

## The impact of technologies on leadership styles in Southeast European countries

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**Abstract.** This paper focuses on analyzing the range of factors that influence the transformation of leadership styles by technologies. The aim is to evaluate the level of transformation achieved by influence of technologies in certain post-socialist countries in Southeastern Europe (SEE). The theoretical part of the research identifies two sets of factors (endogenous and exogenous) that are important in understanding the influence of technologies on leadership transformation. Key factors were identified, including readiness of organization, perceived-easy of use, customer pressure, law regulations, and leader's attitude. In the quantitative section of the research, the impact of these factors on the transformation of leadership styles was evaluated. The hypothesis is that these factors significantly impact leadership style transformation in the selected countries, and by understanding their advantages, leaders can improve their performance. The multiple linear regression method was used to research the perception of the impact of selected factors. A mathematical model based on multiple linear regression analysis was created to explain the relationship between the dependent variable (the level of transformation of leadership style) and the selected independent variables. The results have confirmed the validity of the hypothesis and, consequently, the selected factors have the high influence to the transformation of leadership styles in the analyzed countries. The study concludes that the evaluation of the current status of selected factors presents opportunities that leaders should consider to survive the effects of globalization and open markets. The selected factors explain the situation in leadership to a great extent in the observed countries.

**Keywords:** leadership style, technology, transformation, South-Eastern Europe (SEE) countries.

**JEL Classification:** O30, O32, M10

**Received:**

May, 2022

**1st Revision:**

February, 2023

**Accepted:**

June, 2023

DOI:

10.14254/2071-8330.2023/16-2/8

## 1. INTRODUCTION

Technology has had a significant potential to impact on leadership styles, both in terms of how leaders use technology and how technology has changed the way leadership is practiced. Here are some key ways technology and leadership styles are related:

- *Communication:* Technology has enabled leaders to communicate with their teams more efficiently and effectively. Leaders can use various communication tools like emails, messaging apps, video conferencing, and social media to communicate with their teams instantly. This has led to more democratic and participative leadership styles where leaders seek input and feedback from their team members.
- *Decision making:* Technology has made it possible for leaders to access real-time data and information, which has changed the way decisions are made. With data analytics and other tools, leaders can make more informed and data-driven decisions. This has led to a more analytical and strategic leadership style.
- *Collaboration:* Technology has enabled remote collaboration, making it easier for teams to work together across different time zones and locations. Leaders who embrace this technology tend to adopt a more team-oriented and collaborative leadership style.
- *Innovation:* Technology has become a driving force of innovation, and leaders who embrace technology tend to be more innovative and open to new ideas. They are more likely to experiment with new tools and processes to improve their business processes.
- *Flexibility:* Technology has made it easier for leaders to be flexible in their work styles, allowing them to work remotely or from different locations. This has led to a more flexible and adaptable leadership style.
- *Automation:* Technology has enabled automation of repetitive and mundane tasks, freeing up leaders to focus on more strategic work. Leaders who embrace automation tend to adopt a more efficient and streamlined leadership style, where they prioritize productivity and effectiveness.
- *Transparency:* Technology has made it easier to track and monitor progress, which has led to greater transparency in the workplace. Leaders who embrace technology tend to adopt a more transparent leadership style, where they are open about goals, progress, and challenges. This has led to more trust and accountability within teams.
- *Customer-centricity:* Technology has enabled leaders to gain a deeper understanding of customer needs and preferences. With tools like customer relationship management (CRM) systems and social media monitoring, leaders can better understand customer feedback and adjust their strategies accordingly. Leaders who embrace technology tend to adopt a more customer-centric leadership style, where they prioritize customer satisfaction and loyalty.
- *Continuous learning:* Technology has made it easier for leaders to access training and development opportunities, enabling them to continuously improve their skills and knowledge. Leaders who embrace technology tend to adopt a more learning-oriented leadership style, where they prioritize personal growth and development.

