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Addressing Socio-Economic Drivers of Management Style Evolution: Embracing Complexity Leadership Solutions

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Abstract

Background: The information age has ushered in a novel economic model known as the information economy, challenging traditional bureaucratic mechanisms that were primarily seen as tools to mitigate uncertainty. Within this context, complex leadership emerges as a paradigm that thrives on systemic interactions and intricate dynamics. Here, the onus lies on establishing the framework and conditions that empower the adaptive essence of leadership to flourish.

Purpose: The aim of this research is to establish a framework for optimal leadership management, uncovering previously unexplored factors shaping employee work behavior. By identifying and defining key components within management mechanisms that greatly enhance employee performance, the objective is to cultivate rooted and effective management practices.

Study design/methodology/approach: The research involved 480 respondents from diverse socio-demographic backgrounds and companies. Complexity leadership was assessed using the Complexity Leadership Scale, measuring Generative and Administrative leadership. Employee cooperation was evaluated with the Scala Supportive and Non-Controlling Supervision. Statistical methods included multiple regression, Pearson correlation, t-tests, and MANOVA.

Findings/conclusions: The evaluation shows that both Generative and Administrative leadership are moderately expressed. Generative leadership positively correlates with Supportive and Non-Controlling Supervision, achieving statistically significant results. In contrast, Administrative leadership has negative correlations with these supervisory styles.

Limitations/future research: The limitations of the research are of a methodological nature and refer to the sample of employees, according to demographic characteristics and company characteristics. Also,

questionnaires based on self-assessment most often imply a certain number of socially desirable answers. Future research should include a larger sample to improve external validity and ensure that the empirical evidence obtained is variable across a range of organizational settings.

Keywords
Leadership, Complexity, Employees, Organizations, Socio-economic drivers

Introduction

The requirements for changes in management styles and mechanisms that are imposed on modern organizations relate to the readiness and strength of the organization to prerequisite for survival, in a growing competitive environment. Managing organizations in conditions of complexity and continuous changes requires much more management knowledge, skills, tools, but also personal creativity, initiative, responsibility in order to improve organizational efficiency. The end of the industrial era showed that for the success of the organization, it is of great importance to increase the capacity to accept and use all resources in an adequate way, which above all implies the organization's concern for the continuous development of employees. The reality of the information age actually demanded the definition of new theories of leadership, which is built on the complex foundations of social and economic relations (Khan et al., 2016). It was shown that it is not enough just to improve management, but also, to include organizational learning about new conditions, that necessitate strategies that can adapt to more complex conditions, if it is necessary (Dunn, 2020).

In the new economy based on information technology and knowledge, the requirements have focused on creating an atmosphere in which production costs would be reduced and knowledge accumulation would increase, which would contribute to the development of knowledge-based products, which are unlikely to be replicated with increasing accumulation knowledge (Hager & Beckett, 2022).

Navigating the ever-changing landscape of modern business demands a redefined approach to management, encompassing not only personnel, but also process oversight. Traditional leadership theories predominantly focus on explaining leadership through the lens of individual personality traits or specific behavioral tendencies. While these perspectives offer some insight, they have been found lacking, especially in the context of contemporary organizational environments characterized by rapid change, complexity, and constant development. As a result, these theories have been criticized for their limited scope and inability to fully capture the dynamic nature of leadership. This has paved the way for more intricate and multidimensional frameworks that integrate a broader array of socio-economic, organizational, and personal factors, acknowledging the complexity of leadership in modern management processes (Avotri et al., 2019). Leadership style is one of the most important concepts that determines employees' attitudes and behaviors, which can also influence employees' feelings and thoughts. Leadership management involves a set of activities aimed equally at people and processes, guided by a unifying vision and continuous communication among all participants in the work process. The ability to communicate is one of the main pillars of a leader's potential to leave a positive impact on employees. In that case, leadership style and communication ability can be seen as basic dimensions that influence employee performance, primarily commitment to work and productivity (Dinh et al., 2014).

Such frameworks highlight the need to consider external influences, adaptive capabilities, and the interplay between leaders and their environments in order to provide a more accurate and holistic understanding of effective leadership. Traditional leadership methods have fallen short of anticipated outcomes, failing to deliver the promised results suggested by theoretical frameworks. Practical observations have underscored the deficiencies of existing theories, urging the evolution of new methodologies that harmonize organizational objectives and foster personal growth while achieving and innovating goals (Cort et al., 2018). Theories on leadership have developed significantly in recent years, but a global perspective on leadership reveals a serious lack of contextualization and a more comprehensive understanding. A more cohesive theoretical and empirical model requires insight into context, which is recognized as one of the most important factors (Reiche et al., 2017). Researchers agree that leadership management contributing to success must be adaptable to the

existing context and circumstances (Eva et al., 2019).

