

Features of manifestation of creativity among modern managers

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Abstract: The aim of this article is to investigate the impediments to creativity perceived by managers, the levels of creativity, its indicators, and personal characteristics conducive to creativity, as well as to elucidate the correlations among them. An experimental study was conducted involving 300 participants. Methods employed include surveying, testing, and mathematical statistical analysis. As the level of creativity increases, participants tend to assess their opportunities more favorably. The expression of creativity depends on the interconnection among the barriers to creativity, indicators of creativity, and personal qualities of creativity. A high level of creativity is manifested when there are fewer barriers and personal qualities such as Imagination and a propensity for Risk-taking. Conversely, the level of expression of creativity is low when there is an interconnection between Creativity and Complexity, Imagination, and creativity barriers such as lack of confidence and conformity to majority opinion.

Keywords: creativity; manager; barriers; personal qualities; self-assessment of creativity

1. Introduction

As a guarantee of solving new problems, creativity is mentioned as one of the important psychological qualities of a manager. Today creativity as a quality is relevant and in demand in all areas of professional activity. Especially its role in management is growing.

The modern manager is always dealing with solving new problems, building interpersonal relationships with employees, and facing new challenges at work. Managerial activity, as a unique field of activity, requires special personal characteristics for the manager. Creativity is regarded as a significant professional psychological attribute because managerial activity involves making rapid, unique, and sometimes risky decisions that profoundly affect the efficiency of the unit, department, and organization. During a rapid change and innovation, the professional competence of a public administrator, particularly the level of creativity and the ability to make innovative decisions, becomes more important.

Within the management system, emphasis is placed on the presence of creative managers who aim to cultivate creativity among their team members and establish conducive environments for its expression. Providing favorable conditions is often a precondition for expressing creativity in management, and overcoming various external and internal barriers.

However, along with its importance, fundamental theories and approaches to creativity began to develop from the 1960s. It can be stated that the fundamental theories of creativity were formed before 2006, 2008, after which all studies of

creativity are carried out within the framework of these theories.

Research on creativity in management activities was carried out by Maslow, Nelkey, Amabaili, Makarenko, Lazarev, Yagolkovsky, Morozov, Markova's works.

As Maslow noted, everyone needs creativity (Maslow, 2022, p. 136). According to Maslow, leaders of superpowers must accept and learn to manage creative people, identify them as early as possible, provide appropriate education, and create favorable conditions (Maslow, 2022, p. 138).

As Runco notes, Creativity is extremely valuable to individuals and society as a whole. It is related to productivity, adaptability, and health, and it benefits individuals, institutions, and societies (Runco, 2004, p. 29).

To implement these strategies effectively, managers require creativity as a fundamental quality for system-building. This attribute affords them the ability to navigate challenging circumstances, devise innovative problem-solving approaches, and undertake calculated risks.

Speaking of the peculiarities of expressing creativity in managerial activity, A. Morozov views creativity as a special quality of the modern manager, which determines the ability to carry out a socially significant creative activity. He emphasizes the idea that the modern manager needs soft skills for effective management. The author argues that the manager is responsible for the development of the subordinates' creativity, which implies that the manager has highly-developed creativity. Along with this, he mentions the interconnection and interaction of creativity and the personal qualities of the manager (Morozov, 2014).

Talpos finds that, maybe the most important role of a manager is to find new solutions to the problems that appear on the way. As such, in many ways, the greatest enemy for the effectiveness of a manager is sameness, because every good manager has to continuously find new and innovative ways to organize the company's activities in order to get things done (Talpos, 2017).

However, it has not been sufficiently studied how the indicators of creativity in managerial activity are related to the personal qualities of creativity. The urgency of the issue is especially emphasized when dealing with the cases where the creativity criteria of a person are high but personal qualities are low. The issue is how creativity is expressed in the activity. The research findings indicate that managers frequently do not exhibit their creativity due to both internal and external obstacles. It is assumed that managers do not express their creativity in cases of insufficient levels of personal qualities of creativity. This means they are creative but the self-assessment of creativity is low. There are also barriers to creativity, which do not let managers express their creativity. The goal of this study is to explore the barriers to creativity as perceived by managers, along with the level of creativity and its indicators, and personal qualities associated with creativity. Additionally, the aim is to investigate the correlation between these factors. The hypothesis posits that the expression of creativity is influenced by the interconnection among barriers to creativity, indicators of creativity, and personal qualities of creativity, with the nature of the activity determining the various manifestations of this relationship.