In summary, technology can have a profound impact on the way leader's approach their work, and those who embrace technology tend to adopt more modern, collaborative, and data-driven leadership styles. Leaders who are open to using technology can leverage its benefits to improve communication, decision-making, collaboration, innovation, flexibility, automation, transparency, customer-centricity, and continuous learning. In today's dynamic business landscape, the rapid evolution of technologies such as Big Data, cloud technology, artificial intelligence, and blockchain is posing a threat to established business models and

traditional job roles. As a result, all businesses must act quickly to address these novel challenges by identifying and appointing innovative leaders who can provide effective solutions. To navigate the challenges that lie ahead, financial services organizations need to embrace a new leadership approach.

To capitalize on disruptive technologies, businesses must have boardroom leaders who not only possess digital expertise but also demonstrate the capability and vision to embrace these innovations. While it is increasingly common to appoint board members with digital backgrounds in the financial sector, the successful integration of disruptive technologies requires more than just digital comprehension. Senior leaders must acquire a diverse range of skill sets to effectively address the opportunities and threats posed by evolving technologies.

These skill sets include core competencies in change management, innovative thinking, the ability to drive values and build trust, and an entrepreneurial spirit. In this fast-changing environment, individuals with these critical skills are essential to understand the potential of new technologies and be prepared to adapt swiftly. To succeed in the ever-evolving world of technologies, it's crucial to have leaders who possess a clear vision, the capacity to stimulate growth, recognize novel revenue sources, and embrace emerging technologies. The key differentiator between successful and unsuccessful business leaders will be their ability to drive significant transformational change.

## **2. LITERATURE REVIEW**

Various studies have been conducted on leadership styles, as it is considered a crucial element for achieving organizational goals with high efficiency and effectiveness (Al Hilaa et al., 2017). Leadership can be defined as the process by which an individual motivates or influences others to achieve organizational goals (Kesting et al., 2016). According to A. Albert and T. Olivia (2015, p. 558), "leadership plays a significant role in motivating others to accomplish specific tasks and meet organizational goals. Strategic leadership involves managing human and social capital, such as building great human capital teams and forming alliances with partner companies' social capital, which are critical corporate resources". The leadership style employed influences employee behavior, motivation, and attitudes, which ultimately impacts organizational performance (Fiaz et al., 2017). The two primary leadership styles discussed in the literature are transformational and transactional leadership. Transformational leadership focuses on external conditions and involves idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. On the other hand, transactional leadership involves an exchange process between leaders and subordinates and is centered on achieving organizational goals by meeting the needs of subordinates. While transformational leadership is focused on the vision of the organization, transactional leadership is geared towards achieving company goals.

In SEE countries, various leadership styles are present including authoritarian, participative, laissez-faire, transactional, and transformational. Authoritarian leaders tend to prioritize decision-making over inclusivity and rarely consider input from their team, resulting in a faster decision-making process (Busse and Regenberg, 2018). In contrast, participative leaders adopt a people-oriented approach and encourage direct feedback from their subordinates, resulting in inclusive team management (Naik, 2015). Laissez-faire leaders take a passive approach to leadership, allowing subordinates freedom and autonomy in their work without interference (Rassa and Emeagwali, 2020). "Transactional leaders emphasize the role of organization, supervision, and group performance and use punishment and reward to attain compliance from their followers. They accept existing organizational goals and structure and negotiate with the team to achieve these goals, primarily striving to maintain the status quo" (Kabeyi, 2018, p. 193). These features are typical for the current trend in HR management with an emphasis on knowledge-based leadership development (Stachova et al., 2020). According to Budhiraja and M. Malhotra (2013), the transformational

leadership style emphasizes motivating subordinates through enthusiasm and vision. This style was also “found to result in positive behavior among employees, including increased organizational commitment and job satisfaction, particularly in the service sector. These positive effects ultimately align subordinates towards achieving the organization's long-term goals” (Tonkin, 2013, p. 45). The positive consequences can increase significantly in uncertain situations like pandemic threats when leadership plays a key role in supporting a positive emotional environment for work (Sarihasan et al., 2022).

