009). This aspect is further developed in the theory of learning regions (Lundvall et al., 1994). Despite the existence of several supranational tolls to eliminate regional disparities, there are still significant differences in regional economic development within the European Union (EU). The economic growth of the regions is often attributed to technological change and innovation intensity. The ability of poor regions to catch up with the rich ones is closely related to their ability to generate sufficient investments, but also to its innovation capacity (Fagerberg, 2010). The institutional characteristics, knowledge infrastructures and knowledge transfer systems at the regional level appear to be crucial for promoting innovations at regional level (Doloreux et al., 2005).

Innovation consists of knowledge that arises as a result of scientific, research and development activities and, consequently, the ability of workers to apply them into practice (Hudec et al., 2009). The technology sector appears to be particularly important for the knowledge based economy and this sector also undertakes a high share of all R&D expenditure. Higher R&D expenditure appears to further lead to more researchers, more patents and also higher economic growth (Hunady et al., 2014). Knowledge creation in high technology sectors depends significantly on university research and R&D performed by the high technology sectors themselves (Acs et al., 2013). Human capital is an important factor supporting the knowledge based economy. This seems to be crucial for regional economic growth. Regions with a large share of employees with a higher education experience higher economic growth (Cuaresma et al., 2014). Pylak et al. (2016) used the share of employees in science and technology as well as the share of the population with tertiary education as one of the main variables describing the characteristics of regional innovation systems. Based on logit regression they found that the chances for achieving greater economic growth by less-developed regions were better in regions with higher innovativeness. Thus, an increase in the share of people with tertiary education and employed in science and technology also appeared to have a positive effect on regional GDP per capita. In line with this statement, the intensity of science, research and development together with the proportion of tertiary educated people are those factors supporting innovation performance and thus also regional economic development (Badinger et al., 2003; Sterlacchini, 2008; Acs, 2002). R&D activities of firms seem to be the key factor leading to innovation (Hunady et al., 2014). On the other hand, there are also some different results. For example, Baesu et al. (2015) found that the number of employees in science and technology has no significant effect on the innovation performance of high-tech industry. This could be true due to so called valley of death between research and successful innovation, which could be crossed by communication and interaction between academia and business (Hudson et al., 2013).

However, in general we can say the accumulation of intellectual capital is one of the main factors that create differences in the productivity of individual regions (Fischer et al., 2009). Hence, the support of science and technology activities within the region seems to be beneficial for maintaining the economic development of the region. Furthermore, there is also some other direct positive effects of higher
education institutions located in the region. However, the extent of these benefits depends on their quality and policy settings in the region (Arbo et al., 2007).

In general we can assume that higher intensity of science and technology in the region could have some positive consequences on productivity within the region. Productivity growth in the region can often be explained by research and development expenditures. There have been many studies directed at finding links between innovation, research and development (R&D) and productivity growth (for example Frenken et al., 2007; Hall et al., 2013 or Guellec et al., 2001).

Furthermore, the knowledge infrastructure of the region is a crucial stimuli for promoting innovation activities in the region (Doloreux et al., 2005). The spatial distribution of R&D expenditures among the regions has been examined in the EU countries (Martín et al., 2005) as well as in other countries, such as, for example, China (Wei et al., 2008). However, there are also significant differences in the innovation capacity of regions.

The actual acquisition of knowledge can be made either from local sources within the region or from the external environment or other regions. As stated by Pastor et al. (2013), the process of knowledge acquisition from other regions is a very important source of regional development. Perhaps, this way of acquiring knowledge is even more important for less developed regions.

According to Sandu (2012) human resources in science and technology are one of the main indicators describing the current research and innovation potential of the region together with the number of patents, publications and R&D expenditures. Moreover, the amount of innovation activities in the region could be indirectly measured by the proportion of research and development employees (Fritsch et al., 2011).

Our paper aims to examine the link between the intensity of science and technology in the regions and their economic development. There are only a few studies dealing with this issue at the regional level. In comparison to most of the other studies, we used panel data approach for all NUTS 2 regions in EU28. We tested two main research hypotheses as follows:

- H01: We assume that human resources in science and technology in the region is positively correlated with economic growth of the region.
- H02: We assume that the share of population with tertiary education in NUTS 2 regions is positively correlated with unemployment in the region.

The intensity of science and technology is proxied by the share of human resources employed in these areas. We further describe the methodology and data used in the analysis in the next section of our paper. Key results are summarized and discussed in the third section. Finally we make some conclusions and remarks in the final section of the paper.

**Methodology and data**

Our main scientific aim is to identify the link between the share of employees in science and technology and the economic development of the region measured by GDP per capita. In line with this aim we stated two research hypotheses. To test them we analysed the empirical data. In this section we describe our methodology as well as the data in more detail.

Our dataset consists of panel data for NUTS 2 regions in EU28 countries retrieved from Eurostat database (European Commission, 2017). NUTS 2 regions are basic regions for the application of regional policies from the EU perspective. Thus, this regional level is often used in this type of analysis. Furthermore, there is significant lack of data at lower levels. The data include several variables for NUTS 2 regions in
the period 2003-2014. This period has been chosen based on data availability. Thus, we have more than 3471 non-missing observations. We particularly used four variables in the analysis. These are summarized in the Table 1. The two most important variables are regional GDP per capita and regional number of employees in science and technology.

Table 1
Description of variables used in the analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>Regional gross domestic product (GDP) by NUTS 2 regions. Purchasing power standard (PPS) per inhabitant.</td>
<td>European Commission (2017) - Eurostat database [nama_r_e2gdp]</td>
</tr>
<tr>
<td>Share of employees in science and technology</td>
<td>The share of employees in science and technology on total number employment by NUTS 2 regions. Full-time equivalent (FTE).</td>
<td>European Commission (2017) - Eurostat database [rd_p_persreg]</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Rate of unemployment in NUTS2 regions.</td>
<td>European Commission (2017) - Eurostat database [rd_p_persreg]</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Basic descriptive statistics of all variables are shown in Table 2.

Table 2
Basic descriptive statistics for variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>94.67</td>
<td>94.0</td>
<td>266.0</td>
<td>21.0</td>
<td>33.69</td>
</tr>
<tr>
<td>Share of employees in science and technology</td>
<td>27.01</td>
<td>27.00</td>
<td>56.1</td>
<td>10.5</td>
<td>7.09</td>
</tr>
<tr>
<td>Tertiary education</td>
<td>25.48</td>
<td>25.50</td>
<td>58.9</td>
<td>6.90</td>
<td>8.20</td>
</tr>
<tr>
<td>Unemployment</td>
<td>8.89</td>
<td>7.70</td>
<td>37.00</td>
<td>1.80</td>
<td>5.10</td>
</tr>
</tbody>
</table>

Source: Authors’ work based on the data retrieved from European Commission (2017).

We examined the relationship between the regional share of employees in science and technology and regional GDP per capita using panel Granger causality tests and the panel fixed-effects and random effects models. The choice between random effects and fixed-effects application was based on the results of the Hausman test. Variables used in the models were tested for weak stationarity using a panel stationarity test.

According to the results of these tests we can conclude that all selected variables are found to be non-stationary at their levels but appear to be stationary at the first differences. Thus we have to use all tested variables at their differences in order to avoid potential problem of spurious regression. Hence, we decided to use the first differences of the variables in all regression models.
Results and discussion

Firstly, we examine the development of the two main variables during the selected period of time. As we can see in Figure 1, average share of employees in science and technology has an increasing trend in the EU countries during the years 2003-2014. The same is true for the average share of people with tertiary education, which is rising even more quickly during this period.

Figure 1
The average share of the population with tertiary education in the active population (left) and the average share of employees in science and technology (right)

Next we analyse the correlation between all selected variables. The Pearson correlation coefficients between each pair of variables are summarized in the Table 3. As we can see, there is a strong positive correlation between regional GDP per capita and the share of employees in science and technology. There are also moderate positive correlations between the share of people with tertiary education in the region, regional GDP per capita and the share of employees in science and technology.

On the other hand, all three variables are negatively correlated with regional unemployment. Thus, the regions with more intensive science and technological activities have in general less unemployment. The negative correlation between GDP per capita and unemployment is of course in line with theoretical expectations.

In the next part of the analysis, we focus our attention on a relation between GDP per capita and the share of employees in science and education. In order to test the direction of the causality we applied Granger causality tests in order to test the direction of potential causality between the variables.

The results that can be seen in Table 4, strongly suggest that there is causality in the Granger sense arising from employment in science and technology to regional GDP per capita. On the other hand, the effect in the opposite direction is not statistically significant.
Table 3
Correlation matrix of selected variables

<table>
<thead>
<tr>
<th></th>
<th>GDP per capita</th>
<th>Number of employees in science and technology (share)</th>
<th>Tertiary education (share)</th>
<th>Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita</td>
<td>1.000</td>
<td>0.716***</td>
<td>0.435***</td>
<td>-0.429***</td>
</tr>
<tr>
<td>Share of employees in</td>
<td>0.716***</td>
<td>1.000</td>
<td>0.497***</td>
<td>-0.431</td>
</tr>
<tr>
<td>science and technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary education</td>
<td>0.435***</td>
<td>0.497***</td>
<td>1.000</td>
<td>-0.036</td>
</tr>
<tr>
<td>(share)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>-0.429***</td>
<td>-0.431***</td>
<td>0.036</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Note: *** denotes statistically significant at the 1 percent level.
Source: Authors’ work based on the data from Eurostat database.

Table 4
The results of Granger causality test

<table>
<thead>
<tr>
<th>Number of lags:</th>
<th>F-statistic</th>
<th>F-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 lag</td>
<td>2 lags</td>
</tr>
<tr>
<td>ΔGDP per capita does not Granger Cause ΔShare of employees in science and technology</td>
<td>0.4706</td>
<td>0.787</td>
</tr>
<tr>
<td>ΔShare of employees in science and technology does not Granger Cause ΔGDP per capita</td>
<td>10.393***</td>
<td>27.651***</td>
</tr>
</tbody>
</table>

Note: *** denotes statistically significant at the 1 percent level.
Source: Authors’ work based on the data from Eurostat database.

Finally, we analysed the relationship using panel data regressions. We applied several different fixed effects panel regressions. All models were tested for autocorrelation and multicollinearity. Moreover, we also used standard errors robust for heteroscedasticity.

As we can see in Table 5, we firstly applied the cross-sectional random effects model (regression 1.1), but the results of the Hausman test suggest that the fixed-effects model should be the more appropriate one. Hence, we decided to use only fixed effects models. However, the period fixed effects model (regression 1.3) shows only very small R² statistics, thus this model was taken into the account only as a robustness check.

The results of regressions (see Table 5) suggest that there is a significant positive effect of the share of employees in science and technology on regional GDP per capita. This effect is statistically significant at the 10% and 5% levels respectively. The change in the share of people with tertiary education in the region appears to be insignificant with respect to GDP per capita.

We also used the share of employees in science and technology lagged by one period as an independent variable. The positive effect is even more significant in this case as we can see in regression 1.5. These results are in line with the theoretical assumptions and previous empirical results such as Badinger et al. (2003) or Sterlacchini (2008). They also complement the results achieved by Pylak et al. (2016).
Table 5
Results of panel regression models with GDP growth as dependent variable

<table>
<thead>
<tr>
<th>Regression model:</th>
<th>1.1 Cross section RE</th>
<th>1.2 Cross section FE</th>
<th>1.3 Period FE</th>
<th>1.4 Cross section &amp; period FE</th>
<th>1.5 Cross section FE</th>
<th>1.6 Cross section FE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-0.12 (1.59)</td>
<td>-0.116** (-2.16)</td>
<td>-0.124* (-2.28)</td>
<td>-0.112** (-2.09)</td>
<td>-0.204*** (-3.40)</td>
<td>-0.097* (-1.92)</td>
</tr>
<tr>
<td>ΔShare of employees in science and technology</td>
<td>0.065** (2.02)</td>
<td>0.006* (1.94)</td>
<td>0.081** (2.13)</td>
<td>0.078** (2.19)</td>
<td>0.138*** (3.58)</td>
<td></td>
</tr>
<tr>
<td>Random effect (RE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed effects (FE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>0.002</td>
<td>0.20</td>
<td>0.005</td>
<td>0.20</td>
<td>0.21</td>
<td>0.20</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.001</td>
<td>0.12</td>
<td>0.002</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Akaike criterion</td>
<td>4.93</td>
<td>8.475</td>
<td>4.94</td>
<td>4.97</td>
<td>4.93</td>
<td></td>
</tr>
<tr>
<td>Hausman test</td>
<td>1.195</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>2.07</td>
<td>2.411***</td>
<td>1.584*</td>
<td>2.395***</td>
<td>2.383***</td>
<td>2.47***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3471</td>
<td>3471</td>
<td>3271</td>
<td>3271</td>
<td>3271</td>
<td>3271</td>
</tr>
</tbody>
</table>

Note: We used data for NUTS II regions in the EU within the period 2003-2014; symbols (.) denotes z-statistics and */**/*** denotes statistically significant at the 10/5/1 percent levels. Standard errors have been corrected for heteroscedasticity.
Source: Authors’ work based on the data from Eurostat database.

Furthermore, based on the results of regression 1.6 we can say that the relationship between these two variables seems to be of a nonlinear inverse U-shape form. This means that the GDP per capita rises with the increase in the share of employees in science and technology only to a certain point. The maximum appears to be at approximately 2.23%. However, we can see that the R2 is rather low in all models, which means that the intensity of science and technology in the region is still not the main factor affecting the regional GDP per capita.

In the next five regression models, we used unemployment share as a dependent variable instead of GDP per capita. We assume that this variable reflects in particular the intensity of R & D activities as well as the use of human resources in this area. The regression results are summarized in Table 6.

Based on our results, it is clear that the change in the share of staff in science and technology in the region negatively correlates with the change in the rate of regional unemployment. This variable is statistically significant at a 1% significance level in all models used. Again, we can say that our results are fully in line with Cuaresma et al. (2014) who stated that a large share of employees with a higher education is related to higher economic growth in the region.

Based on our results we can say that we are not able to reject both of our research hypotheses. Thus, the results suggest that human resources in science and
technology as well as the share of people with tertiary education are both positively correlated with economic growth of the region.

Table 6
Results of panel regression models with unemployment as dependent variable

<table>
<thead>
<tr>
<th>Dependent variable: Δ Unemployment</th>
<th>1.1</th>
<th>1.2</th>
<th>1.3</th>
<th>1.4</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>C (Fixed effects)</td>
<td>0.21</td>
<td>0.20</td>
<td>0.20***</td>
<td>0.19***</td>
<td>-0.17***</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td>(0.82)</td>
<td>(8.78)</td>
<td>(9.98)</td>
<td>(8.02)</td>
</tr>
<tr>
<td>ΔShare of employees in science and</td>
<td>-0.20***</td>
<td>-0.18***</td>
<td>-0.19***</td>
<td>-0.17***</td>
<td>-0.18***</td>
</tr>
<tr>
<td>technology</td>
<td>(-3.01)</td>
<td>(-2.98)</td>
<td>(-3.99)</td>
<td>(-4.15)</td>
<td>(-4.28)</td>
</tr>
<tr>
<td>ΔGDP per capita</td>
<td>-0.14***</td>
<td>-0.11***</td>
<td>-0.14***</td>
<td>-0.11***</td>
<td>-0.09***</td>
</tr>
<tr>
<td></td>
<td>(-5.31)</td>
<td>(-6.34)</td>
<td>(-5.36)</td>
<td>(-6.34)</td>
<td>(-3.05)</td>
</tr>
<tr>
<td>ΔGDP per capita (lag=1)</td>
<td></td>
<td></td>
<td></td>
<td>0.005</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-1.03)</td>
<td>(-1.36)</td>
</tr>
<tr>
<td>Fixed effects(FE) / Random effects(RE)</td>
<td>Cross-section RE</td>
<td>Cross-section FE</td>
<td>Period FE</td>
<td>Cross-section &amp; period FE</td>
<td>Cross-section &amp; period FE</td>
</tr>
<tr>
<td>R2</td>
<td>0.10</td>
<td>0.20</td>
<td>0.31</td>
<td>0.41</td>
<td>0.44</td>
</tr>
<tr>
<td>F-statistic</td>
<td>193.15***</td>
<td>20.00***</td>
<td>130.2***</td>
<td>6.55***</td>
<td>6.69***</td>
</tr>
<tr>
<td>Number of observations</td>
<td>3442</td>
<td>3442</td>
<td>3442</td>
<td>3442</td>
<td>3143</td>
</tr>
</tbody>
</table>

Note: We used data for NUTS II regions in the EU within the period 2003-2014; symbols (...) denotes z-statistics and */**/*** denotes statistically significant at the 10/5/1 percent level. Standard errors have been corrected for heteroscedasticity.

Source: Authors’ work based on the data from Eurostat database.

Conclusion
Innovation is supposed to be the key determinant of economic growth in the long run. With respect to innovation performance, especially science and technology seems to be the most important sector. Hence, we can say that universities and other research institutions are often critical when creating innovation in the region. The intensity of science and technology has been proxied by the share of human resources employed in this sector. We can assume that a higher share of employees in science and technology will positively affect the regional economic development. We can assume that a higher share of employees in science and technology will positively affect the regional economic development. We also take to the account a control variable representing the share of people with tertiary education living in the region. This has been used because the educational level is often assumed to be a very important factor with respect to knowledge creation and innovation. Of course the role of universities is again crucial in this case. Thus we can say that the public support of universities could be seen as one of the effective policies for improving innovation performance and also impact on economic growth in the region.

We found a positive correlation between the intensity of science and technology and the economic development of the region. Based on our results, we can say that an increase in the human resources in science and technology should have a positive effect on regional GDP per capita. This effect seems to be even stronger when taking to account a one year lag. However, we also found a certain turning point for this positive effect. Hence, it means that increasing the share of employment in science and technology beyond this point would not lead to any
further positive effects on regional economic development. Our results also suggest a negative correlation between research activities and unemployment rate in the region. It is also important to mention that our approach does not capture all variables that could have an effect on regional economic development. We see a potential for further research to investigate potential effects of other variables related to innovation on regional economic growth. Moreover, despite the fact that we have tested the models for reverse causality, the endogeneity could still be a problem in our case. Thus, it should be perhaps more appropriate to speak about certain correlations rather than strict causal effects.

References


About the authors

Vladimir Hiadlovsky, is the Rector of Matej Bel University in Banska Bystrica. He is associate professor of Business economics and management. His research is focused on business economics, financial management and the concept of corporate social responsibility. He has several publications in journals with impact factor. He is also the member of scientific boards of Matej Bel University in Banska Bystrica, University of Economics in Bratislava, Technical University in Zvolen and Constantine the Philosopher University in Nitra. The author can be contacted at vladimir.hiadlovsky@umb.sk

Jan Hunady, is assistant professor at the Faculty of Economics, Matej Bel University in Banska Bystrica, Slovakia. He received his PhD in public economics and services at Matej Bel Univeristy. He has already published a number of papers at conferences and journals, primarily in the area of public finance and innovation. He also participates on several research projects in the area of research policy and innovation. He has expertise in econometrics and econometrics package programs particularly panel data and time series analysis. The author can be contacted at jan.hunady@umb.sk

Marta Orviska, is professor of finance, banking and investment at Matej Bel University. She is one of the most cited economists in Slovakia. Her research interests are focused on macroeconomics and public finance, including tax policy and tax evasion, standardisation, voting behaviour and the analysis of attitudes to, for example, NATO and the EU in the new applicant countries and new members of the EU, and to new technologies. Since 2000, she has held and hold several positions in national and international projects in these areas and she has published a number of articles including in the European Journal of Political Economy, Journal of Common Market Studies, Social Indicators Research, Economics of Governance, Journal of Policy Modelling, Information Economics and Policy, Central European Journal of Public Policy, South East European Journal of Economics and Business, Politicka ekonomie, Drug Discovery Today and Nano Today. The author can be contacted at marta.orviska@umb.sk

Peter Pisar, is associate professor of finance, banking and investment at Matej Bel University. He has been the Head of Department of Finance and Accounting since 2015 executive editor of the scientific journal Region Direct and project manager of Europe Direct Information Center Relay, European Commission, Brussels, REIC Banska Bystrica, Slovakia. His research is focused on European public finances, especially innovative financing and the evaluation of regional policy and public expenditure programs. In practice, he is also a consultant for the development and implementation of projects supported by EU funds and is particularly concerned with public policies supporting innovation. The author can be contacted at peter.pisar@umb.sk
The Effects of Expenditures for Labour Market Policy on Unemployment Rate

Laura Južnik Rotar
Faculty of Business, Management and Informatics Novo mesto, University of Novo Mesto, Novo Mesto, Slovenia

Abstract
Background: Labour market policy aims to fight against unemployment and to raise employment. With this study we attempt to contribute to the evidence of the effectiveness of active labour market policy. Objectives: In the empirical part of the paper we aim to research the relations between the labour market policies and macroeconomic variables. Methods/Approach: In order to distinguish the effects of expenditures for labour market policies on unemployment rate, we separately analysed the effects of expenditures for active labour market policies and the effects of expenditures for passive labour market policies on unemployment rate using panel regression analysis. Results: The expenditures for active labour market policies have negative and statistically significant effect on unemployment rate, whereas the expenditures for passive labour market policies have positive and statistically significant effect on unemployment rate. Conclusions: Not only the activation strategies with benefit conditioning, but also encouraging and enabling unemployed person to actively approach in searching for a job should be implemented. The implementation of activation strategies which create favourable conditions for unemployed people to develop their skills, fulfil their potential, continuously maintain contacts with the employers and actively participate in the society should be supported.

Keywords: labour market policies, effectiveness, microeconometric estimation, macroeconometric estimation, labour market, unemployment rate, European Union

JEL classification: C21, J64, J68
Paper type: Research article

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Introduction
Since 2008, the EU-27 has experienced the consequences of the most severe economic crisis: over 23 million unemployed with small and medium sized enterprises weakened by economic downturn. To strengthen the future growth and competitiveness the Europe 2020 strategy has been put in place. The Europe 2020 strategy addresses the main societal challenges and gives directions for smart, sustainable and inclusive growth. One of the greatest challenges is how to fight
against the rising unemployment rates. According to the Eurostat unemployment report (Eurostat, 2017) from the beginning of 2005 until the first quarter 2008 the trend was declining unemployment rate which stood at 6.8 % or 16.2 million persons. From that period on the unemployment rate reached 9.7 %, whereas from 2013 there is a trend of decreasing unemployment rate. At the end of 2016 the unemployment rate reached 8.2 % (Eurostat, 2017).

In dealing with the rising unemployment rates and social exclusion, an important role is played by the labour market policies that can contribute to an increase in employment and a decrease in unemployment. Since there are large funds intended for the labour market policies, and since there is an increasing pressure in terms of budget limitations, an ageing population and other obstacles, the question of estimation of impacts of such policies and programmes is quite appropriate. The evaluation of the effectiveness of labour market policies and programmes is usually based on the use of different techniques which consider an individual's participation in an employment programme and assess the probability of future employment in comparison with the situation where the individual is not included in the programme. Such evaluations are part of microeconometric evidence of the impact of the labour market policies and programmes on different outcomes. Whereas macroeconometric evidence of the impact of the labour market policies and programmes focuses on the evaluation of the impact of such policies and programmes on macroeconomic variables (for example employment and unemployment). This approach typically relies on the cross-country econometric analysis based on panel data sets. Nevertheless, such evaluations can serve as a basis for the development and monitoring of economic effects of policies on the labour market. Secondly, the findings of such evaluations can serve as the professional basis for the economic policy makers. Thirdly, such evaluations contribute to the more effective distribution of funds.

Labour market policy aims to fight against unemployment and to raise employment. With this study, we attempt to contribute to the evidence of the effectiveness of active labour market policy. We follow the design of an aggregate impact analysis, which aims to explain the impact of labour market policies and programmes on macroeconomic variables. Therefore, the objective of our study is to estimate the effects of expenditures for labour market policies on unemployment rate. The objective of empirical study is to separately estimate the effects of expenditures for active as well as passive labour market policies on unemployment rate as there is a variety of programmes and measures within labour market policies and as such impact differently on unemployment rate. The hypothesis of the research is that the effects of expenditures for active labour market policies will be negative on unemployment rate, whereas the effects of expenditures for passive labour market policies will be positive on unemployment rate and as such not resulting in lowering the unemployment rate.

The structure of the paper is as follows. In the second section, we provide literature review focusing on the microeconometric and macroeconometric evidence of the impact of the labour market policies and programmes on different outcomes. We continue with the explanation of the methodology, whereas the fourth section comprises results of the estimations and their discussion. The final section concludes.

**Literature review**

There is a growing interest to estimate the effectiveness of active labour market policy especially in the context of evidence-based policy making which is the orientation of the European Commission in the programming period 2014-2020.
Impact evaluations which are part of a broader agenda of evidence-based policy making can be described by a shift in focus from inputs to outcomes and results (Gertler et al., 2016). According to Gertler et al. (2016) impact evaluations can provide robust and credible evidence on performance and most importantly whether a particular programme has achieved its outcomes. This information is crucial also for decision makers, which decide whether a particular programme should continue or should it be terminated. Not only for decision makers also for citizens it is important whether public funds have been spent effectively.

In carrying out effective impact evaluations there is major challenge connected with such evaluations. That is to identify the causal relationship between programme or policy and outcomes of interest. From a microeconometric point of view, research focuses on the impact of particular programme or policy on participants in such programmes or policy. In an attempt to identify causal effects for such research one is inevitably faced with the fact that we cannot observe the same individual in two different situations simultaneously (see, for example Dehejia, 2013; Caliendo et al., 2015; Frölich et al., 2015). If we are trying to estimate the effectiveness of a certain employment programme this would mean that we are trying to compare the outcome of an individual participating in such employment programme with an outcome had that individual not participated in such employment programme (Južnik Rotar, 2012). Because we cannot observe the same individual in two different situations at the same time, the identification of causal effects is actually the problem of missing data (see, for example Rosenbaum et al., 1983; Khandker et al., 2010). Namely, the researcher is interested in the result that would occur if a person participates in the employment programme and on the other hand the result for the same person in the case of not participating in the employment programme – the so-called counterfactual (see, for example Hansen et al., 2014; Heckman et al., 2015; Huber et al., 2013).

On the other hand, from a macroeconometric point of view studies focus on general economic factors connected with the labour market, such as employment and unemployment rate (Gonzalez Carreras et al., 2015). The estimation of macroeconomic impact of active labour market policies on different factors associated with the labour market is typically implemented with panel data econometric approach (Martin, 2014).

Kluve (2010) estimates the effectiveness of European active labour market programmes based on meta-analysis and concludes that the employment programme type is almost exclusively the one that matters for programme effectiveness and not so much the other factors of economic expansion and contraction or public employment service as a typical labour market institution. Kluve (2010) found out that direct employment programmes in the public sector frequently not provide positive effects, while supports to employers to hire workers proved to be effective, whereas different programmes to equip participants with different knowledge and competences showed modest positive effects.

Card et al. (2015) based on using regression models for the estimated employment programme effects found out that in the short run the average impacts are close to zero, whereas the effects become beneficial for participants in the long run; that the type of programme is important, whereas greater benefits are for programmes that emphasize skills, knowledge and experience formation; that impacts are greater for women and participants who entered into employment programmes after being unemployed for more than one year and the effects of employment programme are beneficial for participants more likely in a recession.
Baumgartner et al. (2008), on the other hand, provide a study of the effects of two employment programmes to encourage self-employment in Germany using matching with difference in differences approach. Baumgartner et al. (2008) conclude that the aforementioned self-employment programmes proved to be effective and that such type of employment programmes may be the one for which the funds are distributed effectively.

Martin (2014) describes trends in spending for active labour market policies in OECD countries and how the economic crisis affected the spending in OECD countries and argues that such spending is seen as very important in enabling unemployed people transition from social benefits to work. Martin (2014) adds that microeconometric evaluation should be complemented with macroeconomic analysis. Macroeconometric evidence of the impact of active labour market policies on unemployment and employment can be found for example in Murtin et al. (2013a); Murtin et al. (2013b); Bassanini et al. (2009); Belot et al. (2004). All studies mentioned estimate the impact of active labour market policies on aggregate labour market and all studies mentioned suggest that active labour market policies do have impact to reduce unemployment and long-term unemployment.

**Methodology**

In order to estimate the effects of expenditures for labour market policy on unemployment rate we construct panel regression model. Variables included in our analysis are government expenditures for active and passive labour market policies and unemployment rate. Due to the availability of data panel regression analysis was performed on a sample of 20 EU countries over the 2004-2015 period. Our panel is balanced. EU countries included in the sample were: Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Hungary (HU), Ireland (IE), Italy (IT), Luxembourg (LU), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Slovak Republic (SK), Slovenia (SI), Spain (ES), Sweden (SE). Data needed for empirical analysis were obtained from the OECD.Stat Database (2017). The specification of a panel regression function was the following:

\[
\ln UR_{i,t} = a_0 + \Pi \left[ \ln ALMP_{i,t} \right] + \Phi \left[ \ln TUD_{i,t}, \ln GDPpc_{i,t}, \ln LTUR_{i,t} \right] + \varepsilon_{i,t}
\]

\[(1)\]

\(UR_{i,t}\) denotes rate of unemployment as % of labour force, \(ALMP\) denotes government expenditures for active labour market policies in country \(i\) at time \(t\). Such expenditures include labour market policy services and measures. They aim to activate the unemployed and to strengthen the transition process into employment as well as to help people at risk of losing the job (Eurostat, 2013), whereas \(PLMP\) refers to government expenditures for passive labour market policies which cover financial assistance mostly unemployment benefits (Eurostat, 2013) (both in % of gross domestic product GDP). As a control variable of labour market situation we included trade union density (TUD) and long-term unemployment rate (LTUR). In order to control for macroeconomic situation we use gross domestic product per capita in USD PPP (GDPpc). Ln is natural logarithm used to reach the greater symmetric distribution of panel regression variables. With \(\Pi\) and \(\Phi\) we denote vectors of regression coefficients, the association of rate of unemployment measure with explanatory variables and control variables.

We included year dummies (vector \(\Psi\)) in the above regression function which was re-estimated accordingly.
\[ \ln UR_{t,t} = \alpha_0 + \Pi \left[ \frac{\ln ALMP_{i,t}}{\ln PLMP_{i,t}} \right] + \Phi \left[ \frac{\ln TUD_{i,t}}{\ln GDP_{i,t} \ln \text{Year}} \right] + \Psi \left[ \frac{\ln LTUR_{i,t}}{\text{Year} 2004 \text{-- Year} 2015} \right] + \varepsilon_{i,t} \] (2)

We introduced fixed and random effects across model specifications in order to try to avoid biases that could arise from different estimation methodologies (see, for example Kennedy, 2008; Stock et al., 2015; Wooldridge, 2010). Robust standard errors were used to control for heteroskedacity and autocorrelation (similar methodological approach can be found in Južnik Rotar, 2017).

**Results and discussion**

Table 1 provides descriptive statistics for all the variables included in the empirical study. Table 2 reports correlation coefficients between these variables. Following the recommendations from the literature the multicollinearity may be a problem if the zero-order correlation coefficient of each two regressors is over 0.8 (see, for example Wooldridge, 2010). In our study the correlation coefficients are all in acceptable levels as can be seen in Table 2.

In order to distinguish the effects of expenditures for labour market policies on unemployment rate, we separately analysed the effects of expenditures for active labour market policies and the effects of expenditures for passive labour market policies on unemployment rate. The most obvious aim of labour market policy is to help people back into employment and termination of unemployment. Active labour market programmes include for example public employment services, counselling and administration, programmes for youth targeted in transition from school to work, training programmes which all try to improve the prospects of unemployed person in the labour market gaining skills and knowledge needed in fast changing labour market with human capital accumulation and increased labour productivity. Regarding all this one would expect that the expenditures for active labour market policy would have a negative effect on unemployment rate.

Figure 1 shows the expenditures for active labour market policies and unemployment rate. It can be seen, that the relationship between expenditures for active labour market policies and unemployment rate is negative, suggesting that ALMPs might decrease unemployment rate.