The object of the research is the influence of barriers to creativity and personal qualities of creativity in the manifestation of creativity, the correlation between the barriers to creativity, indicators of creativity, and personal qualities of creativity.

The problem discussed in the article represents the concept of creativity revelation in a new way, which is especially important in the case of studying the creativity of modern managers. This research has both theoretical and practical implications. The barriers to creativity become visible by field. Creativity is further conceptualized as a system characterized by the interconnection of its barriers, indicators, and personal qualities. Consequently, a new model for studying managers' creativity is proposed, comprising three main components: barriers, indicators, and personal qualities. The practical significance of the research is that the results of this research can be applied in the process of preparation and training of managers. It is also necessary to apply a complex and systematic approach, to take into account the unique interconnection of creativity barriers, standards and personal qualities.

The article suggests new theoretical model, which is going to be the basis for the practical work. It is supplementing the concept of the study of personal creativity and it will become the basis for developing a new methodology for the development of creativity.

The research is unique and new by its nature. The novelty of the research is the study of the relationship between creativity standards, personal qualities of creativity and creativity barriers in managerial activity. The need for this kind of study derives from the assumption that often managers do not show their creativity facing a number of external and internal barriers. They do not show their creativity in case of insufficient level of personal qualities of creativity. This means they are creative, but the self-esteem of creativity is low. If the obstacles of creativity are added to all this, the picture will become very painful. The novelty of this research lies in the application of the proposed creativity exploration model to managers in both public and private sectors, and its comparison with indicators from non-managerial or specialist roles.

2. Theory section

It should be noted that in this research creativity is viewed as a system-building quality. This means that the peculiarities of expression of creativity allow us to make assumptions about the expression level of personal qualities. The correlation between the indicators of creativity and personal qualities of creativity in management has been studied.

Despite the fact that there are many studies on creativity, as well as many attempts to define this concept, there is still no common approach to both the definition of creativity and the methods of measuring creativity.

Creativity is the production of a novel and appropriate response, product, or solution to an open-ended task (Amabile, 2012).

According to Taylor as far back as the 1960s, more than 60 definitions of creativity were given, which were grouped into several groups. The main directions of the definitions were the gestalt approach, the innovative approach, the aesthetic or expressive approach, the psychoanalytic or dynamic approach, and the problem-based, and other approaches (Taylor, 1998).

Usually, four main aspects are distinguished in creativity approaches: the creative process, result, person, and environment (Funke, 2006).

Creativity is described by Torrance as an ability to perceive problems and

contradictions, as well as to make assumptions about missing elements of the situation. He puts forward the “Theory of Intellectual Threshold”, according to which if the IQ is higher than 120, the creative ability becomes an independent quantity. This means that according to Torrance, there are no creative people with low intellect, but there are intelligent people with low creativity (Torrance, 1965).

From this point of view the approach of Herbert Simon is of great interest. He thinks that creativity is thinking: we think and that is wonderful. Henning notes that creativity is based on sincerity, justice, and reliability. It is aimed at educating beauty, self-respect, love, peace and education. The social nature of creativity was also studied. For example, McCann draws attention to the fact that creativity benefits society, as it is a process of creating a useful, necessary result for society (Cropley and Cropley, 2019).

Guilford’s approach has its special place in the study of creativity. He distinguishes two main types of thinking, divergent and convergent. According to Guilford, divergent thinking is the basis of creativity. Due to divergent thinking, one can suggest many possible solutions. Convergent thinking suggests finding the only correct solution for the problem in the presence of many conditions. According to Guilford, convergent thinking coincides with the intellect measured by IQ tests. The approach, according to which creative thinking is the same as divergent thinking, is known as a psychometric approach. Guilford’s approach identifies 16 intellectual factors that describe creativity, including semantic flexibility, visual adaptive flexibility, semantic spontaneous flexibility, originality, curiosity, the ability to develop assumptions, and more. Guilford later developed six basic criteria for creativity: the ability to identify and propose a problem, fluency, originality, flexibility, the ability to refine an object by adding details, the ability to solve problems, or the ability to analyze and combine.