The use of technology in organizations depends on the prevailing leadership style, as observed by S. Klempin and M. Karp (2018). Under authoritative leadership, technology changes and implementation do not affect the organization's underlying processes or structures since the focus is on maintaining clear commands and hierarchy. In contrast, participative leadership uses technology to manage skilled teams more efficiently and increase participation and engagement among team members. “This approach allows organizations to be more flexible and align employees towards achieving organizational goals” (Sinani, 2016, p. 72). In this regard, the efficiency of skilled teams' management influences a lot via the technology development in knowledge development and use (Bilan et al., 2023). Gameda and Lee (2020, p. 38) “found that “technology's role is not significant in supporting distanced working under laissez-faire leadership, which weakly correlates with innovative work behavior and work engagement. Leadership does not affect the task performance or work engagement of subordinates”. S. Gençer and Y. Samur (2016) revealed that technology is strongly correlated with the contingent reward factor of transactional leadership, where technology enables leaders to exercise formal control and power over subordinates and focus them on short-term goals. S. Farouk (2016) found that transactional leadership is also effective in transferring technology and introducing new techniques to subordinates. Finally, Tomi Mano, Thoyib, and Maskie (2014) established “that transformational leadership style supports the integration of information and communication technology in organizations through shared vision, individualized support, building consensus, and intellectual stimulation”.

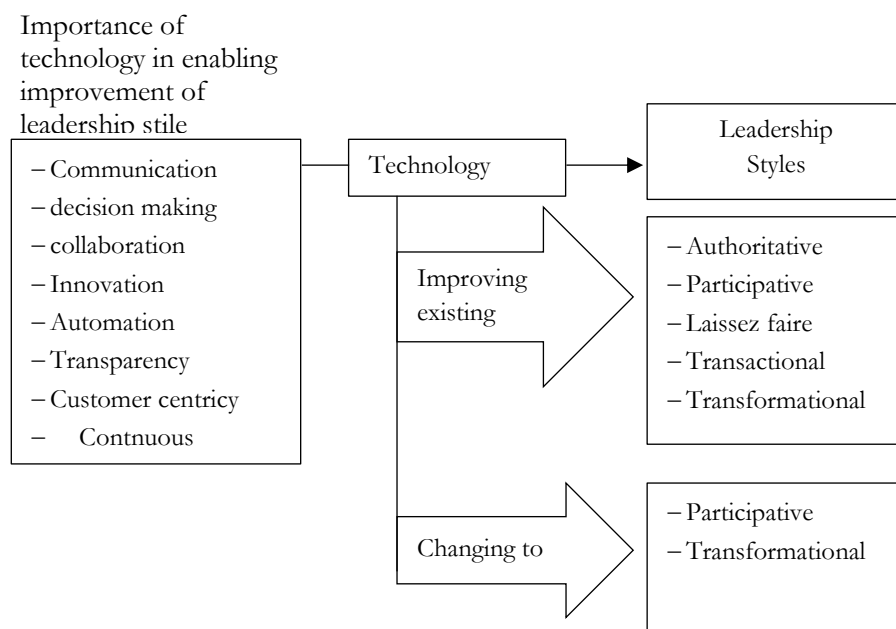


Figure 1. Conceptual framework

Source: own

Figure 1 demonstrates how technology affects various leadership styles. It indicates that technology enhances communication and skill management, encourages participation and improves task performance,

aids in achieving organizational goals, promotes congruent work behavior and engagement, facilitates technology transfer for generating new knowledge, fosters shared vision, provides individualized support, encourages consensus-building, and stimulates intellectual growth. This framework enables the connection between technology and different leadership styles, including authoritative, participative, laissez-faire, transactional, and transformational, and highlights their interrelationships.

### **2.1 Leadership transformation technology factors**

W. Chung and colleagues (2007, p. 14) acknowledge that firms must be prepared both internally and externally to adopt new technology, according to the literature on innovation and emerging technology adoption. M. Fathian et al. (2008) define readiness as a company's ability to successfully adopt, use, and benefit from technology or innovation. Based on existing research on adopting new technologies, several factors were chosen to examine their influence on leadership-'s style. These factors include perceived usefulness, compatibility, readiness of organization, perceived-easy of use, customer pressure, law regulations, and leader's attitude.