**Table 1**
Descriptive statistics for panel regression variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnALMP</td>
<td>-0.545</td>
<td>0.619</td>
<td>-2.995</td>
<td>0.717</td>
</tr>
<tr>
<td>lnPLMP</td>
<td>-0.161</td>
<td>0.762</td>
<td>-2.525</td>
<td>1.115</td>
</tr>
<tr>
<td>lnTUD</td>
<td>3.221</td>
<td>0.684</td>
<td>1.504</td>
<td>4.357</td>
</tr>
<tr>
<td>lnGDPpc</td>
<td>10.477</td>
<td>0.349</td>
<td>9.685</td>
<td>11.414</td>
</tr>
<tr>
<td>lnLTUR</td>
<td>3.581</td>
<td>0.427</td>
<td>2.251</td>
<td>4.334</td>
</tr>
<tr>
<td>lnUR</td>
<td>2.020</td>
<td>0.435</td>
<td>0.916</td>
<td>3.261</td>
</tr>
</tbody>
</table>

Source: Authors’ work, OECD database
Table 2  
Correlation matrix for panel regression variables

<table>
<thead>
<tr>
<th></th>
<th>lnALMP</th>
<th>lnPLMP</th>
<th>lnTUD</th>
<th>lnGDPpc</th>
<th>lnLTUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnALMP</td>
<td>1.000</td>
<td>0.699</td>
<td>0.470</td>
<td>0.480</td>
<td>-0.472</td>
</tr>
<tr>
<td>lnPLMP</td>
<td>1.000</td>
<td>0.296</td>
<td>0.314</td>
<td>-0.103</td>
<td>-0.565</td>
</tr>
<tr>
<td>lnTUD</td>
<td>1.000</td>
<td>0.559</td>
<td>-0.543</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>lnGDPpc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnLTUR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

Source: Authors’ work, OECD database

Figure 1  
Expenditures for ALMPs (% of GDP) and rate of unemployment as % of labour force

According to the methodological explanation taken from Eurostat the expenditures for passive labour market policies which form the group of labour market policy supports include the categories out-of-work income maintenance and support and early retirement. Since the main aim of such policies is to provide financial help to unemployed person it is difficult to straightforward conclude whether such policies have positive or negative effect on labour market outcomes.

The usual critique of such policies is that they only provide money transfer and as such, they do not empower unemployed person to effectively combat against unemployment. The so-called lock in effect may also be present (see, for example Van den Berg et al., 2015). It refers to lowering the motivation of unemployed person to actively search for a job and additionally building their knowledge as with time knowledge becomes obsolete.

Figure 2 depicts the expenditures for passive labour market policies and unemployment rate. Figure 2 shows the positive relationship between expenditures for passive labour market policies and unemployment rate, suggesting that such policies might produce counter effects and increase unemployment.
In order to quantify the effects of expenditures for labour market policies on unemployment rate we performed panel regression analysis and analysed relationships between unemployment rate and both active and passive labour market policies. The panel data set consisted of 20 EU countries during 2004-2015 period. Table 3 shows the estimation results of the panel regression analysis. The results confirm our hypothesis of the research that the effects of expenditures for active labour market policies are negative on unemployment rate, whereas the effects of expenditures for passive labour market policies are positive on unemployment rate. The results are similar for fixed and random effects. From the panel regression results the expenditures for active labour market policies have negative and statistically significant effect on unemployment rate. On the other hand, the expenditures for passive labour market policies have positive and statistically significant effect on unemployment rate, meaning that higher expenditures for passive labour market policies are statistically significantly connected with higher unemployment rate. In 2008 the EU was hit by the most severe economic crisis with rising unemployment and lowering economic activity. Different European countries differently responded to such situation. In times of high and persistent unemployment different labour market policies are gaining their meaning. Besides that, the potential has been seen in the “revival” of activation strategies to help the unemployed person, especially target groups of unemployed defined by European Commission. Such strategies are based on carrot and stick motivation imposing conditionality requirements, for example, that benefit recipient must actively approach to finding a job. If the benefit recipient does not meet the conditions, a benefit sanction follows. This require strict monitoring of jobseeker behaviour of whether he is actively searching for a job, but also guiding and counselling the unemployed person to effectively match unemployed person with job vacancies. Besides that, passive labour market policies should provide good information to unemployed person about the coordination between tax and benefit system. The transparency of benefit system should be enabled in order that each
unemployed person would receive unequivocally information that it is better to work (see, for example Južnik Rotar, 2017).

Table 3
Estimation results of panel regression analysis

<table>
<thead>
<tr>
<th>Model</th>
<th>Fixed (within group) effects</th>
<th>Random effects GLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>8.874* (0.903)</td>
<td>8.505* (0.835)</td>
</tr>
<tr>
<td>lnALMP</td>
<td>−0.113* (0.035)</td>
<td>−0.087* (0.033)</td>
</tr>
<tr>
<td>lnPLMP</td>
<td>0.306* (0.027)</td>
<td>0.303* (0.024)</td>
</tr>
<tr>
<td>lnGDPpc</td>
<td>−0.731* (0.074)</td>
<td>−0.701* (0.069)</td>
</tr>
<tr>
<td>lnLTUR</td>
<td>0.193* (0.056)</td>
<td>0.228* (0.052)</td>
</tr>
<tr>
<td>lnTUD</td>
<td>0.032 (0.020)</td>
<td>0.013 (0.019)</td>
</tr>
</tbody>
</table>

Year dummies

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hausman test</td>
<td>75.579*</td>
<td>75.493*</td>
</tr>
<tr>
<td>No. of obs.</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>

Note: *significant at 1%; robust standard errors in parentheses

Source: Authors’ work, OECD database

Conclusion

The aim of this paper was to estimate the effects of expenditures for labour market policies on unemployment rate for 20 EU countries including Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden over the 2004-2015 period. Estimation results confirmed our hypothesis, which is the effects of expenditures for active labour market policies are negative on unemployment rate, whereas the effects of expenditures for passive labour market policies are positive on unemployment rate, suggesting that expenditures for passive labour market policies are not effectively distributed. Not only the activation strategies with benefit conditioning, but also encouraging and enabling unemployed person to actively approach in searching for a job should be implemented. The implementation of activation strategies should be supported. A clear signal should be passed to unemployed people that the benefits are greater if working than receiving social benefits. The availability of data for longer time period and other European countries is seen as an limitation of this research. Decomposing unemployment rate into different age structure is seen as a possible direction for future research. Especially focusing on youth unemployment rate as youth are usually to the greater extent hit by the periods of economic expansion and recession on the labour market. After all, within the European Union, special attention is devoted to help young people on the labour market and there is a need to sustain the young human capital.
References


About the author

Laura Južnik Rotar is an Assistant Professor of Economics at the Faculty of Business, Management and Informatics, University of Novo Mesto, University of Novo Mesto. She received her PhD degree from the Faculty of Economics, University of Ljubljana. She has published in refereed journals, such as Panoeconomicus, Eastern European Economics, Managing Global Transitions, Our Economy, and Management. She has been involved in several research projects on national and European level. The author can be contacted at laura.juznik@yahoo.com.
Estimation of Fixed Capital Investment in SMEs: the Existing Differentiation in the Russian Federation

Iuliia Pinkovetskaia, Vladislava Slepova
Ulyanovsk State University, Ulyanovsk, Russia

Abstract

Background: One of the goals of Russia economy is to increase SMEs specific weight in GDP per 100% by 2030. Objectives: The purpose of this work is the assessment of the investments into fixed capital of SMEs and influence of factors such as size categories, types of economic activity and territorial placement, needed for the fulfillment of this goal. Methods/Approach: The comparative analysis of SMEs investments is based on relative indicators, which are calculated per enterprise and per worker. The research was conducted with the usage of the official statistical information obtained in the course of total observation of activity of the enterprises in 2015. Modelling of empirical data was based on functions of normal distribution. Results: We defined the values investments in SMEs which are located in 82 regions and related to three categories and six types of activity. We revealed regularities of distribution of investments calculated per enterprise and per worker, and identified the regions with the lowest investments in SMEs. Conclusions: New knowledge of the investment in the fixed capital in the Russian SMEs was achieved. Proposed information and tools are applicable for justification of the investments needed for the SMEs development. The methodical approach can be used in the future studies, as well in entrepreneurship and public management education.

Keywords: SMEs, size categories of the enterprises, investments into fixed capital, types of economic activity, regions of Russia

JEL classification: L26, C31

Paper type: Research article

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Introduction

SMEs (SMEs), as the accumulated experience shows, are the most important factor of economic development for many countries, including those in the conditions of economic crisis (Acs et al., 2008; Baumol, 2004; Decker et al., 2014; Simon-Moya et al., 2016). To date in Russia there are 5.6 million SMEs, which employ 18 million employees. SMEs produce 20% of Russia’s gross domestic product. The share of
Russian SMEs in the GDP and the number of employees is more than two times lower than the corresponding figures for the countries of the European Union (SME Bank, 2015).

In order to enhance the role and growth of SMEs, the state strategy for development of SMEs till 2030 was accepted (Russian Federation, 2016). The Strategy plans the growth of SMEs in GDP twice (up to 40%) and growth of a share of workers in such enterprises up to 35% of the total number of the working population. The specified purposes, as shows foreign experience (Sollner, 2014), are real. Implementation of the strategy involves the formation of investment plans of the SMEs sector in the medium and long term.

The development of these plans should be based on the justification of investments into fixed capital. Therefore, an important scientific problem is to assess the relative levels of investment, namely investment per enterprise and per employee. Such relative indicators can provide the federal and regional authorities with the information needed to identify additional investments in fixed capital in the development of plans. This plans will be based on the anticipated increase in the number of enterprises and their workforce. The investment potential of SMEs should expand through the various forms and methods of investments attraction including such institutes as the state guarantees.

Government should provide information, marketing, financial and legal support to SMEs. To motivate the authorities on support of SMEs should be drawn up the official national rating of authorities’ efficiency, based on the data of investment climate observations in the Russian regions. This rating must base on the comparative analysis mentioned above relative indicators through the regions. In Russia the system of incentives for development of SMEs in such regions should be created, where the role of entrepreneurship is low. The Korean experience of this activity is described in the article (Choi et al., 2015).

The purpose of the present paper is the assessment of the investments into fixed capital of SMEs in 2015 and influence of such factors as size categories, types of economy activity and territorial placement to them. In order to ensure a comparison of investments in SMEs located in different Russian regions, the calculations are based on the relative indicators. Fixed capital investments are determined in counting per one enterprise and per one employee. In our paper the modeling of differentiation of relative indicators of investment in SMEs in each of the regions is the bases for the application of functions of normal distribution. The possibility of applying such functions to describe relative performance follows the pilot work (Pinkovetskaia, 2015).

**Literature review**

Foreign and Russian authors researched the concepts and the principles of investment into fixed capital of SMEs. In our opinion, the following findings of researches are of the greatest interest. Pichler et al. (2000) gave the analysis of the main aspects of investment policy and factors, exerting impact on the amount of investment in the SMEs. Poire et al. (1984) proved on the case of Northern Italy, that in the circumstances of crisis small enterprises are more effective. That is why basic investment should be made into the SMEs, but not into the big enterprises with the standardized mass production. Skuras et al. (2008) discuss issues of justification of decisions on investments into fixed capital of SMEs of six countries of the European Union. The conclusion that the size of firm exerts direct impact on the volume of investment was drawn. Similar results are demonstrated by Lewandowska et al. (2015), who found out the significant differences in investments into SMEs in various
regions of Poland. The China experience (Wu et al., 2008) demonstrates that the amount of investments depend on the types of activity in SMEs. In this article authors showed that to get the credit in the financial markets the enterprises must have specialists of this sphere. Microenterprises rarely employ such specialist, which creates a problem.

Regional aspects of investments into fixed capital of small enterprises in Russia are considered in the monograph (Gnevko, 2010), as the proof of essential distinctions of the volumes of investment in SMEs from territorial placement of these enterprises. Some articles are devoted to the study of investment in the SMEs of specific Russian regions. Bogomolova et al. (2016) analyzed investments into fixed capital of small business of the northern region and proved that they much depend on a type of economic activity. In another article, Noreen (2014) examined how the investments differ in East regions of Russia.

In general, the analysis of researches allowed us to draw a conclusion that problems of investment are relevant. Such factors as size categories, specialization of SMEs, and regions in which they are located, have significant effect on the amount of investments into fixed capital.

We propose the usage of the functions of normal distribution as the research tool. These functions have been widely disseminated in modern scientific research in the economy, engineering, medicine, psychology, biology. The following works can be cited as examples of using these functions in economic research. Allanson (1992) presented an analysis of the evolution of the size of agricultural land, including smallholder farming, based on the function density of distribution. In the book, Vince (1992) considered the application of normal distribution functions for the characteristics of trading activity and, in particular, the estimation of profits and losses. Filatov (2008) gives the main attention the method of complex assessment of the financial condition groups of enterprises. Totmianina (2011) proceeded from the normal distribution of the value of company assets, during the modeling of the probability of default of corporate borrowers of banks. Shapkin (2003) described approaches to portfolio investment management based on the normal distribution of equity returns. Modeling of financial profit in the Russian stock market is considered in the article Balaev (2014). Marek et al. (2013) discussed the possibility to predict the trend of the wage distribution. The determination of the number of empirical data is important in the development of normal distribution functions. The relevant justifications are presented in the works of various authors (Heinhold et al., 1964, Hodasevich, 2017), which indicated that the number of observations must be at least 40. The quality of the developed normal distribution functions can be checked using tests. As showed the analysis of the literature (Bolshev et al., 1983; Hollender et al., 1983; Pearson et al. 1977; Shapiro et al., 1972) authors are using tests of Kolmogorov-Smirnov, Pearson and Shapiro-Wilk.

**Methodology**

The source of the data, used in this research, is official information of the Federal State Statistics Service of the Russian Federation gathered from so-called total observation of activity SMEs for 2015 (Federal State Statistics Service, 2017). Total observation included all SMEs, conducting activities in the territory of Russia. The division in size categories is made in accordance with Russian Federation state Law № 209 “About development of medium and small entrepreneurship in the Russian Federation”. Information of observation includes indicators of activities of small enterprises (to 100 workers inclusive) and medium enterprises (from 101 to 250
workers). Among small enterprises, there are identified microenterprises (up to 15 workers inclusive).

Statistical observation of SMEs in Russia was carried out on 14 types of economic activities: agriculture; fishery; mining and quarrying; processing productions; production and distribution of the electric power, gas and water; wholesale and retail trade; transport and communication; hotels and restaurants; operations with real estate; financial activity; education; health care; social and personal services. SMEs are located in all regions of Russia without exception. Therefore, these observations describe indicators of SMEs operating in 82 regions of Russia.

In the course of the research, two groups of SMEs had been defined. The first group included enterprises allocated on size and territorial features, and the second group – on type of economic activity and territorial features.

The enterprises located in each of 82 regions of Russia, belonging to the following three size categories, had entered into the first group: the microenterprises with the number of workers lower or equal to 15, small enterprises with the number of workers from 16 to 100 persons, and medium enterprises numbering 101 to 250 workers.

We have also taken into account the specialized in six primary types of economic activity: agriculture; the processing productions; wholesale and retail trade; transport and communication; operations with real estate (Table 1). The exchange rate for 2015 in Russia was 1 ruble=0,015 Euros.

<table>
<thead>
<tr>
<th>SMEs</th>
<th>Volume of investment into fixed capital, billion rubles</th>
<th>Number of enterprises, thousand units</th>
<th>Number of employees, thousand persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>All enterprises of Russia, including</td>
<td>1348</td>
<td>1468</td>
<td>13517</td>
</tr>
<tr>
<td>Agriculture</td>
<td>181</td>
<td>34</td>
<td>722</td>
</tr>
<tr>
<td>Processing productions</td>
<td>159</td>
<td>146</td>
<td>2336</td>
</tr>
<tr>
<td>Construction</td>
<td>309</td>
<td>162</td>
<td>1637</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>103</td>
<td>528</td>
<td>3342</td>
</tr>
<tr>
<td>Transport and communication</td>
<td>63</td>
<td>101</td>
<td>852</td>
</tr>
<tr>
<td>Operations with real estate</td>
<td>380</td>
<td>347</td>
<td>2921</td>
</tr>
<tr>
<td>Six primary types of activity</td>
<td>1195</td>
<td>1318</td>
<td>11810</td>
</tr>
<tr>
<td>Eight other types of activity</td>
<td>153</td>
<td>150</td>
<td>1707</td>
</tr>
</tbody>
</table>

The analysis of data from the Table 1 show that 88.6% of the total amount of investments are in fixed capital, 89.8% of the total number of enterprises and 87.4% of total employment concentrated in SMEs, belong to six primary types of economic activity. Respectively, the cumulative specific weight of investments in SMEs for eight other types of economic activity does not exceed 12%. Specific weight of investments in SMEs for each of these eight types of economic activity does not exceed 2%. Authors identified six primary types of activity for the following research, considering the prevalence of investments to the enterprises specialized on them.

In the course of the studies the following two hypotheses were tested:
- H1: Relative investments per worker depend on the size category of the SMEs;
- H2: Relative investments per enterprise and per worker depend on the type of economic activity of SMEs.
Distribution of values of the investments in SMEs calculated per enterprise and per worker across all regions can be described with application of the normal distribution. The following conceptual provisions define this.

Each SMEs act as the independent actor, defining the purposes and tasks, proceeding from a concrete situation, and conducts risk economic activity. Respectively, the group of the enterprises, formed on the criteria stated above, includes a significant amount of the enterprises. Economic, historical, climatic, demographic, educational and other features of development of the specific region in Russia have significant effect over SMEs sector indicators. This features act independently from each other, so we can assume probabilistic (stochastic) distribution of indicators values, including indicators of investments into fixed capital calculated per SMEs and per worker. Average investments per enterprise and per worker describe average arithmetic values for all SMEs in each region on three size categories and six types of activity.

Discussed in the paper investment in the fixed capital of SMEs formed by the influence of two kinds of drivers, the first of them determined the similarity of the investment values of regional groups of SMEs and the second their differences (Pinkovetskaia, 2015). The first type of drivers leaded to the investments grouping in the vicinity of some average value for all regions. The second type of drivers determined the degree of differentiation of investment values. The deviation of investments in specific regions from the average value could be both in the direction of reduction and in the direction of increase.

From the Chebyshev theorem (Kramer, 1962) follows that individual random values can have significant distinctions, in so doing, their arithmetic mean is relatively stable. A similar conclusion follows from the central limit theorem (Jenish et al., 2009), which establishes that the arithmetic mean of quite a large number of independent random values loses the character of a random value. Thus, the relative values of each SMEs investment in the region are random values that may have a significant spread, but we can foresee the significance of their arithmetic mean.

Note that in accordance with the Lyapunov theorem, the distribution of the average values of independent random values approaches the normal distribution, if the following conditions are met: all values have finite mathematical expectations and dispersion, none of the values is not sharply different from the rest. The mentioned above conditions correspond the values of relative investments in SMEs by regions. As Gmurman (2003) pointed out, the distribution of random values is fast enough (more than ten observations) approaching the normal distribution. The number of SMEs located in each region and related to specific size categories and types of economic activity ranges from hundreds to tens of thousands, which is much larger than the criterion by Gmurman (2003). In our paper, we used the methodical approach, which was based on the spatial data. Similar approach was considered in the work (Schröder et al., 2014).

Thus, there are theoretical prerequisites for using the functions of normal distribution to describe the differentiation of relative investments in the fixed capital of SMEs by regions of Russia. As already indicated in the literature review, considerable experience has been gained in using of normal distribution functions to describe the distribution of empirical indicators. In general course, the normal distribution function is as follows:
Where $m$ - average value; $\sigma$ - standard deviation; $K$ - coefficient, which is determined by characteristics of random values and their dimensionality.

Thus, the estimation of values of investments in the fixed capital of SMEs, we gave in our paper, included the information on all enterprises in Russia and was based on functions of normal distribution. The assessment included the average values of SMEs investments in the Russian regions, which divided into three size categories and six types of economic activity. Investments were considered per enterprise (per worker), dispersion and interval of change, typical for most regions, as well as differentiation of investments on size categories of SMEs and types of activity.

Empirical information for 2015, which we used in the course of the research, included the volume of investments in fixed capital by SMEs, number of enterprises and number of employees. Values of investments we calculated, respectively per enterprise and per worker. We generated information for each region of Russia on three size categories and six types of economic activity. In total, we formed 18 informational databases. These databases included average values of fixed capital investments of SMEs located in each of 82 regions. As mentioned in the literature review theoretically, the research must have not low than 40 observations.

**Results**

We tested the formulated hypotheses using the data of relative investments of two groups of SMEs. The first group included SMEs of three size categories: medium enterprises, small enterprises, excluding microenterprises and microenterprises. The second group included SMEs of six primary types of economic activity: agriculture, processing productions, construction, wholesale and retail trade, transport and communication, operations with real estate. For SMEs that belong to each of the size categories and main types of activity were developed functions of normal distribution. These functions describe the distribution of values of investments in fixed capital counting per enterprise and per worker, for all SMEs located in each region of Russia. We developed 18 functions. Processing of statistical data and evaluation of functions of normal distribution were carried out with application of the Microsoft Excel 2010 and STATISTICA 10.

The indicators of the obtained functions of normal distribution are the average values of investments in fixed capital of SMEs for 2015, standard deviations, the intervals of change values of investment. These intervals correspond to the values of investments that are typical for SMEs located in the majority (68%) regions of Russia. The boundaries of these intervals were determined on the basis of the average values of investments and standard deviations. The minimum value of the interval corresponds to the difference between the average investment value and standard deviation. The maximum value of the interval corresponds to the sum of the average investment value and standard deviation.

As the example, we presented three developed functions of normal distribution. They are describing the values of investment into fixed capital per enterprise (million rubles) for 2015.

The first function describes the distribution of investments per medium enterprise ($x_i$):
y_1(x_1) = \frac{685}{10.39 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_1-20.92)^2}{2 \times 10.39 \times 10.39}} \quad (2)

It is well known that in a formula of function of normal distribution are such indicators as expected value (average value) and a standard deviation. In the formula (1) these values are equal to 20.92 and 10.39 respectively.

The second function describes the distribution of investments counting per small enterprise, excluding the microenterprises (x_2):

y_2(x_2) = \frac{75}{1.21 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_2-2.45)^2}{2 \times 1.21 \times 1.21}} \quad (3)

The third function describes the distribution of investments counting per microenterprise (x_3):

y_3(x_3) = \frac{10}{0.16 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_3-0.34)^2}{2 \times 0.16 \times 0.16}} \quad (4)

Tables 2 and 3 show the indicators that correspond to all developed functions of normal distribution on the three size categories and six basic types activity of SMEs.

<table>
<thead>
<tr>
<th>Number of function</th>
<th>Size categories</th>
<th>Average value</th>
<th>Standard deviations</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Counting per enterprise</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Medium enterprise</td>
<td>20.92</td>
<td>10.39</td>
<td>10.53-31.31</td>
</tr>
<tr>
<td>(3)</td>
<td>Small enterprise excluding microenterprises</td>
<td>2.45</td>
<td>1.21</td>
<td>1.24-3.66</td>
</tr>
<tr>
<td>(4)</td>
<td>Microenterprise</td>
<td>0.34</td>
<td>0.16</td>
<td>0.18-0.50</td>
</tr>
<tr>
<td><strong>Counting per worker</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>Medium enterprise</td>
<td>0.16</td>
<td>0.07</td>
<td>0.09-0.23</td>
</tr>
<tr>
<td>(6)</td>
<td>Small enterprise excluding microenterprises</td>
<td>0.08</td>
<td>0.03</td>
<td>0.05-0.11</td>
</tr>
<tr>
<td>(7)</td>
<td>Microenterprise</td>
<td>0.08</td>
<td>0.03</td>
<td>0.05-0.11</td>
</tr>
</tbody>
</table>

*Source: Authors' work*
The analysis of the dynamics of SMEs fixed investment from 2010 to 2015 showed that during this period in the calculation per enterprise they growth twice. The volume of production during the same period increased 2.3 times. Therefore, we suggested that the existing investments (the characteristics of which are shown in tables 1 and 2) were effective. Conservation the momentum of growth in investment is capable of further SMEs development. The assessment of the existing investments describes the regional averages of investments per enterprise and per worker, the size and the sector structure of investments and can be used to substantiate the need for investments for SMEs.

Testing of how well functions of normal distribution approximate the studied data, based on the application of criteria of consent, following from the theory of mathematical statistics. Authors used the tests of Kolmogorov-Smirnov, Pearson and Shapiro-Wilk. Tests allow to compare empirical distribution of the studied indicators with theoretical, described by the functions. Tests demonstrate the level of rejection of these data from the specified functions. The methodology of using tests detailed in the literature to which reference we gave in the literature review. In the table 4 we showed the calculated values, corresponding to the mentioned tests.

The calculated values of statistics by Kolmogorov-Smirnov test (provided in the second column of table 4) are from 0.3 to 0.10, which is less than the table value that is 0.152 at a significance level of 0.05. Similarly, the calculated values of the Pearson’s test (given in the third column of table 4) are from 1.89 to 4.68, which is less than the value in the table equal to 9.49. Statistics value of the Shapiro-Wilk test (provided in the fourth column of table 2) is from 0.94 to 0.98, which exceed the tabular value of 0.93 at a significance level of 0.01. In general, the developed models have a high quality by all the tests and well describe the studied regularities.
Table 4
Calculated values of statistics

<table>
<thead>
<tr>
<th>Number of function</th>
<th>Calculated value by criterion of consent</th>
<th>Kolmogorov-Smirnov</th>
<th>Pearson</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>0.07</td>
<td>1.89</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>0.06</td>
<td>2.39</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>0.04</td>
<td>3.18</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>0.05</td>
<td>2.73</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>(6)</td>
<td>0.06</td>
<td>2.83</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>(7)</td>
<td>0.04</td>
<td>3.92</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(8)</td>
<td>0.06</td>
<td>3.20</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>(9)</td>
<td>0.04</td>
<td>4.31</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(10)</td>
<td>0.05</td>
<td>2.57</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>(11)</td>
<td>0.10</td>
<td>2.57</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>(12)</td>
<td>0.04</td>
<td>4.66</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(13)</td>
<td>0.03</td>
<td>4.52</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(14)</td>
<td>0.05</td>
<td>4.11</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(15)</td>
<td>0.06</td>
<td>3.92</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(16)</td>
<td>0.10</td>
<td>4.68</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>(17)</td>
<td>0.07</td>
<td>3.30</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>(18)</td>
<td>0.04</td>
<td>3.04</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>(19)</td>
<td>0.07</td>
<td>3.84</td>
<td>0.94</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ work

Discussion

Feature of functions of normal distribution (Venttsel, 2001) is that intervals of change of investments, characterize SMEs in most (68%) regions. The boundaries of these intervals are calculated on the basis of the average values and standard deviations. The data in table 2 show that the current level of investment in microenterprises ranges from 2700 to 7500 Euros per year (per enterprise) in most regions. These investments are not very large. That is why entrepreneurs can invest their money and the funds of their relatives. Therefore, microenterprises rarely use bank loans. In addition, microenterprises have no credit history and system of accounting, which banks need.

The data in table 2 show that the current level of investment in medium enterprises ranges from 150 to 460 thousand Euros per year (per enterprise) in most regions. These investments are significant. That is why medium enterprises often use bank loans. Medium enterprises possess the fixed assets; this allows them to get the credits under the security over property (this regularity was already earlier marked in the literature review). Besides, for the financial organizations more preferable provide credits to medium enterprises, than to small enterprises. This is because in the medium enterprises work specialists in crediting and they have ability to provide banks more complete information (including accounting information). This aspect of lending was described in the paper (Cook et al., 2000) devoted to questions on the information environment of the market investors.

Values of investments, which were counted per worker in small enterprises and the microenterprises, are the same. Investments counting per worker in medium enterprises much exceed this value in small enterprises (almost twice). Such provision sounds logical for a number of reasons listed further. Medium enterprises are
technically best of equipped in comparison with small enterprises and, require larger costs of upgrade and support of production activity. Thus, the first hypothesis received a partial confirmation. Relative investments per worker in medium enterprises differ from small enterprises and microenterprises. The size of small enterprises has no effect on relative investments per worker. That is, in SMEs with a workforce of up to 100 people, relative investments do not depend on the size of the enterprise.

The characteristics of investments provided in table 2 are of interest as directly to the businessmen (especially start-ups) and to the departments of federal, regional and municipal government responsible for supporting business development. Besides, the credit and financial institutions, leasing and insurance companies, funds of guaranteeing and angel investors, could use this information.

The volumes of investment calculated per enterprise and per worker, significantly differ from region to region, that is visible from intervals of change given in columns 5 of tables 2 and 3. Values of investments could be used for monitoring of these values in regions, ratings analysis, marking regions with highest and lowest investments in SMEs. In addition, the results are capable to play an important role in addressing support to business by federal and regional authorities.

Regions of Russia with the least investments into fixed capital SMEs were defined from the minimum values corresponding to the lower bounds of intervals. In medium enterprises this group of regions represented by Yaroslavl, Ivanovo, Astrakhan, Sverdlovsk, Irkutsk, Kurgan, Tomsk regions, the city of Moscow and the republic of Dagestan. For small enterprises (excluding the microenterprises) low values of investments feature such regions as Moscow city, Murmansk, Novgorod, Sverdlovsk, Omsk and Tomsk regions, Zabaykalsky territory. For the microenterprises below of the interval, rated investment in Samara, Sverdlovsk, Kurgan, Omsk and Amur regions, the republics North Ossetia - Alania and Khakassia, Khabarovsky territory.

Average values and intervals of change of the investments into fixed capital SMEs per different type of activity on the basis of data for 2015, are presented in table 3. We based them on the developed functions (8)-(19) describing investments into the enterprises specialized on six primary types of economic activity.

The data shown in table 3, present that the current level of investment in wholesale and retail trade SMEs is in the range from 900 to 3000 Euro per year (per enterprise), in transport and communication SMEs from 2400 to 7200 Euro per year (per enterprise). These investments are not very big, and entrepreneurs can implement them through personal funds and money of relatives. We found that the lowest investments are in trade enterprises and transport enterprises. It is caused by the following reasons. Small business in Russia began with trade enterprises and transport enterprises; they have gained bigger development in earlier years and they were on the peak of capital investments. Besides many trade enterprises represent the small outlets, which do not have much fixed capital. Similarly, transport entrepreneurs have several automobiles or buses.

The volumes of investments per enterprise and per worker much differ by types of economic activity that follows from the data provided in table 3. The highest level of investments into fixed capital of the enterprises is in the agricultural production. It is caused by great amounts of fixed assets of such enterprises. Besides, financial support of the agricultural enterprises through the state program of import substitution has considerably increased over recent years (Khulkhachieva, 2017).
Agriculture SMEs need primarily bank loans. Big amounts of investments observed in construction industry are due to large volumes of housing construction by SMEs.

Thus, the second hypothesis was confirmed. That is, studies had shown that investments in fixed capital depend on the type of economic activity of SMEs.

The data provided in table 3 could be used for solving the problems of monitoring, planning and forecasting the volume of investment. Most relevant preparation of justifications on development of SMEs specialized on the types of activity, which have not gained enough development in specific regions of the country. The low level of investment is the characteristic of such regions. Values of the investment in SMEs are smaller, than the lower bounds of intervals (column 5 table 3). The carried-out analysis has shown that on the enterprises connected with agriculture, the low-level of investments noted in SMEs of such regions as the Astrakhan and Magadan regions, the republics of Komi, Dagestan, Tyva and Zabaykalsky territory. Insignificant investments into fixed capital of trade enterprises take place in the republics of Kalmykia, Ingushetia, Tyva, Sakha (Yakutia), Perm, Zabaykalsk, Primorsk, Khabarovsk territory, the Tomsk region. Below, than in other regions of Russia, investment into construction branch is in the Yaroslavl, Sverdlovsk, Omsk, Tomsk, Magadan regions. Investments into the processing industry are not enough in the Ivanovo, Arkhangelsk, Astrakhan, Tomsk, Omsk regions. In the SMEs of transport and communication, small investments are characteristic of the Ivanovo, Kursk, Volgograd, Samara, Sverdlovsk, Chelyabinsk and Novosibirsk regions. In the enterprises, which are carrying out operations with property the investment into fixed capital is low in such regions as the republics of Komi, Dagestan, Karachay-Cherkess and Kurgan regions.

Conclusion
In our research new knowledge of the amount of the investment in the fixed capital for the Russian SMEs was achieved. The research proves that the investments into fixed capital of SMEs depend on such factors as size categories of the enterprises, types of economic activity, and territorial placement of the enterprises. The most important results of researches are: (i) The first hypothesis was partially confirmed, and the second hypothesis was fully confirmed; (ii) We proved that investments into fixed capital significantly differ on the enterprises of various types of economic activity. At the same time, the agricultural enterprises need the greatest investments. The least investments characterize the trade enterprises; (iv) We defined regions, where the volumes of investment into fixed capital by each of size categories of the enterprises and primary types of economic activity, are characterized by values smaller, than the lower level of the corresponding intervals given in tables 2 and 3.

The acquired new knowledge can be used for further research, as well as in the training of students and entrepreneurs. The methodology and tools, which were used in the research process can be applied in the similar studies in the countries with a significant number of territorial (administrative) units.