Creativity was considered by Guilford as a common originative ability (Guilford, 1950; Guilford, 1967).

It is interesting that most researchers and scientists consider creativity as a positive phenomenon. Recently, however, debates have started if it is possible to use creativity for bad purposes (Cropley et al., 2010). In general, creativity is seen as the generation of original, useful ideas and results, which makes it possible to view it as part of positive psychology (Beghetto and Kaufman, 2014).

The approach of Amabile in the study of creativity is relatively innovative. She created a componential theory of creativity. It includes three interrelated concepts such as internal motivation, expertise, and creative thinking skills. Internal motivation is the desire to solve a problem or create something new. Experience entails expertise within a specific domain. Creative thinking abilities encompass processes such as imagination, flexibility, idea generation, and others. It is considered crucial that creativity surpasses the mere aggregation of its cognitive components (Saggar, 2021).

The novelty and strength of this approach are that the author later added the environment as a new component to this componential theory. The environment can both stimulate and hinder the development of creativity. Thus, this model combines external and internal components. Hence, it was selected as the foundation for our approach, which examines both external and internal personal factors of creativity (Amabile, 1983).

Thus, there are many attempts to define and interpret the term creativity. In the observed approaches, creativity is regarded as a characteristic of cognition, involving the process of generating novel ideas that are of public benefit. This perspective largely attributes creativity to the psychological characteristics and qualities of an individual.

Viewing creativity as a system-building quality, it is believed that personal qualities influence various manifestations of creativity in the same manner that creativity affects an individual.

In the research of creativity and creative thinking, the personal approach is oriented to studying the characteristics and qualities of the creative person, motivation, and life path. From this point of view, three main methods have been distinguished: psychoanalytic, differential, and biographical (Yagolkovsiy, 2007).

In this respect, Rubinstein notes that the result of creative work aimed at creating something new mostly bears the seal of the person, the objective and subjective meanings of the activity can largely coincide (Rubinshteyn, 2003).

The need to study the personal qualities of creativity was emphasized by L. Vygotsky. He considers creativity as an activity of a person who creates something new, no matter in the external environment or inside the person (Vigotskiy, 2003).

In this context, Leontev argues that the creative process supposes not only the formation and development of new things by the object, but also by the subject, as it is necessary to pay attention to the interaction of the subject with the object and the whole world (Leontev, 1975):

Chiksentsmikhain mentions that creative people differ in the ability to adapt to almost any situation, and to use any means at their disposal to achieve their goals. These can be considered as features identifying a creative person. Trying to formulate the characteristics of a creative person, the author notes that creative individuals combine such aptitudes in their thinking and behavior which, as a rule, most people do not combine. Just as white color contains all the other colors, so a creative person contains all the variants of human qualities at the same time. The author draws a parallel between a creative person and a “Jungian adult”. Creative individuals are very different from each other, but one thing unites them—the love for their work. Creative people experiment with many alternatives until they are sure they have found the most effective alternative. They always try to find the opposite side of the chosen alternative and discuss the advantages and disadvantages. Creativity development programs are usually based on the development of three basic qualities of divergent thinking: fluency, flexibility, originality of ideas, and reactions/counteraction (Chiksentsmikhain, 2015).

From the point of view of the personality approach, Barron and Harrington mention that creativity is a person’s ability to adapt to the need for creating new approaches and new results. In the creative process, they pay special attention to the person and begin to consider the inner motivation of the creator along with the personal characteristics as a powerful factor (Barron and Harrington, 1981).

Sternberg and Lubart’s investment theory of creativity considers creative those people who can “buy cheap ideas and sell them expensive”. According to this approach, the peculiarity of a creative person is that facing resistance during the process of creating new ideas, he/she is able to overcome that resistance, create a new result, and move forward by repeating this circle. According to the investment theory, creativity

requires six different but interrelated resources: intellectual abilities, knowledge, thinking styles, personality, motivation, and environment. The levels of these resources are the source of individual diversity and the basis for personal dissimilarities in creativity (Robert, 2006).

3. Methods

The methodological principles of the research are the systemic approach and the principle of development of psychological qualities. The methodological basis of this research is the psychometric approach to creativity, the representatives of which (Guilford, Torrens, Williams) define the indicators of creativity, since setting indicators makes creativity measurable.