- Perceived usefulness is deemed important by many authors (see Rashid, 2001), as it is necessary for technologies to offer relative advantages for adoption in organizations.
- Compatibility with job responsibility and value systems is another important factor in adoption, according to several researchers (Tornatzky & Klein, 1982, p. 31).
- Organizational readiness, or a firm's technological capabilities, has also been identified as a predictor of successful IT adoption (Grandon & Pearson 2002).
- Perceived ease-of-use and affordability are additional factors that influence transformational leadership style. For this research we take attitude which seems that perceived ease of use (PEOU) is important factor of influence. It measures the extent to which a company believes that investment in technology requires minimum effort (Davis et al., 1989). Some authors (Venkatesh & Davis, 2000) underscore direct impact on adoption of technology. H. Awa, B. Nwibere, and B. Inyang (2010), stressed that PEOU will have significant effects on the adoption of Internet technology by business.
- Customers' pressure is a major determinant of whether a prospective user will ultimately use a given technology-based system or procedure, as suggested by S. Davis (1979, p. 20).
- Legal regulations has a strong impact on the adoption of technology, according to several studies.
- Owner-manager's knowledge about technologies is a noteworthy determinant of technology adoption, as top management support is crucial in successful innovative change. Top management support ranks as the most important factor in success in innovative change (Furey et al., 1993). In this way, it is less likely that the innovation project in leadership will fall into crisis due to lack of resources.

This paper aims to assess the impact of technology on different leadership styles in SEE countries. Despite the importance of these topics in western literature, there have been only a few researches to explore the impact of technology on different leadership styles in SEE countries. Our ambition is to contribute getting information and knowledge about the state of art in SEE countries.

### **3. RESEARCH MODEL AND HYPOTHESES OF THIS STUDY**

The research model depicted in Figure 2 is based on selected factors that influence the transformation of leadership style. This model links the independent and dependent variables directly, without any intervening variables. It comprises seven variables that are believed to have an impact on transformation

leadership style. The next step is to refine this model by conducting reliability tests, and ultimately eliminate some factors. The starting point is that technology does not have an influence on different leadership styles in SEE countries due to negative impact of the above selected factors.

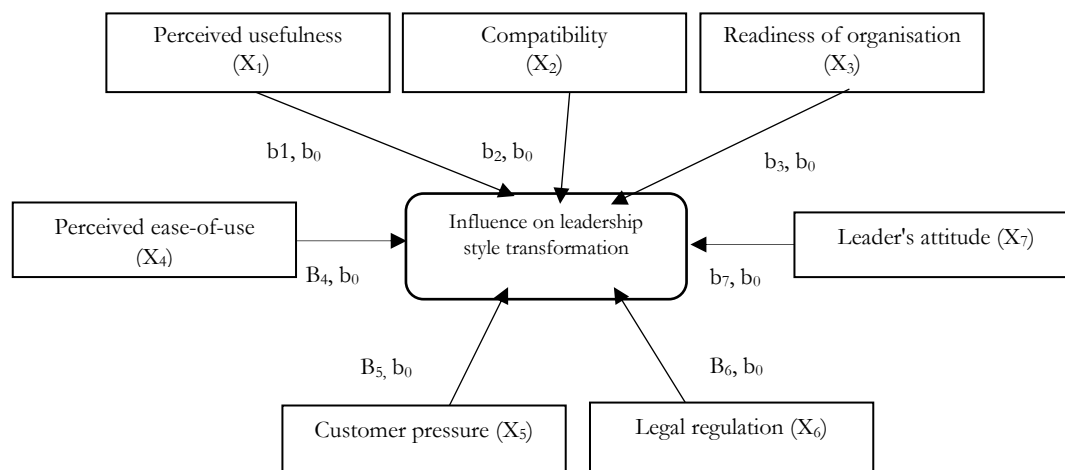


Figure 2. Starting research model

Source: own

### 3.1. Research design and method

Our study utilized a comprehensive survey that involved 240 professional respondents from business environments with high management position. The participants were equally distributed across Montenegro (MNO), Serbia (SER), and Bosnia and Herzegovina (B&H), with 80 respondents from each country. To conduct quantitative analysis, a multi-linear regression model served as the methodological foundation. The survey asked all participants to evaluate the level of transformational leadership style in their respective companies based on their knowledge, experience, and intuition. Additionally, the respondents were asked to rate the value of seven independent factors using Likert's scale, which ranged from 0.5 (the smallest influence) to 5.0 (the biggest influence).