We proposed the methodical approach and assessment tools for investment in SMEs, which can be useful in the research on entrepreneurship problems. The results received in this research, namely specific values of investments counting per enterprise and per worker, serve as a good reference points for the businessmen (especially for the start-up stage) and divisions of the state bodies responsible for the support of SMEs. Aspiring entrepreneurs can use the facts about investments per enterprise and per employee when they choose the type of activity. Working entrepreneurs, basing on the information provided in our paper, can plan further investments depending on the number of employees and the type of their economic activity. Financial institutions may use information to substantiate the
granting of loans to SMEs, financing, leasing, factoring, consignment and other methods of investment. The authorities can apply the results of the study to substantiate plans of SMEs development.

The results of the simulation, namely minimum and maximum values of investments, can be used for monitoring and compiling the investment climate ratings in the regions of Russia. In addition, research results are needed to assess investment requirements for different groups of SMEs. They can be used to develop assistance programs for them, by providing SMEs with grants, subsidies, and reducing interest on loans. Government and regional authorities can use the research results to ensure the implementation of the Federal strategy for SMEs development for the period up to 2030 (Russian Federation, 2016). The future investigations are advised to be based on the information of investment in fixed capital of SMEs of various cities and municipalities.

References
About the authors

Iuliia Pinkovetskaia graduated in 2006 at the Institute Economics and Business, Ulyanovsk State University, majoring in Mathematical methods in Economics. She gained a Ph.D. degree in Russia Academy of Entrepreneurship. She is currently employed as Associate Professor at the Department of Economic Analysis and State Management, Ulyanovsk State University. In 2014 and 2016, she has been awarded as the best young scientist (younger 35 years) in Ulyanovsk state university. From 2006 she teaches following courses: Statistics, State support of development entrepreneurship, Management of development clusters in regional economics, PR in the state sector, Management sociology, Economics of the city, State youth politics. Her main research fields include SMEs, investments, competition, innovations, management of economic systems, state and municipal management, mathematical modeling. She has published more than hundred papers in various national and international scientific journals and participated in scientific conferences. She can be contacted at pinkovetskaia@gmail.com

Vladislava Slepova graduated from the Faculty of Physics and Math in Ulyanovsk State Pedagogical University in 1993. A year later she was elected as an assistant in Economics and Management at the School of Economics and Management, Ulyanovsk State University. She gained her PhD in Economics from Ulyanovsk State University in 1997. In 2000/2001 she worked as a visiting professor at the Harry F. Byrd School of Business, Shenandoah University (Virginia, USA). From 2003 through 2010 she worked as head of department at the Government of Ulyanovsk region. Through these years she gained practical experience in SME policy development and implementation. Since 2011 she works for the Ulyanovsk State University as an Associate Professor of Public Administration. Her research fields include: social and economic development of region and municipality, territorial marketing, social cohesion. She teaches the following courses: state and municipal management, state decision making, and effectiveness audit. In 2013-2014 she joined the research group on social cohesion police development at the Council of Europe. She published number of scientific papers. She can be contacted at vlada_skuratova_73@mail.ru
Consistency of Quality Management in Slovenian Organizations

Vinko Bogataj
Independent researcher, Slovenia
Gordana Žurga
Faculty of Organisation Studies in Novo mesto, Slovenia

Abstract

Background: Having efficient quality management system (QMS) is vital for improving organization’s business. In that context, good knowledge of QMS characteristics and their interrelations with organizational business results is very important. Objectives: Purpose of the study is to explore characteristics of elements of QMS consistency in Slovene organizations that have implemented and maintained QMS, and how the QMS characteristics influence business results. Methods/Approach: Data was collected through web survey of quality managers in organizations that have certified QMS according to ISO 9001:2008. For respondent organizations, data on their business results was retrieved from official sources. Special programme for comparisons and results presentation based on contingency analysis was developed, and correlation between QMS consistency elements and financial results of organizations were statistically processed. Results: The results show that for Slovenian organizations with certified QMS, correlations between QMS consistency elements and organizational business results are confirmed. For the majority of consistency elements correlations are significant, and the elements where correlations are insignificant are also exposed. Conclusions: As quality management will gradually become integral part of holistic organizational management, QMS will influence not only organizational management system and processes’ management but also directly on business results.

Keywords: quality management system, QMS, consistency, business results, Slovenia.
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Introduction

Quality management system (QMS) is indispensable part of management system of an organization. For organization, it is important to develop and constantly improve its operations and achieve competitive advantage. Having efficient QMS is one of approaches for improving organization’s business. In last decades, several authors researched how QMSs contribute to organizational performance and business results (Kaynak, 2003; Prajogo et al., 2003; Yeung et al., 2006; Saizarbitoria, 2006; Alič, 2014).
Different aspects of QMSs were explored to understand causalities in this respect, e.g. regarding implementation of QMSs (Bell et al., 2011; Brown, 2013), integration of different management systems (Asif et al., 2010; Karapetrović et al., 2009), role of leadership and ways of decision-making (Akdere, 2011; Doeleman et al., 2012; Elg et al., 2011; Larson et al., 2010), role of employees and their competencies (Werner et al., 2012; Zelnik et al., 2012), or innovation aspects of QMSs (Dong-Yung et al., 2012).

These studies report that different characteristics of organizations and their environment (business, societal, technological, legal, natural, etc.) have important impact on contribution of organizational QMS to the results achieved. QMS that organizations have must be adequate for their own organizational characteristics and products they produce or to the demands of internal and external environment of organizations. Some studies, i.e. Prajogo et al. (2003) show strong positive impact of QMS on organizational results while others, i.e. Yeung et al. (2006) report of substantially less favourable impact.

Purpose of this paper is to explore characteristics of elements of QMS consistency in Slovene organizations that have implemented and maintained QMS according to the ISO 9000 quality standards, and how these QMS characteristics influence business results. The methodology applied is a combination of a survey of quality managers, analysis of financial data and statistical methods.

The study presented in the paper contributes to understanding interrelations between characteristics of quality management systems and organizational business results. In comparison to previous researches, added value of this research is not only in the set of relations between elements of consistency and other characteristics of QMS but also in addressing the gap between actual and needed organizational characteristics of QMS and to its influence on business effectiveness.

In the paper, we first present review of literature and relevant researches, and set the hypothesis. In continuation the methodology is described, followed by presentation and analysis of the results. Within the discussion, first the summary of the research and the conclusions are given, limitations of the research and practical implications are presented, and areas for further research and investigation are indicated.

Literature Review

In continuation, we present overview of some important findings of researchers that explored area of QMS characteristics and their influence on business characteristics of observed organizations.

Zhang et al. (2012) explored relationship between QMS practice and business characteristics of organizations. The research was conducted in 238 manufacturing organizations in eight states: Austria, Finland, Germany, Italy, Japan, South Korea, Sweden and USA. The authors divided characteristics of QMS into »Quality Exploitation« and »Quality Exploration«. The first term denotes elements of QMS usage while the latter addresses elements of capabilities to improve QMS. The results show that both, internal adjustment of QMS to organizational structure as well QMS's adjustment to uncertainties in the environment, reflect on organization's business characteristics.

On the bases of Resource Dependence Theory (RDT), Singh et al. (2011) analysed correlations between individual elements of QMS. The analysis was conducted in 416 Australian manufacturing organizations with QMS certified according to ISO 9001 quality standards. They divided characteristics of QMS practice into internal processes (nine elements), relations with customers (six elements), relations with suppliers (5 elements), and functional characteristics (seven elements). Authors
found out that in observed organizations ISO 9000 principles detectable but not strongly influence business characteristics of internal processes.

Nair (2006) preformed comparative analysis of researches conducted by key authors between 1995 and 2004 on correlation between QMS practice and business characteristics of organizations. Author's finding was that studies performed proved direct connection between QMS practice and results. Exploration of relations between QMS practice and organizational results may serve also as bases improving theoretical approach to QMS. Nair exposes that in future explorations, attention should be given to the role of »moderation factors« when testing influence of QMS on organizational results measuring. By the term »moderation factors« author denotes factors that influence in such a way that similar situations in the QMS area in similar organizations lead to completely different results.

Martinez-Costa et al. (2009) explored difference between QMS according to standards ISO 9000:1994 and ISO 9000:2000. Research was conducted in 713 Spanish industrial companies. By multivariable analysis of variance (MANOVA) and variance analysis (ANOVA) authors did not manage to prove better results for organizations with QMS according to ISO 9000:2000 as for those organizations with QMS according to ISO 9000:1994. However, they proved that in the first ones total quality management elements were presented more strongly.

Conti (2010) deals with different and sometime even illogical phenomena in quality management theory development. He summarises results of experiments on orientation of quality and system(ic) thinking in processes that create value. On the first place, author puts need for inclusion of modern system insight into quality management. On the second place is the key role of group system thinking in creating value. Techniques and technologies are of course important however, they do not do the changes needed and are also not at most essential for competitiveness. Fragmented view on management is not only problem of quality management but of management in general. Source of the problem is in strategic fragmentation, lack of system perspective, silos organization and excessive specialisation.

Liebesman (2008) states that organizations today have several management systems such as financial management, quality management, environment management etc. that very often do not communicate. They behave as independent organization subsystems (silos) that do not achieve optimal results. Unsatisfied customers as well owners are their logical consequence. Quality system managers (QSM) have to understand language of finance, and financial managers have to understand how QMS can improve financial results. Long-term advantages of organizations are in efficient continuous improvements of processes and products, and in greater understanding of work and responsibilities of co-workers in other processes.

Singh et al. (2011) in their QMS practice model in observed organizations divide characteristics of QMS practice into: elements of relations with customers, elements of relations to suppliers, elements of internal processes, and elements of functional characteristics of QMS practice. However, they do not consider (explore) organizational and functional characteristics of QMS. Sommerhoff (2012, 2013) in his work considers also different factors that have influence on characteristics of quality managers' functions.

Several authors such as Yeung et al. (2006), Nair (2006), Conti (2010) and Liebesman (2008) argue that practically the same QMSs in similar organizations provide different results. Reason for this could be searched for in different manners how the management operates, in different relations between top and middle
management, in different organizational culture and in other differences in organizations that have influence on characteristics of QMS and therefore on its functioning.

**Methodology**

**Research instrument**

The main research question and our aim is to explore characteristics of elements of QMS consistency in Slovene organizations that have implemented and maintained QMS, and how the QMS characteristics influence business results of organizations. Relations between elements of QMS consistency and other QMS characteristics are illustrated in Figure 1.

**Figure 1**

Relations between elements of consistency and other characteristics of QMS

![Diagram](image)

Source: Authors’ work

As elements of QMS consistency in this research, we defined characteristics of QMS as presented in Table 1.

For the research, following hypothesis was set:

**H1**: In organizations in the Republic of Slovenia that have implemented and maintained QMS, it is possible to confirm relations between elements of the QMS consistency and business results of organizations.

**Data**

The research question considered in this article is part of a broader research conducted in the period 2014 – 2016. The main part of empirical research was performed via web survey of quality managers in organizations in the Republic of Slovenia that have certified QMS according to ISO 9001:2008. According to the data of certification organs, in January 2013 there were 1878 such organizations in Slovenia. The web survey among quality managers was performed between June 2014 and April 2015. Web survey was supported by web tool ‘Kwiksurveys’.
Quality managers were invited as appropriate respondents as they at most know QMS in their organizations. The questionnaire for quality managers was composed of 76 questions, and five-level Likert scale was used for providing the data from respondents.

After closing the survey, for organizations that co-operated in the research we then retrieved their business results from the Agency of Republic of Slovenia for public legal records and related services (AJPES, 2015). Their financial data were then categorised according to Likert scale from one to five. Following financial data were analysed: income growth level 2011-2014; added value growth level 2011-2014; income growth level 2013-2014; added value growth level 2013-2014; added value level 2014.

142 filled-in questionnaires were received by quality managers however, only 132 of them were fully completed. Financial data on business operation were available for 126 (out of 132) organizations.

Table 1
Consistency elements included in the research

<table>
<thead>
<tr>
<th>No.</th>
<th>Consistency element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Role of processes’ owners in control of goals’ achievement and processes’ improvement</td>
<td>Careful control and constant care of processes’ owners for improvement of their respective processes is of a key importance for successful organizational business.</td>
</tr>
<tr>
<td>2</td>
<td>Level of quality management principles establishment, according to ISO 9004:2009</td>
<td>Customer focus (2a); Leadership (2b); Involvement of people (2c); Process approach (2d); System approach to management (2e); Continual improvement (2f); Factual approach to decision making (2g); Mutually beneficial supplier relationships (2h).</td>
</tr>
<tr>
<td>3</td>
<td>Level of responsibility of the sales department for resolving customers’ complaints</td>
<td>Responsibility of the sales department for resolving customers’ complaints is of great importance due to correct relationship to customers. With high level of this responsibility, we prevent deception of customers.</td>
</tr>
<tr>
<td>4</td>
<td>Level of usage of QMS as a system for managing organization</td>
<td>QMS has to be a system for managing organization. Any other approach means that QMS is there for itself.</td>
</tr>
<tr>
<td>5</td>
<td>Considering actions and recommendations from internal and external audits in implementing organizational changes by the management</td>
<td>High level of consideration of recommendations from internal and external audits gives the QMS important component for usage of the QMS as a system for managing organization.</td>
</tr>
<tr>
<td>6</td>
<td>Considering actions and recommendations from management review in implementing organizational changes by the management</td>
<td>High level of consideration of recommendations from management review is key element for usage of the QMS as a system for managing organization.</td>
</tr>
<tr>
<td>7</td>
<td>Level of responsibility of processes’ owners for reporting to the management</td>
<td>High level of responsibility of processes’ owners for reporting to the management is key element of settled internal relationships in organization.</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Statistical methods
After closing the survey, the data was processed statistically in ‘Excel’. Comparative questions from the questionnaire that relate to actual and needed characteristics of QMS consistency were processed with program package ‘Mathematica’. We developed a special programme for comparisons and results presentation based on contingency analysis.

Shares of status change $\hat{p}$ are given by confidence interval CI, $(1-\alpha = 0.95; z=1.96)$ that is calculated on the basis of Formula 1.
Questions that relate to correlation between QMS consistency elements and financial results of organizations were statistically processed with statistical programme ‘Statistica’. Pearson’s correlation coefficients (r) were calculated upon Formula 2, for the confidence level (1-α = 0.95).

\[
r = \frac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}} \quad ; \quad \text{where}
\]

\[
S_{xy} = \sum_{i=1}^{n} (x_i - \bar{x}) \cdot (y_i - \bar{y}) \quad ; \quad S_{xx} = \sum_{i=1}^{n} (x_i - \bar{x})^2 \quad ; \quad S_{yy} = \sum_{i=1}^{n} (y_i - \bar{y})^2
\]

The significance limit of Pearson’s correlation coefficient (PCC) is for given number of organizations (N = 126) and confidence level (1-α = 0.95) at 0.17488. In the article, all significant correlation coefficients are bolded and, within tables also additionally shaded. All other correlation coefficients are statistically insignificant.

**Results**

In Table 2 key shares and confidence intervals (confidence level α = 0.95) for elements of QMS consistency are presented. Among basic quality management principles according to ISO 9004:2009 (customer focus, leadership, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationships) the most established principle is customer focus (Slovenski inštitut za standardizacijo, 2009). Population share of establishment level of a principle is within the interval {0.60; 0.76}.

The highest increase in level of a principle establishment that quality managers want is for involvement of people and continual improvement. It is interesting that quality managers in the majority of basic quality principles do not prefer very high level of principle establishment but only high level. The exception is at principle customer focus where it is evident that quality managers want very high level of its establishment.

In respect to other elements of QMS consistency, quality managers are the most satisfied with the following:

- the level of consideration of actions and recommendations from internal and external audits (population share of satisfied quality managers is within interval {0.51; 0.69}),
- the management review (population share of satisfied quality managers is within interval {0.51; 0.69}) when implementing organizational changes by the management.

Also with other consistency elements, it is evident that quality managers in most cases do not prefer very high level of establishment of consistency elements, but only high level. The highest level (in this) quality managers want within responsibility level of processes’ owners for reporting to the management (population share of desired positive changes is within interval {0.43; 0.61}), and within using QMS as a
system for managing the organization (population share of desired positive changes is within interval \(0.39 ; 0.57\)).

Table 2
Shares and confidence intervals for key elements of QMS consistency \((1-\alpha = 0.95)\)

<table>
<thead>
<tr>
<th>No</th>
<th>Organizational characteristics of QMS</th>
<th>Appropriate</th>
<th>Needs to be increased</th>
<th>Needs to be decreased</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Share</td>
<td>Confidence interval</td>
<td>Share</td>
</tr>
<tr>
<td>1</td>
<td>Role of processes’ owners in control of goals’ achievement and processes’ improvement</td>
<td>0.48</td>
<td>{0.39; 0.57}</td>
<td>0.48</td>
</tr>
<tr>
<td>2a</td>
<td>Level of basic quality management principle establishment – customer focus</td>
<td>0.68</td>
<td>{0.60; 0.76}</td>
<td>0.30</td>
</tr>
<tr>
<td>2b</td>
<td>Level of basic quality management principle establishment – leadership</td>
<td>0.60</td>
<td>{0.51; 0.69}</td>
<td>0.38</td>
</tr>
<tr>
<td>2c</td>
<td>Level of basic quality management principle establishment – involvement of people</td>
<td>0.38</td>
<td>{0.30; 0.46}</td>
<td>0.60</td>
</tr>
<tr>
<td>2d</td>
<td>Level of basic quality management principle establishment – process approach</td>
<td>0.52</td>
<td>{0.44; 0.60}</td>
<td>0.45</td>
</tr>
<tr>
<td>2e</td>
<td>Level of basic quality management principle establishment – system approach to management</td>
<td>0.49</td>
<td>{0.40; 0.58}</td>
<td>0.48</td>
</tr>
<tr>
<td>2f</td>
<td>Level of basic quality management principle establishment – continual improvement</td>
<td>0.42</td>
<td>{0.33; 0.51}</td>
<td>0.56</td>
</tr>
<tr>
<td>2g</td>
<td>Level of basic quality management principle establishment – factual approach to decision making</td>
<td>0.56</td>
<td>{0.47; 0.65}</td>
<td>0.40</td>
</tr>
<tr>
<td>2h</td>
<td>Level of basic quality management principle establishment – mutually beneficial supplier relationships</td>
<td>0.55</td>
<td>{0.46; 0.64}</td>
<td>0.44</td>
</tr>
<tr>
<td>3</td>
<td>Level of responsibility of the sales department for resolving customers’ complaints</td>
<td>0.52</td>
<td>{0.43; 0.61}</td>
<td>0.45</td>
</tr>
<tr>
<td>4</td>
<td>Level of usage of QMS as a system for managing organization</td>
<td>0.48</td>
<td>{0.39; 0.57}</td>
<td>0.48</td>
</tr>
<tr>
<td>5</td>
<td>Considering actions and recommendations from internal and external audits in implementing organizational changes by the management</td>
<td>0.60</td>
<td>{0.51; 0.69}</td>
<td>0.39</td>
</tr>
<tr>
<td>6</td>
<td>Considering actions and recommendations from management review in implementing organizational changes by the management</td>
<td>0.60</td>
<td>{0.51; 0.69}</td>
<td>0.36</td>
</tr>
<tr>
<td>7</td>
<td>Level of responsibility of processes’ owners for reporting to the management</td>
<td>0.48</td>
<td>{0.39; 0.57}</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Source: Authors’ work
In the Table 3, correlations between individual elements of QMS consistency and financial results of organizations are given.

**Table 3**
Pearson correlation coefficients between elements of QMS consistency and financial results of organizations (N = 126; 1-α = 0.95)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Role of processes’ owners in control of goals’ achievement and processes’ improvement</td>
<td>3.7460</td>
<td>0.8479</td>
<td>0.1801</td>
<td>0.1134</td>
<td>0.1801</td>
<td>0.1268</td>
<td>0.2802</td>
</tr>
<tr>
<td>2a</td>
<td>Customer focus</td>
<td>4.2857</td>
<td>0.7679</td>
<td>0.1989</td>
<td>0.1252</td>
<td>0.2799</td>
<td>0.0810</td>
<td>0.2726</td>
</tr>
<tr>
<td>2b</td>
<td>Leadership</td>
<td>3.8730</td>
<td>0.8484</td>
<td>0.1800</td>
<td>0.0333</td>
<td>0.2734</td>
<td>0.0000</td>
<td>0.2000</td>
</tr>
<tr>
<td>2c</td>
<td>Involvement of people</td>
<td>3.5317</td>
<td>0.8068</td>
<td>0.0982</td>
<td>0.0841</td>
<td>0.1753</td>
<td>-0.0140</td>
<td>0.1262</td>
</tr>
<tr>
<td>2d</td>
<td>Process approach</td>
<td>3.6429</td>
<td>0.7638</td>
<td>0.0148</td>
<td>-0.0518</td>
<td>0.1185</td>
<td>-0.0148</td>
<td>0.0963</td>
</tr>
<tr>
<td>2e</td>
<td>System approach to management</td>
<td>3.5873</td>
<td>0.7618</td>
<td>0.1485</td>
<td>0.1114</td>
<td>0.1337</td>
<td>0.1337</td>
<td>0.2005</td>
</tr>
<tr>
<td>2f</td>
<td>Continual improvement</td>
<td>3.6746</td>
<td>0.9106</td>
<td>0.1118</td>
<td>0.0559</td>
<td>0.1988</td>
<td>0.0248</td>
<td>0.2485</td>
</tr>
<tr>
<td>2g</td>
<td>Factual approach to decision making</td>
<td>3.8889</td>
<td>0.7180</td>
<td>0.0867</td>
<td>-0.0158</td>
<td>0.1418</td>
<td>0.0236</td>
<td>0.1418</td>
</tr>
<tr>
<td>2h</td>
<td>Mutually beneficial supplier relationships</td>
<td>3.7778</td>
<td>0.7471</td>
<td>0.1817</td>
<td>0.1969</td>
<td>0.2801</td>
<td>0.2574</td>
<td>0.2877</td>
</tr>
<tr>
<td>3</td>
<td>Level of responsibility of the sales department for resolving customers’ complaints</td>
<td>3.7857</td>
<td>0.9261</td>
<td>0.1222</td>
<td>0.0672</td>
<td>0.0672</td>
<td>-0.0244</td>
<td>0.1466</td>
</tr>
<tr>
<td>4</td>
<td>Level of usage of QMS as a system for managing organization</td>
<td>3.5079</td>
<td>0.9011</td>
<td>0.1444</td>
<td>0.0691</td>
<td>0.1381</td>
<td>0.0126</td>
<td>0.1444</td>
</tr>
<tr>
<td>5</td>
<td>Considering actions and recommendations from internal and external audits in implementing organizational changes by the management</td>
<td>3.6825</td>
<td>0.9091</td>
<td>0.1991</td>
<td>0.0809</td>
<td>0.1929</td>
<td>0.0684</td>
<td>0.1618</td>
</tr>
<tr>
<td>6</td>
<td>Considering actions and recommendations from management review in implementing organizational changes by the management</td>
<td>3.7460</td>
<td>0.9545</td>
<td>0.1956</td>
<td>0.1600</td>
<td>0.2430</td>
<td>0.0474</td>
<td>0.1719</td>
</tr>
<tr>
<td>7</td>
<td>Role of processes’ owners in control of goals’ achievement and processes’ improvement</td>
<td>3.7460</td>
<td>0.8479</td>
<td>0.1801</td>
<td>0.1134</td>
<td>0.1801</td>
<td>0.1268</td>
<td>0.2802</td>
</tr>
</tbody>
</table>

Source: Authors’ work

At Level of responsibility of the sales department for resolving customers’ complaints, Level of usage of QMS as a system for managing organization, and Level...
of responsibility of processes’ owners for reporting to the management all correlation coefficients with financial results of organizations are statistically insignificant.

At Considering actions and recommendations from internal and external audits in implementing organizational changes by the management, statistically significant values of PCC with financial results of organizations were found at: Income growth level 2013-2014 (PCC 0.1991) and Income growth level 2011-2014 (PCC 0.1929).

At Considering actions and recommendations from management review in implementing organizational changes by the management we found statistically significant values of PCC with financial results of organizations at: Income growth level 2013-2014 (PCC 0.1956) and Income growth level 2011-2014 (PCC 0.2430).

At Role of processes’ owners in control of goals’ achievement and processes’ improvement we found following statistically significant values of PCC with financial results of organizations: Income growth level 2013-2014 (PCC 0.1801), Income growth level 2011-2014 (PCC 0.1801), and Added value level 2014 (PCC 0.2802).

Correlation coefficients between level of establishment of elements of QMS consistency and financial results or organizations are relatively low. However, correlations between individual financial elements of organizations’ business are not (especially) high as well – see Table 4 where correlations between financial results of organizations are presented.

Table 4
Pearson correlation coefficients between financial results of organizations (N = 126; 1-α = 0.95)

<table>
<thead>
<tr>
<th>Elements of financial operations of organizations</th>
<th>Average income growth level 2013-2014</th>
<th>Average added value growth level 2013-2014</th>
<th>Average income growth level 2011-2014</th>
<th>Average added value growth level 2011-2014</th>
<th>Average added value level 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income growth level 2013-2014</td>
<td>3.0000</td>
<td>0.4160</td>
<td>0.6800</td>
<td>0.2240</td>
<td>0.3440</td>
</tr>
<tr>
<td>Added value growth level 2013-2014</td>
<td>3.0000</td>
<td>0.4160</td>
<td>0.3040</td>
<td>0.6360</td>
<td>0.3280</td>
</tr>
<tr>
<td>Income growth level 2011-2014</td>
<td>3.0000</td>
<td>0.6800</td>
<td>0.3040</td>
<td>0.4080</td>
<td>0.4120</td>
</tr>
<tr>
<td>Added value growth level 2011-2014</td>
<td>3.0000</td>
<td>0.2240</td>
<td>0.6360</td>
<td>0.4080</td>
<td>0.4520</td>
</tr>
<tr>
<td>Added value level 2014</td>
<td>3.0000</td>
<td>0.3440</td>
<td>0.3280</td>
<td>0.4120</td>
<td>0.4520</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Pearson correlation coefficients between elements of consistency are shown in Table 5.
### Table 5
Pearson correlation coefficients between elements of consistency (N = 126; 1-α = 0.95)

| Role of processes' owners in control of goals' achievement and processes' improvement | Average | Standard deviation | Role of processes' owners in control of goals' achievement and processes' improvement | Customer focus | Leadership | Involvement of people | Process approach | System approach to management | Continual improvement | Factual approach to decision making | Mutually beneficial supplier relationships | Level of responsibility of the sales department for resolving customers' complaints | Level of usage of QMS as a system for managing organization | Considering actions and recommendations from internal and external audits | Considering actions and recommendations from management review | Level of responsibility of processes' owners for reporting to the management |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Role of processes' owners in control of goals' achievement and processes' improvement | 3.7460 | 0.8479 | 0.5301 | 0.5887 | 0.3042 | 0.4023 | 0.4805 | 0.5966 | 0.4526 | 0.3522 | 0.3784 | 0.5262 | 0.4550 | 0.4337 | 0.4062 |
| Customer focus | 4.2857 | 0.7679 | 0.5301 | 1 | 0.4455 | 0.4888 | 0.4345 | 0.4630 | 0.6602 | 0.4933 | 0.4880 | 0.4017 | 0.5516 | 0.5321 | 0.5473 | 0.3854 |
| Leadership | 3.8730 | 0.8484 | 0.5887 | 0.4455 | 1 | 0.5649 | 0.5344 | 0.5991 | 0.6502 | 0.5020 | 0.4600 | 0.3825 | 0.6397 | 0.6008 | 0.5823 | 0.4353 |
| Involvement of people | 3.5317 | 0.8068 | 0.3042 | 0.4888 | 0.5669 | 1 | 0.5183 | 0.4770 | 0.4116 | 0.2547 | 0.3170 | 0.2929 | 0.4838 | 0.4392 | 0.5300 | 0.3616 |
| Process approach | 3.6429 | 0.7638 | 0.4023 | 0.4345 | 0.5344 | 0.5183 | 1 | 0.5558 | 0.4182 | 0.3355 | 0.3084 | 0.3659 | 0.5214 | 0.5728 | 0.5001 | 0.5245 |
| System approach to management | 3.5873 | 0.7618 | 0.4805 | 0.4630 | 0.3991 | 0.4770 | 0.5558 | 1 | 0.5891 | 0.4713 | 0.3295 | 0.3953 | 0.5409 | 0.5486 | 0.5369 | 0.4146 |
| Continual improvement | 3.6746 | 0.9106 | 0.5966 | 0.6402 | 0.6502 | 0.4116 | 0.4182 | 0.5891 | 1 | 0.5560 | 0.3750 | 0.4004 | 0.6223 | 0.5507 | 0.5761 | 0.3885 |
| Factual approach to decision making | 3.8889 | 0.7180 | 0.4526 | 0.4933 | 0.5020 | 0.2547 | 0.3535 | 0.4713 | 0.5560 | 1 | 0.4308 | 0.3729 | 0.3723 | 0.3990 | 0.3671 | 0.3409 |
| Mutually beneficial supplier relationships | 3.7778 | 0.7471 | 0.3522 | 0.4880 | 0.4600 | 0.3170 | 0.3084 | 0.3295 | 0.3750 | 0.4308 | 1 | 0.4625 | 0.2759 | 0.3311 | 0.3914 | 0.2495 |
| Level of responsibility of the sales department for resolving customers' complaints | 3.7857 | 0.9261 | 0.3784 | 0.4017 | 0.3825 | 0.2929 | 0.3659 | 0.3953 | 0.4004 | 0.3729 | 0.4625 | 1 | 0.3424 | 0.3842 | 0.3905 | 0.3250 |
| Level of usage of QMS as a system for managing organization | 3.5079 | 0.9011 | 0.5262 | 0.5516 | 0.6397 | 0.4838 | 0.5214 | 0.5409 | 0.6223 | 0.3723 | 0.2759 | 0.3424 | 1 | 0.6770 | 0.7093 | 0.4917 |
| Considering actions and recommendations from internal and external audits | 3.6825 | 0.9091 | 0.4550 | 0.5321 | 0.6008 | 0.4392 | 0.5728 | 0.5486 | 0.5507 | 0.3990 | 0.3311 | 0.3842 | 0.6770 | 1 | 0.6993 | 0.4708 |
| Considering actions and recommendations from management review | 3.7460 | 0.9545 | 0.4337 | 0.5473 | 0.5823 | 0.5300 | 0.5001 | 0.5369 | 0.5761 | 0.3671 | 0.3914 | 0.3905 | 0.7093 | 0.6993 | 1 | 0.4456 |
| Level of responsibility of processes' owners for reporting to the management | 3.6587 | 0.7916 | 0.4062 | 0.3854 | 0.4353 | 0.3616 | 0.5245 | 0.4146 | 0.3885 | 0.3409 | 0.2495 | 0.3250 | 0.4917 | 0.4708 | 0.4456 | 1 |

Source: Authors' work
It is interesting that in all elements of QMS consistency mutually statistically significant correlations are evident. Here, we expose only the strongest correlations. Level of usage of QMS as a system for managing organization strongly correlates with following QMS consistency elements: Considering actions and recommendations from management review in implementing organizational changes by the management (PCC 0.7093), and Considering actions and recommendations from internal and external audits in implementing organizational changes by the management (PCC 0.6770).

Considering actions and recommendations from internal and external audits in implementing organizational changes by the management strongly correlates to Considering actions and recommendations from management review in implementing organizational changes by the management (PCC 0.6993).

In the research of QMS characteristics in Slovene organizations, we asked the respondents for their assessment of actual state (1 to 5), and also what would be in their opinion the needed state. In Table 6, influence of the difference between needed and actual level of establishment of elements of QMS consistency on business results of organizations is presented.

The gap between needed and actual characteristics of QMS consistency has significantly negative correlations with several elements.

Gap (needed – actual) for Level of responsibility of the sales department for resolving customers' complaints has significantly negative correlations with Added value growth level 2013-2014 (PCC -0.195).

Gap (needed – actual) for Level of usage of QMS as a system for managing organization has significantly negative correlations with Added value level 2014 (PCC -0.233).

Gap (needed – actual) for Role of processes' owners in control of goals' achievement and processes' improvement has significantly negative correlations with Income growth level 2013-2014 (PCC -0.188), Added value growth level 2013-2014 (PCC -0.271), Income growth level 2011-2014 (PCC -0.202), Added value growth level 2011-2014 (PCC -0.181) and Added value level 2014 (PCC -0.236).