According to Williams, creativity is a certain set of thinking and personal qualities, which fosters the expression of creativity. This is the reason why the methodology developed by him evaluates both cognitive and personal-individual qualities of creativity. Cognitive factors of creativity are fluency of thinking, flexibility, originality, and elaboration. The personal-individual factors of creativity are the ability to take risks, complexity, curiosity, and imagination. William's test reveals the level of creative thinking and five criteria: fluency, flexibility, originality, elaboration and verbal creativity. The test personal qualities of creativity reveals the ability to take risks, complexity, curiosity, imagination and the index Self-assessment of creativity (Tunik, 2003). The Armenian-adapted version of the test was utilized.

A questionnaire was developed to check the barriers to creativity. The basis for creating the questionnaire was Nöllke's approach to the killers of creativity (Nöllke, 2007). The method of expert survey was used. According to this method, the experts give their qualitative marks to the judgments made by us. As researchers, our task is to transform those quantitative evaluations into qualitative analysis. In the decision-making process, experts carry out informational and analytical activities of decision-shaping and evaluating.

There are three main factors in the implementation of the expert survey method: selection of experts, conducting a survey and analysis of the obtained results. Following these principles, a questionnaire aimed at identifying the specifics of the emergence of barriers to creativity was developed. The expert questionnaire included 19 factors that can hinder the expression of creativity. The expert should evaluate them on a scale of one to six (Poghosyan, 2023). The factors are fear of new things, fear of mistakes, fear of being criticized, fear of seeming funny, fear of not being accepted by the group, limited number of decision options, laziness, inconsistency, indifference, lack of interests, mistrust, rigidity of thinking, inability to make independent decisions, rewarding, competition, self-confidence, same-type "template" thinking, inability to make independent decisions.

Based on theoretical approaches to creativity, an experimental study was organized and conducted among a sample of 300 individuals. This sample comprised 100 public sector managers, 100 private sector managers, and 100 employees from public administration without subordinates. The inclusion of both managers and employees aimed to highlight the creativity of the former. The managers in both sectors held middle-level positions and possessed a high level of education. In terms

of gender distribution, 134 women and 166 men participated in the research. The study employed methods such as surveying, testing, mathematical statistical analysis (including Pearson's test and Student's t test), and qualitative analysis. The average age of public sector managers was 48, IT managers was 46, and employees was 50.

Among the statistical analysis methods, Pearson correlation coefficient (PCC) was used, that measures linear correlation between two sets of data, as well as the Student's t-test to test whether the difference between the response of two groups is statistically significant or not.

The results of the research were analyzed by SPSS-23 mathematical-statistical software.

4. Results and discussion

4.1. Creativity level of managers (n = 100)

The results of the research show that the indicators of Fluency ($M = 11$, according to the test, 12 is considered a high score of fluency) and Originality ($M = 22$, according to the test, 36 is considered a high score of originality) are high among managers. This means they can come up with a lot of ideas that are unique, unusual, and unexpected. The indicator of Flexibility is at the middle level ($M = 6$, according to the test, 11 is considered a high score of flexibility). This means the managers may not always be able to suggest ideas in different categories. The level of Elaboration is low ($M = 15$, according to the test, 36 is considered a high score of elaboration), which means they have difficulties in improving and developing ideas. The indicator of Naming is above average ($M = 19$, according to the test, 36 is considered a high score of naming), which means they do not always present their ideas creatively.

Thus, the indicator of the creativity of managers is above average ($M = 72$, according to the test, 131 is considered a high score of creativity), which means that they can propose new, unusual solutions to the problem, but those solutions may not always be developed, improved, and applied in different areas.

4.2. Personal qualities of creativity

The results of the study on personal qualities of creativity show that managers' Curiosity ($M = 15$), Complexity ($M = 14$), and Ability to take risks ($M = 15$) are above average, which means that they are looking for new ways and means of thinking, and like to explore new thoughts and ideas, seek different solutions to problems, read and study books, games, maps, pictures to know as much as possible. They put forward their ideas and thoughts, do not pay attention to the reactions of others, set high goals, try to achieve them, allow themselves the possibility of making mistakes and failing, like to study new ideas or things, disobeying the opinion of others, prefer to have the opportunity to take risks so that they know what the outcome will be. They are interested in complex events. However, it should be noted that these indicators are not very high. Managers' self-assessment of creativity is in the middle level ($M = 54$, the test norms is 100). They do not always think about unknown phenomena, build mental images, or imagine what has never happened. They do not trust their intuition so much and do not move beyond the borders of the real world.