The information contained in this document was processed using the SPSS software. To achieve the goals of the empirical portion of this study, several methods were employed, including descriptive statistics, total item correlations, the Cronbach alpha reliability test, and the analysis of research factors using the analysis of the main component. The theoretical model was first tested, and then the Cronbach alpha test was used to calculate the total correlation for decision-making purposes. This test aimed to evaluate the internal consistency of each of the factors. To improve the internal reliability, items were deleted, and the analysis of the investigated factors was used to select the dominant ones. As a result, four independent factors were selected and reduced to form a refined measure. The final scale could be considered an excellent standard for exploring this phenomenon not only in the observed countries but also in other regions.

### 3.2. Correlation of items and Cronbach alpha reliability test

Cronbach's alpha reliability test is the most common and popular method for assessing the internal consistency of a scale. This coefficient of internal consistency ranges between 0 and 1, with a higher  $\alpha$ -score indicating greater reliability. According to Nunnally and Bernstein (1994), a Cronbach  $\alpha$ -score greater than 0.7 indicates strong internal reliability of the items in the scale. In Table 3, the results of the Cronbach Alpha

Test show high reliability across dimensions. By excluding variables X1 and X2, the reliability of the scale increased from 0.683 to 0.801, indicating a high level of internal consistency in the measurement.

Table 1

Cronbach's Alpha test reliability

Cronbach's Alpha	N of Items
0,759	7

Source: own calculation

Table 2

Total statistics of items

	Scale Mean if Item Deleted`	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
X <sub>1</sub>	19,2875	17,086	-,040	,813
X <sub>2</sub>	20,6188	15,232	,023	,874
X <sub>3</sub>	20,0687	11,950	,854	,656
X <sub>4</sub>	19,9208	12,730	,623	,700
X <sub>5</sub>	19,5750	11,883	,859	,654
X <sub>6</sub>	20,1563	12,493	,696	,686
X <sub>7</sub>	19,0854	11,762	,834	,655

Source: own calculation

Table 3

Cronbach's Alpha test reliability after deleting items X<sub>1</sub> i X<sub>2</sub>

Cronbach's Alpha	N of Items
,943	5

Source: own calculation

The pivotal step in this study was to evaluate the model developed in the theoretical section using factor analysis. Factor analysis is a statistical technique utilized to identify factors that explain the variation and co-variation among measures (Green, Salking & Akey, 2000, p. 29). In the initial phase, the principal component analysis (PCA) was carried out to determine the number of factors, which explains as much variation as possible. The number of factors extracted depends on the eigenvalue, with a value above 1.0 being the preferred norm. Subsequently, Varimax with Kaiser normalization was used to extract the factors, and the items with a loading factor below 0.5 were removed from further analysis based on the recommendation of some scholars (Jayawardhena, 2004). Before conducting the factor analysis, the Kaiser-Meyer-Olkin (KMO) test and the Bartlett test were performed to ensure that the factor analysis was appropriate. A KMO index greater than 0.5 and a p-value less than 0.05 for the Bartlett test are standard requirements for conducting factor analysis. Based on these two tests, factor analysis was deemed suitable for further measurement. Factor analysis that all variables to have significant impact on the dependent variable's variance explanation. Figure 3 depicts the impact model after the analysis, and a linear regression analysis was conducted on it.