And last but not least, Gap (needed – actual) for Level of responsibility of processes' owners for reporting to the management has significantly negative correlations with Income growth level 2013-2014 (PCC -0.191), Added value growth level 2013-2014 (PCC -0.183), and Added value level 2014 (PCC -0.216).

**Discussion**

The research conducted clearly showed that in organizations with QMS certified according to ISO 9001 standard exists the correlation between consistency elements and business results of organizations. By the mean of the research conducted, we managed to confirm hypothesis set on correlation between level of establishment of consistency elements, as seen by quality managers and organizational business results.

The main conclusion of the research is that the correlation between consistency elements and business results of organizations in Slovenia is confirmed. For the majority of consistency elements correlations are significant. In comparison to previous researches presented, added value of this research is not only in the set of relations between elements of consistency and other characteristics of QMS but also in addressing the gap between actual and needed organizational characteristics of QMS and to its influence on business effectiveness. In this, three groups of correlations are exposed: correlation between level of establishment of elements of QMS consistency and financial results of organizations, correlations between QMS
consistency elements in organizations and, influence of the difference between needed and actual level of establishment of elements of QMS consistency on business results of organizations.

Table 6
Pearson correlation coefficients between assessed difference (needed – actual) of elements of QMS consistency and financial results of organization (N = 126; 1-α = 0.95)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of processes' owners in control of goals' achievement and processes' improvement</td>
<td>0.579</td>
<td>0.813</td>
<td>-0.188</td>
<td>-0.271</td>
<td>-0.202</td>
<td>-0.181</td>
<td>-0.236</td>
</tr>
<tr>
<td>Customer focus</td>
<td>0.381</td>
<td>0.703</td>
<td>-0.064</td>
<td>-0.105</td>
<td>-0.129</td>
<td>-0.016</td>
<td>-0.242</td>
</tr>
<tr>
<td>Leadership</td>
<td>0.476</td>
<td>0.745</td>
<td>-0.137</td>
<td>-0.129</td>
<td>-0.228</td>
<td>-0.030</td>
<td>-0.167</td>
</tr>
<tr>
<td>Involvement of people</td>
<td>0.730</td>
<td>0.763</td>
<td>-0.030</td>
<td>-0.170</td>
<td>-0.096</td>
<td>-0.059</td>
<td>-0.141</td>
</tr>
<tr>
<td>Process approach</td>
<td>0.556</td>
<td>0.765</td>
<td>-0.015</td>
<td>-0.141</td>
<td>-0.089</td>
<td>-0.044</td>
<td>-0.096</td>
</tr>
<tr>
<td>System approach to management</td>
<td>0.571</td>
<td>0.731</td>
<td>-0.039</td>
<td>-0.209</td>
<td>-0.070</td>
<td>-0.108</td>
<td>-0.093</td>
</tr>
<tr>
<td>Continual improvement</td>
<td>0.746</td>
<td>0.857</td>
<td>-0.172</td>
<td>-0.198</td>
<td>-0.205</td>
<td>-0.145</td>
<td>-0.350</td>
</tr>
<tr>
<td>Factual approach to decision making</td>
<td>0.437</td>
<td>0.721</td>
<td>-0.024</td>
<td>-0.126</td>
<td>-0.063</td>
<td>-0.102</td>
<td>-0.126</td>
</tr>
<tr>
<td>Mutually beneficial supplier relationships</td>
<td>0.532</td>
<td>0.689</td>
<td>-0.074</td>
<td>-0.320</td>
<td>-0.172</td>
<td>-0.271</td>
<td>-0.279</td>
</tr>
<tr>
<td>Level of responsibility of the sales department for resolving customers' complaints</td>
<td>0.524</td>
<td>0.756</td>
<td>-0.045</td>
<td>-0.195</td>
<td>0.015</td>
<td>-0.045</td>
<td>-0.127</td>
</tr>
<tr>
<td>Level of usage of QMS as a system for managing organization</td>
<td>0.619</td>
<td>0.875</td>
<td>-0.058</td>
<td>-0.110</td>
<td>-0.116</td>
<td>-0.052</td>
<td>-0.233</td>
</tr>
<tr>
<td>Considering actions and recommendations from internal and external audits in implementing organizational changes by the management</td>
<td>0.524</td>
<td>0.827</td>
<td>-0.151</td>
<td>-0.075</td>
<td>-0.123</td>
<td>0.034</td>
<td>-0.144</td>
</tr>
<tr>
<td>Considering actions and recommendations from management review in implementing organizational changes by the management</td>
<td>0.460</td>
<td>0.900</td>
<td>-0.063</td>
<td>-0.138</td>
<td>-0.075</td>
<td>0.031</td>
<td>-0.151</td>
</tr>
<tr>
<td>Level of responsibility of processes' owners for reporting to the management</td>
<td>0.611</td>
<td>0.681</td>
<td>-0.191</td>
<td>-0.183</td>
<td>-0.174</td>
<td>-0.083</td>
<td>-0.216</td>
</tr>
</tbody>
</table>

Source: Authors' work

Conclusion
In this article, study of QMS characteristics in Slovene organizations is presented in the light of their influence on organizational business results. Correlation analysis leads to some findings that differ from general belief. The research conducted shows current
state in Slovene organizations. Calculated correlation coefficients between QMS characteristics and business results show their interdependency. For the majority of consistency elements, significant values of PPC with business results are calculated. QMS consistency elements for which we did not manage to prove correlation with business results are: Process approach, Factual approach to decision making, Level of responsibility of the sales department for resolving customers’ complaints, Level of usage of QMS as a system for managing organization and, Level of responsibility of processes’ owners for reporting to the management. It is however interesting that we manage to prove significant values of PPC for the impact of difference between needed and actual state of consistency elements on business results, for following consistency elements: Customer focus, Leadership, System approach to management, Continual improvement, Mutually beneficial supplier relationships, Level of responsibility of the sales department for resolving customers’ complaints and, Level of usage of QMS as a system for managing organization.

Important practical implication of the research conducted is in understanding the correlations and causalities discovered. Due to changes in the environment and the new ISO 9001:2015 quality standard, characteristics of QMS and their impact on organizational business will partly change. Namely, quality management will gradually become integral part of holistic organizational management. Through unified approach to leadership that is incorporated in the new ISO 9001, ISO 14001 and other standards, QMS will influence not only on organizational management system and processes’ management but also directly on business results. In that context, good knowledge of QMS characteristics will be valuable asset.

As far as the scope and limitations of the research are considered, the organizations included in the research were from different branches and sectors. 126 of them is relatively small number; higher number of them would definitely contribute to decreasing standard deviation and increasing reliability of results. The research was limited on the territory of Slovenia. We believe that conducting similar research in other countries could be very interesting especially in comparing correlations between QMS characteristics and financial results of organizations.

Another interesting area for further investigation could be to include some additional areas in testing correlations between QMS characteristics and financial results of organizations, such as: level of maturity of QMS, and in this how organizations are involved in more demanding TQM schemes (business excellence, national quality awards, etc.). Here we lean also on some findings of other researchers presented earlier that gave mixed results that were somehow not adequately explained. Additionally, it could be interesting to determine a point or interval on the maturity trajectory where positive impact of QMS on business results occurs beyond any doubts.

References

About the authors

Vinko Bogataj earned his doctoral and master degrees in the area of quality management, and his bachelor degree in mechanical engineering. He works as independent researcher and consultant, and has extensive experience in quality management. Vinko Bogataj frequently co-operates in international conferences. Areas of his scientific interest and research are quality management and engineering. Author can be contacted at vinko.bogataj@guest.arnes.si.

Gordana Žurga holds her doctoral degree in politology, and master degree in economy. She is professor at the Faculty of Organisation Studies in Novo mesto, Slovenia, with national and international experience in quality management and public management. Areas of her scientific interest and research are quality management, project management and public management. Author can be contacted at gordana.zurga@fos.unm.si.
Impact of Leadership Style to Financial Performance of Enterprises

Ivan Miloloža
Faculty for Dental Medicine & Health, University of Osijek, Osijek, Croatia

Abstract

Background: Measurement of financial performance of enterprises is an important part of balanced scorecard system. Previous research has indicated a relationship between leadership and financial performance of enterprises. Objectives: Purpose of the paper is to investigate the impact of leadership styles in Croatian enterprises to their financial performance. Methods/Approach: Survey research has been conducted on the sample of Croatian companies, measuring their financial performance and presence of leadership styles. Results: Overall, democratic style is the most often present in Croatian enterprises, followed by the authoritarian and laissez-faire styles. Conclusions: Small enterprises are more successful financially in the presence of the democratic style. Enterprises in the stagnation phase are more successful if all leadership styles are mixed together in practice, indicating the need to push the employees with all possible styles. Enterprises oriented towards international markets are more successful financially in the presence of the democratic style and the laissez-faire style.

Keywords: financial performance, leadership styles, democratic, authoritarian, laissez-faire, international, SME, enterprise

JEL classification: O15

Paper type: Research article

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Introduction

The financial perspective includes indicators that are related to the enterprise strategy (Westerfield, 2003; Parast et al., 2015). In other words, measuring financial performance will show how the implementation of the strategy contributes to the creation of final results. The objectives of the financial perspective should bring about positive results, which affects the results of other perspectives (Kang et al., 2014). In addition, it is important to keep track of the financial perspective and balance it with other non-financial perspectives. The focus of the enterprise on managing relations with customers, suppliers and partners, or on quality of products, must be aligned with other financial indicators and must impact them positively, which is true for any other business indicator as well (Kovach et al., 2015).
The main goal of the financial perspective is to increase the shareholder value, which can be achieved in two ways. The first way is to increase revenue. The steps leading to the achievement of the first goal are: emergence on new markets, offering new products and attracting new customers. The other way is to increase productivity, which can be achieved by improving costs structure or by utilizing existing assets better through the reduction of capital required to support a determined business level (Eljelly, 2004). It is important to point out that both ways which lead to increase in the shareholder value must be carried out actively and simultaneously. That way it is possible to eliminate the risk of endangering the growth of the enterprise.

Leading and leadership are two different terms that cannot be used interchangeably. Leadership can be defined by personal traits or as a process. Leading is one of the five management functions, and according to some scientists also the most important one, because it is focused on working with people, harmonising their relationships and encouraging them to work and perform tasks more efficiently. Leading consists of a set of processes that direct employees towards achieving goals more efficiently (Pejic Bach et al., 2006; 2013).

Successful leadership represents one of the most important factors that contribute to the enterprise success, and it can be defined in several ways that will be hereinafter set out. Koontz et al. (1990) define leadership as a process of influencing employees in order to motivate and encourage them to achieve the enterprise’s goals. Griffin (2002) believes that leadership is both a process and a trait. As a process, leadership represents the focus on activities that a leader takes, and as a trait, leadership represents leader’s traits. Leadership can also be defined as the skill of encouraging employees to participate voluntarily in the realization of enterprise’s goals (Rožman et al., 2017).

Previous research has shown that leadership styles have a different impact on the success of an enterprise in the knowledge management area (Miloža 2015a, 2015b, 2015c). The contribution of this research will be to determine the impact of leadership styles on the financial success of an enterprise.

**Literature review**

**Measuring financial success**

There is a large number of the financial success measurements and only one measurement cannot lead to a financial result, thus it is important to use multiple measurements at the same time. The three most commonly used financial measurements are: (i) business growth, (ii) value creation and (iii) business profitability. Financial measurement **Business growth** includes: revenue to assets ratio, increase in revenue and assets, revenue from new products and services, as well as revenue per employee. Financial measurement **Value creation** includes: economic value added (EVA), market value added (MVA), stock price and dividends. Financial measurement **Business profitability** includes: profit margin, ROE, ROA, ROI, ROCE and profit per employee.

Financial perspective usually involves indicators that include revenue to costs ratio, return on investment (ROI), return on equity (ROE) and economic value added (EVA). Depending on the industry within which an enterprise operates, it is possible to use indicators such as risk management or measuring intellectual capital. Indicators from the financial perspective are a prerequisite for selecting other indicators, thus they need to be defined very carefully.
There is a large number of financial indicators, and the most commonly used ones are as follows (Niven, 2007): total assets, ratio of profit to assets, return on net assets, gross margin, net operating profit after taxes, profit per employee, revenue from new products, revenue and revenue per employee, return on equity (ROE), return on capital employed (ROCE), return on investment (ROI), economic value added (EVA), cash flow, debt indicators, interest coverage ratio, accounts receivable collection period, period of obligations to suppliers, current ratio. In small and medium-sized enterprises in Croatia, the most commonly used financial indicators are liquidity indicators and indicators of accounts receivable collection period.

Parmenter (2010) states the following measurements in order to manage the financial perspective successfully: (i) total assets and total assets per employee, (ii) return on equity (ROE) and return on capital employed (ROCE), (iii) economic value added (EVA), (iv) value added per employee, (v) gross margin, (vi) growth rate, (vii) credit rating, (viii) debt, (ix) dividends and stock price.

Measuring leadership styles
Scientists who supported behaviour-based leadership theories tried to define the best leadership style that would be effective in all situations, which led to several theories and leadership models such as: authoritarian, democratic and laissez-faire leadership style. Given the advantages and disadvantages that exist in all three leadership styles, one can conclude that there is no single best leadership style, but that leaders must adapt to the situation and their associates in order to achieve the best result.

Methodology
The Leadership Styles Questionnaire, taken from the book Introduction to Leadership by Northouse (2012) was used as a research instrument. In addition, a questionnaire for measuring enterprise success in terms of four dimensions of success was used. Table 1 shows the financial success of all enterprises together. It can be noticed that respondents from all enterprises believe that items F1. Profitability, F2. Profit and F3. Return on investment within dimension Financial success are equally important (average rating 3.50). Cronbach’s alpha is greater than 0.7, which indicates that the financial success indicators are consistent.

<table>
<thead>
<tr>
<th>Financial success</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Average</th>
<th>St. dev.</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1. Profitability</td>
<td>60</td>
<td>2</td>
<td>5</td>
<td>3.533</td>
<td>0.833</td>
<td>0.825</td>
</tr>
<tr>
<td>F2. Profit</td>
<td>60</td>
<td>2</td>
<td>5</td>
<td>3.500</td>
<td>0.893</td>
<td></td>
</tr>
<tr>
<td>F3. Return on investment</td>
<td>60</td>
<td>2</td>
<td>5</td>
<td>3.517</td>
<td>0.930</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ work

The survey was conducted on a stratified sample of 60 Croatian enterprises total divided into 6 sub-groups. Of this, there were: (1) 10 small and medium-sized enterprises in the growth phase (sub-code: SME-growth); (2) 10 small and medium-sized enterprises in the maturity phase (sub-code: SME-maturity); (3) 10 small and medium-sized enterprises in the stagnation phase (sub-code: SME-stagnation); (4) 10 large enterprises in the growth phase (sub-code: Large-growth); (5) 10 large
enterprises in the maturity phase (sub-code: Large-maturity) and (6) 10 large enterprises in the stagnation phase (sub-code: Large-stagnation).

Comparison of average ratings of the presence of leadership styles in all enterprises together is as follows. The respondents agree mostly with the attitudes that reflect democratic leadership style, while they agree the least with the attitudes that reflect laissez-faire leadership style (the lowest average ratings are recorded).

Results
Impact of leadership styles on all enterprises together
Table 2 shows a regression model with the dependent variable Financial success. All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.254 was established, indicating that the selected model implied 25.4% deviation from the dependent variable.

There is only one statistically significant independent variable in the model that reflects the authoritarian style – L10. Most employees feel insecure about their work and need direction (statistically significant at 1% level). Variable L10 has a negative impact on the dependent variable Financial success in all enterprises.

There is one statistically significant independent variable in the model that reflects the democratic style – L14. It is the leader’s job to help subordinates find their “passion” (statistically significant at 1% level). Variable L14 has a positive impact on the dependent variable Financial success in all enterprises.

There is only one statistically significant independent variable in the model that reflects the laissez-faire style – L15. In most situations, workers prefer little input from the leader (statistically significant at 1% level). Variable L15 has a positive impact on the dependent variable Financial success in all enterprises.

<table>
<thead>
<tr>
<th>Financial success</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.403</td>
<td>0.405</td>
<td></td>
<td>5.936</td>
<td>0.000***</td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 10. Most employees feel insecure about their work and need direction.</td>
<td>-0.271</td>
<td>0.089</td>
<td>-0.393</td>
<td>-3.038</td>
<td>0.004***</td>
</tr>
<tr>
<td>Democratic style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 14. It is the leader’s job to help subordinates find their “passion”.</td>
<td>0.322</td>
<td>0.105</td>
<td>0.375</td>
<td>3.058</td>
<td>0.003***</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 15. In most situations, workers prefer little input from the leader.</td>
<td>0.264</td>
<td>0.087</td>
<td>0.371</td>
<td>3.043</td>
<td>0.004***</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td>0.254</td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td>0.214</td>
<td></td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work
Impact of leadership styles on small and medium-sized enterprises

Table 3 shows a regression model with the dependent variable Financial success in SME enterprises. All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.420 was established, indicating that the selected model implied 42.0% deviation from the dependent variable.

There are two statistically significant independent variables in the model that reflect the authoritarian style – L10. Most employees feel insecure about their work and need direction (statistically significant at 5% level) and L13. The leader is the chief judge of the achievements of the members of the group (statistically significant at 5% level). Variable L10 has a negative impact on the dependent variable Financial success in SME enterprises, while variable L13 has a positive impact.

There is only one statistically significant independent variable in the model that reflects the democratic style – L8. Most workers want frequent and supportive communication from their leader (statistically significant at 5% level). Variable L8 has a positive impact on the dependent variable Financial success in SME enterprises.

There is only one statistically significant independent variable in the model that reflects the laissez-faire – L15. In most situations, workers prefer little input from the leader (statistically significant at 1% level). Variable L15 has a positive impact on the dependent variable Financial success in SME enterprises.

Table 3
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles in relation to the size of the enterprise – SME

<table>
<thead>
<tr>
<th>Financial success - SME</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.096</td>
<td>1.240</td>
<td></td>
<td>0.077</td>
<td>0.939</td>
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<tr>
<td>Authoritarian style</td>
<td>L 10. Most employees feel insecure about their work and need direction.</td>
<td>-0.293</td>
<td>0.107</td>
<td>-0.444</td>
<td>2.744</td>
</tr>
<tr>
<td></td>
<td>L 13. The leader is the chief judge of the achievements of the members of the group.</td>
<td>0.321</td>
<td>0.152</td>
<td>0.328</td>
<td>2.113</td>
</tr>
<tr>
<td>Democratic style</td>
<td>L 8. Most workers want frequent and supportive communication from their leader.</td>
<td>0.369</td>
<td>0.197</td>
<td>0.314</td>
<td>1.871</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td>L 15. In most situations, workers prefer little input from the leader.</td>
<td>0.392</td>
<td>0.118</td>
<td>0.588</td>
<td>3.335</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td>0.420</td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work
Impact of leadership styles on large enterprises

Table 4 shows a regression model with the dependent variable Financial success. All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.563 was established, indicating that the selected model implied 56.3% deviation from the dependent variable.

There are two statistically significant independent variables in the model that reflect the authoritarian style – L13. The leader is the chief judge of the achievements of the members of the group (statistically significant at 10% level) and L16. Effective leaders give orders and clarify procedures (statistically significant at 10% level). Variable L13 has a positive impact on the dependent variable Financial success in large enterprises, while variable L16 has a negative impact.

There are two statistically significant independent variables in the model that reflect the democratic style – L11. Leaders need to help subordinates accept responsibility for completing their work (statistically significant at 5% level) and L14. It is the leader’s job to help subordinates find their “passion” (statistically significant at 1% level). Variable L11 has a negative impact on the dependent variable Financial success in large enterprises, while variable L14 has a positive impact.

There are two statistically significant independent variables in the model that reflect the laissez-faire style – L6. Leadership requires staying out of the way of subordinates as they do their work (statistically significant at 1% level) and L15. In most situations, workers prefer little input from the leader (statistically significant at 1% level). Variable L6 has a negative impact on the dependent variable Financial success in large enterprises, while variable L15 has a positive impact.

Table 4
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles – large enterprises

<table>
<thead>
<tr>
<th>Financial success – Large</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.459</td>
<td>0.921</td>
<td>2.671</td>
<td>0.014**</td>
<td></td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L13. The leader is the chief judge of the achievements of the members of the group.</td>
<td>0.332</td>
<td>0.162</td>
<td>0.347</td>
<td>2.045</td>
<td>0.052*</td>
</tr>
<tr>
<td>L16. Effective leaders give orders and clarify procedures.</td>
<td>-0.162</td>
<td>0.079</td>
<td>-0.328</td>
<td>-2.062</td>
<td>0.051*</td>
</tr>
<tr>
<td>Democratic style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L11. Leaders need to help subordinates accept responsibility for completing their work.</td>
<td>-0.326</td>
<td>0.154</td>
<td>-0.390</td>
<td>-2.121</td>
<td>0.045**</td>
</tr>
<tr>
<td>L14. It is the leader’s job to help subordinates find their “passion”.</td>
<td>0.450</td>
<td>0.128</td>
<td>0.571</td>
<td>3.520</td>
<td>0.002***</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L6. Leadership requires staying out of the way of subordinates as they do their work.</td>
<td>-0.325</td>
<td>0.106</td>
<td>-0.472</td>
<td>-3.061</td>
<td>0.006***</td>
</tr>
<tr>
<td>L15. In most situations, workers prefer little input from the leader.</td>
<td>0.425</td>
<td>0.121</td>
<td>0.506</td>
<td>3.507</td>
<td>0.002***</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.563</td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work
Impact of leadership styles on enterprises in the growth and maturity phase (leaders)

Table 5 shows a regression model with the dependent variable Financial success in enterprises in the growth and maturity phase (leaders). All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.407 was established, indicating that the selected model implied 40.7% deviation from the dependent variable.

There is only one statistically significant independent variable in the model that reflects the authoritarian style – L16. Effective leaders give orders and clarify procedures (statistically significant at 5% level). Variable L16 has a negative impact on the dependent variable Financial success in market leader enterprises.

There are three statistically significant independent variables in the model that reflect the laissez-faire style – L12. Leaders should give subordinates complete freedom to solve problems on their own (statistically significant at 5% level), L15. In most situations, workers prefer little input from the leader (statistically significant at 10% level) and L18. In general, it is best to leave subordinates alone (statistically significant at 1% level). Variable L15 has a positive impact on the dependent variable Financial success in market leader enterprises, while variables L12 and L18 have a negative impact.

Table 5
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles in relation to the growth phase of the enterprise – Enterprises in the growth and maturity phase (leaders)

<table>
<thead>
<tr>
<th>Financial success – Enterprises in the growth and maturity phase (leaders)</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>4.146</td>
<td>0.537</td>
<td></td>
<td>7.728</td>
<td>0.000***</td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 16. Effective leaders give orders and clarify procedures.</td>
<td>-0.143</td>
<td>0.078</td>
<td>-0.265</td>
<td>-1.849</td>
<td>0.074**</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 12. Leaders should give subordinates complete freedom to solve problems on their own.</td>
<td>-0.182</td>
<td>0.096</td>
<td>-0.276</td>
<td>-1.901</td>
<td>0.067*</td>
</tr>
<tr>
<td>L 15. In most situations, workers prefer little input from the leader.</td>
<td>0.372</td>
<td>0.108</td>
<td>0.494</td>
<td>3.444</td>
<td>0.002***</td>
</tr>
<tr>
<td>L 18. In general, it is best to leave subordinates alone.</td>
<td>-0.195</td>
<td>0.099</td>
<td>-0.289</td>
<td>-1.962</td>
<td>0.059*</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.407</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.331</td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work
Impact of leadership styles on enterprises in the stagnation phase (followers)

Table 6
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles in relation the growth phase of the enterprise – Enterprises in the stagnation phase (followers)

<table>
<thead>
<tr>
<th>Financial success – Enterprises in the stagnation phase (followers)</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.146</td>
<td>0.808</td>
<td>-2.657</td>
<td>0.017**</td>
<td></td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 7. As a rule. employees must be given rewards or punishments in order to motivate them to achieve organizational objectives.</td>
<td>0.315</td>
<td>0.084</td>
<td>0.407</td>
<td>3.734</td>
<td>0.002***</td>
</tr>
<tr>
<td>L 10. Most employees feel insecure about their work and need direction.</td>
<td>-0.278</td>
<td>0.075</td>
<td>-0.404</td>
<td>-3.696</td>
<td>0.002***</td>
</tr>
<tr>
<td>L 13. The leader is the chief judge of the achievements of the members of the group.</td>
<td>0.680</td>
<td>0.109</td>
<td>0.740</td>
<td>6.257</td>
<td>0.000***</td>
</tr>
<tr>
<td>Democratic style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 8. Most workers want frequent and supportive communication from their leader.</td>
<td>0.273</td>
<td>0.132</td>
<td>0.218</td>
<td>2.068</td>
<td>0.055*</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 3. In complex situations. leaders should let subordinates work problems out on their own.</td>
<td>0.257</td>
<td>0.071</td>
<td>0.407</td>
<td>3.601</td>
<td>0.002***</td>
</tr>
<tr>
<td>L 6. Leadership requires staying out of the way of subordinates as they do their work.</td>
<td>-0.176</td>
<td>0.085</td>
<td>-0.227</td>
<td>-2.062</td>
<td>0.056*</td>
</tr>
<tr>
<td>L 15. In most situations. workers prefer little input from the leader.</td>
<td>0.301</td>
<td>0.072</td>
<td>0.445</td>
<td>4.160</td>
<td>0.001***</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td>0.843</td>
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</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td>0.774</td>
<td></td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work

Table 6 shows a regression model with the dependent variable Financial success in enterprises in the stagnation phase (followers). All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.843 was established, indicating that the selected model implied 84.3% deviation from the dependent variable.
There are three statistically significant independent variables in the model that reflect the authoritarian style – L7. As a rule, employees must be given rewards or punishments in order to motivate them to achieve organizational objectives (statistically significant at 1% level), L10. Most employees feel insecure about their work and need direction (statistically significant at 1% level) and L13. The leader is the chief judge of the achievements of the members of the group (statistically significant at 1% level). Variables L7 and L13 have a positive impact on the dependent variable Financial success in market follower enterprises, while variable L10 has a negative impact.

There is only one statistically significant independent variable in the model that reflects the democratic style – L8. Most workers want frequent and supportive communication from their leader (statistically significant at 10% level). Variable L8 has a positive impact on the dependent variable Financial success in market follower enterprises.

There are three statistically significant independent variables in the model that reflect the laissez-faire style – L3. In complex situations, leaders should let subordinates work problems out on their own (statistically significant at 1% level), L6. Leadership requires staying out of the way of subordinates as they do their work (statistically significant at 10% level) and L15. In most situations, workers prefer little input from the leader (statistically significant at 1% level). Variables L3 and L15 have a positive impact on the dependent variable financial success in market follower enterprises, while variable L6 has a negative impact.

**Impact of leadership styles on enterprises oriented towards domicile markets**

Table 7 shows a regression model with the dependent variable Financial success in enterprises oriented predominantly towards domestic market. All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.456 was established, indicating that the selected model implied 45.6% deviation from the dependent variable.

There is only one statistically significant independent variable in the model that reflects the authoritarian style – L10. Most employees feel insecure about their work and need direction (statistically significant at 5% level). Variable L10 has a negative impact on the dependent variable Financial success in enterprises oriented predominantly towards domestic market.

There are two statistically significant independent variables in the model that reflect the democratic style – L14. It is the leader’s job to help subordinates find their “passion” (statistically significant at 5% level) and L17. People are basically competent and if given a task will do a good job (statistically significant at 10% level). Variable L14 has a positive impact on the dependent variable Financial success in enterprises oriented predominantly towards domestic market, while variable L17 has a negative impact.

There are two statistically significant independent variables in the model that reflect the laissez-faire style – L15. In most situations, workers prefer little input from the leader (statistically significant at 1% level) and L18. In general, it is best to leave subordinates alone (statistically significant at 10% level). Variable L18 has a negative impact on the dependent variable Financial success in enterprises oriented predominantly towards domestic market, while variable L15 has a positive impact.
Table 7
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles in relation to the international orientation of the enterprise – Predominantly domestic market

<table>
<thead>
<tr>
<th>Financial success – Predominantly domestic market</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.890</td>
<td>0.584</td>
<td></td>
<td>6.666</td>
<td>0.000***</td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 10. Most employees feel insecure about their work and need direction.</td>
<td>-0.265</td>
<td>0.109</td>
<td>-0.387</td>
<td>-2.447</td>
<td>0.020**</td>
</tr>
<tr>
<td>Democratic style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 14. It is the leader’s job to help subordinates find their “passion”.</td>
<td>0.258</td>
<td>0.119</td>
<td>0.326</td>
<td>2.164</td>
<td>0.038**</td>
</tr>
<tr>
<td>L 17. People are basically competent and if given a task will do a good job.</td>
<td>-0.235</td>
<td>0.116</td>
<td>-0.280</td>
<td>-2.024</td>
<td>0.051*</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 15. In most situations, workers prefer little input from the leader.</td>
<td>0.355</td>
<td>0.090</td>
<td>0.546</td>
<td>3.918</td>
<td>0.000***</td>
</tr>
<tr>
<td>L 18. In general, it is best to leave subordinates alone.</td>
<td>-0.221</td>
<td>0.109</td>
<td>-0.284</td>
<td>-2.018</td>
<td>0.052*</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td>0.456</td>
<td></td>
</tr>
<tr>
<td>Adjusted R2</td>
<td></td>
<td></td>
<td></td>
<td>0.371</td>
<td></td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work

Impact of leadership styles on enterprises oriented towards international markets

Table 8 shows a regression model with the dependent variable Financial success in enterprises oriented predominantly towards foreign market. All items of measuring leadership styles, which refer to the authoritarian, democratic and laissez-faire style, were used as independent variables. Step-wise multiple regression analysis was used to form the model. A model with a determination coefficient of 0.926 was established, indicating that the selected model implied 92.6% deviation from the dependent variable.

There are two statistically significant independent variables in the model that reflect the authoritarian style – L4. It is fair to say that most employees in the general population are lazy (statistically significant at 1% level) and L10. Most employees feel insecure about their work and need direction (statistically significant at 1% level). Variable L4 has a positive impact on the dependent variable Financial success in enterprises oriented predominantly towards foreign market, while variable L10 has a negative impact.

There are three statistically significant independent variables in the model that reflect the democratic style – L2. Employees want to be a part of the decision-making process (statistically significant at 1% level), L14. It is the leader’s job to help subordinates find their “passion” (statistically significant at 1% level) and L17. People are basically competent and if given a task will do a good job (statistically significant at 1% level). Variables L2, L14 and L17 have a positive impact on the dependent variable Financial success in enterprises oriented predominantly towards foreign market.
There are three statistically significant independent variables in the model that reflect the laissez-faire style – L3. In complex situations, leaders should let subordinates work problems out on their own (statistically significant at 1% level). L6. Leadership requires staying out of the way of subordinates as they do their work (statistically significant at 1% level) and L15. In most situations, workers prefer little input from the leader (statistically significant at 5% level). Variable L6 has a positive impact on the dependent variable Financial success in enterprises oriented predominantly towards foreign market, while variables L3 and L15 have a positive impact.

