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# TRUST AND KNOWLEDGE-SHARING FACTORS IN THE CONTEXT OF EFFICIENCY OF VIRTUAL TEAMS

Faktori poverenje i deljenje znanja u kontekstu  
efikasnosti virtuelnih timova

## Abstract

Virtual teams, as a group of people who perform work interdependently with the division of responsibilities in the outcomes of work tasks, significantly rely on technology that supports their communication and everyday work. The topic of this paper is the research on the connection between trust factors (individual, institutional and cognitive) and knowledge sharing in a team in the context of the efficiency of virtual teams. For this purpose, a correlation-regression study was conducted on a non-random sample of 132 respondents consisting of employees from teams that function exclusively as virtual, multicultural and multinational. Also, the mediator effect of knowledge sharing factors concerning trust, and efficiency of virtual teams were examined. The obtained results confirmed that all dimensions of trust - individual and institutional and cognitive trust are important for the efficient functioning of virtual teams. Contrary to the created hypotheses, it was shown that the factor of knowledge sharing in virtual teams is not a predictor of trust or efficiency of virtual teams.

**Keywords:** *virtual teams; virtual teams' efficiency; individual trust; institutional trust; cognitive trust; knowledge sharing; organizational culture; Covid-19.*

## Sažetak

Virtuelni timovi, kao grupa ljudi koja obavlja posao međuzavisno uz podelu odgovornosti u ishodima radnih zadataka, značajno se oslanjaju na tehnologiju koja podržava njihovu komunikaciju i svakodnevni rad. Tema ovog rada je istraživanje povezanosti faktora poverenje (individualno, institucionalno i kognitivno) i deljenje znanja u timu u kontekstu efikasnosti virtuelnih timova. U tu svrhu, na neslučajno-prigodnom uzorku od 132 ispitanika kojeg čine zaposleni iz timova koji funkcionišu isključivo kao virtuelni, multikulturalni i multinacionalni, sprovedeno je korelaciono-regresiono istraživanje. Takođe, ispitivan je i medijatorski efekat faktora deljenja znanja u odnosu poverenja i efikasnosti virtuelnih timova. Dobijeni rezultati potvrdili su da su sve dimenzije poverenja - individualno i institucionalno i kognitivno značajne za efikasno funkcionisanje virtuelnih timova. Suprotno kreiranim hipotezama, pokazalo se da faktor deljenje znanja u virtuelnim timovima nije prediktor ni poverenja, ni efikasnosti virtuelnih timova.

**Ključne reči:** *virtuelni timovi; efikasnost virtuelnih timova; individualno poverenje; institucionalno poverenje; kognitivno poverenje; deljenje znanja; organizaciona kultura; Covid-19.*

## Introduction

Digitalisation, globalisation and technological changes in modern society are transformatively influencing how employees work [29a]. Consequently, human resources departments have been investing increasing efforts to create a work environment that nurtures and encourages work efficiency. One of the central needs of the modern (digitized) business environment is aimed at create cooperation that is not conditioned by cultural, national and linguistic discourses [6]. This type of business cooperation has many benefits, whether we are talking about the highly specialized staff that can be physically located anywhere, time and money savings or the diversity of the virtual team in terms of creativity and originality [3].

In response to the growing trends towards business globalization, as well as the increased competitive pressures to establish greater organizational flexibility, the so-called virtual teams have emerged [37], representing a group of people doing work interdependently, sharing responsibilities in job outcomes, relying heavily on technology which supports their communication [15]. Over the last twenty years, this modality of work has become more prevalent, considering the progress and maturation of the digital world, especially in the context of telecommunications speed, the power of computer equipment, and particularly good adaptation to digital work. In addition to the prevalence of the virtual work mode, the motivation for researching virtual teams has additionally been stimulated by the fact that the context, that is, the way of working, has changed in the past year and more with the outbreak of the coronavirus pandemic, having in mind that COVID-19 played as a booster to the social and economic transformations triggered by the 4.0 Industrial Revolution, increasing the diffusion and employment of technological devices and requiring to reconsider the traditional approach to work and organization [8; 12]. Namely, teams that previously functioned as “traditional” were forced to become virtual during the pandemic, and we have been witnessing a growing trend of virtual teams in almost all sectors and areas of work where such a possibility existed. The data suggest that 80% of companies in the global labor market shifted their

business to virtual or “mixed” forms of team collaboration during the early months of the pandemic [24].

As a consequence of the paradigm shift in the work environment, this paper focuses on exploring factors that may affect the effectiveness of virtual teams. Identifying these factors seems to be a very important aspect in the efforts of organizations to maintain their competitiveness in the market. The growing prevalence of modalities of work in virtual teams, as well as special efforts made to preserve and research the efficiency factors of virtual teams, have been recognized as important motives for researching this topic.

## Key determinants of virtual teams

A review and analysis of the literature dealing with the concept of virtual teams reveal the existence of several definitions of this concept, based on emphasizing the importance of various factors in determining the degree of “virtual”. Also, when analysing different definitions of this concept, it is necessary to consider the context of the time in which they were created, given that the understanding of virtual teams has changed with the development and integration of technology into various aspects of a business.