Table 4

KMO i Bartlett's Test

Kaiser-Meyer-Olkin Measre of Sampling Adequacy.	,858, Sig ,000
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Source: own calculation

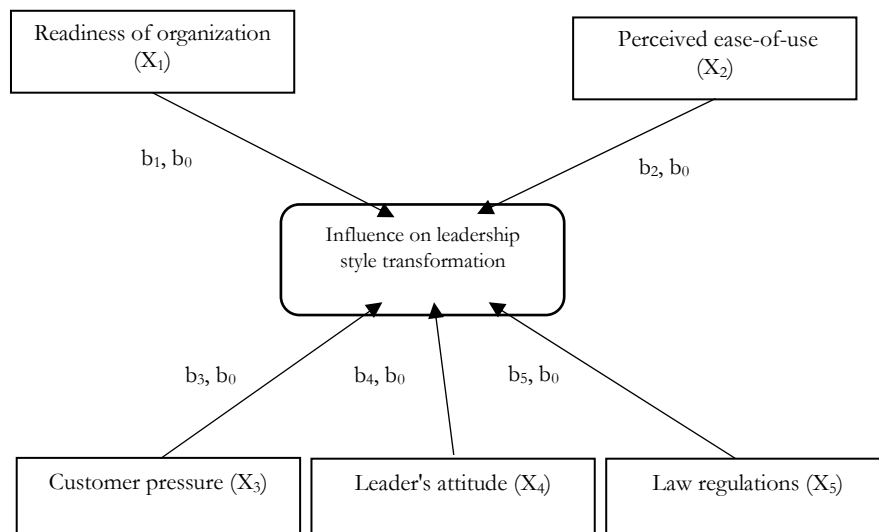


Figure 3. The revised model

*Source: own*

#### 4. MODEL OF MULTIPLE HIERARCHICAL REGRESSION ANALYSIS

In line with the requirements of multiple linear regression, our goal was to determine the functional relationship between the dependent variable ( $Y$ ), which represents the level of transformational leadership styles, and the independent variables ( $X_1, X_2, X_3, X_4, \text{ and } X_5$ ). To achieve this, we sought to estimate the realistically expected mean value of the dependent variable based on the individual estimations provided by the respondents. Each respondent independently estimated both the dependent variable  $Y$  and the independent variables ( $X_1, X_2, X_3, X_4, \text{ and } X_5$ ). To accomplish our task, we needed to determine the coefficients ( $b_0, b_1, b_2, b_3, b_4, \text{ and } b_5$ ) and calculate the expected mean value  $\bar{Y}$  using Equation (1).

$$\bar{Y} = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 \quad (1)$$

Where,

- $b_0$  - is Y-axis intercept, determined on the basis of an appropriate sample;
- $b_1, b_2, b_3, b_4, \text{ and } b_5$  - are coefficients of variables  $X_i, i = 1,5$  respectively, or slopes of the corresponding lines.

The coefficients  $b_1, b_2, b_3, b_4, \text{ and } b_5$  represent the slopes of the corresponding lines for the independent variables  $X_1, X_2, X_3, X_4, \text{ and } X_5$ . These coefficients allow us to estimate the value of the dependent variable for any new value within a predefined interval for each independent variable. It is important to note that represents an average estimated value, as it is the mean value of  $X_1, X_2, X_3, X_4, \text{ and } X_5$ . The least squares method is utilized to determine this value. Our objective was to determine the coefficients  $b_1, b_2, b_3, b_4, \text{ and } b_5$  in order to minimize the sum of squared errors (SSE), as represented by Equation (2).

$$SSE = \sum_{k=1}^n (Y_k - \bar{Y}_k)^2 = \sum_{k=1}^n (Y_k - (b_0 + b_1X_{1k} + b_2X_{2k} + b_3X_{3k} + b_4X_{4k} + b_5X_{5k}))^2 \quad (2)$$

Where

$Y_k$  - is actual value of the dependent variable, given by the  $k$  respondents ( $k = \overline{1, n}$ );



$\bar{Y}_k$  - is the estimated value of the dependent variable on the basis of the model, in the case of k respondents ( $k = \overline{1, n}$ );

n – is the total number of respondents.

The least-squares method is employed to determine a straight line that minimizes the sum of vertical differences between each pair of points (Balakrishnan et al., 2007). In essence, this method identifies the straight line that best fits the given set of points by finding the optimal values for the intercept (b0) and coefficients ( $b_1, b_2, b_3, b_4,$  and  $b_5$ ). These values are crucial for obtaining a more accurate estimation of the dependent variable (Y) based on the provided (estimated) values of  $X_1, X_2, X_3, X_4, X_5$  and  $Y_k$  ( $\forall k, k = \overline{1, n}$ ).