Table 8
Regression model with the dependent variable: Financial success and the independent variables: items of leadership styles in relation to the international orientation of the enterprise – Predominantly foreign market

<table>
<thead>
<tr>
<th>Financial success – Predominantly foreign market</th>
<th>Non-stand. coefficients</th>
<th>Standard error</th>
<th>Standardized coefficients</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-3.910</td>
<td>1.278</td>
<td>-3.061</td>
<td>0.009***</td>
<td></td>
</tr>
<tr>
<td>Authoritarian style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 4. It is fair to say that most employees in the general population are lazy.</td>
<td>0.395</td>
<td>0.120</td>
<td>0.443</td>
<td>3.292</td>
<td>0.006***</td>
</tr>
<tr>
<td>L 10. Most employees feel insecure about their work and need direction.</td>
<td>-0.199</td>
<td>0.063</td>
<td>-0.280</td>
<td>-3.142</td>
<td>0.008***</td>
</tr>
<tr>
<td>Democratic style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 2. Employees want to be a part of the decision-making process.</td>
<td>0.521</td>
<td>0.123</td>
<td>0.512</td>
<td>4.252</td>
<td>0.001***</td>
</tr>
<tr>
<td>L 14. It is the leader’s job to help subordinates find their “passion”.</td>
<td>0.603</td>
<td>0.098</td>
<td>0.585</td>
<td>6.145</td>
<td>0.000***</td>
</tr>
<tr>
<td>L 17. People are basically competent and if given a task will do a good job.</td>
<td>0.811</td>
<td>0.142</td>
<td>0.840</td>
<td>5.702</td>
<td>0.000***</td>
</tr>
<tr>
<td>Laissez-faire style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L 3. In complex situations. leaders should let subordinates work problems out on their own.</td>
<td>0.449</td>
<td>0.063</td>
<td>0.764</td>
<td>7.132</td>
<td>0.000***</td>
</tr>
<tr>
<td>L 6. Leadership requires staying out of the way of subordinates as they do their work.</td>
<td>-0.548</td>
<td>0.074</td>
<td>-0.658</td>
<td>-7.369</td>
<td>0.000***</td>
</tr>
<tr>
<td>L 15. In most situations. workers prefer little input from the leader.</td>
<td>0.249</td>
<td>0.101</td>
<td>0.271</td>
<td>2.471</td>
<td>0.028**</td>
</tr>
<tr>
<td>Model fit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td></td>
<td></td>
<td>0.926</td>
<td></td>
</tr>
<tr>
<td>Prilagodeni R2</td>
<td></td>
<td></td>
<td></td>
<td>0.880</td>
<td></td>
</tr>
</tbody>
</table>

Note: * 10%, ** 5%, *** 1% probability
Source: Authors’ work

Discussion
Table 9 shows the impact of different leadership styles on the aggregate financial success variable. The last three lines of the table show the dominant impact of a particular leadership style.
Table 9
Impact of different leadership styles on the aggregate variable of financial success

<table>
<thead>
<tr>
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Note: The table shows the levels of significance and the direction of impact of independent variables.
Source: Authors’ work

Authoritarian leadership style
It can be noticed that variable L4 has a statistically significant positive impact on the financial success only in enterprises oriented towards international market, and the same goes for variable L7 and enterprises in the stagnation phase (followers). On the other hand, only variable L10 has a negative impact on virtually all enterprises, except on large enterprises and enterprises in the growth and maturity phase.

Democratic leadership style
It can be noticed that the variables related to the democratic leadership style have almost entirely positive impact on both large and small enterprises, both market leaders and followers, and regardless of the market orientation. It is possible to single out variable L14, which has a statistically significant positive impact on the financial success in both small and large enterprises, as well as in both enterprises oriented towards international market and enterprises oriented towards domestic market. On the other hand, only two variables have a negative impact on the aggregate variable of financial success. Variable L11 has a negative impact on large enterprises, while variable L17 has a negative impact on enterprises oriented towards domestic market.

Laissez-faire leadership style
It can be noticed that variable L15 has a statistically significant positive impact on the aggregate variable of financial success in all enterprises, regardless of their size, market orientation or growth phase, and the same goes for variable L3 and
enterprises in the stagnation phase (followers) and enterprises oriented towards international market. On the other hand, variable L6 has a negative impact on large enterprises, enterprises in the stagnation phase, as well as enterprises oriented towards international market, which is also true for variable L18 and enterprises in the growth and maturity phase (leaders) and enterprises oriented towards domestic market.

**Conclusion**

The research results point to the following differences in financial success. For the purpose of the conclusion, only the difference in the aggregate variable of financial success will be analysed. The influence of the authoritarian style is as follows: (i) a negative impact is present in enterprises in the growth and maturity phase, as well as in enterprises oriented predominantly towards domicile markets; (ii) a neutral impact is present in small, medium-sized and large enterprises, in enterprises in the stagnation phase, as well as in enterprises oriented towards international markets; (iii) a positive impact is not present in any enterprise group. The impact of the democratic style is as follows: (i) a negative impact is not present in any enterprise group; (ii) a neutral impact is present in large enterprises and enterprises oriented towards domicile market; (iii) a positive impact is present in small enterprises, enterprises in the stagnation phase and enterprises oriented towards international markets. The impact of the laissez-faire style is as follows: (i) a negative impact is present in enterprises in the growth and maturity phase; (ii) a neutral impact is present in large enterprises, enterprises in the stagnation phase, as well as in both enterprises oriented towards international markets and enterprises oriented towards domicile markets, and (iii) a positive impact is not present in any enterprise group.

Overall conclusions are as following: (i) small enterprises are more successful financially in the presence of the democratic style and the laissez-faire style, while no leadership style has a statistically significant effect on the financial success in large enterprises; (ii) enterprises in the stagnation phase are more successful in the presence of all leadership styles, while no leadership style has a statistically significant impact on the financial success in enterprises in the growth and maturity phase; (iii) enterprises oriented towards international markets are more successful financially in the presence of the democratic style and the laissez-faire style, while no leadership style has a statistically significant impact on the financial success in enterprises oriented towards domicile markets.

**References**


About the author

Assistant Professor Ivan Miloloža, Ph.D. graduated from the Faculty of Economics and Business in Zagreb and received a Ph.D. at the Faculty of Economics in Osijek in 2015. He lived and worked abroad in the period from 1983 to 1986 (Argentina and the Netherlands). Since 1986, he has been employed by Munja, the only Croatian battery manufacturer, where he has performed virtually all management functions and is currently the CEO of the Board (since 1999). He is Assistant Professor at the Department of Dental Medicine and Health, Dean for Institutional Cooperation and Development and Chair of the Department of History of Medicine and Social Sciences. He has performed many social functions in various state bodies, associations and banks, and was a participant and guest lecturer at numerous domestic and foreign faculties and international conferences. Author can be contacted at email: ivan.miloloza@fdmz.hr.
Going Entrepreneurial: Agro-tourism and Rural Development in Northern Montenegro

Tatjana Stanovčić, Sanja Peković, Jovana Vukčević, Djurdjica Perović
University of Montenegro, Faculty of Tourism and Hotel Management Kotor, Podgorica, Montenegro

Abstract

**Background:** In Montenegro, there is a growing awareness of the necessity to further develop sustainable forms of tourism and foster economic development of mostly agrarian northern rural areas. However, this is of the utmost importance not only for sustaining local economy, but also for creating more balanced framework for territorial development. **Objectives:** Paper aims to set a framework for studying the role of innovations and entrepreneurship in developing sustainable agro-tourism in Montenegro through identifying main resources, obstacles, challenges and potentials of the process. **Methods/Approach:** The analysis is based on both review of the secondary sources and the fieldwork conducted between June and October 2015 in rural areas of Kuci and Durmitor, as well as the number of interviews with farmers and tourism professionals from the country. **Results:** The results highlighted the low levels of both entrepreneurial culture and hospitality awareness amongst local population, lack of investments, infrastructural backwardness and insufficient government support as the main obstacles to developing successful and sustainable agro-tourism ventures. **Conclusions:** Public bodies should create a comprehensive strategy for sustainable tourism development, which should focus on providing incentives, training and support to the farmers eager to diversify their agro-activities through entrepreneurial actions.

**Keywords:** entrepreneurship, rural development, katun activities, agro-tourism, Montenegro

**JEL classification:** L83

**Paper type:** Research article

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Introduction

In Montenegro as much as in most parts of Europe, poverty and poor living standards, along with the high unemployment rate instigated severe depopulation of the northern rural areas. It is acknowledged by both scholars and policy planners that in order to reduce rural immigration, it is necessary to optimize the usage of
environmental, agricultural and tourist potentials of rural areas through innovations and entrepreneurship.

Fostering entrepreneurship in agro-tourism sector should not only create value for the local community, but also contribute to preservation of rural heritage (such as katuns, which are the temporary Mountain settlements where rural households stay with their livestock during summer months), while at the same time encouraging sustainable tourism in rural areas. Thus, it is becoming increasingly important to address obstacles, challenges and opportunities for developing entrepreneurial activities in the area related to the agro-tourism. The paper will focus on entrepreneurship as a tool for enhancing sustainable development of Montenegrin northern region, developing agro-tourism and diversifying economic activities in rural areas.

The paper aims at questioning the new patterns of agro-tourist production and consumption which are emerging in the region as rural households seek to diversify their agro-related activities and tourists continue to seek out new experiences, authentic destinations and innovative types of consumption in terms of food, place, leisure and entertainment. It will do so by analysing both existing literature on the topic and the results obtained through the field analysis of the rural households in the areas of Kuci and Durmitor, including number of interviews with relevant stakeholders from the sector.

The main goal of the article is to provide a scholarly contribution to the mostly policy-based discussions on tools and mechanisms for developing sustainable entrepreneurial ventures in agro-tourism. While number of policy papers and strategic documents emphasize importance of fostering agro-tourism and economic development of mountain rural areas, as most resourceful in these terms, there were not many scholarly attempts to address main challenges and mechanisms of the process. The paper should thus represent an original contribution to debates in the field and perhaps inform future research and policy actions in the area.

First part of the paper questions the intersection between tourism and agriculture, its potentials and implications for rural restructuring, sustainable territorial development and empowerment of local communities. The second part discusses entrepreneurial activities in rural areas and various emerging forms of agro-tourism, while the third emphasizes some of the main challenges and obstacles hampering the entrepreneurial development of this sector. In conclusion, we will apply the analysed concepts to Montenegrin case, outlining the current activities and providing several suggestions for overcoming obstacles and fostering entrepreneurial activity in Montenegrin agro-tourism sector.

**Literature review**

Agro-tourism could be defined as any income-generating activity taking place at the farm in order to create enjoyment or educate the visitors, taking in consideration variety of natural, historical, cultural and environmental assets of the land, as well as the people who cultivate it (George et al., 2008). Number of scholars suggested the importance of agro-tourism in terms of providing supplementary source of income to local communities (Hall, 2004). As such, agro-tourism is often related to the economic growth, rising living standards and enhancement of socio-cultural assets of rural areas (Nunkoo et al., 2012). Thus, rural tourism might be understood as a platform for sustainable territorial development which by fostering productivity in rural zones, enhances the employment rates, distribution of income, preservation of landscape and rural heritage (Mahmoudi et al., 2011).
Noteworthy, in most scholarly work from the discipline, terms such as agro-tourism (agri-tourism), farm tourism, farm-based tourism, and rural tourism are often used interchangeably (Barbieri et al., 2008; Roberts et al., 2001; Wall, 2000; Phillip et al., 2010; Schilling et al., 2012), but some researchers still used it as distinct, yet similar concepts (Iakovidou, 1997; McGehee et al., 2004). For the purpose of this paper, agro-tourism will be addressed as the set of tourism-related activities relying on agriculture, carried out in rural areas either in groups or individually (Fahmi et al., 2013). Merging elements of farming and tourism in order to enhance distribution of farming products and provide travellers unique rural experience (Wicks et al., 2003), it promises substantial benefits for the rural areas, reducing unemployment, rural migration and poverty (Jeczmyk et al., 2015). While it usually refers to tourists staying in rural accommodation for several days for a fee or day trippers immersing in recreational activities and traditional farming life (Fahmi et al., 2013), this paper will be also discussing variety of other agro-related tourism practices characteristic for rural areas. More precisely, in the paper the term agro-tourism will be used more in the sense of “rural tourism” in general, encompassing both the agricultural activities (harvesting crops, milking cows) and those which are farms-based but not necessarily agricultural (horse riding, food processing, etc).

The agro-tourism is undoubtedly recognized as one of the most important tools for promoting the richness of natural and cultural heritage, while at the same time contributing to the economic development of the rural communities (Jaafar et al., 2013). Especially in developing countries, it fosters employment, improves economic structure, increases standard of living, while at the same time ensuring more balanced territorial development. Furthermore, agro-tourism also provides consistent education to people and society related to the agriculture, promotes local products, creates added value through the activities of direct marketing and stimulates economic activities (Zoto et al., 2013). Amongst the other benefits of the agro-tourism, most often cited are contributions in terms of exchanges between rural and urban areas, multiplier effects on direct investment, stimulating the development of physical infrastructure, increasing the value of properties in the area, fostering infrastructural development and creating opportunities for other economic developments.

The importance of developing agro-tourism has been recognized by both scholars and policy makers at the EU level. The Common Agricultural Policy, reformed in 2013, regulating agricultural activities and rural development, is considered to be one of the most challenging EU policies. In order to respond to a number of challenges facing agriculture in Europe (declining farm incomes, price volatility, low productivity growth rates, depopulation, etc.), the reformed CAP invited for reorientation of farming from product-centered towards more entrepreneurial modes of agriculture. In order to improve the competitiveness of the agricultural sector and its sustainability over the long term, it is thus necessary to diversify both agronomic and non-agricultural activities in the rural areas through the assimilation of new entrepreneurial skills. Most studies conducted in this field confirmed that the economic growth and the increase of the living standards in European rural areas are mostly due to the creation of new economic activities and acquisition of entrepreneurial skills for the rural population (Sima, 2016). Agro-tourism is increasingly seen as one of the most significant diversification strategies, promoting sustainable management of natural resources and viable economic development of rural areas.

Tourism in rural areas incorporates both tourism-leisure activities and traditional farming ones (McGehee, 2007). According to Roberts et al. (2001), it makes as much
as up to 10 to 20% of overall tourism activity. Every year 23% of European holidaymakers choose the countryside as a holiday destination and Council decision on Community strategic guidelines for Rural Development (2007-2013) highlighted the growth potential of tourism, crafts and the provision of rural amenities in terms of developing micro-businesses and strengthening the rural economy (Brscic, 2006). Therefore, it is essential to analyse entrepreneurial strategies generating revenues into rural areas and discuss successful entrepreneurial agro-tourist activities, their development and constraints.

Entrepreneurship is considered to be the key determinant of tourism growth (Keller, 2010) and innovations in rural tourism are recognised as a potential solution for counteracting the tendency of abandoning villages in northern regions, the reduction of the agricultural income and the aging population (Pribeanu et al., 2014). According to Sonino’s definition, entrepreneurship is in the core of agro-tourist activity, since agro-tourism refers to the “activities of hospitality performed by agricultural entrepreneurs and their family members that must remain connected and complementary to farming activities” (Sonnino, 2004). Phelan et al. (2011), McElwee (2006) and McElwee (2008) highlight the increasingly important role of entrepreneurship in developing modern farming, arguing that the farmers are requested to develop entrepreneurial skills and capabilities in order to remain competitive and diversify their activities.

Studying the motivations of the ago-tourist, Phillip et al. (2010) especially emphasized the desire for peace and tranquility, interest in nature, health consciousness, nostalgia for the roots, rural recreation, curiosity about the farming lifestyle, etc. In reference to the rural recreation, he addressed farmers’ traditions, lifestyle, culture, dresses and languages as a valuable source of entertainment for the tourists, along with the agricultural products and processes. Thus, there is a potential to develop agro-tourism products such as culinary tourism, bed and breakfast, hunting, fishing, bullock cart riding, horse riding, boating, collecting herbs and mushrooms, rural games, etc. Some of the successful income-generating entrepreneurial activities of agro-tourism in developed countries are: Farm family vacations; Bed and Breakfast; Farm tours; Picnic grounds; Herb walks; Roadside Stand selling fresh farm products and craft items, etc. Due to the extraordinary landscape potential, rural areas are perfect for orienteering activities, flora and fauna watching and photography courses. In terms of educational tourism, often cited are the activities of organizing educational tours for school children; workshops on interesting, emerging agriculture topics; farm schools teaching particular agricultural skills; arts & crafts workshops; processing of organic cheese, bread, meat, honey, etc. or traditional cooking demonstrations... Several sports activities can attract tourists to mountain countryside, such as horseback riding; cross-country skiing; fishing and hunting; mountain biking... Some other examples of agro-entrepreneurial ventures include: Wineries with Friday happy hours; Exhibition of farm equipments; Sheep Shearing, Wool Processing; Pageants; Crop Art; Miniature Village; Farm Theme Playground for Children; Gift Shop; Food Sales; Lunch Counter, and others.

**Methodology**

**Research Instrument:** The first part of the article builds on the analysis of secondary sources, related mostly to scholarly debates on entrepreneurship in agro-tourism and the relevant policy papers and analyses conducted by Government bodies, Ministries and international organisation. The second part mostly summarizes the results of the fieldwork conducted in northern Montenegrin areas of Durmitor and
Kuci in summer 2015, including over 15 semi-structured interviews with farmers aged from 30 to 60 years (12 male and 3 female respondents). Finally, the research results are partly based on the responses obtained from the semi-structured interviews conducted with 5 professionals from the tourism sector (representatives of tourist agencies and tour operators specialising in rural tourism experiences).

Data: Since rural tourism in Montenegro is still relatively under-researched phenomena and not many quantitative or qualitative data were available, this paper uses external and internal factor analysis to assess development and potential of this sector in general. As for the data used in the article, they have been mostly collected through the fieldwork or gathered through scholarly publications and policy papers drafted by relevant public bodies and foreign development agencies.

Case study selection: In addressing the obstacles hampering entrepreneurial development of agro-tourism the paper adopted a case study approach based on the research material gathered from several fieldwork trips carried out by the researchers between June and October 2015 (mostly in Kuci and Durmitor area, using mostly methods of ethnographic observation of katuns and agro-tourism enterprises and interviews with local producers and agro-tourism entrepreneurs). This research material consists of several semi-structured interviews, conducted face-to-face in Montenegrin language, as well as additional direct observations and informal discussions with farmers during the fieldworks. The selection of the areas was based on their distinctive natural, cultural and agricultural resources, susceptible to be commercialised through agro-tourism development.

Method: Through the analysis of secondary sources and information obtained by primary research, the paper explores the role of entrepreneurship in agro-tourism sector, hoping to indirectly create the awareness in society, the media, institutions, government and related authorities, of the importance of educating the local community with the entrepreneurial knowledge. In order to do so, the paper provides a comprehensive SWOT analysis of the existing situation, suggesting in the conclusion the ways to move forward.

Results

Going entrepreneurial in agro-tourism: Strengths

Choenkwan (2015) emphasized that the main determinants of the successful mountain agro-tourist offer are not only the richness of natural resources, scenic landscapes and pleasant climate (which only some regions are endowed with), but the accessibility and distance from the large population (or tourist) centre as well. In Montenegrin case, these pre-requisites seem to be fulfilled, since the climate conditions and the picturesque landscape correspond to the tourist inclinations, while at the same time being in the immediate proximity of the main roads, airports and popular seaside resorts. Moreover, the established slogan “wild beauty” and the country’s notoriety for preserved natural resources and fascinating landscapes should serve as a strong argument in promoting and developing ecological and agro-tourism in rural areas. This is especially true for katuns, temporary settlements in mountainous regions where the agricultural households stay with livestock during the summer season. This distinctive Montenegrin tradition reflects the richness of cultural and historical identity of the mountain pastures and represents an exploitable tourist resource, allowing tourists to admire the picturesque countryside while tasting traditional agro-products of superior quality and discovering local customs and heritage.
Going entrepreneurial in agro-tourism: Weaknesses

Even if the local conditions are suitable for the development of agro-tourism, it was evident from the field research that not many farmers have the skills and resources required to attract tourists into agricultural households. It should be noted that the results pointed out that the agro-tourism offer in the explored regions was extremely limited, and mostly based on offer of food and beverage. Local producers specializing in production of typical regional products (wines, prosciutto ham, cheese, olive oil, honey, etc.) are either non-aware of the possibilities to grow their business by incorporating tourism into their agricultural endeavours, or consider it to be too costly, too complicated and out-of-scope. Therefore, their activity mostly turns around traditional agricultural production and sale through roadside stands or directly to nearby restaurants and hotels. As discussed in the previous chapters, it was also evident that low levels of national and international support, depopulation, unattractive infrastructure, limited entrepreneurial knowledge and aging population further hamper development of agro-tourism in the region.

Going entrepreneurial in agro-tourism: Opportunities

When discussing possible entrepreneurial activities in these areas it is necessary to take into consideration not only the geographical position, natural potentials, local community and available infrastructure, but also the socio-demographic character and specific ethno-cultural features influencing the feasibility of the suggested solutions. In reference to all of these, some of the suggested diversification activities might include transit tourism/short breaks between 4-8 days duration (e.g. Bed & Breakfast/Bed & Bike, excursions); active tourism (e.g. hiking, biking); eco-agro tourism (e.g. organic farms, flora & fauna watching); events (e.g. local music and folklore events, celebrations); MICE (e.g. team building); gastro-tourism (e.g. cheese production, cooking, harvest, fishing); educational or scientific or volunteer agro-tourism (e.g. dry stone workshop, organic farming); cultural (e.g. gastronomy, handcraft, souvenirs) and mixed forms (e.g. katun network).

Rural areas, and specifically katuns are not only attractive in terms of natural resources and heritage potential, but also specific architecture reflecting particular ethno-cultural characteristic, unusual furniture and utilities (which should, however be arranged in accordance with minimum comfort requirements) and traditional tools used for decades in farming work, highlighting the ethnic originality and creativity. It would be thus possible to arrange some of the katuns into gift shops selling organic products such as milk, cheese or meat, into mini-museums displaying traditional costumes, farming tools and objects; restaurants suggesting traditional dishes made of locally-manufactured organic products, etc. In terms of rural tourism development in Montenegro, Moric (2013) further suggested possibility of clustering as an important tool for overcoming number of limitations of fragmented rural households, through organisation of specific trails and promoting them as attractive tourist routes.

Several successful entrepreneurial ventures already created attractive agro-tourist offer at katuns (Stara Kuca in Kucka Korita, eco-katun Stavna Andrijevica, Vranjak in Kolasin), and some even used digital innovation to promote sustainable lifestyle, nature and gastronomy of the region. American entrepreneur Brit Boone created Meanderbug, a successful platform connecting local hosts and tourists willing to stay in katuns and village cottages, explore the agro-products or natural landscapes and immerse with traditional production, mountain sports or local culture. In an interview conducted in June 2016, Brit Boone highlighted that, according to his experience, the hosts from northern Montenegrin countryside are in general knowledgeable
about the village life and attractions in the region, which allows them to provide useful recommendations to tourists. They have natural hospitality and cooking skills enabling unforgettable traditional gastro-experience. Yet, according to him, they in general lack the capacity to fix errors on-the-go, to comply with hospitality standards and to adapt their offer to tourists’ requirements. This, along with the fact that only 3% of overnights is generated in central and north part of Montenegro, is why it would be so important to address issues preventing the stronger development of agro-tourism in northern Montenegro.

**Going entrepreneurial in agro-tourism: Threats**

When addressing the obstacles to entrepreneurship in Montenegro, it is noteworthy that the communist system did not give the possibility for private ownership development (Aidis, 2005), due to which Montenegro only recently developed the environment suitable for innovation and entrepreneurship. Thus, the entrepreneurial culture is still on a relatively low level and not many households consider entrepreneurial agro-tourist ventures when planning and implementing their agricultural activities. Based on interviewers and observation, the development of agro-tourism in northern Montenegro has good growth potential, but it faces a number of threats:

1) Management capabilities are weak;
2) IT knowledge is limited;
3) Lack of funding for investment presents a major constraint;
4) Available infrastructure (e.g., internet access; transport) is deficient;
5) Government support is limited

**Discussion**

In order to further enhance the development of entrepreneurial ventures in agro-tourism, as discussed in the paper, the weakness concerning management capabilities could be overcome by promoting partnerships between agro-tourism entrepreneurs and larger tourism organizations providing management and marketing services (Frazier et al., 2004; Gaddefors, 2005). For instance, Beritelli (2011) and Go et al. (2000) report the advantages of regional level tourism marketing cooperation. Moreover, Dimitrovski et al. (2012) indicate that tourist organizations play crucial role in providing education to farmers and other stakeholders involved in rural tourism. Thus, it would be important that the results of the research are conveyed to the tourism workers and policy strategists, so that they can direct their efforts towards the identified resources and limitations.

Additionally, threats associated to the lack of IT skills could be also eliminated by partnering with relevant organizations, and providing farmers relevant IT training (which should be organized and stimulated by the Government). As indicated by Schendel et al. (2007) entrepreneurship in rural tourism could be helped by Governments through allocation of resources necessary to develop and commercialize their services. Moreover, additional trainings and seminars should be organized in order to present external funding opportunities which farmers might apply for (e.g. EU funding). As the Governments play important role in providing the essential physical infrastructure (roads, electricity networks, railways, water systems, airports), the careful allocation of resources which would stimulate rural entrepreneurship would be of the utmost importance. Finally, as we discussed the importance of entrepreneurial activities for economic growth, government should be more involved in stimulating and creating an appropriate business environment
for entrepreneurial development in agro-tourism business. More precisely, government should propose policies and programs that target specifically entrepreneurial activities in order to develop skills and capabilities necessary for starting and running businesses (Lordkipanidze et al., 2006).

Conclusion

The paper discussed most relevant tools and mechanisms for developing entrepreneurial activities in agro-tourism sector in northern Montenegro, as well as the current obstacles to this process. It can be concluded that the transition from the exclusively product-based economy of rural areas into tourism entrepreneurship requires not only the set of financial instruments and capacity building tools, but also a significant change in prevailing rural mentality and comprehensive hospitality training. This represents an important challenge for local communities in Montenegro, since creation of new opportunities can only be achieved through substantial involvement, training and education of farmers.

As discussed in previous sections, a successful entrepreneurial venture requires much more than a mere recognition of market potential, namely the capacity to invest time, effort and sources, to identify potential customers, sources of funding and commodity market for the service or product offered, to correctly evaluate business idea, costs, risks and opportunities (Pribeanu et al., 2014). Building on these conclusions and ideas, the paper suggested the framework for analysing agrotourism entrepreneurship in northern Montenegro, specifically addressing the obstacles restraining development of entrepreneurial activities in agro-tourism.

The field research and interviews conducted in 2015 and 2016 undoubtedly pointed out to the lack of entrepreneurial knowledge and hospitality awareness among the local communities in northern Montenegrin countryside. This may have important practical implications as it would be extremely relevant to raise the awareness in society, institutions, government and related authorities, of the importance of educating the local community and enhancing their entrepreneurial knowledge, as well as increasing the hospitality awareness, providing financial incentives, business infrastructure, developing public-private partnerships and fostering rural networking. Therefore, if Montenegro decides to strive towards sustainable tourism, it will have to start by providing incentives, training and support to the farmers eager to diversify their agro-activities through entrepreneurial actions. Noteworthy, the findings of this study could be useful for the design of public-support policies for this sector.

It should be noted at the very end that the study was partially based on the results obtained through the HERIC project “KATUN - Valorising the Montenegrin Katuns through sustainable development of agriculture and tourism” conducted from 2015 to 2017 by University of Montenegro. As such, the paper represents just a pilot study into the vast field of organisation of agricultural life of northern rural areas in Montenegro, aiming to provide basic understanding of the strengths, weaknesses, obstacles and threats to developing entrepreneurial agro-tourist ventures in the region. Thus, further studies in the field should focus on providing more in-depth analysis of different financial instruments that may be used for these purposes, branding of specific agro-tourist products, and policy development in the area, clustering/networking opportunities, and others.
References

About the authors

Tatjana Stanovcic holds a Ph.D. in Economics from the Faculty of Economics, University of Belgrade, Serbia, obtained in 2005. She has been a professor at the Faculty of Tourism and Hotel Management since 2006 and she held a position of the Dean of the Faculty from 2007 to 2013. She was a member of the University Senate from 2010 to 2014. She is a member of the Editorial Board of several journals, amongst which “International Scientific Journal Tourism”, “Selective Tourism”, “UTMS Journal of Economics”. Her main research interests include financial analysis, financial management and accounting. She has published over 30 scientific papers and participated in over 20 academic conferences. She is a member of several conference organizing committees and number of academic networks and societies. She has participated in over 10 projects that have been funded by national and international organizations, such as Heric, COST, Tempus, Erasmus etc.). She can be contacted at stanja@ac.me

Sanja Pekovic holds a Ph.D. in Economics from the University Paris-EST. She is Assistant Professor at the Faculty of Tourism and Hotel Management. Since October 2017, she is Director of Centre for Studies and Quality Assurance of UoM. She is a member of University Senate. Between 2006 and 2011, she was Researcher at the Center for Labor Studies (Centre d’Eudes de l’Emploi) and Lecturer at the University Paris-EST. Her research interests are within the field of quality and environmental economics, economics of innovation, applied econometrics, and on this topic she has presented studies at national and international scientific congresses, which have been published in international journals. Dr Pekovic was visiting scholar at the INRA-SupArgo (Montpellier), at the University of Montenegro (Podgorica), at the Laboratoire CNRS UMI 2615 Franco-Russe PONCELET (Moscow) and at Institute of Environment, UCLA (Los Angeles), etc. She can be contacted at psanja@ac.me

Jovana Vukcevic is research and teaching assistant at the Faculty of Tourism and Hotel Management, University of Montenegro. Previously, she was engaged as a researcher at Leipzig Graduate School Global and area studies, start-up scholar at Bielefeld University and ZEIT Stiftung's pre-doctoral fellow. She obtained her Erasmus Mundus Master degree from Charles University of Prague and EHESS Paris in the field of European studies. She also holds BA in Economics from University of Montenegro and MA in Management from University of Nice. She presented at academic conferences in Berlin, Dublin, Paris, Florence, Warsaw, etc. and participated in number of European trainings and programs. Author can be contacted at jovanav@ac.me

Djurdjica Perovic, PhD, has been a Professor at the Faculty of Tourism and Hotel Management of the University of Montenegro since 2008. She defended her thesis „The state and directions of tourism development of the Montenegrin coast in the function of a successful market appearance” at the Faculty of Science and Mathematics of the University of Novi Sad. She has been the Vice Rector at the University of Montenegro since November 2017. Previously she was the Dean of the Faculty of Tourism and Hospitality since 2013. Her research fields are: Tourism, Tourist Regions, Cultural Tourism and Selective Forms of Tourism. She has published more than 30 papers and she has participated at more than 20 science conferences. She is the author and co-author on two monographs. She has experience in Heric, IPA, Erasmus+ and bilateral projects. She was a visiting professor at “MESI” University and Russian New University from Moscow. She can be contacted at duda@ac.me
The Effect of Government Subsidy on Non-Technological Innovation and Firm Performance in the Service Sector: Evidence from Germany

Shoaib Abdul Basit, Thomas Kuhn
Faculty of Economics and Business Administration, Technische Universität Chemnitz, Germany
Mumtaz Ahmed
Department of Management Sciences, COMSATS Institute of Information Technology, Islamabad, Pakistan

Abstract

Background: To enhance the innovation activities at the firm level, government subsidies play an important role. Objectives: The objective of the study is to explore whether firms in service sector that receive government subsidies engage more in marketing and organizational innovation activities than their counterparts. Second, focusing on the subsidized firms in the service sector, the impact of innovations (marketing as well as organizational) on firm performance—measured as the probability of submitted copyright applications by firms, has been analyzed. Methods/Approach: The propensity score matching approach and probit model have been used to analyze the innovation activities of subsidized and non-subsidized firms. The empirical analysis is based on the micro level data from Mannheim Innovation Panel, covering the Community Innovation Survey of 2011. Results: Empirical results show that public subsidy has a significant positive effect on marketing and organizational innovation. In addition, within the firms that have received government subsidy, the impact of only marketing innovation is found to be significant on firm performance. Conclusions: These findings employ that subsidized firms are more likely to perform better than their counterparts. Furthermore, public subsidy programs increase the probability of applying for a copyright in small and medium firms.

Keywords: marketing and organizational innovation; firm performance; subsidy; propensity score matching; kernel matching; nearest neighbor matching; radius matching

JEL classification: O3, O30

Paper type: Research article

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Introduction

Government funding policy for Research and Development (R&D) and innovation activities is an important phenomenon in most of the countries. The role of government to provide subsidy for business innovation is very influential because of technological innovation that contributes to growth in national competitiveness (Kim et al., 2016). In modern economies, most of the countries have decided to correct for the existence of market failure by assisting business financed R&D through direct as well as indirect grants.

Several studies have shown the positive relationship between subsidy and innovation (Buson Piquer, 1991; Fernández et al., 1995). Hall et al. (2009) point out that subsidy recipient firms boost the R&D effort. In addition, product innovation positively effects the firms’ labor productivity while process innovation has a bigger impact through the associated investment. Li et al. (2010) analyze the Chinese provincial panel data for the years 2001-2008 and find that public R&D subsidies have a significant interval effect on firm’s innovation performance. Some scholars argue that government supports to enhance firm innovation activities by providing soft loans, tax incentives and subsidies and it encouraging to the increased innovation activities at firm level (Beugelsdijk et al., 2002; Romijn et al., 2002; Souitaris, 2002 among others).

Most of the studies on innovation have focused on the manufacturing sector e.g., Haned et al., (2014) for France; Czarnitzki et al., (2011) for Canada; Becker et al. (2004) for Germany; Hussinger (2008) for Germany; Almus et al. (2003) for Germany; Peters et al., (2013) for Germany; Arvanitis et al. (2013) for Switzerland; Cozza et al. (2012) for Italy; Carboni (2017) for European countries including Germany, Austria, UK, Italy, France, Spain and Hungary. Moreover, Becheikh et al. (2006) provide a review of existing literature on innovation in manufacturing sectors over the period 1993 to 2003 and claim that around 81% of the existing studies on this subject either focused on product or on process or on both types of innovation activities.