One of the theories that has given the most attention to contextual factors is contingency leadership theory, which emphasizes the impact of external influences on management. Contingency theories argue that leadership effectiveness depends on the interaction between a leader's traits or behaviors and situational factors (Amghar, 2022; Subatyarto & Lestari, 2020). This theory has profoundly shaped the evolution of other theoretical frameworks, particularly complexity leadership.

Information economy recognized bureaucratic mechanisms only as a basic tool for reducing uncertainty. Contemporary approaches to management have tried to offer alternatives to the bureaucratic approach to management and to work out ways to put these alternatives into practice, focusing on visible problems of organizational structure, power issues and role of technology, to define uncertainty in organizations and possibility to achieve goals (Wong et al., 2023).

The attitude imposed in the existing Industry 4.0 dominated by mass production, automation and digitization is changing towards the creation of an individual-centered society that is able to balance technological and economic progress with solving social problems. Employees in Industry 5.0 will be focused on training and providing value-added tasks to employees.

As a basis for the beginning of the quantitative draft of the research, and based on the insight into the existing research concepts, the following research questions were asked:

1. to what extent is leadership in organizations based on a complexity approach to management?
2. do organizations have access to supportive behavior for their employees?
3. does a complexity leadership style and a supportive attitude towards employees guide the behavior of employees?

The lack of leadership theories so far is reflected in the absence of a more complex understanding of their impact on employee behavior and results. This is because only personal prerequisites, organizational influences, or cultural influences were emphasized individually. Problems in the interpretation of leadership concepts, terminological interpretations, and defining the importance and role of the scientific approach are reflected in the theoretical approaches to leadership. Although these theoretical approaches were built on each other with a clear goal of improving the understanding of leadership, each approach had its own limitations. These limitations inspired other authors to include new influencing factors

This research addresses the management challenges observed in organizations in Serbia, highlighting a widening gap between the existing management systems and the evolving needs driven by advancements in technology and changes within organizations and society. The paper is structured as follows: the first section introduces the research problem, the second provides a review of relevant literature, the third outlines the research methodology, the fourth presents the research findings, and the fifth discusses the results in the context of prior studies and the proposed hypotheses. The final section offers concluding reflections and implications.

1. Literature review: Complexity leadership

Adequate leadership style is one of the challenges for the best organized business today, where changes are accelerated and the need for continuous development of human resources in the organization is essential.

The existing theories of leadership did not provide enough flexibility and comprehensiveness to explain and predict the management needs in organizations (Lichtenstein et al., 2006). Dominant paradigms in existing theories mainly deal with basic aspects of system stability, such as organizational functioning and their structures with recognizable uncertainty avoidance mechanisms. The vast majority of research on leadership has studied leadership in a formal context, very often through managerial roles (Bedeian & Hunt, 2006; Rost, 1991) and has not adequately addressed leadership that occurs throughout the organization (Schneider, 2002; Callahan, 2019). The study of leadership has long been primarily focused on Western societies, only recently have leaders in developing countries, primarily due to the globalization of the workforce, globalization of markets, increased competition and communications, become aware of the need to develop new styles of organizational management (Damayanti et al., 2021).

Terminologically, it was administrative leadership that refers to formal acts that serve to

coordinate and structure organizational activities, and the conditions in real systems required the introduction of the concept of adaptive leadership based on informal adaptive dynamics in the entire organization (Heifetz & Linski, 2002). Efforts to address shortcomings in current leadership theories are pursued through the concept of complexity leadership (Rosenhead et al., 2019; Johns, 2024). Complexity leadership entails the dynamic collaboration and adaptation of numerous individuals to capitalize on emerging opportunities within both the internal and external milieu (Prescott & Rowe, 2015).

Earlier theories of leadership were mainly focused on leaders, that is, the actions of individuals, the dynamic, complex systems and processes that make up leadership were neglected. Therefore, earlier models have been criticized as being incomplete and impractical (Gronn, 2002; Osborn et al., 2002; Edmonstone, 2016).

Leadership research has revealed a failure to adequately acknowledge social and contextual factors, largely due to the perception that contextualized research is less scientifically rigorous and lacks valuable contextual details (Johns, 2024). Previous theoretical approaches to leadership have exhibited numerous shortcomings, which were manifested in failures to perceive changes in organizational dynamics based on changes in the environment. The development of management involved the application of proven solutions to known problems, whereas the development of leadership requires considering new possibilities for problem-solving (Cilliers, 2001; Dooley, 1996; Marion & Uhl-Bien, 2001). The essence of earlier leadership theories focused on the leader's personality, while neglecting the complex systems and processes that constitute leadership. Therefore, earlier models have been criticized as incomplete and impractical (Gronn, 2002; Osborn et al., 2002).