Early definitions of virtual teams indicated differences between virtual and traditional teams, emphasizing the physical distance and interaction of team members based on technology [23]. Some of these definitions have suggested that virtual teams are a temporary, culturally diverse, and geographically distant group of people who communicate electronically [20]. In the early definitions of virtual teams, scepticism and insecurity towards this form of work can be noticed. Namely, at the beginning of the 21<sup>st</sup> century, it was difficult to maintain confidence in the efficiency of virtual teams, taking into account the beginning of technological development, and the low level of “maturity” and presence of these teams. Studies show that in the early 2000s, a small percentage of teams that functioned as virtual managed to achieve their goals, with a significant failure rate [14]. Aspects that were identified as problematic in the early development stages of virtual teams were weak individual commitment, workload,

unclear job roles, absenteeism, and social phenomena such as social loafing. Also, Mowshowitz [26] points out another problematic aspect related to the functioning of virtual teams, and that is that clients themselves can notice the lack of consistency, consistency and reliability in virtual business and work. In addition to all the above, the initial stages of the development of virtual teams were accompanied by suggestions that the functioning of teams should not be exclusively virtual. The need to maintain traditional teams (face to face) or a hybrid approach [20] was highlighted. The beginning of the development of virtual teams was also accompanied by the presence of strong concerns about establishing and maintaining trust among team members. Trust requires contact [17], which in the early stages of virtual teams was hampered by insufficient technological capabilities. Namely, in the transitional phases, when the technology was not yet developed to the extent it is today, nor was it incorporated into the labor market, the representation of virtual teams was not significant. In studies examining the effectiveness of virtual teams, most respondents felt that virtual communication was not as effective as face-to-face communication, while half of the respondents said they were confused about virtual collaboration-based technology [14].

With the further development of technology, the focus of researchers has gradually shifted from comparing virtual and traditional teams to attempts to define the “virtuality” of teams [23]. At this stage, the most important thing was to operationalize, that is, to understand well what virtuality specifically means - to define what kind of functioning, that is, the degree of virtuality is needed for a team to be characterized as virtual. Certain authors suggest that the way team members are geographically distributed, as well as their reliance on technological capabilities, is a more significant determinant of team virtuality, rather than comparing these teams to traditional ones [25]. Definitions that emerged in the 2000s (in the so-called “middle stage of development” of virtual teams) were aimed at emphasizing that these are primarily teams and that virtuality should be treated as a characteristic of these teams [23]. Consequently, these authors have defined virtual teams as teams whose members use technology

to varying degrees, doing work beyond geographical, temporal, and relational boundaries, to accomplish common work tasks [23].

In the last few years, due to the rapid development of technology and the changes it has introduced in the ways of performing work tasks, interest in virtual teams among researchers, but also the human resources sector in organizations, has flourished. Virtual teams have emerged as a powerful structure in the modern business environment characterized by the use of information and communication technologies (ICT), changes in organizational design and a multicultural workforce [25]. Modern definitions of virtual teams are becoming flexible, and open to change in the context of a dynamic business environment. It is emphasized that this is a modality of work in which team members are geographically distant, with limited contact (face to face), and work is done interdependently to achieve common goals [9]. Changes in the field of defining virtual teams have been accompanied by an increased number of studies that directly or indirectly deal with the concept of virtual teams. Unlike earlier studies that concluded that virtual teams are not as successful as traditional ones [14], recent studies show just the opposite. Namely, research shows that virtual teams can be highly efficient and with better performance compared to traditional teams if they have managed adequately [34]. Also, virtual forms of business collaboration can have a positive effect on employee productivity [14]. Since virtual teams have become an efficient form of business, the central topic becomes the research of the factors that affect that efficiency, while the comparison with traditional forms of business remains in the background.

### **(Dis)advantages of virtual teams**

Some of the key advantages and disadvantages of virtual teams have been identified in the academic literature. One of the central advantages of virtual teams is that this type of work organization allows access to team members who have higher levels of expertise. This is since virtual teams are not geographically limited in terms of staff recruitment, nor do they have to relocate highly qualified team members outside the local region. Thus, virtual

teams allow all organizations to recruit the most talented candidates in a given field, regardless of their geographical location [3]. Moreover, virtual teams provide coverage of the work process in different time zones, which is enabled by recruiting employees in different geographical locations, so the working day can last twenty-four hours instead of eight, as is the case with traditional teams [28]. Some authors emphasize the importance of virtual functioning in the context of reducing operating costs, such as travel expenses, per diems, materials, maintenance and lease of office space [3]. Given that virtual teams represent a heterogeneous, multicultural working group, it is inevitable that there are differences in opinion, approaches and perspectives, which is another of their advantages: the diversity of the team provides creativity and originality in work [3]. On the other hand, the heterogeneity of team members is important in the context of efforts to create an inclusive work environment, as it develops values that imply equality among all team members [3]. Finally, at the individual level, the advantages of the virtual way of working imply a high level of flexibility and the ability to manage time, along with high responsibility, motivation and empowerment of team members [25].