A major part of the literature focuses on analyzing the impact of government subsidies on innovation in general, however, only few studies on this subject are available for the service sector. For instance, Czarnitzki et al. (2001) identify the relation among public R&D grants and innovation activities of German service firms and propose that innovation activities increase the company’s success in applying for future R&D grants. However, the issue of marketing and organizational innovation in the service sector has not been considered. Later, Czarnitzki et al. (2002) examine the impact of innovation subsidies in German service sector and find that the recipients of innovation funding’s have a remarkably higher innovation concentration as compared to non-recipients. Further, findings reveal that, on average, the innovation intensity of subsidized firms is almost six percentage points higher than that of non-subsidized firms. Similarly, Liu et al. (2016) analyze the effects of different public subsidies including regional, national, and European funded programs on both product and process innovation and on export performance by considering small and medium enterprises in German manufacturing and service sectors. Using a panel data from Mannheim Innovation Panel (MIP) over the period 2001-2014, Liu et al. (2016) find that government financial support gives a higher innovation output, and in later years this reserved into an increase rate of export success. However, this relationship required the certain types of government support and it holds for some specific types of innovation output. Le et al. (2016) point out that R&D grant recipient firms from manufacturing and service sectors significantly increase the probability of patent applications during 2005 and 2009, however, no positive effect on trademark applications is found. Recently, Kim et al. (2016) reveal that in-house R&D activities are crucial factors in case of product innovation for both large as well as small medium
enterprises in the Korean service sector suggesting that the government support program has a remarkable impact on product innovation.

From the thorough review of literature, it is observed that the impact of public subsidy on marketing and organizational innovation has been completely ignored in the existing literature, in particular with regard to the role of marketing and organizational innovation for the service sector. This motivates us to dig out this issue by providing a deeper analysis on firms that receive subsidies by focusing particularly on firms in the service sector. Specifically, the objective is to know if firms that receive subsidy engage more in marketing and organizational innovation activities than non-subsidized firms. In addition, the impact of marketing as well as organizational innovation on firm performance (taking copyright as a proxy for firm performance) will be analyzed. To our knowledge this is the first study taking into consideration copyright as a proxy for the measurement of firm performance in the service sector. The empirical analysis is carried out using Mannheim Innovation Panel 2011 survey data and making use of probit and propensity score matching method (PSM). The treatment effects of public subsidy are estimated by comparing treated firms (the firms that receive subsidy) with untreated (the firms that do not receive subsidy). In addition, a probit model is used to access the effect of marketing and organizational innovation on copyright applications in services industries.

The remaining paper is laid as follows:
Section 2 provides the literature review while section 3 discusses the econometric approach, data, and descriptive statistics of key variables used in the analysis. Section 4 elaborates the empirical results while the last section describes the concluding remarks and some policy implications.

**Literature review**

The government role in providing subsidies for business innovation is influential because technological innovation contributes to growth and national competitiveness (Branstetter et al., 2002; Kim et al., 2016; Le et al., 2016). Romer (1989) considers innovation as an essential source of economic growth.

Nowadays, services play a key role in the economic development. Duchene et al., (2009) reveal that in the United States (US) and Europe (EU), the share of services is almost three quarters of total value added and it is still growing. In fact, a structural shift is observed from manufacturing to services in five economies including Poland, Slovak Republic, Czech Republic, Slovenia and Hungary (Hanzl-Weiss et al., 2010). Some other studies point out that due to relation of their competitiveness and profitability, the importance of service innovation has increased (see for example, Cainelli et al., 2004; Van Riel et al., 2004; Etche et al., 2008, among others).

Public subsidy for research and development is a representative incentive to enhance innovation activities at the firm level (Herrera et al., 2008). Further, Bérubé et al. (2009) reveal that those Canadian firms that benefit from research and development grants as well as tax credits perform better in innovation activities (especially introduced the new goods to the market) than those firms that get benefit from R&D tax credits only. Similarly, Czarnitzki et al. (2011) elaborate that R&D tax credit has a positive impact on the number of improved products that introduced by the beneficiary firms in Canada. Bozic et al. (2016) compare the determinants of innovation activities of Croatian manufacturing and service SMEs and find that the recipients of public funding engage more into the product innovation in services SMEs than manufacturing SMEs while the public funding recipients from the manufacturing SMEs engage more in process innovation. Wang et al. (2017) analyze the impact of state innovation funding programs by the Chinese government on firm performance.
and find that grant recipient firms survive longer and do more patent than non-recipients.

Considering previous studies, many scholars demonstrate that public subsidy has a positive influence on product or process innovation (see Czarnitzki et al., 2011; Kim et al., 2016; Bérubé et al., 2009; Hall et al., 2009). Le et al. (2016) point out that R&D grant recipients increase the probability that a firm introduces new goods or services into the world market whereas its impacts on product and process innovation are comparatively weaker. It is argued that public subsidy has a significant impact on non-technology innovation (organizational and marketing innovation).

Thus, based on the existent literature, following hypotheses are proposed and tested empirically:

**Hypothesis 1**

“Service firms that receive public subsidy engage more in marketing and organizational innovation activities than non-subsidized firms”.

Government policy in terms of support to innovation is very influential for SMEs to become and remain innovative. Without the government support, SMEs are incapable to do innovation (Keizer et al., 2002). It is important to explore the impact of government policy on firm innovation performance. Bronzini et al. (2016) analyze the effect of R&D subsidy programs in northern Italian regions on the innovation activities of subsidized firms. They find that subsidy programs have remarkable effect on the number of patenting applications of subsidized firms. Similarly, Czarnitzki et al. (2006) investigate the effect of public R&D grants on firms’ innovation activities in Germany and suggest that subsidy has a positive influence on firms’ patenting activities. Czarnitzki et al. (2014) examine the two different sources of funding (such as national as well as European funding) impact on innovation input and output of German firms and notice that both funding sources including national and European grants enhance to a considerable innovation input in the economy. In case of innovation output subsidized firms are more active patentees as well as more likely to file a patent. In addition, Doh et al. (2014) investigate the public funding on innovation activities in small and medium enterprises in South Korea and show that a positive relation among technological development assistance by the Korean government and innovative design registration as well patent acquisition of SMEs exists.

Moreover, Sandvik et al. (2003) analyzes that market innovation has a positive impact on firm sales and growth. Similarly, Otero-Neira et al. (2009) also discover that market innovation has a positive influence on business performance. Further, Polder et al. (2010) reveal that for economic and commercial success, organizational innovation plays a key role. According to Lam (2005), organizational innovation is an essential pre-condition of technological (product and process) innovation. Lokshin et al. (2008) suggest that organizational innovation boost the creativity and flexibility of firms and assists the progress of technological innovations. Johne et al. (2000) reveal that marketing innovation enhances sales by increase in demand for product consumption and this factor leads to an additional profit towards firms.

Note that, all studies mentioned above claim that R&D subsidy has a significant effect on firms’ patent and innovation activities but do not provide any evidence on the effect of public R&D subsidies on copyright application activities of the firms. Additionally, most of the studies discuss about the effect of non-technological innovation on firm performance, sales, and/or technological innovation. However, none of these existing studies has focused on examining the impact of non-technological innovations on firm performance in terms of probability of submitted
copyright applications. This is what is considered in this study and the same issue is tested by formulating the following hypothesis:

Hypothesis 2
“Within the subsidized firms in the service sector, marketing as well as organizational innovation are positively associated with firm performance as compared to non-subsidized firms”.

In the existing literature, several studies use the number of patents and/or registered patent applications as a proxy to measure innovation output or firm performance (Albors-Garrigos et al., 2011). Patent is a specific type of intellectual property right (IPR) usually used as a protection to the innovation. In addition, patents give a right on the creation of new work. It is difficult for a firm to get a patent and it is a costly as well as time consuming process. Rogers (1998) discusses the definition and measure of innovation at firm level, pointing out that a firm can use a patent up to 20 years. Copyright is also another type of IPR used to protect the original work of an inventor. Copyright applies automatically and legally protects the inventor normally till 50 years (Rogers, 1998). Moreover, there is no need of registration of copyrights. For instance, copyright could be applied automatically on work, music, software, piece of written paper etc.

The present study focuses on the service sector firms only. Since the service sector includes several key industries including: “Whole Sale Services, Transport/Post Services, Media Services, IT Services, Financial Services, Technical Services, Business Services, R&D services, Firm Related Services, Banking and Insurance” and most of the service firms use copyrights to protect their innovation or creation of new work. So, the present study has a valid reason to use copyright as a measure of firm performance.

Methodology
Two routes are adopted to test each hypothesis. More specifically, the first hypothesis requires one to estimate the differences in outcomes among recipients of the government subsidies and non-recipients of subsidies. In the empirical analysis, in order to assess the public subsidy effect, it’s very important to avoid the potential selection bias. Various econometrics methods can be applied to avoid the selection bias, including difference in difference (DID) estimation method, instrumental variables (IV) as well as matching method and selection model as well. However, the DID estimation cannot be applied for cross-sectional dataset. To correlate the treatment variables not the output variables, IV methods as well as selection methods require instrumental variables. Keeping the above mentioned points into account, the present study applies the matching method introduced by Rosenbaum et al. (1983) and developed by Heckman et al., (1997, 1998). It is an advantage that a specific function form is not needed to be assumed in matching method while the addressing of endogeneity problem. To test the second hypothesis, probit regression is applied. This is because our output variable (copyright application) in the second hypothesis is a binary variable, so in this case Probit regression is the suitable method.

Matching Method
Following Caliendo et al. (2008), the matching approach is described as follows:
In a binary variable, the treatment indicator \( B_i \) equals ‘1’ if firms receive public R&D subsidy and ‘0’ if firms do not receive public R&D subsidy. For each individual firm ‘i’, the potential outcomes is \( Y_i(B_i) \). In this paper, \( Y_i \) is used in two different forms: (I)
marketing innovation, and, (ii) organizational innovation. The treatment effect is described for every individual firm ‘i’ as follows:

\[ \tau_i = Y_i(1) - Y_i(0). \] (1)

It is important to note that the counterfactual outcome, \( Y_i(0) \), cannot be observed. Hence, estimation of \( \tau_i \) is not possible and thus the estimation of average treatment effect (ATE) is needed. ATE shows the difference among the recipient and non-recipient expected outcomes.

\[ \tau_{ATE} = E[Y_i(1) - Y_i(0)]. \] (2)

It is important to note that, ATE covers those firms as well for which there was no intention of implementing the program, and thus this measure may not be relevant. Thus, a new measure is needed that can estimate the impact on those firms for which the program is actually proposed. This new measure is called average treatment effect on treated (ATT) and can be explained as:

\[ \tau_{ATT} = E[Y_i(1)|B = 1] - E[Y_i(0)|B = 1] \] (3)

Note that, in (3) above, \( E[Y_i(0)|B = 1] \) cannot be observed being the counterfactual mean. But one can generate the selection bias, (last two terms in equation 4 below), via \( E[Y_i(0)|B = 0] \), given as:

\[ E[Y_i(1)|B = 1] - E[Y_i(0)|B = 0] = \tau_{ATT} + E[Y_i(0)|B = 1] - E[Y_i(0)|B = 0] \] (4)

When the selection bias is zero, \( \tau_{ATT} \) can be estimated accurately. The condition of zero selection bias does not hold in non-experimental studies, though it holds true in random experiments. To overcome the selection bias problem, conditional independence assumption (CIA) is needed and it is suggested by Rubin (1974). CIA presumes independence of potential outcomes and recipients for firms that have the same exogenous variables \( X \) (those variables that potentially affect the receiving of public R&D support). The following expression grants permission of replacing counterfactual outcome for non-recipient’s outcome when CIA holds (provided there does not exist any systematic difference between non-recipient and recipient):

\[ E[Y_i(0)|B = 1, X] = E[Y_i(0)|B = 0, X] \] (5)

This leads us to re-write equation (3) as:

\[ \tau_{ATT} = E[Y_i(1)|B = 1, X = x] - E[Y_i(0)|B = 0, X = x] . \] (6)

As discussed above, in the present paper, \( Y_i \) is used in two different forms, a) marketing innovation b) organizational innovation. The ATT for \( Y_1 \) (marketing innovation) as well as \( Y_2 \) (organizational innovation) is given in equation (7) and (8) below:

\[ \tau_{1ATT} = E[Y_{1i}(1)|B = 1, X = x] - E[Y_{1i}(0)|B = 0, X = x] \] (7)

\[ \tau_{2ATT} = E[Y_{2i}(1)|B = 1, X = x] - E[Y_{2i}(0)|B = 0, X = x] \] (8)
The Matching Method approach (Rubin, 1974) is chosen to be used to analyse the difference in outcomes of non-recipients and recipients. Rosenbaum et al. (1983) propose the usage of the balancing property score approach to build a valid control group in case of several variate as in this case. Generally, it is not possible to match recipients and identical non-recipients. The present study uses three popular matching methods: a) kernel matching, b) nearest-neighbor matching, and c) radius matching. Kernel matching is a non-parametric approach which use the weighted average of all observations in the non-recipient (control group) to construct the counterfactual outcome. Kernel matching requires to select the kernel function as well as the bandwidth—the former is relatively less important than the latter which is crucial due to the trade-off among variance and bias of estimates, while small variance and large bias are induced in high bandwidth. The Epanechnikov’s kernel function with 0.05 as bandwidth is used to match the recipients with the control group (the subsidized vs. non-subsidized firms). The nearest-neighbor matching identifies the nearest firms on the bases of propensity score. Selection of K imposes a tradeoff between bias as well as variance, where greater k guide to small variance and big bias. Based on previous literatures we select k=7. In radius method bad matches could be prevented through the selection of the level of tolerance at the maximum propensity score range and we use 0.05 as the level of tolerance. In the existing literature, no clear-cut matching method is superior, therefore, the empirical analysis is carried out through using three matching methods, and a comparison is also provided. The results of the propensity score matching method (kernel, nearest neighbor and caliper) retrieved from the probit model are provided in Table 4-5 for small as well as for medium firms.

Data and its Sources

Table 1
Definition of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Innovation</td>
<td>1 if firm introduces marketing innovation and 0 otherwise</td>
</tr>
<tr>
<td>Organizational Innovation</td>
<td>1 if firm introduces organizational innovation and 0 otherwise</td>
</tr>
<tr>
<td>Public R&amp;D Subsidy</td>
<td>1 if firm receives local, national, EU and 0 otherwise</td>
</tr>
<tr>
<td>Copyright Application</td>
<td>1 if firm uses copyright and 0 otherwise</td>
</tr>
<tr>
<td>Graduate Employee</td>
<td>1 if number of graduate employees are less than 100 and 0 otherwise</td>
</tr>
<tr>
<td>Small Firms</td>
<td>1 if firm has less than 50 employee and 0 otherwise</td>
</tr>
<tr>
<td>Medium Firms</td>
<td>1 if firm has 50 to 249 employees and 0 otherwise</td>
</tr>
<tr>
<td>Large Firms</td>
<td>1 if firm has 250 or more employees and 0 otherwise</td>
</tr>
<tr>
<td>National market</td>
<td>1 if firm performs in national market environment and 0 otherwise</td>
</tr>
<tr>
<td>Eastern Germany</td>
<td>1 if firm is placed in Eastern part of Germany and 0 otherwise</td>
</tr>
<tr>
<td>Whole Sale Services Firms</td>
<td>1 for whole sale firms and 0 otherwise</td>
</tr>
<tr>
<td>Transport/Post Services</td>
<td>1 for transportation service firms &amp; 0 otherwise</td>
</tr>
<tr>
<td>Media Services</td>
<td>1 for Media service firms and 0 otherwise</td>
</tr>
<tr>
<td>IT Services</td>
<td>1 for IT service firms and 0 otherwise</td>
</tr>
<tr>
<td>Finance Services</td>
<td>1 for finance service firms &amp; 0 otherwise</td>
</tr>
<tr>
<td>Technical Services</td>
<td>1 for technical service firms and 0 otherwise</td>
</tr>
<tr>
<td>Business Services</td>
<td>1 for business service firms and 0 otherwise</td>
</tr>
</tbody>
</table>

Source: Authors’ work
The present study uses micro data of German service sectors firms from 2011 Mannheim Innovation Panel (MIP) survey organized by the Centre of European Economic Research (ZEW) with the cooperation of the German Ministry of Education and Research (BMBF). MIP survey collects information on innovation activities and R&D and it asks from the respondent firms if they have received any government funding for innovation as well as various sources of funding. All types of public R&D subsidies such as local, national, federal and EU level are considered. The analysis is done on subgroups of firms (small, medium and large) to get a deeper picture at the firm level. The discussion of relevant variables is provided in Table 1.

**Dependent and Independent Variables**
The present study contains two parts of analysis one for each of hypothesis 1 and hypothesis 2. In the first part of analysis, the organizational innovations as well as marketing innovations are taken as dependent variables while subsidy is considered as an independent variable. For the second part of our analysis, firm performance is considered as a dependent variable, measured as the probability of submitted copyright application by firms due to new methods of marketing innovation or new organizational methods, while marketing and organizational innovation are independent variables.

**Control Variables**
Firm specific control variables are essential to properly separate the casual effect of R&D subsidy. In analysis, several control variables are used that might have an impact on the outcome variables stated above. Several basic variables are used as controls including firm size on the base of total employment and number of graduate employees following Reinkowski et al. (2010), firm geographical market location following (Almus et al., 2003) and Eastern Germany as an additional control to analyze the impact of the reunification of Germany in 1990. Due to a change from the planned economy to the market economy, Eastern German companies get benefits from special conditions in case of government support (Czarnitzki et al., 2014). Finally, several service industry dummies are also included as controls (see Table1 for detailed discussion and construction of these control variables).

**Descriptive Statistics**
Table 2 presents the descriptive statistics for public subsidy recipients and non-recipients in small medium and large firms in the service sector. It is noted that in subsidized firms, the average of marketing innovation, organizational innovation and copyright application are higher as compared to non-subsidized firms. The difference in average may be due to the selection bias which must be corrected while assessing the public subsidy effects.

Further, Table 2 shows the remaining variables as exogenous covariates X. In order to fulfil the conditional independence assumption, covariate X should contain those variables that have potential effect on receiving the subsidy. In the present study, the following variables are used as X: number of graduate employees, firm size (small and medium), service sector dummies and a dummy for Eastern Germany. The average number of graduate employees of public subsidy recipients is bigger than that of the non-recipients.

Besides examining the full sample, the effect of government R&D subsidy is also analyzed at different firm sizes (small, medium and large). As Kim et al. (2016) analyze the effect of R&D activities on product innovation in Korean service sector and find
that for product innovation internal R&D activities are the most significant factors for large as well as small medium enterprise (SMEs). The same study also reveals that public funding programs have remarkable impact on product innovation but only in case of SMEs. Similarly, another Korean study investigate the effect of public financial support programs on innovation activities of SMEs and find that a significant relationship exists between public support programs and technological innovation (Doh et al., 2014). Bozic et al. (2016) compare the innovation determinants in manufacturing as well as service sector among small and medium sized firms in Croatia. The results suggest that R&D matters for product innovation, however, firm size does not have any effect on both innovation types (i.e. product and process) in any of the sectors.

Table 2
Descriptive Statistics across Firm Size

<table>
<thead>
<tr>
<th>Variables</th>
<th>Small firms (Less than 50 Employees)</th>
<th>Medium firms (50 to 250 Employees)</th>
<th>Large firms (more than 250 Employees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public funding recipients</td>
<td>Non-recipients</td>
<td>Public funding recipients</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Marketing Innovation</td>
<td>Mean: 0.500 SD: 0.502</td>
<td>Mean: 0.296 SD: 0.457</td>
<td>Mean: 0.571 SD: 0.501</td>
</tr>
<tr>
<td>Organizational Innovation</td>
<td>Mean: 0.533 SD: 0.501</td>
<td>Mean: 0.268 SD: 0.443</td>
<td>Mean: 0.762 SD: 0.431</td>
</tr>
<tr>
<td>Copyright Application</td>
<td>Mean: 0.197 SD: 0.399</td>
<td>Mean: 0.070 SD: 0.255</td>
<td>Mean: 0.179 SD: 0.389</td>
</tr>
<tr>
<td>Graduated Employees</td>
<td>Mean: 0.910 SD: 0.288</td>
<td>Mean: 0.674 SD: 0.469</td>
<td>Mean: 0.974 SD: 0.160</td>
</tr>
<tr>
<td>National Market</td>
<td>Mean: 0.874 SD: 0.333</td>
<td>Mean: 0.605 SD: 0.489</td>
<td>Mean: 0.865 SD: 0.347</td>
</tr>
<tr>
<td>Eastern Germany</td>
<td>Mean: 0.625 SD: 0.486</td>
<td>Mean: 0.391 SD: 0.488</td>
<td>Mean: 0.381 SD: 0.492</td>
</tr>
<tr>
<td>Wholesale</td>
<td>Mean: 0.044 SD: 0.206</td>
<td>Mean: 0.117 SD: 0.321</td>
<td>Mean: 0.024 SD: 0.154</td>
</tr>
<tr>
<td>Transport/Post Services</td>
<td>Mean: 0.051 SD: 0.222</td>
<td>Mean: 0.238 SD: 0.426</td>
<td>Mean: 0.143 SD: 0.354</td>
</tr>
<tr>
<td>Media Services</td>
<td>Mean: 0.059 SD: 0.236</td>
<td>Mean: 0.065 SD: 0.246</td>
<td>Mean: 0.071 SD: 0.261</td>
</tr>
<tr>
<td>IT Services</td>
<td>Mean: 0.279 SD: 0.450</td>
<td>Mean: 0.049 SD: 0.216</td>
<td>Mean: 0.167 SD: 0.377</td>
</tr>
<tr>
<td>Financial Services</td>
<td>Mean: 0.007 SD: 0.086</td>
<td>Mean: 0.068 SD: 0.251</td>
<td>Mean: 0.024 SD: 0.154</td>
</tr>
<tr>
<td>Technical Services</td>
<td>Mean: 0.456 SD: 0.500</td>
<td>Mean: 0.180 SD: 0.384</td>
<td>Mean: 0.524 SD: 0.505</td>
</tr>
<tr>
<td>Business Services</td>
<td>Mean: 0.044 SD: 0.206</td>
<td>Mean: 0.109 SD: 0.311</td>
<td>Mean: 0.048 SD: 0.216</td>
</tr>
<tr>
<td>Sample Size</td>
<td>Mean: 136 SD: 635</td>
<td>Mean: 42 SD: 156</td>
<td>Mean: 14 SD: 56</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Results

The findings by the application of probit regression showing the impact of different variables is provided in Table 3. More specifically, Table 3 provides findings for marketing and organizational innovation across different firm sizes (small, medium and large). It can be seen that the impact of government R&D subsidy on marketing and organizational innovation is positive and highly significant in small as well as in medium sized firms. This result indicates that in small and medium firm’s subsidy significantly increases the likelihood that a firm performs marketing and organizational innovation. In case of large firms, it has an opposite but insignificant sign. The positive sign for large firms can be attributed to several reasons. One probable reason can be that the total number of firms in the large firms that receive subsidy is very low as compared to large firms that do not receive any subsidy (see Table 2, only 14 firms receive...
subsidy). Thus, the impact of subsidy may get diluted by the non-subsidized firms. In addition, graduate employees in small firms and media services in medium firms are positively associated with marketing and organizational innovation. The p-value of LR statistics is less than 1%, suggesting that all variables are jointly significant as well, both in small and medium firms. Thus, the first hypothesis holds for small and medium firms but it doesn’t hold for large firms.

These empirical findings are broadly in line with previous literature finding positive impacts of public R&D subsidy on product and/or process innovation (for instance, Czarnitzki et al., 2011; Kim et al., 2016; Bérubé et al., 2009). The empirical findings are in contrast with Bozic et al. (2016) showing that R&D matters for product innovation but firm size has no influence on both types of innovations in the manufacturing and service sector. In contrast, in this study, firm size matters. Further, Bozic et al. (2016) elaborate that marketing innovations are less likely to introduce in services firms that operating in technology intensive sector and new services are more likely to promote in service sector. However, our results suggest that small as well as medium service firms are more likely to introduce new marketing and organizational innovation.

Table 3
Estimation Results of Probit Model among Firm Size

<table>
<thead>
<tr>
<th>Variables</th>
<th>Small firms (Less than 50 Employees)</th>
<th>Medium firms (50 to 250 Employees)</th>
<th>Large firms (more than 250 Employees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Marketing Innovation</td>
<td>Organizational Innovation</td>
<td>Marketing Innovation</td>
</tr>
<tr>
<td>Subsidy</td>
<td>0.560*** (0.146)</td>
<td>0.620*** (0.146)</td>
<td>0.919*** (0.333)</td>
</tr>
<tr>
<td>Graduate Employees</td>
<td>0.356*** (0.132)</td>
<td>0.441*** (0.138)</td>
<td>0.507 (0.409)</td>
</tr>
<tr>
<td>National Market</td>
<td>0.063 (0.116)</td>
<td>0.196* (0.119)</td>
<td>0.091 (0.263)</td>
</tr>
<tr>
<td>Eastern Germany</td>
<td>0.033 (0.108)</td>
<td>0.114 (0.111)</td>
<td>0.029 (0.239)</td>
</tr>
<tr>
<td>Transport/Pos</td>
<td>0.305* (0.162)</td>
<td>-0.084 (0.168)</td>
<td>0.192 (0.359)</td>
</tr>
<tr>
<td>IT Services</td>
<td>-0.071 (0.228)</td>
<td>0.084 (0.232)</td>
<td>1.230** (0.553)</td>
</tr>
<tr>
<td>Financial Services</td>
<td>-0.247 (0.205)</td>
<td>-0.029 (0.210)</td>
<td>0.390 (0.500)</td>
</tr>
<tr>
<td>Technical Services</td>
<td>-0.370 (0.240)</td>
<td>0.473** (0.227)</td>
<td>0.636 (0.552)</td>
</tr>
<tr>
<td>Business Services</td>
<td>-0.486*** (0.157)</td>
<td>-0.317** (0.160)</td>
<td>-0.429 (0.463)</td>
</tr>
<tr>
<td>Coef.</td>
<td>-0.013 (0.194)</td>
<td>0.256 (0.201)</td>
<td>0.054 (0.418)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.622*** (0.146)</td>
<td>-1.051*** (0.157)</td>
<td>-1.283** (0.534)</td>
</tr>
<tr>
<td>LR statistics</td>
<td>40.84 (0.004)</td>
<td>56.61 (0.000)</td>
<td>23.36 (0.010)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.048</td>
<td>0.069</td>
<td>0.119</td>
</tr>
<tr>
<td>Observations</td>
<td>657</td>
<td>651</td>
<td>152</td>
</tr>
</tbody>
</table>

Note: Standard errors are in parentheses; ***, ** and * respectively denote significance at 1%, 5% and 10% significance level

Source: Authors’ work
**Empirical Results**

Tables 4 and 5 present the estimation results from matching methods (kernel and nearest neighbor and radius). In table 4 the first part shows the results from kernel matching and the middle part displays the K-nearest neighbor matching method results. Finally, the last part describes the findings of radius matching, whereas unmatched explains the difference in marketing and organizational innovation between non-recipients and recipients before matching and ATT (estimated via propensity score matching) shows the average treatment effect in the treated observations.

**Table 4**

<table>
<thead>
<tr>
<th>Output Variables</th>
<th>Sample</th>
<th>Treated</th>
<th>Controls</th>
<th>Difference</th>
<th>S.E.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kernel</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing innovation</td>
<td>Unmatched</td>
<td>0.508</td>
<td>0.298</td>
<td>0.210</td>
<td>0.047</td>
<td>4.51</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.508</td>
<td>0.281</td>
<td>0.227</td>
<td>0.061</td>
<td>3.72</td>
</tr>
<tr>
<td>Organizational innovation</td>
<td>Unmatched</td>
<td>0.532</td>
<td>0.279</td>
<td>0.253</td>
<td>0.046</td>
<td>5.53</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.532</td>
<td>0.312</td>
<td>0.220</td>
<td>0.060</td>
<td>3.65</td>
</tr>
<tr>
<td><strong>K-Nearest neighbor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing innovation</td>
<td>Unmatched</td>
<td>0.508</td>
<td>0.298</td>
<td>0.210</td>
<td>0.047</td>
<td>4.51</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.508</td>
<td>0.291</td>
<td>0.217</td>
<td>0.081</td>
<td>2.68</td>
</tr>
<tr>
<td>Organizational innovation</td>
<td>Unmatched</td>
<td>0.532</td>
<td>0.279</td>
<td>0.253</td>
<td>0.046</td>
<td>5.53</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.532</td>
<td>0.268</td>
<td>0.264</td>
<td>0.076</td>
<td>3.47</td>
</tr>
<tr>
<td><strong>Radius</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing innovation</td>
<td>Unmatched</td>
<td>0.508</td>
<td>0.298</td>
<td>0.210</td>
<td>0.047</td>
<td>4.51</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.508</td>
<td>0.281</td>
<td>0.227</td>
<td>0.061</td>
<td>3.73</td>
</tr>
<tr>
<td>Organizational innovation</td>
<td>Unmatched</td>
<td>0.532</td>
<td>0.279</td>
<td>0.253</td>
<td>0.046</td>
<td>5.53</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.532</td>
<td>0.310</td>
<td>0.222</td>
<td>0.060</td>
<td>3.68</td>
</tr>
</tbody>
</table>

Source: Authors' work

The fourth column of Table 4 shows the average of marketing and organizational innovation which receive the treatment (subsidized firms) while the fifth column exhibits the control group (non-subsidized). The sixth column presents the difference among fourth and fifth column while the seventh column contains standard error of the differences. Whereas, the t-value for the equivalence of difference in average among two groups are presented in the last column.

Overall, subsidy has a significant as well as positive effect on marketing innovation for small and medium sized firms. Since the number of subsidized firms is low for large firms (only 14 firms have received subsidy), so the overall impact of subsidized firms gets diluted in case of large firms. The results of kernel, nearest neighbor and radius matching suggest that the effect of subsidy on marketing and organizational innovation is positive and significant for small firms while in case of medium firms this is true only for organizational innovation.

In sum, selection bias is corrected through propensity score matching methods (i.e., kernel and nearest neighbor and radius). In all matching methods the estimated average treatment effect on treated (ATTs) is statistically significant and positive for
the case of small firms for both marketing and organizational innovation, whereas in case of medium firms this again holds for organizational innovation only. These results imply that R&D subsidy effects vary with the firm size. Similarly, results are in line with Bronzini et al. (2016), revealing that in small firms R&D support program has remarkable effect on the number of patenting applications in subsidized firms. In addition, empirical results are in line with Le et al. (2016) indicating that public R&D grant reception has differential effect in small to medium firms.

Table 5  
Treatment Effects of Subsidy on Marketing and Organizational Innovation (Medium Firms)

<table>
<thead>
<tr>
<th>Output Variables</th>
<th>Sample</th>
<th>Treated</th>
<th>Controls</th>
<th>Difference</th>
<th>S.E.</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing innovation</td>
<td>Unmatched</td>
<td>0.571</td>
<td>0.276</td>
<td>0.296</td>
<td>0.089</td>
<td>3.32</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.571</td>
<td>0.488</td>
<td>0.083</td>
<td>0.149</td>
<td>0.56</td>
</tr>
<tr>
<td>Organizational innovation</td>
<td>Unmatched</td>
<td>0.743</td>
<td>0.371</td>
<td>0.372</td>
<td>0.092</td>
<td>4.06</td>
</tr>
<tr>
<td></td>
<td>ATT</td>
<td>0.743</td>
<td>0.274</td>
<td>0.469</td>
<td>0.152</td>
<td>3.08</td>
</tr>
</tbody>
</table>

Source: Authors’ work

Test of Balancing Property
As explained in section 3 above, one must check that the means of covariates should not differ statistically significant from the zero among recipient as well as non-recipient groups. Matching estimates can be considered as reliable if the means of covariates do not differ significantly.