The complex leadership approach indicates that leadership is too complex a phenomenon to be described solely as the act of an individual or group, without a clear understanding of the complexity of changes in the social and economic environment. Complex adaptive systems, the basic unit of analysis in the science of complexity, represent an essential starting point in modern organizations (Baltaci & Balci, 2017; Shoup, 2016; Turner & Baker, 2017). Baltaci and Balci (2017) described the theory of complexity leadership as a dynamic relationship between employees and managers, based on learning and development, knowledge sharing, but also established on believing that creative problem solving, joint decision-making and process control form, is essential for success of organizations. Conversely, there are also authors who argue that complexity leadership is based on managing unpredictable interactions and recognizing interaction as the most important success factor in a leader's work (Geer-Frazier, 2014; Milch & Laumann, 2016). Leadership, as presented through the lens of complexity theory, addresses an organization's capacity to adapt to conditions characterized by constant change, risk, and pressure. This theory delves into the examination of behavioral patterns that foster psychosocial dynamics among employees, the management mechanisms employed by the social system to transition between stable patterns, and how leaders facilitate or inhibit such contexts (Allen, 2018). Complexity theory provides a scientific basis for organizations to adopt a networked, systems-oriented approach that is attuned to the dynamics of complex adaptive systems. Leaders who establish the conditions for self-organization, foster networked perspectives, cultivate sensitivity to initial changes, and foster an adaptive culture respond to change in non-linear ways that sustain dynamics (Westover, 2024).

The necessity of developing new management styles entails transcending theories rooted in the industrial era and embracing newer paradigms like complexity leadership (Uhl-Bien et al., 2007). Complexity leadership theory directs attention to the perspectives of all actors in business processes, at all organizational levels and at all times (Marion & Uhl-Bien, 2001; Uhl-Bien, et al., 2007). Hazy and Uhl-Bien (2013) believed that the complexity theory of leadership combines generative and administrative functions in community building and the collection and use of significant information for the organization and employees.

The concept is rooted in the development of adaptive systems and interactive dynamics, which give rise to collective momentum for action and change, thereby engendering novel behavioral patterns or operational modalities (Plowman et al., 2007). Complexity leadership theory is a model that underscores the significance of learning, creativity, and adaptability, which is equated to complex adaptive systems. The three interconnected leadership roles: adaptive leadership, administrative leadership, and ——

enabling leadership. These roles acknowledge the dynamic interplay among various organizational components and their relationships (Clarke, 2013). They posits that the interaction of individual and organizational factors engenders a complex system, resulting in leadership at a higher level. Leadership development occurs in response to circumstances and the environment.

The basic components of leadership in complexity theory are communication and cooperation, which increases the adaptability and cooperation of all participants in work processes, as well as increasing organizational knowledge and skills. The merits of complexity leadership theory are evident in its comprehension of organizational processes and the utilization of adaptive problem-solving within organizations (Anderson & Meyer, 2016; Cicmil et al., 2017; Lowell, 2016; Schneider et al., 2017).

A leadership framework called complexity leadership theory seeks to capitalize on dynamic opportunities and focuses on identifying and exploring strategies and behaviors that encourage organizational and subunit creativity, learning, and adaptability when appropriate (Cilliers, 2001; Dooley, 1996; Hosking, 1988). A complexity leadership perspective assumes hierarchical structuring and various adaptive functions that exist only in interaction. As defined by Heifetz and Laurie (2001), adaptive challenges are problems that require new learning, innovation, and new patterns of behavior. The development of various resonant skills is necessary to manage uncertainty without relying on excessive control. At this stage of leadership development, the complexity of leadership implies the creation of administrative synergy with numerous complex powers in the administration, which immediately resonates with the competitive, uncertain conditions required by the new era and a flexible, efficient decision-making process, rather than solely focusing on the members of the organization (Lichtenstein et al., 2006; Warwick, 2023). Complexity leadership is a function of coordination and interaction, emphasizing flexibility, interactivity, dynamism, and hierarchical structuring that can adapt to new conditions across all hierarchical levels of the organization (Uhl-Bien & Marion, 2009). Flexible systems imply high levels of self-coordination arising from informal relationships and structures. Self-coordination develops in good communication and understanding among the members of the organization (Uhl-Bien, 2021). The theory aims to integrate the various roles of leadership and define functions for establishing interactions between complex adaptive systems and bureaucracy. Adaptive leadership is an interactive, dynamic process that focuses on adaptive outcomes, such as ensuring compliance with new, changing organizational conditions (Do & Mai, 2023). Action-oriented leadership aims to activate organizational dynamics, facilitating the optimal utilization of organizational opportunities while mitigating conflicts.