#### 4.1. Results and discussion

Table 5 presents the numerical results obtained from deploying multiple linear regression using SPSS. In addition to the key parameters of the linear regression ( $b_0, b_1, b_2, b_3, b_4,$  and  $b_5$ ), statistical parameters such as tolerance and VIF were also calculated. It has been confirmed that there are no concerns regarding the normality of the data. The results of the tolerance test and Variance Inflation Factor (VIF) indicate that there is no multicollinearity ( $VIF < 10$ ), and none of the tolerance levels are less than or equal to 0.01.

Table 5

Linear multiple regression model key parameters and statistics

Param.	Tolerance	VIF
$Y_v$		
$X_1$	,097	8,281
$X_2$	,501	1,998
$X_3$	,098	8,181
$X_4$	,210	4,754
$X_5$	,121	8,276

Source: own calculations

By using the specified model, and calculated data from Table 1, the lines that represent linearly the impact of independent variables ( $X_{1-5}$ ) to the dependant variable (Y) are given below:

$$\bar{Y}_k = -1,211 + 0,24X_1 - 0,08X_2 + 0,08X_3 - 0,75X_4 + 0,06X_5 \quad (3)$$

Based on Eq. 3,  $\bar{Y}_k$  was calculated, and shown in Table 6. The average values of the dependant variable estimated by the respondents are shown in Figure 3, and expressed in %. It is obvious that the highest percentage of respondents (over 45%) assessed the level of transformation of leadership style low (below (2). The 18% assessing medium (2,5-3) influences of transformation of leadership style to which the respondents are exposed in accordance to the subjective judgments of the respondents from the analysed countries.

Table 6

Mean values of the dependent variable  $\bar{Y}_k$ 

	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>
	3,0500	3,1979	3,5438	2,9625	4,0333
b <sub>0</sub>	-1,211				
b <sub>1</sub>	0,247				
b <sub>2</sub>	-0,080				
b <sub>3</sub>	0,088				
b <sub>4</sub>	0,756				
b <sub>5</sub>	0,006				
$\bar{Y}_k$	1,86				
R <sup>2</sup>	0,855				

Source: own calculations.

Due to the analysis of the linear dependence between dependent and mean values of independent variables (Figure 4-5), it becomes clear that variable X<sub>5</sub>, have the most pronounced influence on the dependent variable. But, all variables have approximately high negative influence.

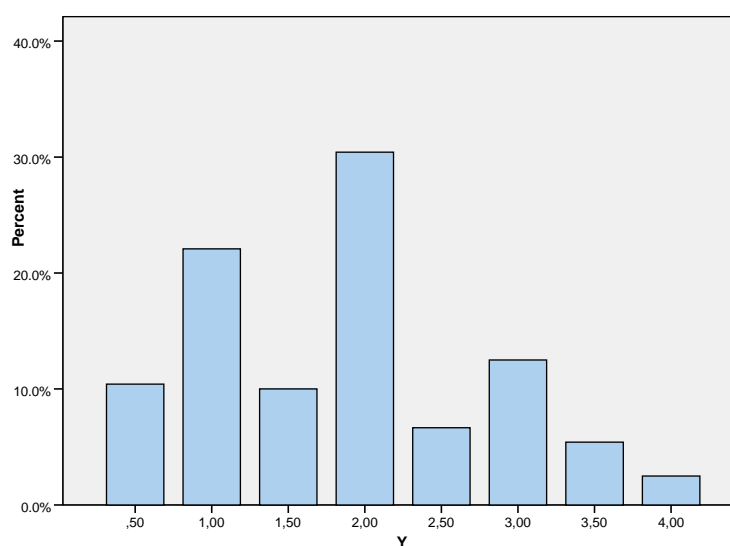


Figure 4. Percentage of appearing values in the set of dependent variable (Y)