Table 6 presents the mean covariates of every group before and after matching, and in addition it provides the t-test for mean sample values across the two groups along with the corresponding p-value. Most importantly, among recipient as well as non-recipient, before matching (the unmatched), the means of many covariates differ statistically. In the unmatched case, the findings show that in both groups (treated as well as control groups) usually do not have the same characteristics. However, after matching (in all methods), the mean difference among non-recipients and recipients is equal in all covariates, lending support to the null hypothesis of equality of means across the two groups.
Table 6
Test for Matching Covariates via Balancing Property: Test Statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Kernel Mean</th>
<th>T-test</th>
<th>K nearest neighbour Mean</th>
<th>T-test</th>
<th>Radius Mean</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treated</td>
<td>Control</td>
<td>Treated</td>
<td>Control</td>
<td>Treated</td>
<td>Control</td>
</tr>
<tr>
<td>Graduate Employees</td>
<td>0.924</td>
<td>0.714</td>
<td>5.870</td>
<td>0.000</td>
<td>0.924</td>
<td>0.714</td>
</tr>
<tr>
<td>National Market</td>
<td>0.872</td>
<td>0.597</td>
<td>6.810</td>
<td>0.000</td>
<td>0.872</td>
<td>0.597</td>
</tr>
<tr>
<td>Eastern Germany</td>
<td>0.567</td>
<td>0.390</td>
<td>4.370</td>
<td>0.000</td>
<td>0.567</td>
<td>0.390</td>
</tr>
<tr>
<td>Transportation Services</td>
<td>0.073</td>
<td>0.259</td>
<td>-5.430</td>
<td>0.000</td>
<td>0.073</td>
<td>0.259</td>
</tr>
<tr>
<td>Media Services</td>
<td>0.062</td>
<td>0.064</td>
<td>-0.090</td>
<td>0.925</td>
<td>0.062</td>
<td>0.064</td>
</tr>
<tr>
<td>IT Services</td>
<td>0.253</td>
<td>0.513</td>
<td>8.910</td>
<td>0.000</td>
<td>0.253</td>
<td>0.513</td>
</tr>
<tr>
<td>Finance Services</td>
<td>0.264</td>
<td>0.291</td>
<td>-0.530</td>
<td>0.596</td>
<td>0.264</td>
<td>0.291</td>
</tr>
<tr>
<td>Technical Services</td>
<td>0.011</td>
<td>0.069</td>
<td>-2.970</td>
<td>0.003</td>
<td>0.011</td>
<td>0.069</td>
</tr>
<tr>
<td>Business Services</td>
<td>0.045</td>
<td>0.138</td>
<td>-3.450</td>
<td>0.001</td>
<td>0.045</td>
<td>0.138</td>
</tr>
</tbody>
</table>

Source: Authors' work
Note: U: represent unmatched group, while M: present the matched group

Table 7 reports the results of mean and median biases (before and after matching using all matching methods) along with some additional statistics including pseudo $R^2$ and LR statistic for joint significance along with its p-value. It can be noted that, after matching, the mean as well as the median bias decrease considerably in all matching methods. Since pseudo $R^2$ is very close to zero, the matching may be considered as successful. The p-value of LR statistic is also zero lending support to a successful matching.

Overall, these statistical findings strongly support the validity of propensity score matching results reported.
Effects of Marketing and Organizational Innovation on Firm Performance

This section provides results and discussion related to the second hypothesis presented in Table 8. The estimation is done by employing Probit regression and developing several models (Model 1—6) with and without using control variables to see the detailed and clear picture of the results. This hypothesis requires to shift focus only to those firms that have received subsidy. For this, firm performance is considered as a dependent variable measured via copyright—proxy for firm performance—a categorical variable that takes a value of ‘1’ if firm uses a copyright application and zero who did not use copyright application. The independent variables include marketing and organizational innovation along with various controls (see Table 1). Since the dependent variable is categorical, so the probit model is ideal in the present situation. It is important to note that these regressions (Model 1—6) use aggregate data (combining observations for small and medium firms) and we do not run regressions separately for small and medium firms, as earlier done in case of first hypothesis. If the focus is on estimating two separate regressions (one each for small and medium firms) then there exists multicollinearity between various categories of control variables, taking either a value ‘1’ or ‘0’ throughout or in most cases. This makes the estimation of the coefficient for the particular dummy variable impossible. Thus, technically, it is not possible to estimate regressions separately for small and medium firms. In addition, the case of large firms is also not considered here due to the small number of observations.

Table 8 presents the results for the second hypothesis. Here again, probit regression model is used to estimate the effect of marketing and organizational innovation on copyright—used as a proxy to measure firm performance. The Model 1—3 in Table 8 report the results without including control variables while Model 4—6 provides the findings including controls. More specifically, Model 1 considers the effect of marketing innovation on firm performance only, Model 2 analyzes the effect of organizational innovation on firm performance only, and Model 3 estimates the impacts of both, marketing and organizational innovation on firm performance. Model 4—6 work in parallel to Model 1—3 but do not include control variables. Overall, Model 6 is a more general model as it analyzes the impact of both, marketing and organizational innovation and all control variables on firm performance.

The empirical findings based on Model 1, 3, 4 and 6 suggest a positive and significant effect of marketing innovation on firm performance since p-value is less than 1% in all cases. In addition, the coefficient of organizational innovation is also found to be positive and significant (Model 2 and 5). However, it is insignificant in Model 6, where all control variables are added too. The pseudo R2 is reasonable for the model with controls suggesting a relatively better fit that the models without control variables. The p-value of LR statistic is zero to three decimal places in all models.
suggesting the joint significance of the regressors (Model 3—6). These findings suggest that $H_2$ is supported in case of marketing innovation only. It is important to note that organizational innovation is found to be significant when taken individually (Model 2 and 5), however, its impact on firm performance gets diluted when both types of marketing and organizational innovations are considered together.

The empirical findings of this study are consistent with previous studies that also support the idea that all types of innovations (product, process, marketing and organizational) are (more or less) positively and significantly linked with some aspect of firm performance in manufacturing firms (Gunday et al., 2011). However, the empirical results are in contrast with Atalay et al. (2013) who show that marketing and organizational innovation do not have a positive (and significant) influence on firm performance in case of the automotive industry.

In sum, the results suggest that marketing innovations are more likely and organizational innovations are less likely to stimulate the firm performance in the service sector.

### Table 8
Probit Estimation on Copyright Application (various specification)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Innovation</td>
<td>0.821***</td>
<td>-</td>
<td>0.782***</td>
<td>0.713***</td>
<td>-</td>
<td>0.664***</td>
</tr>
<tr>
<td></td>
<td>(0.172)</td>
<td></td>
<td>(0.182)</td>
<td>(0.209)</td>
<td></td>
<td>(0.221)</td>
</tr>
<tr>
<td>Organizational Innovation</td>
<td>-</td>
<td>0.387**</td>
<td>0.119</td>
<td>-</td>
<td>0.379*</td>
<td>0.168</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.160)</td>
<td>(0.177)</td>
<td></td>
<td>(0.197)</td>
<td>(0.213)</td>
</tr>
<tr>
<td>Graduate Employees</td>
<td>-</td>
<td>-</td>
<td>0.343</td>
<td>0.373</td>
<td>0.330</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.519)</td>
<td>(0.503)</td>
<td></td>
<td>(0.524)</td>
</tr>
<tr>
<td>National Market</td>
<td>-</td>
<td>-</td>
<td>0.417</td>
<td>0.506*</td>
<td>0.411</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.280)</td>
<td>(0.279)</td>
<td></td>
<td>(0.282)</td>
</tr>
<tr>
<td>Eastern Germany</td>
<td>-</td>
<td>-</td>
<td>0.043</td>
<td>0.076</td>
<td>0.072</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.192)</td>
<td>(0.190)</td>
<td></td>
<td>(0.194)</td>
</tr>
<tr>
<td>Transport/Post Services</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.039</td>
<td>-0.157</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.421)</td>
<td>(0.412)</td>
<td>(0.424)</td>
</tr>
<tr>
<td>Media Services</td>
<td>-</td>
<td>-</td>
<td>1.610***</td>
<td>1.697***</td>
<td>1.615***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.370)</td>
<td>(0.360)</td>
<td>(0.370)</td>
<td></td>
</tr>
<tr>
<td>IT Services</td>
<td>-</td>
<td>-</td>
<td>1.028***</td>
<td>0.956***</td>
<td>1.030***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.334)</td>
<td>(0.322)</td>
<td>(0.335)</td>
<td></td>
</tr>
<tr>
<td>Finance Services</td>
<td>-</td>
<td>-</td>
<td>-0.134</td>
<td>-0.064</td>
<td>-0.129</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.549)</td>
<td>(0.543)</td>
<td></td>
<td>(0.551)</td>
</tr>
<tr>
<td>Technical Services</td>
<td>-</td>
<td>-</td>
<td>0.745**</td>
<td>0.551*</td>
<td>0.739**</td>
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<td>Business Services</td>
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<td>Pseudo R2</td>
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<td>0.076</td>
<td>0.232</td>
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<tr>
<td>Obs.</td>
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<td>491</td>
<td>491</td>
<td>416</td>
<td>415</td>
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Note: Standard errors are in parentheses; ***. ** and * respectively denote significance at 1%, 5% and 10% significance level.

Source: Authors' work
Conclusion

This paper considers the case of marketing and organizational innovation for the subsidized and non-subsidized firms. Particularly, the firms are subdivided into three categories depending upon the total number of employees (small, medium and large) and the impact of public subsidy is analyzed by comparing the marketing and organizational innovation between subsidy recipients and non-recipients. In addition, the paper covers the issue of marketing innovation and organizational innovation and their impact on copyright application—used as a proxy to measure firm performance. The empirical analysis is based on the micro data from Mannheim Innovation Panel – Services (MIP) Germany. To our knowledge, this is the first study to analyze the effect of marketing as well as organizational innovation on firm performance (measured in terms of copyright applications). Thus, it fills an important gap in the existing literature.

The empirical findings reveal interesting results for the subsidized as well as non-subsidized firms while focusing on small and medium firms.

Firstly, the basic summary statistics suggest that subsidized firms are more involved in marketing and organizational innovation than non-subsidized ones and this is found true for all types of firms (small, medium and large). However, reader should take into account, that we omit the large firms due to low number of observations, the overall impact of subsidized firms gets diluted in case of large firms (see details of subsidy recipients in Table 2) These results are further confirmed via probit regression as well. However, the results of probit regression show a positive impact for the subsidized firms, i.e., these firms are more involved in innovations of both types (organizational as well as marketing). Moreover, these results are found to be significant for small and medium firms.

To avoid the selection bias, propensity score matching is used and in particular, three popular methods—kernel, nearest neighbor matching and radius matching are used to carry out the empirical analysis. The results of kernel matching, nearest neighbor and radius matching suggest that the impact of subsidy on marketing and organizational innovation is positive as well as significant for the small firms, while in case of medium firms, all matching methods show positive and significant effects of subsidy on organizational innovation.

Secondly, the impact of marketing and organizational innovation on firms’ performance taking copyrights as proxy is also analyzed for small and medium firms via probit regression. The empirical findings suggest that the impact of both, marketing and organizational innovation, is highly significant on the performance of small and medium sized firms.

Further, the empirical findings for both types of innovation (Model 1—6) suggest that marketing innovation has a highly significant impact on firm performance in the whole sample (combining both small and medium firms), while organizational innovation has less significant impact on firm performance.

All in all, the empirical findings suggest that public R&D subsidy matters for marketing and organizational innovation in service firms and ultimately its effect on firm performance. In addition, the impact of public subsidy is found to be positive as well as significant on firm performance implying that the subsidized firms are more likely to perform better than their counterparts. Moreover, the results show that a public subsidy program is successful and it increases the probability of applying for a copyright in case of small and medium sized firms. Moreover, public subsidy also stimulates the marketing and organizational innovation in small and medium firms.

Based on empirical findings, it is recommended that the government should provide subsidy to firms of all sizes in the service sector especially to the small and medium sized ones to enhance the firm performance and to bring about innovation.
The only limitation of the study is the unavailability of sufficient relevant data for the large firms that received subsidy. This can be addressed by using a panel data in a future research.

References


About the authors

Shoaib Abdul Basit, M.Sc. is a PhD student at Faculty of Economics and Business Administration, Technische Universität Chemnitz, Germany. He received M.Sc. degree in economics with specialization in “Innovation and Change” at Friedrich Schiller University Jena, Germany. He participated in 10th summer school on “Innovation and Uncertainty” jointly offered by Max Planck Institute of Economics Jena and Friedrich Schiller University of Jena, Germany. He participated in workshops for academic writing and teaching in English at Center for Young Scientists at Technische Universität Chemnitz, Germany. He attended conference of International Schumpeter Society in FSU Jena, Germany. His main research interests lie in economics of innovation and industrial organization. Corresponding author can be contacted at: shoabkherani_iu@yahoo.com

Thomas Kuhn is a Professor of Public Finance at Faculty of Economics and Business Administration, Technische Universität Chemnitz, Germany. He has published papers in several journals such as International Journal of Global Environmental Issues, Journal of Evolutionary Economics, Resource and Energy Economics, Journal Public Finance, Procedia Economics and Finance, Review of International Economics, Review of Economic Design, Forschungsinstitut zur Zukunft der Arbeit (IZA) etc. He published textbooks and monographs: Volkswirtschaftslehre 1: Grundlegende Mikro- und Makroökonomik, 6 and Theorie des kommunalen Finanzausgleichs published by Springer, Theorie des Kommunalen Finanzausgleichs - Allokative und distributive Aspekte as well as coauthor in Einführung in die Volkswirtschaftslehre. Author can be contacted at: thomas.kuhn@wirtschaft.tu-chemnitz.de

Mumtaz Ahmed is an Assistant Professor at Department of Management Sciences, COMSATS Institute of Information Technology, Islamabad, Pakistan. He holds a PhD and a Post-Doc in Econometrics. He has a number of publications in top journal like Economic Modelling, Communications in Statistics—Theory and Methods, Empirical Economics. His main research interest areas include Information Theoretic Methods in Econometrics and Energy Economics. Author can be contacted at: mumtaz.ahmed@comsats.edu.pk
The Possible Use of Akerlof and Kranton’s Utility Model in Higher Education

Nikolett Mihaly
Faculty of Economics and Business, Szent István University of Gödöllő, Gödöllő, Hungary

Abstract

Background: The identity and utility research carries significant role in the modern economics. There are financial outputs, if we can moderate appropriate the student’s and worker’s identities. Objectives: The paper examines the possible use of the utility model and theoretical principles of Akerlof and Kranton (2000, 2002) in higher education. The examined aspects are utility, identity and role. Methods/Approach: The paper aims at employing the model of Akerlof in higher education and how the terms identity and utility can be interpreted in this environment. Results: To sum up, we can say that while case studies and certain experiments seem to justify the model of Akerlof and Kranton, there are few scientific results in higher education to rely on that prove the relationship between identity and utility. Conclusions: It can be deduced that the identity of students has some economic impacts. Institutional policy can increase not only the success of its students but also their income through identity changes.

Keywords: Education, Well-Being, Innovation
JEL classification: I2, I3, O35
Paper type: Research paper

Introduction

Identity is one of the most studied topics nowadays, as it is frequently used when interpreting different situations. It is not only used in psychology and sociology purely in a scientific sense, but it also appears in economics as a moderating factor of economic processes (Akerlof et al., 2000; Akerlof et al., 2002; Akerlof et al., 2005; Adler, 2014). The explanations of identity and ‘ideal’ as well as ‘social category’ are closely related to supply side of psychology and sociology and on the demand side of economics (Aaker et al., 2009; Aaker, 2010; Aaltio et al., 2015). The interpretations offered by each faculty can be extremely complex; thereupon we have to clarify the definitions under the given circumstances in order to be able to assess their impact. Most of the non-economist scholars interpreted the formation of identity and its aspects in different theoretical frameworks, such as psychoanalytical and
developmental psychological theories that resulted in the following issues and difficulties: (i) How can we compare and coordinate the different interpretations of identity?; (ii) How can we operationalise the theoretical terms?

In this respect, Abdelal et al. (2005) made headway when they incorporated the definitions of identity and the scientific methods, as well as results of their research, into a unified framework (and the other researchers of identity were encouraged to make further unifications and comparisons between their results). In their study, they separated personal and social identity and within the latter one four kinds of identity contents were defined. Their work contributes a lot to finding the missing link that would connect the theoretical economic and psychological/sociological rationale in connection with identity to provide an opportunity for reliable empirical works.

Akerlof et al. (2002) created a theoretical model that examines how belonging to a certain social category (social identity) and rules of that category affect the school performance and the utilities of the person and the institution. Furthermore, they also examined how the school can influence the category/identity selection of students.

The goal of this paper is to propose a framework that can address in a methodological manner the question: Can the model of Akerlof et al. (2002) be employed in higher education? Additionally, the paper identifies how the terms social identity and utility can be interpreted in this environment. The results of the study described in this paper can be applied to construct better management systems that focus on the identity formation opportunities in higher education institutions, which in turn can lead to better utilities for students and their identities.

Social Identity and Utility

Social Identity

One of the most significant economic theoretical approaches related to identity is provided by the works of Akerlof et al. (2000, 2002, 2005, 2008, 2010). In their financial analysis (2002), the sociological approach of education was applied in secondary and primary schools when the terms of ideal, identity and social category are taken over to classical utility models (Akerlof et al., 2002). In the classical educational-economic model (1) the students can choose the degree of their efforts, i.e. time spent on studying, so that it balances the discounted dividend; (2) the resources determine the quality of the school.

According to the critics of the authors, economists can explain the effect of increasing expenditure on qualification, but they are unable to determine when and why these expenditures are effective (Friedman, 1957; Modigliani, 1988). Therefore, it is necessary to take into account the moderating impact of the terms introduced by them. If they fail to do so, only partial responses could be given to such important questions, such as: How the method of allocating funds for schools can influence the chances of earning an academic degree? In order to obtain a PhD degree, what school reforms must be implemented? The model can resolve these questions and can provide guidelines to empirical applications. According to one of their most important hypotheses, the efficiency of funds does not only depend on the quantity of funds used but also on the identity of students in connection with the studies and the relationship between these two attributes. Further, identity and efforts do not only determine the future chances of the students (utility) but also the long-term quality of the school.

The next part of the paper interprets the term of utility in higher education, and presentation of the model of Akerlof and Kranton follows. Then, the use of their
assumptions in the Hungarian higher education system is presented with some limitations. The psychological and sociological definitions of utility in the model are enlisted. Finally, the paper is concluded with several questions that follow its analysis.

**Utility**

The key factor of the study is the utility of students pursuing their academic studies. Literature reviewing and interpreting utility in its classical economic sense is too large to review to be repeated in this paper, and yet a new, improved version of utility that assists in interpreting the term in the domain of education economics is described. The following parts of this section include such student ‘utilities’ that exist in reality but are not considered in economic calculations as far as we know.

According to Samuelson et al. (1995) utility is ‘total satisfaction deriving from consumption, subjective pleasure, usefulness’. These economists gave up the ideal of measuring utility (cardinal approach), but instead re-formulated the theory of consumer behaviour with the help of the category of consumer preferences, regarding utility as a suitable way of describing preferences (ordinal approach). The utility function is a procedure in which values are assigned to consumer baskets in a way that the more preferred baskets are given bigger values, while the less preferred are assigned lower values. In the classical utility function, the beneficial effect is derived directly from the consumption of goods, while others such as Lancaster (1971) argue that it is the goods themselves and not the assembly of their characteristics that define utility. The theory implicitly promises that by using formulae we can predict what level of utility each group can reach with a given amount of goods. In the case of two or more goods provided, we know how they are related. It does not take into consideration the fact that individuals assess the value of the same goods differently, depending on their personality, experience, the given situation, time, etc. For example, obtaining a certain degree at the age of 23 and 63 is different. Another problematic part of the theory is that it disregards the fact that the value of the goods does not only derive from their characteristics but also from the added value assigned to them by the society. Recently, economists have adopted from psychologists the idea that utility depends on how the situation is reflected (Kahneman et al., 1979). Identity is one of the major ways that reflects the situation of people.

To summarize, we cannot discuss preferences and their predictability in general, due to individual varieties and the social embeddedness of goods. This mode of reference can only work in a homogeneous population. However, it can also be debated whether formulae can be used in every scenario to express the utility of a given object or a service. Obviously, the physiological phenomena in the mind or the impact generated by a certain situation, such as the process of generating happiness/usefulness cannot be described by formulae. In this case, the mathematical and numerical representation of economics can hardly lead to a better understanding of reality. However, interpreting the factors in the formulae and understanding their relations is much more sensible.

**Utility in Education**

Different utilities can be distinguished in education. We can differentiate them on the basis of who is the ‘beneficiary’ of each type of utility and when each type of utility is ‘realised’. The utility of the provision and ‘consumption’ of educational services can be interpreted in time: short-term (current /perceived) and long-term utility. Further, we can also differentiate between the utilities of the student, the institution and the society. To summarize, there are four types of utilities:
The short-and long-term utility of higher education institutions. In the case of higher education institutions, we can differentiate between tangible and less tangible utilities - those that can only be assessed in the end (and, of course, expenses that can affect the previous one, though they are not within the scope of this paper). Tangible utilities are identified as income in education, which can be expressed by money realised through the educational policy of the institution (e.g. alumni donations), income derived from state grants, leasing of buildings, etc. are excluded. The term intangible utilities describes items with valuation that can hardly be expressed in monetary terms, such as the quality of the institution and its reputation. The impact of these latter aspects on attracting new students and the financial advantages can hardly be presented, but it is certain that the efficiency of working on human capital generates long-term utility.

The short-and long-term utility of students. Before analysing these two definitions, it is important to note that education is interpreted as goods in its ‘Lancastrian’ meaning (1971), i.e. the assembly of its characteristics is regarded to define utility. Following this theory, partial utilities are identified with partial satisfaction. Subjective short-term utility, such as the opinions of students about the service that they receive can serve as a satisfaction indicator (such as satisfaction with the infrastructure of education, the level of quality etc.) and objective short-term utility are differentiated. This latter one is offered in the form of different opportunities as a by-product to the consumer by the institution. They advantages derived from the nature of the educational process may not have any future gains at all (availability of free-time activities below the market price, time management on their own, etc.)

The long-term utility of the students. A difference can also be made between the subjective and the objective utilities, though the boundary is less obvious. For example, when reflecting upon his life, an experienced expert (in a subjective way) can think that it served him well - it made him happy, satisfied and resulted in utility when deciding upon graduating in medical sciences at a young age. However, we do not know for sure whether his happiness derives from the fact that he could help many people or whether his career increased his quality of life (or the combination of those two aspects, etc.).

The theory on human capital condemns the latter one and its results can be identified with objective, long-term utilities with certain limitations (Akerlof et al., 2002). The theory on human capital assumes that people invest in their own productivity by education and training. These investments can enhance their productivity, productiveness and increase the market value of their work (Schultz, 1961). Therefore, their future salary will be higher. Investments in human capital are not restricted to formal education. ‘All investment forms that improve productivity can be regarded as an investment’ (Varga, 1998). In connection with the theory of human capital two theories were born to assess the economic value of people. One of them is the ‘approach based on productivity costs’ that was represented by E. Engel (1884), who counted expenses of such nature till the age of 27, as he assumed that this was the time for education to be over. The other is the ‘theory of capitalised payment’ that calculates the economic value of people by disregarding all previous costs and takes into consideration only the current and the expected market value of the individual. When measuring human capital it is supposed that 1. People only calculate the monetary yield of the school that they are going to maximise 2.
Individuals know all the alternatives of decision making, so they are entirely informed. They do not have salary while studying (the current value of the profit of human capital equals the discounted cash flow).

These approaches, based on human capital, put an emphasis on the direct financial returns of education. However, several attempts were made to assess the non-financial and external gains of education (Le et al., 2003). Garai (2003) raises the question and also tries to answer it: Who invests in human capital: the individual or the society? Another question presented in this study is: What proportion of the education can be regarded as investment and what proportion is consumption? According to his study, the response depends on income, social situation and abilities. He also estimated the level of education necessary to maximise the assets of individuals. Varga remarks that the allocation of educational expenditure on investment and consumption is not carried out. Allocation by all means that it is discretionary (Varga, 1998). It is very unpredictable to calculate future gains regarding the changing business environment and the all-time changes in individual preferences. According to Thurow (1970): (1) Future preferences are not known when deciding on investment. The human capital investment systematically changes preferences. It can also be assumed that over time that participation in education appears as an investment rather than consumption in the minds of students, so the change in this preference system will also alter the relative importance of money, which also affects satisfaction. Further, changes in preferences will also change the importance of financial and non-financial utilities.

The examination of making sensible investments in human capital is not a new phenomenon in economics, as the results of the related observations and studies are directly used in institutional policy. Using the results of social psychology in analysing economic processes is becoming more and more popular nowadays (although several techniques for influencing have long been used in practiced on purpose. An example is increasing the level of loyalty and commitment to the company by using different techniques that increase the efficiency of the working group and the profit of the organisation. The relevant list of literature is too broad to be included.) Akerlof et al. (2002) created a theoretical model that examines how belonging to a certain social category and rules of that category affect school performance. Further, their study also examines how the school can influence the category/identity selection of the students. Prior to their studies, the sociological interpretations and schools as community institutions were missing from the economic analyses of education and terms such as identity, social category etc. were not used. In the next chapter after presenting the model of Akerlof and Kranton, its applicability in higher education is also suggested.

The model of Akerlof and Kranton

It is understood that schools do not only improve skills but also educate. In this process the identity of students shows whether they accept or reject the value system of the school. According to Akerlof et al. (2002), schools have a chance to shape the students’ ideals or approach the economically useful cultural standards and skills.

One of the bases of our theory is Coleman’s examination (1961) of the social ‘formation’ of adolescents. Coleman’s questionnaires reflect that students put one another in social categories, which are nerds, soldiers, leaders and burnt-outs. In each category an ideal form that includes certain characteristics and patterns of behaviour is fixed. Coleman experienced that belonging to single social category can influence school performance and the formation of self-image. Akerlof et al.
used this result in their utility model. They argued that students can influence their current and future utility by making two choices: they can select their social category and the effort they make (how much they study). After selecting the category, the students try to fit in by considering the possible fit between their characteristics, efforts and the ideal of the selected category. According to their hypotheses (from 1 to 4): 1. Schools do not only develop skills but also provide implicit examples in the form of categories and ideals that can influence their efforts at school and also have an impact on long-term utility. 2. Schools can create such an identity whose long-term development can maximise their own interests as well as the economic interests of students. 3. It is also assumed that students of different backgrounds can differently identify with the identity targeted by the school. 4. The heads of these institutions must address the possibilities of substituting the offering of one single ideal (social category) for offering alternatives. The study also suggests that more students of different backgrounds will find their way to identify with school by having the opportunity of selection. The downside of this opportunity is that the standard of average skills will become lower.

The authors also studied school reforms, as well as the similarities and differences between the private and public schools financed by the state. They identified with the sociological view according to which the most important differences between public and private schools can be derived from the effect of peers. According to it, one of the advantages of private schools is that they have limitless freedom to invest in the identity of their students, which enhances the success of both the institutions and their students. The authors illustrate with examples (Harlem, New Haven) that investment into identity was not impossible for certain public schools. They invested into the self-image of their students through different programmes and they increased the level of identification with school values. As a result, the schools have reduced internal social differences between the students and increased the chances of further studies. The authors have created the following economic model based on this experience and observations.

The standard and supplemented model
In the standard model of education, utility depends on the efforts made at school and on the financial returns of these efforts: \( U_i = U_i(w \cdot k(e_i), e_i) \). This is supplemented by the identity variable: \( U_i = U_i(w \cdot k(n_i, e_i), e_i, I_i), \) where \( I_i = I_i(e_i, c_i; \varepsilon_i, P) \). \( (e_i = I_i's \ efforts \ at \ school; k(n_i, e_i) = i's \ skills \ (human \ capital) \ that \ depend \ on \ efforts \ and \ abilities \ (n_i); \ w = wage; P = ideal \ characteristics \ and \ behaviour \ within \ a \ category; c_i = the \ category \ of \ the \ person \ concerned; I_i = identity \ depending \ on \ how \ well \ I_i's \ characteristics \ fit \ the \ ideal \ characteristics \ of \ the \ category; \varepsilon_i = the \ individual's \ characteristics, \ e.g. \ sex, race.) In their model, identity depends on efforts in studying, category at school (what category they are enlisted and they enlist themselves), certain characteristics and how well i’s characteristics fit the ideal characteristics of the category. Further, it is also assumed that the students change both the category and the strength of their efforts more or less consciously to maximise utility. The obstacles of identity change can be appearance, accent, etc., so identity depends on the fit between the individual’s characteristics and the ideal characteristics of the category selected and also on how the individual’s and the others’ behaviour fit the ideal behaviour of the category. Utility can appreciate or depreciate depending on the fact whether gains or losses occur in identity. Following the classification of Coleman (1961), three categories are made: leaders (L), nerds (N) and burnt outs (B). There are rules governing the ideal characteristics of these social categories: \( \text{Ideal L: } l=1 \ (l= \ physical \ appearance); \ the \ skills \ of \ ideal \ N \)
n=1; the burnt-outs have no ideal; both can be interpreted on a scale from 0 to 1. The financial costs of effort: \( \frac{1}{2} (e_i)^2 \). Rules also cater for the extent of ideal efforts: \( e(N) > e(L) > e(B) \). The self-image of the student depends on their category \( (ci) \) and how their behaviour and characteristics fit the ideal of the category. For example, \( ci = L \) profit from identity \( Il - t(1-li) \) where \( t \) is such a positive number which indicates how much \( I \) loses if they stand too far from the ideal of their own category (\( t \) also indicates how difficult it is to fit in a category with characteristics that are different from the group). In some research \( IL > IN > IB \) which means that a student in the leader group is more likely to have a more beneficial self-image. The self-image of the burnt out is 0 by the authors: \( IB = 0 \). The student loses benefits if they divert from the effort fit for their category \( \frac{1}{2} (e_i - e(ci)) \).

According to the utility of leaders is as follows:

\[
U_i(L) = p \left[ w \cdot k - 0.5 \cdot (e^2) \right] + (1-p) \left[ Il - t(1-li) - 1.5 \cdot (e - e(L))^2 \right]
\] (1)

We have to notice that this formula does not distinguish between current and future utilities. The student’s utility is calculated so that the moderating effect of effort-making is added to the long-term financial returns of the current efforts and also the factor saying how well the individual fits into the group. The model is based on the assumption that learning a skill does not flexibly react to wage but it does react to social differences. If someone stands aloof from the given category (high level of \( t \)) - for example, due to their unfavourable physical appearance or skills, it is difficult for them to integrate into the group of nerds or leaders. With these characteristics more and more are likely to enter the burnt-out category, where individuals make slight efforts.

**Institutional policy based on the model**

The theory based on the model above assists institutional policy that is supposed to influence the creation of social categories and ‘rules’ (e.g. the proper extent of efforts). If the institutional policy can influence social parameters, then it can also affect the outcomes of education. The authors justify this statement by several examples. They analyse the athletic programme of an American high school that changed the social patterns of the students in a way that many of them became ‘leaders’. Formerly, the prerequisites of entering this group were good appearance and skills supplemented by athletic membership due to the school policy so the opportunity for acquiring skills was ‘democratised’. The authors supported their hypotheses by data from a database whose name is ‘The group of adolescents, the high school and what is behind’. The four groups were also discernible here: ‘nerds’, ‘athletes’, ‘leaders’, and ‘burnt-outs’. One of the interesting results gained from the data analysis is that the leaders and the athletes have a much more positive attitude to school than those who were not in these categories. In this way, the data are consistent with the hypothesis of the authors that the leaders and the athletes identify with the school, while the others do not. Usually, the ‘burnt-outs’ belong to the lower 1/5 economic-social class, while the above-mentioned three other categories to the upper 1/5. The authors present several other studies in their paper that prove that the social background does have an impact on the ability to identify with the school, hence children of workers or immigrants often find themselves in the group of ‘burnt-outs’ (e.g. Willis, 1977).

According to the authors, schools should be reformed so that they could spend their funds on creating a community. A further example is set by Central Park East Primary and Secondary School, where it was also proved that it is worth forming a community and make students identify with their school. The management of the
institution tried to disjoin their students from their problematic background and tried to ‘isolate them in another world’. To this end, different techniques were used, e.g. regular student-teacher meetings were organised, they worked with classes of a few students and uniforms were a must in order to decrease the visible differences between those of different background. Teachers had to do courses where they could learn how to manage the feelings and rhythm and explore the reasons of the behaviour of those who do not fit, etc. However, the most important thing is that teachers set rules for the children alongside which they could interpret the situation and themselves.

Investment in identity has sometimes some obvious and instant utilities. Especially, it can be seen in trainings on national defence. In this case, one of the objectives of the school is to change the identity of the soldiers and would be policemen in such as way so that they see themselves as ‘defenders’ of the given nation. In contrast to the original economic model, the change in preferences (by identity change) can also modify utility. If the between the altered identity (I am a soldier) and the soldier ideal of the army gap is too large, the individual loses utility and their self-image will be damaged. Additionally, the interests of the nation are also curbed as in this case the would-be soldiers may identify with other ideals and make fewer efforts at work, which can be especially risky in warfare (just think about Captain Yossarian, the main character of Joseph Heller’s brilliant novel, Catch 22.).