Complexity leadership perspectives were developed to address the limitations of traditional leadership concepts, which often struggled to transcend bureaucratic positions or administrative hurdles. Complexity leaders operate within complex adaptive systems, striving to navigate interactions between the internal and external environment and the organization. The adaptive nature of complexity leadership pertains to authentically influencing interactive, dynamic, and resonant outcomes. Leadership's interactive nature is not grounded in authority or position but in addressing adaptive challenges. In complex adaptive systems, complexity leadership holds greater sway due to their intricate structure, which surpasses that of open systems (Lichtenstein et al., 2006). Leadership, in essence, emerges as a function of evolving situations and interactions between the internal and external environment and the organization. Historically, management primarily involved performance monitoring, comparing actual practices with standards, providing performance feedback, offering guidance and technical updates, identifying improvement opportunities, troubleshooting, and addressing previously identified issues.

Complexity leadership entails the examination of multifaceted social interactions across various strata and their consequential impact on innovation and emergent outcomes. Notably, within the realm of organizational change, complexity leadership has garnered empirical support, particularly in the domain of innovation (Lichtenstein et al., 2006; Hazy, 2007). A comprehensive series of research endeavors spanning from 2007 to 2015, encompassing 30 complex organizations, has yielded substantive evidence elucidating the pivotal role of social dynamics within these systems in fostering innovation and facilitating adaptation—an imperative facet amidst organizational transformations (Arena & Uhl-Bien, 2016).

Complexity leadership offers advantages related to the appreciation of numerous factors that affect employees in the work process, which are very difficult to perceive without an approach based on the scientific application of theoretical assumptions.

2. Methods

The principle driving motive of the research endeavor is an attempt to diagnose and define the most important factors of the management mechanism that would contribute to the improvement of employee performance.

Specifically, apart from the theoretical overview of the scientific achievements so far in the field of leadership and work performance, the aim of the research is to define frameworks for optimal leadership in working conditions in Serbia and to point out the hitherto unexplored factors that determine the work behavior of employees.

The following research hypotheses have been set:

H1: Different aspects of complexity leadership significantly predict the aspects of supervision.

H2: There is a difference in perception of different aspects of complexity leadership in organizations by employees of different gender, age, length of service and education.

H3: There is a difference in different aspects of complexity leadership in organizations of different size, property and sector.

2.1. Sample

The research was conducted on a sample of 480 respondents of different socio-demographic characteristics, employed in companies with different characteristics. The sample was non-representative. The survey included 240 (50%) male respondents and 240 (50%) female respondents. In the context of the company's characteristics, the research included respondents - employees who work in companies of different sizes - small, medium and large. According to the results of the frequency analysis, it was determined that 128 (26.7%) respondents work in small companies, 152 (31.7%) work in medium-sized companies, while 200 (41.7%) respondents work in large companies. The survey did not include respondents who are employed in micro-enterprises. The structure of the sample according to the type of ownership is defined through the categories of private and public companies. The survey included 296 (61.7%) respondents - employees in private companies and 184 (38.3%) employees working in the public sector. The structure of the sample is also defined through employees in relation to the activity of the company where the respondents work. The survey included 231 (48.1%) respondents from companies predominantly engaged in service activities and 249 (51.9%) respondents in companies predominantly engaged in manufacturing activities. The research was conducted through personal contact between the researcher and the employee, as well as through an online questionnaire, during the period from September to December 2023.

Table 1 shows measures of central tendency and measures of variability for the numerical socio-demographic variables age and work experience of the respondents. Based on descriptive statistics, it was determined that the age range ranges from 25 years to 65 years of age with an average age of M = 43.98 (SD = 9.490). Length of service ranged from 1 to 36 years of service with a mean value of M = 16.25 (SD = 8.452). Deviations of the arithmetic mean according to the indicators of skewness (Sk) and kurtosis (Ku) are not significant and therefore it is determined that the data are normally distributed.

Table 1 Descriptive statistics of numerical variants of age and length of work experience of respondents

	Min	Max	M	SD	Sk	Ku
Age	25,00	65.00	43.98	9.409	.313	-.267
Length of work	1.00	36.00	16.25	8.452	.289	-.380

Source: the authors

2.2. Measures

The Complexity Leadership Scale (Hazy & Uhl-Bien, 2013) was used to measure complexity leadership. The scale measures two dimensions: Generative Leadership and Administrative Leadership. The scale consists of 10 items arranged in five-point categories (1 = completely disagree, 3 = not sure, and 5 = completely agree), where each dimension is measured by 5 items. Generative leadership in theoretical foundations improves the resilience of the enterprise and its capacity to respond to changes in the environment. This dimension assesses leadership qualities associated with creativity, innovation and the ability to generate new ideas and solutions. Leaders who rate high on this scale can be seen as visionaries who inspire and empower their team members to think creatively and contribute to the development of new concepts. Interactions within Administrative Leadership are

focused on creating expected value by using known resources and capabilities. This dimension focuses on the traditional aspects of leadership related to administrative and managerial tasks. The dimension includes skills such as: organizing, planning, coordinating and implementing strategy to ensure the smooth functioning of the company's daily activities. Leaders with a high score on Administrative Leadership may excel at overseeing tasks, resources, and processes.