On the other hand, the key disadvantage of this form of work is the difficulty in establishing trust among team members, especially if the team operates exclusively virtually [9]. Also, working in a virtual environment is characterized by tendencies toward weaker sharing of knowledge and information within the team [37]. Certain authors also recognize the difficulties in monitoring and managing virtual teams [3], especially in the context of monitoring individual performance [20]. Namely, in virtual forms of business, it is difficult to assess the individual contribution of each team member, given that the focus is on the overall achievement of the team. Another disadvantage of this way of working is the fact that not all employees are psychologically adapted to function exclusively in a virtual way [3]. Virtual forms of business in that case exclude that part of the workforce that is not able to adapt and function efficiently as a virtual team. Namely, many employees need constant contact with the team, while virtual ways of working make them feel alienated and isolated. Earlier, at the beginning of the

development of this modality of work, a key shortcoming was the technological inadequacy of organizations in this way of working [3], which primarily refers to the fact that not all employees are technologically trained for this form of work, and that a small number of organizations is technologically ready for the transition to exclusively virtual functioning. It could be said that today, with the appearance of “digital generations” in the labor market, the situation is far better. Namely, as today’s labor market is made up of generations that have “grown” with the use of digital technologies, the problem of technological readiness of organizations is becoming almost negligible.

### The efficiency of virtual teams

The need for a comprehensive definition of virtual teams, their advantages and disadvantages, is important in determining what is needed for such a team to function effectively [16]. When we talk about efficiency, we should first define what exactly efficiency means in the context of virtual teams. The first dilemma about defining efficiency is related to the fact that efficiency at the individual level differs significantly from that at the collective level, within an organization or team [28]. However, efficiency at the collective level affects that at the individual level, and vice versa. Efficiency in the context of virtual teams would refer to the achievement of virtual teams (collective level), but also to the job satisfaction that would be felt by each team member (individual level). Gibson and Cohen [16] believe that both business and team outcomes should be taken as measures of the effectiveness of virtual teams. Possible business outcomes include productivity, goal achievement, innovation, timeliness, customer satisfaction, and learning at the organizational level. Possible human outcomes imply certain attitudes of members such as commitment, satisfaction, and longevity, i.e., the capacity to persevere in future joint work. The measure of achievement, that is, the efficiency of the virtual team will also depend on the team itself, i.e., on the type of work that the given team performs [16]. Other authors point out the three basic criteria that should be taken into account when defining the efficiency of virtual teams [22]. The first criterion refers to the level of team productivity

and considers the team's achievement, i.e., the extent to which the group's performance, product or service meets the required standards. The second criterion refers to the team's ability to learn and improve its functioning during the performance of work tasks (in the future), thus emphasizing the team process, and not the outcomes concerning team functioning in the present. Finally, the third dimension relates to the extent to which the team can provide satisfaction to each individual member. This dimension also indicates the process itself, but to a greater extent refers to individual team members [22]. Looking at the above criteria for defining the efficiency of virtual teams, we notice that efficiency can be treated in different ways, depending on which criterion we focus on. In the case of quality criteria, this can be e.g., performance measurement, and a qualitative measure of the subjective perception of team members. In addition to qualitative and quantitative measures, monitoring the team process itself can also be a measure of team efficiency [22].

After defining efficiency in the context of virtual teams, we will focus on defining efficiency factors of virtual teams. By definition, virtual teams rarely or never meet face to face, and in such a work environment they also face different factors that affect their effectiveness compared to traditional teams. For example, the difference in time zones can affect the efficiency of coordination between teams. It often happens that the level of successful coordination is directly related to the level of the time difference - the greater the time difference, the lower the level of coordination [10]. The language barrier can pose additional problems in full understanding between team members, and the efficient functioning of virtual teams. Among the various criteria that we take into account when considering the efficiency of virtual teams, the most important is the one according to which teamwork is a source of satisfaction for each of the team members. In other words, a team cannot be effective if its members are not satisfied with the way it works [22]. Team member satisfaction is a measure of efficiency based on subjective perception. However, researchers suggest that the perception of team members can be a very important predictor of team efficiency, as team members are key to doing the job and directly affect the productivity of the entire team, and thus

its satisfaction [22]. In short, if a member is not satisfied with the functioning of his virtual team, then we cannot even talk about the existence of any "form" of efficiency in that team. Moreover, the technologies used to perform various business tasks within an organization are often, due to the cost-effectiveness and ease of system maintenance, standardized for each organization individually. In terms of technology, members of virtual teams are usually structured as individual systems, where each member has a technological environment that suits him best as an individual (use of different licenses, software, subscription to software tools). Such differences in technologies used within the same virtual team, as well as different levels of technological literacy, also affect team efficiency [31].

This paper aims to examine the influence of the factors identified as the most important on the efficient functioning of virtual teams. After reviewing the scientific literature, we concluded that several factors can affect the efficiency of virtual teams. However, in this research, we will focus on two factors that have been identified as most important for the effective functioning of virtual teams - trust and knowledge sharing within the team [32; 28; 37; 27]. According to the definition of the American Psychological Association [APA], "trust is reliance on someone/ something and dependability on them". In interpersonal relationships, "trust refers to the reliability that a person or group of people has concerning other persons or groups" [2]. Different authors recognize and distinguish trust at the individual and collective level, that is, the so-called "individual trust" and "collective trust". Collective trust is defined as a psychological state, common to all team members, which is characterized by acceptance of the vulnerability of others and is based on the expectations, intentions or behaviors of others within the team [30; 16]. Collective trust in virtual teams is defined as the degree of reliance of individuals on their "remote" team members [32]. As discussed earlier, trust is an important factor for the functioning of teams of any type and structure, but special importance is attached to the development of trust in the context of virtual teams. Namely, researchers in this field believe that trust is an important element in preventing the geographical distance between members of the virtual team from becoming psychological [1]. In