Comparing the average indicators of creativity between managers and non-managers or employees, it is evident that managers exhibit higher levels of creativity than employees (refer to **Table 1**).

Table 1. The comparison creativity level of managers and employees.

Creativity Level of Managers and Indicators of Creativity	M Managers <i>n</i> = 100	M employees <i>n</i> = 100	t
Fluency	11	10	2.75
Flexibility	6	5	4.24
Originality	22	20	2.0
Elaboration	15	12	3.43
Naming	19	17	2.50
Creativity	72	62	3.63

According to the Critical Values of the Student’s t Distribution, the indicators of Fluency, Flexibility, Originality, Elaboration, Naming, and Creativity are higher among managers compared to employees. According to the Critical Values of the Student’s t Distribution, the difference is significant ($p < 0.001$) in the case of Flexibility, Elaboration, and Creativity.

It can be assumed that employees have fewer opportunities to express their creativity compared to managers. This is the reason why their personal traits of creativity and the indicators of creativity self-assessment are at a middle level. The comparison of the personal qualities of creativity of managers and employees shows that the difference is not so significant (see **Table 2**).

Table 2. The comparison of the personal qualities of managers and employees’ creativity.

Self-assessment of creativity	M Managers <i>n</i> = 100	M employees <i>n</i> = 100	t
Curiosity	15	14	1.83
Imagination	10	11	1.82
Complexity	14	13	1.84
Risk-taking ability	15	14	2.06
Self-assessment of creativity	54	51	1.80

The indicators of Curiosity, Complexity, Risk-taking ability and Self-assessment of creativity are higher among managers than employees. According to the Critical Values of the Student’s t Distribution, the difference is significant ($p < 0.001$) in the case Risk-taking ability. The indicators of Imagination are higher among employee than managers, though the differences are low and not significant. It can be concluded that the self-assessment of creativity is low among both managers and employees. During the testing process, both managers and employee were skeptical about their creativity. Here are some examples of their formulations: “I am far from being creative”, “We are just not creative”, “I am not creative”. There is also the phenomenon that if a middle-level manager or employee puts forward a new idea, it is either rejected or criticized, and the person does not want to come up with an idea next time. During

the study, many of them noted: “None of my suggestions are accepted.” “Many ideas were not accepted because the majority did not want to implement them.” This is suggested to be related to the data obtained from analyzing testing results, particularly the low level of Elaboration indicators, indicating a lack of development and improvement of ideas.

A survey was also conducted among managers employed in the IT sector. Below are the results.

The results indicate a high level of creativity among IT managers. Specifically, the indicators of Fluency and Originality are high, while those of Elaboration and Naming are low. This means they can put forward a lot of original ideas, but do not elaborate and improve them, nor do they use their speech creatively.

From the indicators of personal qualities of creativity, the indicators of Complexity are high. The self-assessment of creativity is not high.

When comparing the creativity levels of managers from the IT sector and the public sector, a difference is observed, albeit not significant (refer to **Table 3**).

Table 3. The comparison of the creativity level of the managers from the IT sector and public sector.

Creativity Level of Managers and Indicators of Creativity	M Managers <i>n</i> = 100	M IT <i>n</i> = 100	<i>t</i>
Fluency	11	12	2.5
Flexibility	6	6	-
Originality	22	27	3.63
Elaboration	15	16	0.73
Naming	19	15	3.57
Creativity	72	76	1.14

According to the Critical Values of the Student’s *t* Distribution, the difference is significant ($P < 0.001$) in case of Originality. In this case, the indicators of Originality among the IT managers are high. These differences are believed to stem from the nature of their respective activities. Public sector managers establish interpersonal relationships and communicate more, which promotes the creative use of speech. However, IT managers have more freedom, which allows them to come up with unique ideas and not be molded.

Table 4. The comparison of the creativity level of managers and employees.

Creativity Level of Managers and Indicators of Creativity	M Managers <i>n</i> = 100	M employees <i>n</i> = 100	M IT <i>n</i> = 100
Fluency	11	10	12
Flexibility	6	5	6
Originality	22	20	27
Elaboration	15	12	16
Naming	19	17	15
Creativity	72	62	76

The comparison shows that the creativity index is high among IT managers, the

difference is significant for originality, but the naming index is high among managers. This is also due to the nature of professional activity. IT managers use the word less (refer to **Table 4**).