The Supportive and Non-Controlling Supervision Scale developed by Oldham and Cummings (1996) was used to measure employee cooperation. The scale consists of 12 items of five-level arranged categories that describe employees' perception of the extent to which they receive supportive supervision (eight items) or are subject to an uncontrolled supervisory approach (four items). When supervisors are supportive, they show concern for employees' feelings and needs, encourage open communication about concerns, provide positive and informative feedback, and help employees develop their skills (Deci et al., 1989). On the other hand, controlling supervisors closely monitor employee behavior, make decisions without employee input, deliver feedback in a strict, regulated manner, and generally pressure employees to think, feel, or act in a specific way (Oldham & Cummings, 1996).

2.3. Data analysis

Data analysis was performed in Statistical Package for the Social Sciences - SPSS in order to test the hypothesis. The hypothesis were tested by multiple regression analysis, Pearson correlation, Student's t-test and Multivariate Analysis of Variance (MANOVA).

3. Results

The Table 2 below shows descriptive measures for variables included in regression model – Generative leadership, Administrative leadership, Supportive supervision and Non-Controlling supervision. Regarding to the aspects of complexity leadership - Generative (M = 17.93; SD = 4.557) and Administrative (M = 16.18; SD = 3.402) leadership, it is determined that both scores on both aspects of leadership are moderately expressed.

There are no significant deviations in the analyzed data according to the range of skewness and kurtosis, all values are in the range from -2 to +2. Descriptive statistics of numerical variables included in the model are shown in Table 2.

Table 2 Descriptive statistics of numerical variables

	Min	Max	M	SD	Sk	Ku
Generative leadership	5.00	25.00	17.93	4.557	-.490	.134
Administrative leadership	5.00	25.00	16.18	3.402	-.444	1.117
Supportive Supervision	10.00	40.00	30.25	8.061	-.817	.007
Non-Controlling supervision	4.00	20.00	11.70	2.971	.324	1.500

Source: the authors

Before testing the first hypothesis, the correlation between dimension of complexity leadership and supervision was determined. Based on the Pearson correlation results, it is established that Generative Leadership correlates with Supportive Supervision (r=.477; p=.000) and Non-Controlling Supervision (r=.573; p=.000). Therefore, Generative leadership with all assumed correlates achieves statistically significant correlations. On the other hand, Administrative Leadership has negative correlations with Supportive Supervision (r=-.204; p=.012) and Non-Controlling Supervision (r=-.337; p=.000) The Correlation of complex leadership and aspects of supervision is shown in Table 3.

Table 3 Correlation of complex leadership and aspects of supervision

		Supportive Supervision	Non-Controlling Supervision
Generative leadership	r	.477**	.573**
	p	.000	.000
Administrative leadership	r	-,204**	-.337**
	p	.000	.000

Source: the authors

The first hypothesis was tested by multiple regression analysis. Two regression models were set up. Both regression models have the same set of predictors, while the criterion for the first one is Supportive Supervision and for the other one is Non-Controlling Supervision. According to the results of multiple linear regression, it is determined that the set of predictors composed of the variables Generative Leadership and Administrative Leadership according to the obtained coefficient of determination (R^2) explain 54.7% of the variance of the criterion variable - Supportive supervision. The overview of the general model and its parameters is given in Table 4.

Table 4 Overview of the general indicators of the set regression model according to the criterion variable Supportive supervision

R	R^2	Adjusted R^2	S.E
.740a	.547	.537	1.834

Source: the authors

According to the results of the significance testing, it is determined that the regression model is statistically significant. The set of predictors significantly explain the criterion variable.

Based on the partial contributions of each variable from the set of predictors, it is determined that Generative Leadership (β = .112; p = .041) as a positive predictor, and Administrative Leadership (β = -.123; p = .005). The Generative leadership is positive statistically significant predictor of Supportive supervision, while Administrative leadership is negative statistically significant predictor of the criterion variable. The results of the partial predictor contributions regarding to the criterion Supportive super–vision are shown in Table 5.