The employability of Akerlof and Kranton’s model in higher education
In other trainings, lack of identity (with the faculty/study programme, profession) can also result in utility loss. The individual will have another identity than expected by the school and identifies with another ideal and their efforts are decreasing in studying. It will do harm not only themselves but also the institution and society in a broader sense. The three cases below present some variations of this situation.

Contraproductive behaviour of the students
There was a rumour among the (not self-financing) students of Debrecen University (Hungary) majoring in History 20 years ago that it is worth to postpone graduating from university. There were two reasons for this: on the one hand, they enjoyed the many benefits offered by the university (a lot of free time, exciting programmes, etc.-consumers’ attitude); and they were also afraid to enter the labour market knowing that even if they manage to find a job, their standard of living will be lower due to low payment. To translate this to the term of Akerlof: many could not identify with their study programme or future profession and made an effort to reach a kind of hedonistic lifestyle (burnt out). Accordingly, they usually underperformed and extended their stay at university by several years and decreasing the years of earning money (it can also be assumed that their self-image also negatively changed, provided they did not succeed to persuade themselves that it is wise to conserve ‘youthful freedom’ and consume the university and the parents). The institution did not profit, either as these students are likely 1. to ‘ruin’ the other identification efforts of other students with the university ideal; 2. to become dissatisfied, which could generate negative word-of-mouth; 3. to incur extra costs to university thorough the lessons, exams and administrative fees. There are students who apply for higher education institutions not to satisfy their interests, but rather to obtain the advantages of the identity that accompanies having a degree. Some institutions satisfy this need by becoming ‘degree
manufacturers’, which can have negative consequences both for the individuals and for the society. (Szigethy, 2005; Kjelland, 2008). The individuals can obtain their identity longed for in the end, but they do not acquire skills that would help make a career in the labour market. In many cases, there are no scientific jobs and professions in accordance with the study programme. Producing these graduates puts a burden on the society in the form of high costs and a further cost can be paid for their possible further training and unemployment benefit. Higher education institutions can play other foul plays with their would-be students. After improper selection they accept students whose abilities do not predestine them to graduate from the course. It is done so that more and more state subsidies could be obtained by the institution. The students are unable to meet the requirements and as a result of their failures they leave.

To what extent can the model of Akerlof et al. (2002) be applied to these examples and do we get closer to understand the nature of utilities in higher education? Let us list again the statements on which the model relies on.

1. There are different social groups within the school.
2. The individuals gain or lose utility if they belong to a social category and they are of high or low social status.
3. If the characteristics and the behaviour of the individual fit the ideal of the category, utility is gained.
4. The individuals gain utility if their and others’ actions reinforce their self-image.
5. The members of the different social groups have different rules. One of the consequences is that efforts in studying also differ from group to group.
6. School policy can change the breakdown of the groups, the rules and accordingly, the behaviour and efforts in studying.
7. The efficiency of utilising funds does not only depend on the amount of financial sources but also the identities of students and their relationships. Under the term fund we mean the financial investments of the institution in the students’ education. Efficiency refers to further success (chances of going on studying). The quality of the school is thus influenced by the identity of students.

**Applicability of the model in higher education**

The implication to single statements is marked by points in the following part. The first two statements correspond with our experience by all means. Forgas (1985) tried to isolate the prototype of the target person while carrying out interviews with university students on the one hand, and the feelings students have toward a prototype. He found 16 distinctive types (categories). When perceiving the types, the main determinants were study performance, extroversion, social status and political radicalism. One of the categories was ‘lazy rednecks’ that was described as follows: ‘They are lazy, untidy and they are here just to spend the time. They are bored, impassive, they like sunbathing on the grass, they do only the minimum they miss the lectures, fail, and have no idea why they go to university. They are careless parasites. By all means, we also could identify this type whose members have low social status and do not make efforts in studying. However, we must note that the group membership assigned by others is not equal with the individual’s group identity as the members of the group can have different opinion on the group and themselves. The different ideas of the content of identity must be considered when examining the meaning of identity.

Akerlof et al. (2002) mention both long-term and short-term utilities in connection with the self-image simultaneously, which, in a life of a young man often do not serve
long-term utilities. In some cases, for example, ‘the lazy redneck’ feels good by drinking beer every night and missing their assignments at school, but after coming out of the protective shield of the school this form of behaviour does not promise many benefits (disregarding those of social capital). A perfect positive self-image may hide current utilities and the personality development of such a student can be more balanced in certain sense than that of an all-time worried and anxious ‘nerd’ although the financial gains of the time spent at school is likely to be slighter. The person can feel good in a company that likes drinking, as far as they enjoy total ‘isolation’ in their band, i.e. they do not have to face the judgement of the others who belong to other categories and can set off their long-term losses that derive from this current way of living. The distorting effect of the situation can eventually reduce the feeling of loss but this will not change the objective facts after all. Unfortunately, no such longitudinal examination is known that would have examined how the representatives of the single categories perform in life and what losses, gains and utilities occur. An interesting research topic could be to explore the relationship between academic results in higher education and student identity in relation with the position and salary in the future.

We suppose that the counterparts of ‘nerds’, ‘geniuses’, ‘burnt out’ etc. from secondary school also exist in higher education. The ideal appearance of the category is also guided by rules (dress, behaviour etc.) and the extent of the effort expected in the category. However, it is not practical to fully adapt the model, the identification of ideals as well as the distance of proximity to them as in higher education, looser connections to studying exist, and due to the different subject criteria, the transition between the groups is naturally given. An effort by a young man to identify with the school model is less prominent than at a primary or secondary school.

Institutional changing in the identity forms

The transition from elite training to mass training in the past few decades in Hungary serves as a good example of how can a school policy change the breakdown between the groups, the rules and accordingly, patterns of behaviour and efforts in studying. While in the PhD training teachers still have small groups and there is a possibility of creating a teacher-student relationship and working out a professional identity in connection with a scientific career, etc., in forms of education at lower levels there is usually no chance for the students to deepen their knowledge through the personal relationship with the teachers or orienteer in certain issues in order to maintain or create their professional dedication. In many cases, it is not only the lack of such relationships, but also the identification with the university is rather loose and it is not possible to create such an identity and pride that characterise the students of the American elite universities. One of the slogans of Yale is ‘For God, for country, and for Yale’. This kind of ‘enthusiasm’ and the related forms of behaviour are consciously strengthened. As one of the former students of law at Harvard said: ‘I have been transformed, I have become another man…’ The institutions regularly organise alumni meetings and their Alma Mater delivers such a university newspaper to them that shares news about the successes of the graduates and ask them to financially support the school. The ‘elite’ institutions of education are likely to earn this prominent title because they can integrate effective studying into the decisive factors of identity. It is not by chance that the American universities compete for the Nobel-prize winner professors, as they know their attraction to students can make the competition for being admitted fiercer and the tuition fees to a considerable extent
To summarize, we can say that while case studies and certain experiments seem to justify the model of Akerlof and Kranton, there are few scientific results in higher education to rely on that prove the relationship between identity and utility. However, it can be deduced that students’ identity has some economic impacts, which would be worth examining empirically.

**Conclusion**

This paper aims at answering whether the model of Akerlof et al. (2000, 2002, 2005) can be employed in higher education and how the terms effort and utility can be interpreted in this environment. An attempt was also made to conceptualise the latter one and a suggestion was made to identify subjective utility as satisfaction. Objective utilities should be assessed by payment and position at work efforts are identical with efforts in studying like in the model of Akerlof et al. (2000, 2002, 2005), while its parts can be the number of hours spent on studying; the lectures and seminars visited, and other.

Comparison with previous research and some experience show that significant similarities can be detected in elementary, secondary and higher education in connection with the system of relations between identity-effort-utility. There are profound differences, but it may even be more important to realise that empirical results are missing in higher education.

It is necessary to make up for this loss as it was hypothetically proved by both the literature review and certain empirical knowledge that institutional policy can increase not only the success of its students but also its income (and quality by knowing the effect mechanism of the factors examined and influencing the students’ identity. A questionnaire with the help of previous quantitative interview can quantitatively demonstrate the presumed relationships. Students’ effort can be measured by the number of hour learned during a week and their academic achievements. Student identities and adaptation to an ideal can be mapped through focus group inquiries and then questionnaires and earnings. Other factors of the utility model are also suitable for operationalization. The further examination of the nature of relations between these terms is essential making better advices for institutional managers. Hopefully, the study assisted in it by posing some questions and issues that can be argued.

The limitations of the paper are the unanswered following question: How can students’ identification with the university and their future profession be created/strengthened within the form of mass education? Can the identity forming techniques of the elite universities be applied, and if so, in what form at a poor university of Central East Europe? Will not the bad chances of getting a job and/or disappointing standards of living for the future of the graduates in a country of insecure economic situation counter-balance the positive impacts of identity with a strong university and professional identity? Can the positive word-of-mouth advertising and increased alumni donations change quality in a positive direction? Furthermore, it is not a negligible methodological problem, either, if a student’s identity is based on the ranking of others or their self-description.
References

About the author

Nikolett Mihaly, Ph.D. is an Assistant Professor of Economic Psychology at the Department of Marketing, Faculty of Economics and Business, at Szent István University of Gödöllő. Her current research areas are financial consciousness and higher education institution management. She is the (co)author of number of articles in international and national journals. She is actively engaged in number of scientific projects and collaborates in several applied projects in the field of financial education, marketing and management. Author can be contacted at mihaly.nikolett@gtk.szie.hu
Exploring the Motivation of Employees in a Firm: A Case-Study

Igor Klopotan, Trina Mjeda, Petar Kurečić
University North, Koprivnica, Croatia

Abstract

Background: General concept of motivation, which include the motivational techniques and human resources management as a prerequisite for the most important intangible asset is related to the company performance. Objectives: we build on the conceptual model examining the respondents' attitudes about the influence of various parameters on better business performance and work atmosphere. In addition, we also examine the attitudes towards the impact of motivation, company management, and communication on employee satisfaction.

Methods/Approach: Difference in the perception of essential parameters such as motivation, communication, leadership model, and personnel management within a company, over groups of respondents differentiated by gender and age is tested using Kolmogorov-Smirnov test. Results: The results obtained by this research conducted from an employee point of view, detect the difference in the perception of the parameters of motivation, communication, leadership and personnel management, and their impact on employee satisfaction. Conclusions: Our empirical research results clearly pinpoint the link between successful application of motivational techniques, quality of the leadership and employee satisfaction.

Keywords: motivation, leadership, communication, small and medium-size firms, employees, CAWI method, management

JEL classification: M12, D83, L26

Paper type: Research article

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Introduction

The company’s success is related to the quality of performance activities such as: rewarding employees, the making of a favorable organizational climate and culture, and the programs of studying and training (Horvat et al., 2015). Furthermore, certain studies also uncover the connection between organization’s success and its dependence on employees-related factors such as: job security, job satisfaction, loyalty to the organization, knowledge creation, and the manager’s ability and their attitude towards employees (Mitreva et al., 2012).
Motivation techniques are generally divided into extrinsic and intrinsic, whereby extrinsic motivation instruments can be direct (salaries, royalties and travel expenses) and indirect (social benefits, education, insurance and other various benefits) (Kehoe et al., 2013). Some authors suggest that financial rewards have become obsolete as motivation factors, emphasizing the role of indirect awards such as seminars, courses and participation in projects, among many others (Lazaroiu, 2015). Although the literature regarding this topic can be very heterogeneous, we used the general concept of motivation, which include the motivational techniques and human resources management as a prerequisite for the most important intangible asset.

According to the analysis of other author’s studies and existing scientific knowledge, in this study, we build on the conceptual model examining the respondents’ attitudes about the influence of various parameters on better business performance and work atmosphere. In addition, we also examine the attitudes towards the impact of motivation, company management, and communication on employee satisfaction.

**Literature review**

Motivation techniques used to support organization members can be seen as extrinsic and intrinsic. Therefore, incentives and benefits available to managers can be used very effectively to improve the employee performance. In transitional or post-transitional markets such as Croatian, the importance of different non-tangible motivation techniques has not yet been acknowledged enough, although there is a vast body of research confirming that thesis. As some research present, it is often more efficient to intrinsically motivate employees, since they can accomplish different tasks without consuming additional resources (Joo et al., 2010). Additionally, “a variety of extrinsic constraints can undermine intrinsic motivation and creativity, including expected reward, expected evaluation, surveillance, competition, and restricted choice” (Yoon et al., 2015). Furthermore, when addressing the role of leadership, its importance has to be emphasized regardless of organization’s aim and interests – any organization that employs human power needs a good leader to be able to work effectively (Jerry, 2013). An organization with an effective leader should also address the question of an “effective follower”, thus emphasizing the vital function of employee training and development of different human resources management techniques (Yang et al. 2014; Jha et al., 2016).

Danish et al. (2015) studied the effects of reward system among the bank employees in Lahore, Pakistan, measuring the level of performance the employees demonstrate towards their organizations when they are intrinsically rewarded. The authors used the method of self-administered questionnaires and applied correlational explanatory research design. The research findings revealed a positive relationship among intrinsic rewards and task performance, with both intrinsic and extrinsic motivation and also job satisfaction mediating the relationship (Danish et al., 2015). Moreover, studies aimed at measuring the effect of motivation on employee performance in the public sector, have discovered similar findings on motivation techniques that could also work not only as a motivational tool for achieving more effective and satisfied workers, but also as an additional tool during the employee recruitment phase (Liu et al., 2015).

Additionally, based on a survey within two age groups of employees in Slovenia, Rožman et al. (2017) studied the differences between the motivation and satisfaction of employees, using the Mann-Whitney U test. Their findings confirm the existence of differences between two age groups in the motivation incentives and
workplace satisfaction. Moreover, their research revealed that older employees are “more motivated by flexibility in the workplace; autonomy at work; good interpersonal relationships in the workplace; the possibility of working at their own pace; respect among employees; equal treatment of employees regardless of their age” (Rožman et al., 2017). Obviously, authors have concluded that motivation and satisfaction change as individuals age.

Obviously, there is a lack of consensus among different studies regarding the importance of various motivational techniques and their benefits, since there are studies that confirm the positive relationship between motivation and job satisfaction (e.g., Liu et al., 2008; Liu, 2009; Vandenabeele, 2009), and others that have not confirmed the existence of a significant relationship between the two (such as Moynihan et al., 2007). Nevertheless, the authors of this research consider the field of motivational techniques, leadership quality and employee satisfaction important in running business effectively, especially when considering transitional and post-transitional countries that are still able to significantly improve human resources management in their organizations.

**Methodology**

**Data**

The database of companies consisted of 300 companies selected in a random sample from the Croatian Chamber of commerce directory. In total 87 respondents answered the interview, which represents 29% of the sample. Among the companies that participated in the survey, 64% were SMEs, and 36% were large companies. Most of the companies were registered in Zagreb, Croatian capital city, while smaller number of companies were registered in Split, Osijek, Rijeka and Dubrovnik. Most of the companies were from the primary and secondary sector (56%), while the rest of companies were operating in tertiary and quarterly sector.

**Research instrument**

The target population of this survey are respondents who are or were employed. For the empirical analysis of this study, we collected data from the sample that was comprised from University North students who are studying and working. The research was carried out using CAWI (Computer-assisted web interviewing), and online questionnaire was sent out in a form of link to the e-mail database that was accessible for this research. The survey was composed of a set of statements to which examinees responded by expressing their agreement or disagreement, using a five-degree Likert scale, determined by a “completely agree” to “completely disagree” statements.

**Statistical analysis**

The internal consistency measure, conducted over control question, resulted in Cronbach Alpha reliability coefficient 0.586, whilst the number of items was three. We concluded that the attitudes of respondents can be explored by the proposed control questions. Testing for the distribution normality among all the parameters was carried out by Kolmogorov-Smirnov test for normal distribution. Our findings allow us to reject the zero hypotheses stating that all the parameters have a normal distribution, since all the parameters are statistically significant (0.0000 <0.05). In as much as the assumption of normality is not met, we will use the Kruskal-Wallis hypothesis test, and present the results in the following tables.

Reliability analysis was conducted using Cronbach’s alpha coefficients. The analysis of the internal consistency reveals that the Cronbach’s Alpha reliability coefficient is 0.795, while the number of items was seven. We respected the
recommendations that “internal consistency coefficients of 0.70 or higher are considered to indicate adequate reliability” (Kim et al., 2008). Therefore, we can conclude that the selection of parameters with relatively high consistency allows us to measure the attitudes of the respondents.

**Results**

The structure of sample by gender and age shows that most respondents are female (66%) and the majority of respondent’s average age is up to 25 years (55.17%). The share of the respondents under 30 years of age is 20.68%, and above 30 years of age is 24.15%.

The descriptive statistics of evaluated attitudes of respondents on the importance of particular parameters are presented in Table 1.

According to our findings, the highest rated parameter is “Good communication affects a better working environment”, and the worst rated parameter is “Personnel policy affects the company’s business performance”. An overwhelming majority, 97% of respondents find that motivation is essential when working in a company, while the same percentage of respondents agree that the way they communicate within a company is essential. The leadership model was assessed as essential by 90% of the respondents.

**Table 1**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean (St.Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation affects the company’s business performance</td>
<td>4.55 (0.605)</td>
</tr>
<tr>
<td>Motivation affects a better working environment</td>
<td>4.59 (0.691)</td>
</tr>
<tr>
<td>Leadership model affects the company’s business performance</td>
<td>4.69 (0.535)</td>
</tr>
<tr>
<td>Leadership model affects the better working environment</td>
<td>4.53 (0.790)</td>
</tr>
<tr>
<td>Good communication affects the company’s business performance</td>
<td>4.69 (0.513)</td>
</tr>
<tr>
<td>Good communication affects a better working environment</td>
<td>4.80 (0.546)</td>
</tr>
<tr>
<td>Personnel policy (staff selection and management) affects the company’s business performance</td>
<td>4.38 (0.796)</td>
</tr>
</tbody>
</table>

*Source: Authors’ work*

Along with the proposed parameters measuring the influence of different variables on better business performance and working environment, our survey also comprised three control questions, which will be used to investigate the relevance of individual parameters between groups of respondents. The following control questions are: (i) Is motivation important for working in a company?, (ii) Is the leadership model important for working in a company?, and (iii) Is the communication culture within a company important for working in that company?

Table 2 provides the statistically significant difference in the perception of essential parameters such as motivation, communication, leadership model, and personnel management within a company, over groups of respondents differentiated by gender and age. At 5% confidence level these are: (i) Good communication affects a better working environment, (ii) Good communication affects the company’s business performance, and (iii) the control question “Is the communication culture within a company important for working in that company?”. At 10% confidence level these are: (i) “Is the leadership model important for working in a company?” and (ii) Personnel policy (staff selection and management) affects the company’s business performance.
The research findings presented in Table 3 are determined by the control question "Is motivation important for working in a company?". Clearly, there is a statistically significant difference in the perception of the key parameters of motivation, communication, leadership model, and personnel management within the company. At 1% confidence level this is: Motivation affects the company's business performance, and at 5% confidence level it is: Motivation affects a better working environment.

Results identified by the control question; "Is the leadership model important for working in a company?" are presented in Table 4. The Kruskal-Wallis test indicates that there is a statistically significant difference in the perception of the key parameters of motivation, communication, and leadership model, as well as personnel management within the company. At 1% confidence level this is: Motivation affects the company's business performance. At a level of 5% confidence this is: Leadership model affects the better working environment.

Table 2
Kruskal-Wallis test for different groups

<table>
<thead>
<tr>
<th>Item</th>
<th>Chi-Square</th>
<th>df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the communication culture within a company important for working in that company?</td>
<td>3.84</td>
<td>1</td>
<td>0.05**</td>
</tr>
<tr>
<td>Good communication affects the company's business performance</td>
<td>4.64</td>
<td>1</td>
<td>0.031**</td>
</tr>
<tr>
<td>Good communication affects a better working environment</td>
<td>3.90</td>
<td>1</td>
<td>0.048**</td>
</tr>
<tr>
<td>Is the leadership model important for working in a company?</td>
<td>3.02</td>
<td>1</td>
<td>0.082*</td>
</tr>
<tr>
<td>Personnel policy (staff selection and management) affects the company's business performance</td>
<td>7.73</td>
<td>3</td>
<td>0.052*</td>
</tr>
</tbody>
</table>

Note: *** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%
Source: Authors’ work
The results provided in Table 5 are defined by the control question „Is the communication culture within a company important for working in that company?“ The results implicate there is a statistically significant difference in the perception of the essential parameters such as motivation, communication, leadership model and personnel management within the company. At 1% confidence level these are: (i) Motivation affects the better working environment, (ii) Leadership model affects the better working environment and (iii) Good communication affects the company’s business performance. At a level of 5% confidence this is: Leadership model affects the company’s business performance.

Table 5
Kruskal-Wallis test for different groups

<table>
<thead>
<tr>
<th>Item</th>
<th>Chi-Square</th>
<th>df</th>
<th>Asymp. Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation affects the better working environment</td>
<td>8.19</td>
<td>1</td>
<td>0.004***</td>
</tr>
<tr>
<td>Leadership model affects the company’s business performance</td>
<td>4.76</td>
<td>1</td>
<td>0.029**</td>
</tr>
<tr>
<td>Leadership model affects the better working environment</td>
<td>7.61</td>
<td>1</td>
<td>0.006***</td>
</tr>
<tr>
<td>Good communication affects the company’s business performance</td>
<td>6.80</td>
<td>1</td>
<td>0.009***</td>
</tr>
</tbody>
</table>

Note: *** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%
Source: Authors’ work

Table 6
Partial correlation table for the paired variables

<table>
<thead>
<tr>
<th>Motivation affects the company’s business performance</th>
<th>Motivation affects a better working environment</th>
<th>Leadership model affects the company’s business performance</th>
<th>Leadership model affects the better working environment</th>
<th>Good communication affects the company’s business performance</th>
<th>Good communication affects a better working environment</th>
<th>Personnel policy (staff selection and management) affects the company’s business performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.435*</td>
<td>0.363*</td>
<td>0.433*</td>
<td>0.394*</td>
<td>0.187</td>
<td>0.120</td>
</tr>
<tr>
<td>Motivation affects a better working environment</td>
<td>0.395*</td>
<td>0.277*</td>
<td>0.380*</td>
<td>0.482*</td>
<td>0.450*</td>
<td>0.447*</td>
</tr>
<tr>
<td>Leadership model affects the company’s business performance</td>
<td>0.368*</td>
<td>0.466*</td>
<td>0.369*</td>
<td>0.490*</td>
<td>0.402*</td>
<td>0.363*</td>
</tr>
<tr>
<td>Leadership model affects the better working environment</td>
<td>0.482*</td>
<td>0.402*</td>
<td>0.369*</td>
<td>0.490*</td>
<td>0.402*</td>
<td>0.363*</td>
</tr>
<tr>
<td>Good communication affects the company’s business performance</td>
<td>0.490*</td>
<td>0.402*</td>
<td>0.402*</td>
<td>0.490*</td>
<td>0.402*</td>
<td>0.402*</td>
</tr>
<tr>
<td>Good communication affects a better working environment</td>
<td>0.402*</td>
<td>0.402*</td>
<td>0.402*</td>
<td>0.490*</td>
<td>0.402*</td>
<td>0.402*</td>
</tr>
<tr>
<td>Personnel policy (staff selection and management) affects the company’s business performance</td>
<td>0.363*</td>
<td>0.363*</td>
<td>0.363*</td>
<td>0.363*</td>
<td>0.363*</td>
<td>0.363*</td>
</tr>
</tbody>
</table>

Note: *** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%
Source: Authors’ work

In order to avoid the influence of other variables on the observed pair of variables in the model, we calculated the partial correlation coefficients among the pairs of variables, controlling for the effects of the third variable, i.e. three control questions: (i) Is motivation important for working in a company?, (ii) Is the leadership model important for working in a company?, and finally, (iii) Is the communication culture
within a company important for working in that company? (see Table 6). Although there is a statistically significant correlation between multiple pairs of variables, the correlation coefficient indicates a weak link between the following variables: (i) Good communication affects the company's business performance and Leadership model affects the company's business performance; and (ii) Good communication affects the company's business performance and Leadership model affects the better working environment.

Discussion

Our overall research findings resulted in statistically significant difference in the perception of the parameter of motivation, communication, leadership model and staff management with the following parameters: (i) Good communication affects a better working atmosphere, (ii) Good communication affects the company's business performance, (iii) leadership model is essential for working in a company?, and (iv) the Personnel policy (staff selection and management) affects the company's business performance. Conducting the study, we used control questions to investigate differences in the importance of certain parameters between groups of respondents. Within the control question variable “Is motivation important for working in a company?”, the Kruskal-Wallis hypothesis test revealed the presence of statistically significant difference in the perception of the following parameters: (i) Motivation affects a company’s business performance; and (ii) Motivation affects a better working environment. Regarding the control question "Is the leadership model important for working in a company?", the Kruskal-Wallis hypothesis test has demonstrated a statistically significant difference in the perception of following parameters: (i) Motivation affects the company's business performance; and (ii) Leadership model affects the better working environment. The last variable we used to determine the population is the control question "Is the communication culture within a company important for working in that company?", with the statistical test resulting in statistically significant difference in the perception of parameters: (i) Motivation affects a better working environment; (ii) Leadership model affects the company's business success, and (iv) Leadership model affects the company's business performance.

Interestingly, part of the respondents evaluate the claims negatively: (i) whether motivation is essential for the company's work (3%), (ii) whether the leadership model is important for work (3%) and communication is essential for work (10%). Although there are other studies that confirm the thesis that direct financial rewards such as wages are an outdated motivational factor, previous authors’ research shows that “they are an important parameter in the private sector of the Republic of Croatia”. In regard with the public sector, women emphasize “the importance of good business communication and satisfying working conditions”, while men appreciate “acknowledgement from their colleagues and superiors, and recognition for a well-done job”. Thus, in the previous survey, 35% of the respondents assigned salary as a motivational factor the highest rank.

Furthermore, we obtained the partial correlation coefficient for paired variables accounting for all three control variables. The results exposed the presence of statistically significant correlations between multiple variables, with all the coefficients being positive, and weak correlation was proven between following variables: (i) Good communication affects the company's business performance Leadership model affects the company's business performance; and (ii) Good
communication affects the company’s business performance and Leadership model affects the better working environment.

**Conclusion**

The conceptual model of this empirical research is aiming to describe the respondent’s attitudes towards the influence of various parameters regarding the better business performance and working environment in the company. Furthermore, it also analyses the attitudes regarding the importance of motivation, leadership model and communication on employee satisfaction. Research question was designed around the importance of monitoring the employee satisfaction parameters in the public and private sector, which show that satisfied employees represent the main pillar of any organization’s and company’s development. Indeed, money and other financial rewards as instruments for motivation could have a short-term effect on employee satisfaction; however they can imply a significant factor in choosing future employment. By comparing the results of this research with results conducted over parameters affecting employees’ satisfaction (Klopotan et al., 2016), there is “an obvious correlation in some theoretical aspects and also the results”.

We argue that employee motivation has a significant impact on a better working environment, which is also the highest rated statement by employees. This result correlates with results from a previously mentioned research, confirming that parameters such as “acknowledgment for work well-done, respect by supervisors, job satisfaction, satisfying working conditions, good communication and collegial respect have a direct impact on the employee’s satisfaction” (Klopotan et al., 2016). Moreover, besides the proposition that employee’s motivation influences the working environment, it also has a direct impact on employee satisfaction, which ultimately contributes to a more successful performance.

Our empirical research results clearly pinpoint the link between successful application of motivational techniques, quality of the leadership and employee satisfaction. Overall, the results obtained by this research conducted from an employee point of view, detect the difference in the perception of the parameters of motivation, communication, leadership and personnel management, and their impact on employee satisfaction. We hope that our contribution will motivate further research on the role of motivation of employees and the importance of leadership.

**References**

About the authors

Igor Klopotan, Ph.D. is a lecturer at the University North, Department of Business and Management. He received PhD in economy at the Faculty of commercial and business science in Slovenia with the dissertation thesis “Impact of Corporate Responsibility Communication over the Company web site and Social Networks to Business Reputation”. He is the author and co-author of numerous domestic and international professional and scientific papers, and has participated in several international conferences. He is a member of the program committee of the international scientific conference Entrenova. The author can be contacted at: igor.klopotan@unin.hr.

Trina Mjeda works as an assistant at the University North in Croatia. She is currently engaged in a Ph.D. study program at the Faculty of Economics, University of Rijeka. During her doctoral studies, she is actively participating in numerous international seminars and workshops. As a guest lecturer, she was teaching at the University Rey Juan Carlos in Madrid in 2015, and at the University of Rijeka in 2017 and 2018. She had spent winter semester 2017/2018 at the Institute of Economics, Charles University in Prague, where she was trained in her academic work. She is fluent in English language, and also knows German, Spanish and Albanian language. Author can be contacted at trina.mjeda@unin.hr.

Dr. Petar Kurečić works as Assistant Professor of Political Science at the University North, Croatia. Dr. Kurecic is the author of one scientific book and numerous papers (fifteen in CC/WoS/Scopus indexed journals). His research interests are primarily geo-economics, small states and small economies, and the challenges to European integration. He speaks fluent English and good German. He currently coordinates the work of the international research group “Small States in the Multi-Polar World”. Dr Kurecic received several international mobility grants (ERASMUS+, CEEPUS) and is currently developing two EU projects. Author can be contacted at petar.kurecic@unin.hr.
Notice of Redundant Publication and Erratum

Mijana Pejić Bach
Faculty of Economics & Business, University of Zagreb, Zagreb, Croatia


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Notice of redundant publication

The editor and publishers of the BSR journal issue a notice of redundant publication in relation to the article “Vendor Selection and Supply Quotas Determination by Using a New Multi-Objective Programming Method Based on Cooperative Game Theory” by Tunjo Perić published in the Business Research Journal, Vol. 7 No1, 2016.

Since the publication of this article, it has come to the editors’ knowledge that certain parts of the article text were included in the article “Vendor Selection and Supply Quotas Determination by using Revised Weighting Method and Multi-Objective Programming Methods” previously published by Perić, T., Fatović, M. in the International Journal of Social, Behavioral, Educational and Management Engineering, Vol. 9, No. 6, 2015. This article was not listed in references of the article published in the BSR journal.

Authors have been contacted on this matter, and have provided the following explanation: “The two papers are concerned with testing methodologies for selecting suppliers and determining purchasing quotas from selected suppliers. Since the articles test different methodologies, to ensure comparability of the obtained results it was opportune and justifiable to test the methodologies using the same example. The paper by Perić, Fatović (2015) tests the methodology that includes the following two methods: (a) the revised weighting method, applied only to simplify complex hierarchical quality criteria, and (b) the multi-objective linear programming method based on the cooperative game theory that is only applicable if there are two decision makers. The paper Perić (2016) tests the supplier selection methodology and the procurement quotas of selected suppliers using the example of the one-year procurement of flour for a company engaged in industrial bakery production and the proposed methodology contains the following methods: (a) the revised weighting method, which is used to simplify the complex criterion of product quality and supplier reliability in simpler forms and to form two simple objective functions of quality and reliability, and (b) the MP multi-objective linear programming method for selecting a supplier and determining the purchase quotas from the selected vendors. The MP method is completely different from the multi-objective linear programming method based on the cooperative game theory and it can be applied in the case of a larger
number of decision makers, whereas the previous method applies only in the case of two decision makers. These two methods practically do not have any similarities. Thus, the articles in questions are two different articles with different scientific contributions. Each article uses different methodology. The different proposed methodologies are tested in three different articles using the same example of supplier selection and the supply quotas determination problem”.

COPE recommendations in case of the partial overlap are the following: “In cases of partial overlap (i.e. when authors present some new findings in an article that also contains a substantial amount of previously published information) editors need to consider whether readers are best served if the entire article is retracted or whether it would be best to issue a notice of redundant publication clarifying which aspects had been published previously and providing appropriate cross-references to the earlier work.” (Wager et al., 2009).

Based on the author’s elaboration and recommendations of COPE (Wager et al., 2009), the editor has decided that the readers would be best served by the notice of redundant publication. This is an instance of a partial overlap, i.e. in the paper published in the BSR journal, the author elaborates on new findings but the article also comprises a substantial part of a previously published paper. The authors have agreed to the publication of this notice.

Erratum

Due to the abovesated reasons, the following corrections in the paper “Vendor Selection and Supply Quotas Determination by Using a New Multi-Objective Programming Method Based on Cooperative Game Theory “are conducted:


2. Acknowledgment “This paper has been fully supported by the Croatian Science Foundation under the project STRENGTHS Number 9402” is withdrawn.

References