addition, other authors point out several benefits that contribute to the development and nurturing of trust in the organization such as increasing security and reliability in relationships, with tendencies toward creating an open and meaningful exchange of information and knowledge [16]. Also, trust affects the achievement at the level of the entire organization, and by that, it meant the fulfilment of goals, the quality of work performed, timeliness and flexibility [16]. Developing trust in the context of virtual teams is an important but complex task. Researchers recognize as a potential problem the impossibility of observing different forms of behavior that is possible only in conditions when teams are seen every day (in the so-called traditional teams), which allows them to develop and maintain trust [1]. Also, the absence of physical (geographical) closeness, and differences in ethical origin and experience, are often factors that further complicate socialization in virtual forms of business [16]. Gibson and Cohen [16] also point out that cultural differences in the composition of virtual teams can be negatively related to the possibilities of establishing trust. When it comes to specific forms of trust, some authors have defined three dimensions of trust that relate specifically to the virtual context, namely: individual (personal), institutional (organizational) and cognitive trust [32]. Individual trust develops in early childhood when an individual seeks and receives help from people who care for him. Early establishment of trust inevitably affects the behavior of the individual in the organizational context, because trust in the members of the organization is a behavior that is developed and shaped by the personality of the individual [32]. Institutional trust, which has been developed following institutional theories, refers to the consideration that the norms and rules of organizations are “guides” for the behavior of individuals. The institutional trust exists when individuals respect the rules and regulations of the organization. Namely, the belief that the organization requires the harmonization of different rules, i.e., norms among its members, influences team members to develop trust in each other, even if they have never met live [32]. This form of trust enables the organization and rapprochement of individuals around a common value, in this case, the norm that the organization imposes. In addition to the

positive aspects of this dimension of trust, some authors also recognize the negative ones. These negative aspects concern that institutional trust can be based on fear, and that team members will develop trust out of fear of being punished by the organization [32]. Considering this form of trust in the context of the functioning of virtual teams, it seems inconceivable that members of an organization develop organizational trust based on fear. Rather, it is a matter of fear that they will not be accepted by the organization if they do not conform to its way of working and norms. Cognitive trust is based on patterns that individuals develop towards their team members, relying predominantly on cognitive indicators - signs and impressions [32]. By interacting with each other, individuals use three types of categorization processes to develop trust-based beliefs – grouping, reputation-based categorization, and stereotyping [32]. All these types of categorization processes involve the collection of information about others and the cognitive processing of that information, in terms of developing trust in others [32]. Grouping refers to the fact that team members share common goals that make them perceive each other positively, with a sense of trust [32]. Reputation-based categorization suggests that individuals with a reputation are trusted, that is, perceived as trusted. Stereotyping suggests that individuals in social situations create impressions of others based on their physical appearance or through other models of interaction, with positive stereotyping leading to the development of behaviors based on trust, and vice versa. As can be seen, members of virtual teams may rely on different aspects in attempts to build trust in a virtual context that is different from the ways and mechanisms by which trust is created in situations where teams meet daily and can observe the behaviour of team members in real-time.

Certain authors recognize the tendency to share knowledge as a key indicator that members of virtual teams can observe and rely on in attempts to build trust among team members [1]. Knowledge sharing is defined as the intentional application of one’s ideas, insights, knowledge, and experience to another individual, either through an intermediary (e.g., a computer system) or directly [11]. Nowadays, when virtual forms of business

are common, generating new knowledge and using it (sharing) to produce new products or services is crucial for maintaining or improving the competitiveness of companies [21]. Hence, a large number of studies, which examine the tendencies towards knowledge sharing and their impact on the development of trust, as well as consequently on the efficiency of virtual teams, point to the importance of this factor in perceiving and understanding the virtual functioning of teams. Researchers have recognized that knowledge sharing is key to achieving the effectiveness of both traditional and virtual teams, as well as how team members rely on each other [36]. Virtual teams are usually made up of groups of people belonging to different cultures, business experiences and expertise. It is this diversity that is important when a team faces a problem, given that they have the potential to improve team success and quality of business outcomes through knowledge sharing [35; 18; 36]. Also, knowledge sharing plays a key role in bringing people together, as it directs people towards sharing experiences, specific knowledge and skills [21]. Researchers attach special importance to the knowledge sharing factor for the efficient functioning of virtual teams, believing that knowledge sharing is a factor that directly affects the efficiency of virtual teams, while trust has an indirect impact. Thus, researchers classify knowledge sharing as a mediating factor, and trust as a factor that influences the tendency to share knowledge in a team, and thus efficiency [36]. Consequently, trust is a key factor in the development of tendencies towards knowledge sharing in virtual teams [28]. Namely, individual (personal) trust is seen as an aspect of trust which is a prerequisite for sharing knowledge in teams. The reasons for this should be sought in the fact that people are more willing to share their knowledge with people they trust, and individual trust is of special importance in this context [28]. As individual trust is often difficult to establish when a team functions exclusively virtually, it is important to note other aspects of trust and their impact on the tendency to share knowledge in virtual teams. Namely, it is about cognitive and institutional trust. Studies have pointed to the importance of cognitive, and especially institutional trust, for sharing knowledge among members of virtual teams [19; 28].

## Methodology

The main goal of this research is to examine the nature of the connection between two key factors in the effectiveness of virtual teams - trust and knowledge sharing in the team. As pointed out earlier, the trust factor consists of three dimensions: individual, institutional, and cognitive trust, and therefore the predictability of all three dimensions concerning the effectiveness of virtual teams will be examined. We will also examine the mediating effect of knowledge-sharing factors on the relationship between trust and the effectiveness of virtual teams.