Table 5 Partial predictor contributions of predictors regarding to the criterion Supportive supervision

Models	Nonstandardized coefficient		Standardized coefficient		
	B	S.E	β	t	p
Generative leadership	.091	.032	.112	1.032	.041
Administrative leadership	-.098	.035	-.123	-2.827	.005

Source: the authors

Second regression model determines Generative Leadership and Administrative Leadership as significant predictors of Non-controlling supervision. According to the results of multiple linear regression, it is determined that the set of predictors Generative Leadership and Administrative Leadership, explain 53.5% of the variance of the criterion variable - Non-controlling supervision. An overview of the general model and its parameters is given in Table 6.

Table 6 Overview of general indicators of the set regression model according to the criterion variant Non-controlling supervision

R	R^2	Adjusted R^2	S.E
.731	.535	.524	2.207

Source: the authors

According to the results of the significance testing of the regression model, it is determined that regression model is statistically significant. The set of predictors significantly explain the criterion variable. Based on the partial contributions of each variable from the set of predictors, it is determined that Generative Leadership (β=.123; p=.005) is statistically significant positive predictor, while the Administrative Leadership (β=.-127; p=.004) is negative predictor. The results of the partial contributions of the predictors are shown in Table 7.

Table 7 Presentation of partial predictor contributions of predictors in relation to the criterion Non-controlling supervision

Models	Nonstandardized coefficient		Standardized coefficient		
	B	S.E	β	t	p
Generative leadership	.116	.039	.123	2.242	.005
Administrative leadership	-.119	.042	-.127	-2.867	.004

Source: the authors

The two multiple regression models presented in this study together contribute to the understanding of the relationship between the dimensions of Complexity leadership – Generative leadership and Administrative leadership – and different aspects of supervision. Each model, which includes Supportive supervision and Non-controlling supervision as criterions, reinforces the importance of leadership in shaping employee perceptions and attitudes in the workplace.

3.1. Complexity leadership research results

The second hypothesis supposes that there is a difference in perception of different aspects of complexity leadership in organizations by employees of different gender, age, length of service and education. The results are provided in the chapters below.

3.1.1. Gender differences

The first part of the results was related to determining gender differences in the perception of different aspects of Complexity leadership. In order to determine the significance of differences in the expression of aspects of Complexity leadership, the Student's t-test was used. Based on the results, it is determined that there are no statistically significant differences in Generative and Administrative leadership regarding the gender of employees. Both aspects of Complexity leadership - Generative and Administrative leadership are equally expressed by the male and female subsamples.

Table 8 Gender differences in perception of aspects of Complexity leadership

Complexity leadership	Gender	N	M	SD	t	p
Generative leadership	Male	80	17.20	4.288	-1.655	.101
	Female	400	18.08	4.600		
Administrative leadership	Male	80	16.00	2.662	-.636	.526
	Female	400	16.22	3.533		

Source: the authors

3.1.2. Age and length of service

The table below represents the results of Pearson's correlation between aspects of Complex leadership, age, and length of service.

Generative Leadership has a statistically significant correlation with age. This indicates a weak negative correlation between these two variables. Similarly, there is a weak negative correlation between Generative leadership and length of service. Administrative Leadership statistically significantly correlates with age. This indicates a moderate negative correlation between Administrative leadership and age. Similarly, there is a moderate negative correlation between Administrative leadership and length of service.

Table 9 Correlation between aspects of Complexity leadership, age and length of service

Complexity leadership		Age	Length of service
Generative leadership	r	-.161**	-.141**
	p	.000	.002
Administrative leadership	r	-.226**	-.239**
	p	.000	.000

Source: the authors

3.1.3. Differences in relation to the level of education

Multivariate tests indicated the significance of differences between groups of education and different aspects of Complexity leadership. Willks' Lambda indicates that there is a statistically significant difference between employees of different level of education in terms of different aspects of Complexity leadership.

Table 10 Multivariate Tests

Effect	Value	F	Hypothesis df	Error df	p
Pillai's Trace	.133	11.266	6.000	952.000	.000
Wilks' Lambda	.871	11.358	6.000	950.000	.000
Hotelling's Trace	.145	11.450	6.000	948.000	.000
Roy's Largest Root	.112	17.795	3.000	476.000	.000

Source: the authors

The results indicate that education is statistically significant for both aspects of Complexity learning – Generative leadership and Administrative leadership, so it can be concluded that education has an impact on the differences in perception of both aspects of Complexity leadership. Tests of Between-Subjects Effects is shown in Table 11 below.

Table 11 Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	p
Education	Generative leadership	705.845	3	235.282	12.115	.000
	Administrative leadership	538.746	3	179.582	17.079	.000

Source: the authors

Based on the results, it is determined that respondents with a higher level of education have a higher preference for Generative leadership compared to respondents with a bachelor's degree. Respondents with completed doctoral studies have a higher tendency to evaluate Generative leadership than employees with a high school education. When it comes to Administrative leadership, respondents with a high school diploma and a doctorate have a higher perception of this aspect of Complexity leadership compared to graduates with a bachelor's degree. Mean scores of Complexity leadership aspects among respondents of different educational backgrounds are shown in Table 12.