The correlation analysis conducted among the research results of three groups, specifically among public sector managers, revealed significant connections between Fluency and Curiosity ($r = 0.224, P < 0.01$), Originality and Curiosity ($r = 0.284, P < 0.001$), Elaboration and Curiosity ($r = 0.235, P < 0.01$), and Creativity and Curiosity ($r = 0.314, P < 0.001$) (refer to **Table 5**).

Table 5. The correlation among public sector managers.

Variable N1	Variable N2	Correlation coefficient
Fluency	Curiosity	0.224**
Originality	Curiosity	0.284***
	Self-assessment of creativity	0.216**
Elaboration	Curiosity	0.235**
Creativity	Curiosity	0.314***
	Self-assessment of creativity	0.256**

$P < 0.05^*$, $P < 0.01^{**}$, $P < 0.001^{***}$.

This means the more unique, unexpected, numerous ideas managers come up with, the more they look for new ways of thinking, like exploring new thoughts and ideas, and look for different solutions to the problem, read and study books, games, maps, pictures to know as much as possible. There is a correlation between the managers' results of Originality and Self-assessment of creativity ($r = 0.216, P < 0.01$). This means that the more managers come up with unique, new, unexpected ideas, the more they assess their creativity highly.

There is also a correlation between Creativity and Self-assessment of creativity ($r = 0.256, P < 0.01$) which means that the higher the level of creativity of managers and the more they propose different and unique ways of solving the problem, the higher they assess their creativity.

In contrast to managers, among employees, a correlation is observed between complexity and creativity ($r = 0.332, P < 0.001$), as well as its indicators: Fluency ($r = 0.554, P < 0.001$), Flexibility ($r = 0.499, P < 0.001$), Originality ($r = 0.414, P < 0.001$), and Elaboration ($r = 0.434, P < 0.001$). This means the more they are interested in complex ideas and like setting difficult tasks, exploring something without any help, they are persistent to achieve their goal, suggest complex options to solve problems, like difficult tasks, the more they suggest numerous, unexpected, new ideas, elaborate and refine them (see **Table 6**).

The connections between the results of the Risk-taking ability and the Fluency ($r = 0.378, P < 0.001$), Flexibility ($r = 0.345, P < 0.001$), and Originality ($r = 0.329, P < 0.001$) are remarkable. Those connections show the more they put forward their ideas and thoughts, not paying attention to the reactions of others, set high goals and try to achieve them, allow themselves to make mistakes and fail, like to explore new ideas or things not obeying the opinions of others, prefer to have the opportunity to take risks in order to know what will happen, the more they come up with a lot of different, unique, unexpected ideas.

Table 6. The following connections are discovered among employee.

Variable N1	Variable N2	Correlation coefficient
Imagination	Creativity	0.256**
	Fluency	0.554***
	Flexibility	0.499***
Complexity	Originality	0.414***
	Elaboration	0.434***
	Creativity	0.332***
Risk-taking ability	Fluency	0.378***
	Flexibility	0.345***
	Originality	0.329***
Self-assessment of creativity	Fluency	0.423***
	Flexibility	0.378***
	Originality	0.272***
	Elaboration	0.251**
	Creativity	0.325***

$P < 0.05^*$, $P < 0.01^{**}$, $P < 0.001^{***}$.

There is a correlation between Self-assessment of creativity and Creativity ($r = 0.325$, $P < 0.001$) and all its indicators (Fluency $r = 0.423$, $P < 0.001$), Flexibility $r = 0.378$, $P < 0.001$), Originality ($r = 0.272$, $P < 0.001$), Elaboration ($r = 0.251$, $P < 0.01$) both among employees and managers. There is no correlation only in the case of Naming. Thus, the higher the employees assess their creativity, the more they can suggest new and unexpected ways, methods, and options to solve problems, and the more they refine and elaborate on them.