Following the objectives of the research, three research hypotheses were singled out, conceived under the results of previously conducted research [32; 36; 37; 28; 21]:

- H1:* Trust (individual, cognitive, institutional) predicts the effectiveness of virtual teams.
- H2:* Trust is correlated with knowledge sharing in virtual teams.
- H3:* Knowledge sharing predicts the effectiveness of virtual teams.

The non-experimental research was conducted in the period January-February 2022. The research sample was non-random and consisted of 132 respondents who were employees of Prota Ventures, Funl Studios and Movers Development, whose teams function exclusively as virtual, multicultural and multinational. The virtual teams that participated in the research were geographically located in different areas (mostly in Serbia and the USA). At the very beginning of the questionnaire, in addition to a brief instruction concerning the research, informed consent was included, necessary for the research to be conducted.

The data collection procedure was organized online through an electronic questionnaire (Google Forms) which was based on the integration of three instruments:

1. An instrument that examines the effectiveness of virtual teams on a seven-point Likert-type scale, where respondents answered to what extent they (dis)agree with the given statements [22],
2. An instrument that examines three types or dimensions of trust - individually, institutionally and cognitively with its three subcategories

(grouping, reputation based on categorizations and stereotyping), also on a seven-point Likert-type scale [32], and

3. An instrument that examines tendencies towards knowledge sharing [5].

Also, in the questionnaire itself, the respondents answered the question about the “degree of virtuality”, i.e., the degree to which their team functions as a virtual one. The importance of including this question in the questionnaire is the confirmation of the high degree of “virtuality” of the surveyed teams, which was necessary for the research to be conducted. After the data collection procedure, a database was created and data processing in The Statistical Package for the Social Sciences (SPSS) followed. On that occasion, the following analyses were conducted:

1. Descriptive statistics: arithmetic mean, standard deviation, minimum, maximum.
2. Correlation: Pearson’s correlation coefficient. The correlation of trust (individual, institutional and cognitive), as well as the correlation of knowledge sharing in the team and the efficiency of virtual teams, which was set as a criterion variable, were examined. In addition, the correlation of trust (all three dimensions) and knowledge sharing in the team was examined, to assess the mediator effect of the knowledge sharing variable.

3. Multiple linear regression: criterion variables (efficiency of virtual teams) with research predictors, i.e., trust (individual, institutional and cognitive). Also, multiple linear regression was performed for the criterion variable of virtual team efficiency, with the predictor variable of knowledge sharing in the team.

## Results

Table 1 shows the results of descriptive statistics for all examined variables in the research (trust: individual, institutional, and cognitive, knowledge sharing, the efficiency of virtual teams). As discussed earlier, an instrument consisting of three integrated questionnaires representing Likert scales ranging from 1 to 7 was used in this study; with 1 - I do not agree at all (minimum) and 7 - I completely agree (maximum).

By looking at the table, we can notice that the average score of the efficiency variable of virtual teams ( $M = 6.23$ ) is higher than other variables examined in the research, for which average values were obtained. Then, Table 2 shows Pearson’s correlation coefficients for all examined variables in the research (efficiency of virtual teams, trust: individual, institutional and cognitive, knowledge sharing in virtual teams).

**Table 1: Descriptive statistics**

	Minimum	Maximum	<i>M</i>	<i>SD</i>
The efficiency of the virtual team	1	7	6.23	0.78
Trust	1	7	5.57	1.0
Individual trust	1	7	5.72	0.95
Institutional trust	1	7	5.76	1.14
Cognitive trust	1	7	5.24	1.20
Knowledge sharing in virtual teams	1	7	5.67	0.87

**Table 2: Correlation of the examined variables**

	1	2	3	4	5	6
The efficiency of the virtual team	1					
Trust	.81**	1				
Individual trust	.67**	.86**	1			
Institutional trust	.83**	.91**	.64**	1		
Cognitive trust	.71**	.95**	.74**	.81**	1	
Knowledge sharing in virtual teams	.11	.03	.11	-.02	0.2	1

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$



By looking at the table, we can notice the existence of several significant correlations between the examined variables. First of all, we notice the existence of intercorrelations. Trust significantly correlates with other dimensions of trust (individual, institutional, cognitive). Also, the dimensions of trust are significantly correlated with each other. As the subject of this research is to examine the relationship between trust and the effectiveness of virtual teams, as well as to examine the relationship between knowledge sharing and the effectiveness of virtual teams, we will pay attention to the correlations obtained between these key variables. Thus, following the key hypothesis of our research, a positive significant correlation was obtained between trust and efficiency of virtual teams ( $r = .81$ ,  $p = .00$ ). Also, there is a positive significant correlation between all dimensions of trust and efficiency of virtual teams, following the set hypotheses. Individual trust positively correlates significantly with the efficiency of virtual teams ( $r = .67$ ,  $p = .00$ ). Institutional trust positively correlates significantly with the efficiency of virtual teams ( $r = .83$ ,  $p = .00$ ). Also, the dimension of cognitive trust positively correlates significantly with the efficiency of virtual teams ( $r = .71$ ,  $p = .00$ ).