Table 12 Mean scores of Complexity leadership aspects among respondents of different educational backgrounds

Complexity leadership	(I) Education	(J) Education	(I-J)	p
Generative leadership	MA (M=18.78)	BA (M=16.80)	1.98*	.000
	PhD (M=22.00)	HS (M=17.25)	4.75*	.007
	HS (M=19.51)	BA (M=16.80)	2.71*	.000
Administrative leadership	HS (M=17.7)	BA (M=15.03)	2.72*	.000
	PhD (M=18.50)	BA (M=15.03)	3.47*	.001

*HS - High School

Source: the authors

The third hypothesis assumes that there is a difference in different aspects of complex leadership in organizations of different size, property and sector. The results are presented in the following chapters.

3.1.4. Differences regarding the size of organizations

Multivariate tests indicate the significance of differences between groups of employees who work in organizations of different sizes. Willks' Lambda indicates that there is a statistically significant difference between employees who work in organizations of different sizes in terms of perception of different aspects of Complexity leadership. The overview of multivariate tests are shown in Table 13.

Table 13 Multivariate Tests

Effect	Value	F	Hypothesis df	Error df	p
Pillai's Trace	.126	16.018	4.000	954.00	.000
Wilks' Lambda	.875	16.505	4.000	952.00	.000
Hotelling's Trace	.143	16.990	4.000	950.00	.000
Roy's Largest Root	.140	33.386	2.000	477.00	.000

Source: the authors

The results indicate that size of organization is statistically significant for only one aspect of Complexity leadership - Generative leadership, so it can be concluded that size has an impact on the differences in perception of one aspects of Complexity leadership. The results of the tests of Between-Subjects Effects are shown in Table 14.

Table 14 Tests of Between-Subjects Effects

Source	Complexity leadership	Type III SS	df	MS	F	p
Size	Generative leadership	1078,224	2	539,112	28,986	,000
	Administrative leadership	62,893	2	31,446	2,737	,066

Source: the authors

In terms of determining the significant effect of the size of the organization on Generative leadership, it can be concluded that small and medium organizations are characterized more by generative leadership interactions opposite to large organizations.

Table 15 Mean scores of Complexity leadership aspects among respondents who work in different size of organization

Complexity leadership	(I) size	(J) size	(I-J)	S.E	p
Generative leadership	small (M=19,18)	large (M=16,16)	3,02	,488	,00
	medium (M=19,21)	large (M=16,16)	3,05	,464	,00

Source: the authors

3.1.5. Differences in type of organizations

To determine the significance of differences in the expression of aspects of Complexity leadership, a Student's t-test was used.

Based on the results in Table 16, it is determined that there are statistically significant differences in Generative and Administrative leadership among the organizations of different type of ownership. Namely, both aspects of Complexity leadership and Generative and Administrative leadership are more pronounced in organizations with private ownership.

Table 16 Differences of Complexity leadership regarding the type of the organization property

Complexity leadership	Type of property	N	M	SD	t	df	p
Generative leadership	Private	296	19.08	3.843	6.947	315.720	.000
	Public	184	16.08	4.999			
Administrative leadership	Private	296	16.51	3.371	2.711	386.405	.007
	Public	184	15.65	3.392			

Source: the authors

3.1.6. Differences of Complexity leadership regarding the sector of organization

To determine the significance of differences in the expression of aspects of Complexity leadership regarding the sector, a Student's t-test was used.

Based on the results in Table 17, it is determined that there are statistically significant differences in the influence of Generative and Administrative leadership on the sector of the organization where the employees work. Namely, Generative leadership is more pronounced in the sector of production.

Table 17 Differences of Complexity leadership regarding the sector of organization

Complexity leadership	Sector	N	M	SD	t	p
Generative leadership	Service	296	17.32	4.773	3.764	.000
	Production	184	18.91	4.009		
Administrative leadership	Service	296	16.35	3.440	1.374	.170
	Production	184	15.91	3.331		

Source: the authors

4. Discussion

In the contemporary context of organizational dynamics, the key role of effective leadership in shaping and improving employee performance is increasingly recognized as a critical determinant (Win & Priyashantha, 2016). This research is driven by the imperative to identify and define fundamental factors within management mechanisms that significantly contribute to improving employee performance, with the aim of building practical frameworks for optimal management rooted in the characteristic working conditions that prevail in the Republic of Serbia.