Among IT managers there is an interesting and remarkable correlation between the personal qualities of creativity and creativity indicators (Flexibility and Risk-taking ability ($r = 0.356$, $P < 0.001$), Elaboration and Risk-taking ability ($r = 0.282$, $P < 0.001$), Creativity and Risk-taking ability ($r = 0.341$, $P < 0.001$). The observed correlation between Naming and Imagination ($r = 0.372$, $P < 0.001$), Complexity ($r = 0.254$, $P < 0.01$), Risk-taking ability ($r = 0.246$, $P < 0.01$), and Self-assessment of creativity ($r = 0.251$, $P < 0.01$) is evident, unlike that observed among managers (refer to **Table 7**).

Thus, it can be inferred that individuals who generate numerous ideas spanning various categories, develop them, and employ creative speech tend to assert their ideas and thoughts without heed to others' reactions. They also set ambitious goals, endeavor to achieve them, permit themselves to err and encounter failure, demonstrate a preference for exploring new ideas or concepts irrespective of others' opinions, are inclined towards risk-taking, propose intricate solutions to problems, construct mental images, and esteem their creative prospects. A correlation is evident between Naming and Imagination, Complexity, Risk-taking ability, and Self-assessment of creativity.

Table 7. Remarkable correlations among the results of the IT managers.

Variable N1	Variable N2	Correlation coefficient
Fluency	Risk-taking ability	0.226**
	Imagination	0.213**
Flexibility	Risk-taking ability	0.356***
	Self-assessment of creativity	0.226**
Elaboration	Risk-taking ability	0.282***
	Imagination	0.372***
Naming	Complexity	0.254**
	Risk-taking ability	0.246**
	Self-assessment of creativity	0.369***
	Risk-taking ability	0.341***
Creativity	Imagination	0.250**
	Self-assessment of creativity	0.251**

$P < 0.05^*$, $P < 0.01^{**}$, $P < 0.001^{***}$.

Looking at the results of the study on barriers to creativity, it can be asserted that fear of making mistakes (3.0), limited number of solution options (3.2), laziness (3.1), indifference (3.0), lack of confidence (3.2), rigidity of thinking (3.2), time constraints (3.3), stereotypical thinking (3.0), yielding to majority opinion (3.2), and avoidance of decision-making responsibility (3.1) are barriers faced by public sector managers. It is noteworthy that the highest score is attributed to the barrier of time constraints.

Fear of making a mistake (2.5) and running out of time (2.5) are barriers for the IT managers.

Fear of making a mistake (3.5), unconfidence (3.1), running out of time (3.6), stereotypical thinking (3.1), and yielding to the majority opinion (3.2) are barriers for the employee.

4.3. Discussion

Comparing the data with the killers of creativity (Nöllke's approach), where reward is regarded as a barrier to creativity, it is noteworthy that neither public managers (2.1), IT managers (1.9), nor employees (2.6) perceive it as such. Generalizing, fear of making mistakes and time constraints emerge as obstacles for both public sector and IT managers and employees.

Lack of confidence, stereotypical thinking, and yielding to the majority opinion are obstacles for the public sector managers and employees. However, IT managers do not consider them as obstacles. Combining these findings with indicators of creativity, it can be observed that public sector managers do not yield to majority opinion, exhibit confidence, avoid stereotypical thinking, which enables them to generate numerous unique ideas, ultimately leading to a high level of creativity.

Table 8 presents a qualitative comparison of the three groups. The method of qualitative analysis was applied.

Table 8. The barriers, indicators and personal qualities of creativity of managers and employees.

	Managers	Employees	IT managers
Creativity criteria (indicators)	Fluency Originality Naming	Fluency Originality	Fluency Originality
The level of creativity	Above average	Low	High
Personal qualities of creativity	Curiosity Complexity Risk-taking ability	Curiosity Complexity Risk-taking ability	Curiosity Complexity Risk-taking ability
Self-assessment of creativity	Above average	Low	Above average
The barriers to creativity	fear of making a mistake, limited number of solution options, laziness, indifference, unconfidence, rigidity of thinking, running out of time, stereotypical thinking, yielding to the majority opinion, avoiding responsibility for making decisions	fear of making a mistake, unconfidence, running out of time, stereotypical thinking, yielding to the majority opinion	fear of making a mistake, running out of time
Creativity	Curiosity Self-assessment of creativity	Imagination Complexity Self-assessment of creativity	Imagination Risk-taking ability Self-assessment of creativity

Thus, it can be stated that public sector managers demonstrate above-average levels of creativity and self-assessment there of. Fluency, Originality, and Naming as the indicators of creativity are typical of managers. Curiosity, Complexity, and Risk-taking ability are typical for managers as the personal qualities of creativity. Fear of making mistakes, the limited number of solution options, laziness, indifference, unconfidence, the rigidity of thinking, running out of time, stereotypical thinking, yielding to the majority opinion, and avoiding responsibility for making decisions as barriers are typical of managers to creativity. In the case of managers, there is also an interconnection between Creativity and Curiosity.