When it comes to the second variable that is important in understanding the efficiency of virtual teams and knowledge sharing, we created a hypothesis about the relationship between this variable and the efficiency of virtual teams. However, the hypothesis has not been confirmed. In this study, knowledge sharing in virtual teams does not correlate significantly with the effectiveness of virtual teams ( $r = .11$ ). Also, it was shown that knowledge sharing does not correlate with another factor, i.e., with trust in virtual teams ( $r = .03$ ), and we can conclude that the hypothesis about the mediator effect of knowledge

sharing has not been confirmed. Namely, to talk about knowledge sharing in general as a mediator variable that affects the relationship between trust and the efficiency of virtual teams, there would have to be a correlation of this variable with both trust and the efficiency of virtual teams. That is, there must be a correlation of all variables in the mediator model - a correlation between the efficiency of virtual teams and trust, a correlation between efficiency and knowledge sharing, and a correlation between trust and knowledge sharing in a team [4].

Table 3 shows the regression model with the efficiency of virtual teams as the criterion and trust as the predictor.

Regression analysis with the efficiency of virtual teams as a criterion and trust as a predictor is statistically significant ( $R^2 = .66$ ;  $F_{(1,132)} = 257.89$ ;  $p < .00$ ). The correlation coefficient is  $R = .81$ , while the determination coefficient is  $R^2 = .66$ , and we conclude that trust in virtual teams explains 66% of the variance in the efficiency of virtual teams. We can conclude that trust in virtual teams predicts the efficiency of virtual teams ( $\beta = .81$ ;  $p < .00$ ). Therefore, the results of the regression analysis are in line with the expectations of the research, trust in virtual teams is a significant predictor of success, i.e., the efficiency of virtual teams. Furthermore, we will look at regression analysis with the efficiency of virtual teams as a criterion and the dimensions of trust as a predictor. We will examine the significance of each model, i.e., each predictor individually.

Regression analysis with the efficiency of virtual teams as a criterion and individual trust as a predictor is statistically significant ( $R^2 = .45$ ;  $F_{(1,132)} = 105.14$ ;  $p < .00$ ). The correlation coefficient is  $R = .67$ , while the determination coefficient is  $R^2 = .45$ , and we conclude that individual trust in virtual teams explains 45% of the variance in the efficiency of virtual teams. Thus, individual trust in virtual

**Table 3: Regression model with the efficiency of virtual teams as a criterion and trust as a predictor.**

	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Trust in virtual teams	0.64	0.04	0.81	16.06**

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$

**Table 4: Regression model with the efficiency of virtual teams as a criterion and individual trust as a predictor.**

	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Individual trust	0.55	0.05	0.67	10.25**

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$ ; reliability coefficient  $\alpha = .79$

teams predicts the effectiveness of virtual teams ( $\beta = .67$ ;  $p < .00$ ). Considering the results of regression analysis, we can conclude that they are following the hypothesis. Individual, personal trust is a significant predictor of the effective functioning of virtual teams.

Table 5 below shows regression analysis with the effectiveness of virtual teams as a criterion and institutional trust as a predictor.

We can conclude that the regression analysis is statistically significant ( $R^2 = .69$ ;  $F_{(1,132)} = 287.65$ ;  $p < .00$ ). The correlation coefficient is  $R = .83$ , while the determination coefficient is  $R^2 = .69$ , and we conclude that institutional trust explains 69% of the variance in the efficiency of virtual teams. The results of the regression analysis indicate that institutional trust predicts the efficiency of virtual teams ( $\beta = .83$ ;  $p < .00$ ). Institutional trust is a strong, i.e., the strongest predictor of the effectiveness of virtual teams.

Table 6 shows regression analysis with the efficiency of virtual teams as a criterion and a dimension of trust (cognitive trust) as a predictor.

Regression analysis with the stated criterion and predictor is statistically significant ( $R^2 = .51$ ;  $F_{(1,132)} = 135.21$ ;  $p < .00$ ). The correlation coefficient is  $R = .71$ , while the determination coefficient is  $R^2 = .51$ , so we can conclude that cognitive trust explains 51% of the variance in the efficiency of virtual teams. The results of regression analysis, for the last examined dimension of trust, indicate that cognitive trust significantly predicts the efficiency of virtual teams ( $\beta = .71$ ;  $p < .00$ ). The presence of cognitive trust in the team (as well as the

remaining two dimensions of trust) presupposes the efficient functioning of virtual teams.

Summarizing the results of all dimensions of trust for the efficient functioning of virtual teams, we can again point out that each dimension, i.e., each predictor proved to be statistically significant in considering the efficient functioning of virtual teams.

Finally, we will look at the regression analysis of another predictor that is important for this research, more precisely, sharing of knowledge in virtual teams.

Looking at the table, we conclude that the regression analysis is not statistically significant ( $R^2 = .01$ ;  $F_{(1,132)} = 1.60$ ). The correlation coefficient is  $R = .11$ , while the determination coefficient is  $R^2 = .01$ . Based on the above, we can conclude that the sharing of knowledge in virtual teams explains a very small percentage of the variance in the effectiveness of virtual teams. Thus, knowledge sharing in virtual teams is not a significant predictor of the effectiveness of virtual teams ( $\beta = .11$ ). The obtained result is not following the hypothesis about the predictive value of the knowledge sharing factor for the efficient functioning of virtual teams.