The results of the assessment of aspects of leadership within the organizational context provide an insight into the dynamics of leadership, by determining the expression of generative and administrative leadership. The moderate expressiveness of the results in both aspects of complexity leadership indicates a balanced approach, suggesting that leaders in the investigated environment show a combination of innovative and administrative qualities. Emphasis on supportive supervision over non-controlling supervision implies a workplace culture that

prioritizes cooperativeness and employee support, aligning with contemporary leadership theories emphasizing the importance of cooperative and empowering leadership styles (Lee et al., 2020; Zhu & Sun, 2020).

In the regression model, in which Supportive Supervision was taken as the criterion variable, according to the results of multiple linear regression, it was determined that the set of predictors composed of the variables Generative Leadership and Administrative Leadership according to the obtained coefficient of determination (R^2) in line with the Supportive Supervision criterion explain statistically significantly 54.7% of the variance of the criterion variable. Based on the partial contributions of each variable from the set of predictors, it is determined that Generative Leadership as a positive predictor and Administrative Leadership as a negative predictor stood out as statistically significant predictors.

Generative leadership was found to be a positive predictor. Generative leaders encourage learning, foster resilience, stimulate meaning-making, continue to reinvent and learn, creating meaning and new value (Gigliotti, 2024), they achieve goals by investing in relationships with people, they are empathetic and give of themselves without any expectations, emphasizing learning and development (Kemer, 2024). This is consistent with research that has determined the positive impact of transformational and generative leadership on fostering supportive and empowering supervisory relationships (Podsakoff et al., 2014). On the other hand, administrative leadership appears as a negative predictor, suggesting that leadership styles that emphasize control, routine, and hierarchical decision-making may decrease the level of supportive organizational behaviors. The absence of significant deviations in the data, as indicated by kurtosis and skewness, suggests a normal distribution of responses. The results of the Pearson correlation analysis provide insight into the relationship between leadership and various organizational variables, focusing on the interaction between generative and administrative leadership and their hypothesized correlates. Generative leadership shows statistically significant correlations with supportive and non-controlling supervision. Leadership in the examined organizations is based on a complex approach, with support provided to employees, confirming the proposed hypotheses.

This indicates that leaders who exhibit generative qualities tend to foster positive organizational outcomes through supportive and non-controlling supervisory practices. This is consistent with the theoretical understanding that leaders who emphasize participative decision making contribute to a positive organizational climate (Podsakoff et al., 2014). The result highlights the potential shortcomings of bureaucratic management in creating a supportive and empowering work environment (Bass & Riggio, 2006). Leadership in organizations in Serbia is still in its early stages, as reflected in the results of this study. Nevertheless, it is crucial for both organizational and employee development to monitor changes in employee behavior and create conditions where leadership can play a dominant role within organizations.

Conclusion

The results indicate the existence of problems in the management of organizations, which are reflected in the answers to individual questions, as well as the absence of a consistent complex approach to management. Understanding and optimizing these factors are essential for companies operating in Serbia in order to effectively navigate the dynamic environment. It is clear that in the future, new approaches to leadership will need to be explored to further advance complexity leadership theory (Tourish, 2019).

Recognizing the importance of interactions and leadership management is key to realizing a quality social and economic environment, showing that effective joint activities between leaders and employees are vital to creating a positive work environment. The development of leaders and leadership that fosters generativity, and therefore social responsibility, will become imperative in preparing for the new reality (Hastings et al., 2024).

The advantage of viewing work performance from the perspective of complexity leadership emerged due to the complexity of working conditions, organizational demands on employees, and employees' need for more comprehensive participation in work processes (Törnblom, 2018). The results of Do and Mai (2023) revealed that both administrative and generative behaviors of complexity leadership have positive relationships with five key factors in high-performance organizations: openness and action orientation, long-term focus, continuous improvement and

renewal, workforce quality, and management quality. This study enriches and expands complexity leadership theory by offering a more nuanced understanding of leadership's impact on high-performance organizations.

The significance of complexity leadership is evident in its identification of key elements crucial for fostering adaptive organizational behavior (Gavalas, 2024). Leadership development is based on increasing other people's sensitivity to the context in which they live and work, establishing and reinforcing simple principles, and facilitating and encouraging constructive dialogue (Bäcklander, 2019; Dollarhide, et al., 2021).

In terms of limitations, the conducted research falls by its nature into cross-sectional studies, which is a common limitaettion in such cases, thereby limiting the valid establishment of cause-and-effect relationships. A specific sample of employees in the Republic of Serbia may be questionable in relation to the question of generalization of the results, not only because of the unevenness according to the demographic characteristics and characteristics of the companies in which the respondents already work, but also because of the existing cultural differences. Self-assessment of claims, as a common method of collecting primary data, opens the possibility for response bias and social desirability. Future research efforts should aim for a larger sample to improve external validity and ensure that the empirical evidence obtained is variable across a range of organizational settings.

Declarations

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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