Employees have a low level of creativity and self-assessment of creativity. Fluency and Originality are typical for employees as indicators of creativity. Curiosity, Complexity, and Risk-taking ability are typical for employees as the personal qualities of creativity. Fear of making mistakes, running out of time, stereotypical thinking, and yielding to the majority opinion as barriers to creativity are typical for employees. In the case of employees, there is also an interconnection between Creativity and Imagination, Creativity and Complexity (see **Table 8**). The data can be compared with observations made by Martindale and Simonton, which highlight the significance of variables such as independence, nonconformism, unconventional behavior, a broad range of interests, openness to new experiences, risk-taking propensity, and cognitive and behavioral flexibility (Funke, 2009, p. 17).

IT managers have a high level of creativity. The self-assessment of creativity is above average. Fluency and Originality are typical for IT managers as indicators of creativity. Curiosity, Complexity, and Risk-taking ability are typical for managers as the personal qualities of creativity. Fear of making mistakes, and running out of time are typical for IT managers as barriers to creativity. In the case of IT managers, there is also an interconnection between Creativity and Imagination, Creativity and Risk-

taking ability. The research data also supports Amabile's perspective, indicating that the creative process may vary across different domains of activity (Amabile, 2012).

Meusburger notes Amabile's words, whatever an individual's talent, the conditions under which he or she works can significantly raise or lower the level of creativity (Meusburger, 2009, p. 136).

The research of Nadia Hayel Al-Srouf shows, that for management employees, creativity is low due to the routine nature of their work so their performance will not be novel all times and they are restricted with many laws that may prevent their creativity (Hayel and Al-Srouf, 2013).

Carmeli A. notes that, inclusiveness is key in providing leadership support for creativity, because it cultivates high quality relationships that further augment a sense of psychological safety. The latter is a vital social-psychological mechanism which creates conditions where individuals feel safe to bring up ideas, voice opinions, and to question. All of these behaviors have been found to be related to increased creativity in the workplace (Carmeli, 2010).

There is an interconnection between creativity and self-assessment in the three groups. This means that the higher the level of creativity, the higher they assess their opportunities.

5. Conclusions and implications

The characteristics of managers' creativity are influenced by their respective fields of activity. In the IT sector, managers exhibit a high level of creativity, surpassing standard benchmarks in terms of speed, while managers in the public sector demonstrate particularly creative speech patterns. The latter prioritize establishing interpersonal relationships and engaging in communication, fostering a creative discourse. Moreover, the autonomy afforded to IT managers enables them to generate unique ideas without conforming to conventional norms. Personal qualities associated with creativity, such as curiosity, complexity, and risk-taking propensity, are notably pronounced among managers in both sectors. However, self-assessment of creativity remains relatively low among professionals in both the public and private sectors.

Based on the results of the research, it can be concluded that the expression of managers' creativity depends on the unique interconnection among the barriers to creativity, indicators, and personal qualities of creativity. A high level of creativity is manifested when there are fewer barriers and personal qualities such as Imagination and Risk-taking ability. The level of expression of creativity is low when there is an interconnection between Creativity and Complexity, Imagination, and barriers to creativity such as unconfidence and concession to the majority opinion. It means that risk-taking ability is a personal quality, which promotes the expression of creativity and overcomes unconfidence and concession to the majority opinion. Thus, the new model of creativity research and development is made of the level of the managers creativity, criteria, personal qualities, the factors contributing and hindering creativity and their unique relationship.

To facilitate the implementation of training programs aimed at enhancing managers' creativity, it is imperative to design programs that consider the intricacies of their respective roles and responsibilities. These training initiatives should be

tailored to address the complex interplay between barriers to creativity, established standards, and individual personality traits. Leveraging the creativity research and development model can provide a foundational framework for the formulation of a scientific approach to the psychological screening and training of managers.

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