## Discussion

In this paper, we investigated the relationship between factors of trust and knowledge sharing in virtual teams and the effectiveness of virtual teams. The aim was to investigate whether certain factors (which have been shown in previous research to affect the effectiveness of virtual

**Table 5: Regression model with the efficiency of virtual teams as a criterion and institutional trust as a predictor.**

	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Institutional trust	0.57	0.03	0.87	16.97**

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$ ; reliability coefficient  $\alpha = .90$

**Table 6: Regression model with the efficiency of virtual teams as a criterion and cognitive trust as a predictor.**

	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Cognitive trust	0.46	0.04	0.71	11.63**

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$ ; reliability coefficient  $\alpha = .75$  (reputation categorisation) do  $\alpha = .94$  (message-related stereotyping)

**Table 7: Regression model with the efficiency of virtual teams as a criterion and knowledge sharing as a predictor.**

	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Knowledge sharing in virtual teams	0.10	0.08	0.11	1.26

Note: \* -  $p < 0.05$ ; \*\* -  $p < 0.01$ ; reliability coefficient  $\alpha = .86$

teams) can be a significant predictor of the effectiveness of virtual teams. To further examine the nature of the relationship between the two concepts, we focused on the relationship between specific dimensions of trust and the effectiveness of virtual teams. The dimensions of trust we explored were: individual trust, institutional trust, and cognitive trust.

In the rest of the paper, we will discuss each of the previously created hypotheses, in the context of the results obtained in this study. Hypothesis 1 of this research has been confirmed – the existence of trust in virtual teams predicts the efficiency of virtual teams. Namely, it turned out that all three dimensions of trust presuppose the efficient functioning of virtual teams. That is, in virtual teams in which there is trust among members, there is a significant level of efficiency – team members are satisfied with their work and are successful in performing work tasks. The obtained finding is in line with previous knowledge about the importance of the trust factor for the efficient functioning of virtual teams, i.e., the correlation and predictive value of this factor, in the context of the efficiency of virtual teams [7; 33; 28; 37]. Also, in a recent study, it was shown that trust is the most important variable, which has a high predictive value for efficiency, i.e., achievement of virtual teams [14]. Also, it is important to note that modern studies indicate that trust has a stronger impact on the efficiency (achievement) of virtual teams, compared to the impact that trust has on the achievement of traditional teams [13]. Thus, the development of trust in virtual teams can be seen as a key factor that will ensure the success and achievement of the virtual team, as well as the satisfaction of each individual member, and the general “maturity” of the whole team [13].

In the conducted research, we tried to understand the impact of specific dimensions of trust, in the context of their predictive value for the efficiency of virtual teams. In other words, we investigated the extent to which individual, institutional, and cognitive trust predict the effective functioning of virtual teams. In the regression model, it was shown that all dimensions of trust significantly predict the efficiency of virtual teams. Individual trust, as pointed out earlier, is a dimension of trust that provides individuals with an experience of trust in relationships

with others. Thus, an individual who has developed this form of trust in people believes like things, perceiving them as persons on whom he/she can rely [28]. In the conducted research, as well as in previously conducted studies, the finding on the importance of this dimension in achieving the efficiency of virtual teams was again obtained [32; 28; 37]. The existence of individual trust among team members affects, that is, predicts the efficiency of the virtual team. So, when individuals perceive members of a virtual team as people they can rely on, as people they trust, it also has a positive effect on the general mood in the organization, and thus on the job satisfaction that team members feel and the achievements they achieve. Then, the results of the conducted research indicate that the dimension of institutional trust is the most important predictor of the efficiency of virtual teams. In other words, institutional trust among members of virtual teams best predicts team efficiency (more important than the other two dimensions, individual and cognitive trust). In other studies, institutional trust is a significant predictor of success, but not the most significant, as is the case with our research [28; 37]. The reasons for the high predictability of institutional trust for the effectiveness of virtual teams may need to be sought in the fact that institutional trust is an important “guide” for individuals, guiding their behavior within the organization. Namely, the belief that the organization requires the harmonization of different rules, i.e., norms among its members, influences team members to develop trust in each other, even if they have never met in person [32]. The belief of team members that they share common norms and values with other members influences the development of mutual trust, and has a strong effect on efficiency, more precisely, on the achievement of virtual teams. Cognitive trust develops in an individual’s relationships with other team members and refers to various “cognitive schemes” that guide the development of trust and the behavior of individuals in the team [32]. In line with the hypothesis, the dimension of cognitive trust is a strong predictor of the effectiveness of virtual teams. Thus, the trust that develops based on the messages exchanged among team members, the good reputation of individual members, as well as the perception of the presence and behavior of team members, predicts

the effectiveness of virtual teams. The obtained finding is following the results of previous studies [28; 37].