Source: own

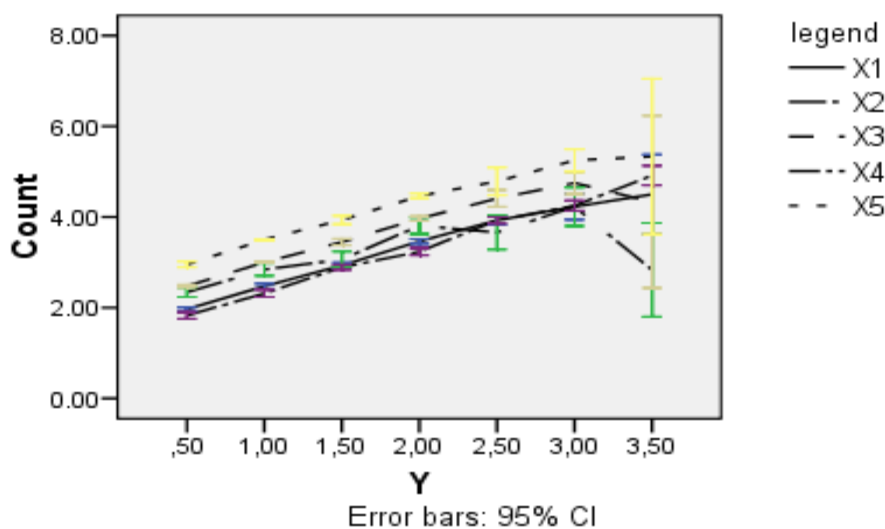


Figure 5. Dependant variable (Y) vs. independent variables (X<sub>1-5</sub>)  
 Source: own

Based on the analysis of independent variables, the data given in Table 7, were obtained, and sorted by the level of impact. In accordance with the mean values of independent variables (Table 7), it can be concluded that lack of law regulation (X<sub>5</sub>), has the greatest negative influence on the transformation of leadership styles in SEE countries. Competitive pleasure (X<sub>3</sub>) has the second most significant negative influence. Readiness organisation is on the third place, and leadership attitude (X<sub>4</sub>) has the weakest negative impact.

Table 7

Mean values of the independent variables and their impact to the dependant variable

Rank	Mean value
1	X <sub>5</sub> [4,0333]
2	X <sub>3</sub> [3,5438]
3	X <sub>2</sub> [3,1979]
4	X <sub>1</sub> [3,0500]
5	X <sub>4</sub> [2,9625]

Source: own calculations

## 5. CONCLUSIONS

The paper proposes a framework for quantitatively modelling the transformation of leadership styles in SSE countries based on several factors, including readiness of organization, perceived-easy of use, customer pressure, law regulations, and leader’s attitude. The research was conducted among highly educated individuals in MNO, SER, and BIH, using statistical methods such as Alpha Combarhs test, PCA, and multiple linear regression. The analysis revealed that factors such as readiness of organisation, perceived ease-of-use, customer pressure, leader’s attitude, and law regulations, had the greatest influence on the transformation leadership styles, while perceived usefulness, compatibility, did not. The research suggests that organisation’s leaders should consider these significant factors when developing their leadership strategies. The regression analysis reveals R<sup>2</sup> value is 0,855 that means that about 85.5%of variation in leadership styles is explained by above listed factors. While the research has some limitations, it makes notable contributions to the field, including filling a research gap, analysing the impact factors in depth, and providing a theoretical framework for the transformation of leadership style that can be generalized to other technology adoption in business. The paper suggests further research should explore additional independent

variables and more complex functional dependencies among the variables, and highlights the potential for improving all independent factors to achieve optimal performance in observed countries.

Technology is playing a critical role in every function of a business today. It has assisted companies in improving leadership in order to make them better suited to global working environments. SEE leaders faces a critical challenge today to align technology and leadership. We identified the factors which prevailed in limitation leaders in selected countries which result that technology has low influence on leadership styles. We hope that information given in this paper will help leaders to improve leadership style on the findings of this study.

## ACKNOWLEDGEMENT

The author, Dusko Knezevic, is grateful to the colleges from Beograd Banking Academy for support of this research, and companies that helped in process of research, and conducting surveys.

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