Contrary to the defined hypotheses, this study showed that the knowledge sharing factor is not a significant predictor of the effectiveness of virtual teams, nor trust in virtual teams. Thus, we conclude that Hypothesis 2 and Hypothesis 3 have not been confirmed. Possible reasons for the lack of predictability of knowledge sharing factors for other variables (efficiency of virtual teams and trust in virtual teams) should be sought in the very complexity of the relationship between all variables presented in the research model. Namely, earlier studies that examined the relationship between the variables of trust and knowledge sharing in virtual teams showed the absence of consistent findings. One study showed that cognitive trust is not a significant predictor of knowledge sharing [28]. Also, another similarly designed study concludes that neither cognitive trust nor institutional trust as significant predictors of the effectiveness of virtual teams [37]. Other studies have attempted to further explain the nature of complex relationships between trust variables, knowledge sharing, and the effectiveness of virtual teams through the implementation of complex models [36]. In the mentioned model, two additional variables were introduced: the degree of team virtuality and the independence of work tasks. These two variables have been shown to significantly shape the relationship between trust and knowledge sharing, as well as the relationship between knowledge sharing and the effectiveness of virtual teams. Namely, greater independence of work tasks negatively affects the relationship between trust and knowledge sharing [36]. Also, it has been shown that the independence of work tasks harms the relationship between knowledge sharing and the efficiency of virtual teams. All of the above findings may indicate the need to introduce other variables into this and studies that would address this topic, which would further influence the understanding of the relationship between knowledge sharing and the effectiveness of virtual teams. Thus, there may be mediator variables, such as the nature of work tasks in virtual teams, that significantly shape the relationships of all key variables in the research. The lack of connection between the variable of knowledge sharing and all other variables in the research can be

observed in the context of the fact that in this research only one aspect of knowledge sharing in virtual teams was examined. The examined aspect, above all, refers to the sharing of ideas and knowledge (expertise) among team members. However, as previously established, knowledge sharing is a multidimensional variable, and it would be methodologically more relevant to examine other, different “forms” of knowledge sharing in virtual teams [36]. As this study showed that there is no significant correlation between predictor variables (trust in virtual teams and knowledge sharing in virtual teams), as well as significant correlations between the predictor variable (knowledge sharing) and the criterion variable (efficiency of virtual teams), Hypothesis 4 was not possible to test. Thus, as noted earlier, examining the mediator effect of a particular variable requires the existence of correlations of all variables in the model for which the mediator effect is being examined.

## Conclusion

The central hypothesis of this research has been confirmed – trust in virtual teams predicts their efficiency. Also, this research suggests that all dimensions of trust are important for the efficient functioning of virtual teams. Namely, individual, institutional and cognitive trust are predictors of the effectiveness of virtual teams. Contrary to expectations and findings in previous studies, in our research, knowledge sharing in virtual teams did not prove to be a significant factor, i.e., it does not represent a predictor of trust or efficiency of virtual teams. It is the lack of predictability of this important factor, knowledge sharing in virtual teams, that may indicate the need for a different examination or understanding of the role of this factor in the model of efficiency of virtual teams. Therefore, it is possible that knowledge sharing should be observed and researched through different indicators, such as, for example, communication among team members, empowerment of other members, cohesion, distribution of work tasks, etc.

Given that the key finding of the conducted research is the importance that trust has for the efficiency of virtual teams, the central topic becomes the design of ways in



which it is possible to develop trust in virtual teams. The development of trust will affect the efficiency of virtual teams, and, from that point of view, it is more important to focus on ways to improve trust, than to directly influence and emphasize the need for achievement. Many modern organizations are primarily focused on key performance indicators while forgetting the importance of factors that directly affect achievement. However, as this research has shown, the relationship between the factors and efficiency of virtual teams is not linear – there seems to be a multitude of intermediate factors that shape the relationship between trust and the effectiveness of virtual teams.

Practical contributions to the research of this topic are centred around concrete findings that could be implemented in human resources practice after the research. Namely, the findings could be important in constructing guidelines for improving the work of virtual teams, specifically, for encouraging factors that contribute to the efficiency of virtual teams. Also, the importance of research is reflected in the need for rapid adaptation to virtual forms of (business) functioning. Therefore, understanding the factors that contribute to the efficiency of virtual teams seems to be very important in the context of preserving competitiveness in the modern labor market. Participation in the process of developing trust in virtual teams can be achieved through the communication of members via intranets, groups on social networks, through the participation of team members in virtual teambuilding (using specific tools through which team members play different online games or connect in common interests), by organizing a daily dose of “chatting”, recording and sharing various videos in which team members introduce themselves to each other and help them get to know each other better. The ultimate goal of these activities is to achieve a culture of trust and common identity, for the virtual team to function more fluidly.

The limitation of the conducted research is reflected in the fact that only one form, i.e., one form of virtuality, was examined. Other researchers have also suggested that virtual teams, given their specific configurations, are difficult to reduce to a single form. There are several forms, i.e., a configuration of virtuality that would be in line with the set definition of virtual teams. For example,

members of virtual teams can be deployed in several different geographical locations (with several members in each location) or they can be deployed in only two locations (which is the case with the conducted research). Another important limitation of the research is reflected in the structure of the sample itself, which consisted of 132 respondents, and raises the question of the possibility of generalizing the findings to the general population. It is important to emphasize that the research sample consisted of respondents from Serbia and the USA, and the question arises to what extent cultural factors could also contribute to the obtained results. Members of the American area may have a different experience and understanding of the key concepts of this research, such for example, knowledge sharing, in relation to respondents from Serbia. In other words, in future research on this topic, it would be important to include (or at least control) the cultural influence of certain factors on the examined phenomena. Finally, all instruments integrated into the conducted research are based on self-reporting methods. For key research concepts, such as the effectiveness of virtual teams, it was found earlier that the self-reporting method is the most relevant indicator of the actual effectiveness of virtual teams [22]. However, the question arises as to whether self-reporting is the most relevant method for other research concepts, i.e. for trust in virtual teams or for knowledge sharing.

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