emerald PUBLISHING

Team Performance Manag

Critical Success Factors of Global Virtual Teams (GVTs): A Study Based on UK Information Technology Experts' Opinion

Journal:	*Team Performance Management*
Manuscript ID	TPM-03-2024-0026.R3
Manuscript Type:	Research Manuscript
Keywords:	Critical success factors, Global virtual teams, IT industry, Causal factors, Effect factors, Fuzzy DEMATEL

Critical Success Factors of Global Virtual Teams (GVTs): A Study Based on UK Information Technology Experts' Opinion

Abstract:

Purpose: This study examines the critical Success Factors of Global Virtual Teams (GVTs) working in the Information technology industry in the UK. It also focuses on the ranking of the success factors and shedding light on the perceived cause-and-effect relationship between the factors.

Design/Methodology/Approach: Data was collected from executives working in the IT industry in the UK. Fuzzy DEMATEL analysis was incorporated to generate results.

Findings: Our findings suggest that overcoming perceived and temporal distance, empowerment, integrative approach, members' competencies, and cultural intelligence are considered to be causal variables. In contrast, effective team leadership, trust, commitment to task, and communication are regarded as an effect. In terms of the degree of importance, communication was ranked in first place. Effective team leadership and overcoming perceived and temporal distance were found to be in second and third place. Empowerment was found to be in the last position in terms of the degree of importance.

Originality: This paper is among the first research on GVTs in the UK IT industry context. Also using the Fuzzy DEMATEL approach differentiates it from the previous studies. The perceived cause-and-effect analysis of the current study using our experts' opinions has a direct policy-making application as well which makes the finding easy to use by practitioners and policymakers at the same time.

Keywords: Success factors, Global virtual teams, UK, IT industry, Causal factors, Effect factors, Fuzzy DEMATEL

INTRODUCTION

The global virtual team (GVT) is being recognized as an innovative concept that utilizes information and communication technologies (ICT) to create a functioning atmosphere (Zakaria and Yusof, 2020). The team members belonging to different global locations, different backgrounds and cultural heritage, scattered organizationally, and connection with the team through asynchronous and synchronous ICTs distinguish global virtual teams from regular workplace teams (Cheng soon & Salamzadeh, 2020; Glikson and Erez, 2020). The organizations that create, manage, and work with global virtual teams tend to be more flexible, have a greater scope for innovation, and tend to be more diverse and innovative in their operations due to the incorporation of members belonging to different dynamic backgrounds (Richter et al., 2021). The features bring significant, unique characteristics to the team.

According to recent statistics, more than 25% of workers worldwide are part of 100% remote work organizations that practice virtual team collaboration and allow each worker to operate in their own time zone (Gitlab, 2021). The figures, therefore, reflect that global virtual teams are gradually becoming an important aspect of modern organizations. They also tend to replace the regular teams and have started to do so in various global firms (Tavoletti and Taras, 2022). In the United Kingdom , the trend of global virtual teams is on the rise, and information technology and fintech companies in London and other regions are gradually shifting towards the GVT model. Closer to 16% of the workforce is working from the comfort of their homes through different ICT technologies (Ons.gov.pk, 2022). The information, therefore, suggests that GVTs have become an important area in organizational studies and require in-depth and detailed analysis of their formation, management, and effectiveness.

Global virtual teams provide numerous benefits to organizations in terms of effectiveness, innovation, flexibility, and diversity; however, they are not without their own set of challenges. Technological impediments, leadership dilemmas, management approaches, language barriers, and cultural differences are some of the challenges that create serious problems in the effective working of a global virtual team (Morrison-Smith and Ruiz, 2020). When the problems are not timely addressed, they could lead to the breakdown of the teams or failure to achieve organizational objectives. Statistics suggest that the above challenges cause more than 60% of the global virtual teams in the UK information technology sector to miss their defined goals and objectives (Hoang, 2022). The current study evaluates the challenges associated with global virtual teams in the British IT sector in an in-depth manner.

A preliminary literature review suggests that different scholars have explored the formation and working of global virtual teams; however, some serious gaps have also been identified. Initially, research on global virtual teams was rarely conducted in the UK and in its IT sector in particular. Some scholars have studied GVTs from different perspectives. Morrison-Smith and Ruiz (2020) have evaluated the GVTs from the perspective of overcoming perceived and temporal distance; Maduka et al. (2018) in the context of effective team leadership; and Hacker (2019) from the perspective of trust. A careful study of the above literature revealed that the majority of scholars have evaluated GVTs from the perspective of success factors. An important aspect that is missing from the literature is that GVTs have not been examined from a regional or national perspective. For example, the way GVTs operate in a specific location, such as the United Kingdom, has not been evaluated in the literature in a significant way. The national working dynamics of GVTs from a regional perspective therefore requires more careful examination. The geographical focus of this study on UK, develops evidence about GVTs which can add to the available knowledge about them and in future build

avenues for more in depth research in this field. A review of the literature also reveals integrative approaches and functional and visionary leadership as two success factors in GVTs (see Eseryel et al., 2021; Shamim, 2022). These studies have investigated them as two success factors, however, it is important to note that these studies did not evaluate integrative approaches and functional and visionary leadership from an industry perspective. This is an important observation and needs to be addressed since not all industries have the same working mechanisms, and approaches tend to differ from industry to industry. GVTs need to be explored from a regional and industrial perspective. Furthermore, the scholars lack consensus on the factors that help create success factors for GVTs (Maduka et al., 2018). Finally, a preliminary literature review suggested that strategies to counter challenges associated with GVTs have not been effectively explored and researched (Hacker, et al., 2019). The main objectives of the present study are: (1) to determine the critical factors that influence the success of global virtual teams which is going to be done using a literature review; (2) to rank the critical factors for global virtual teams' success based on the opinion of the experts; (3) to find the perceived cause-and-effect relationship between the critical success factors of GVTs, again based on the opinion of the experts. In order to reach to these research goals, we utilized fuzzy DEMATEL technique which uses a pairwise comparison questionnaire filled out by experts, in our study managers of UK IT industry. It is clear that the data for this method is gathered from the experts' perception. After the Fuzzy DEMATEL analysis, there will be two different outputs presented to readers, firstly, the ranking of the critical success factors and secondly the cause-and-effect relationship between them using experts' opinions. This second output is very innovative and clearly categorizes the factors into two categories, the cause factors and effect factors. This output can help the practitioners and policymakers to mainly focus on the cause factors as they will influence the effect factors eventually.

The findings of this research contribute both to directions of the future studies and to practice. From the future studies perspective, showing which factors play an important role in success of the GVTs can be a good starting point for future research. The fact that previous studies have not investigated the inter-relationship between the success factors of GVTs, the result of cause-and-effect analysis based on our experts' opinions, adds a unique contribution to this emerging field. Also, practitioners and policymakers can use the cause-and-effect analysis result to focus on the perceived cause factors and to save time and resources by not prioritising the effect factors to them. By ranking the critical success factors and exploring their cause-and-effect dynamics, using expert views, this study adds a new methodological approach in the research on GVTs as well.

In this research, it was considered important to focus on IT industry due to three prime reasons. First, the IT industry promotes innovation and novelty. Second, the majority of the GVTs are expected to be operational in the IT industry. Lastly, the IT industry is in a constant process of evolution and development and for that reason is most ripe for the experimentation of new ideas and concepts.

Also as shared by previous research, considering the success factors and challenges can result in a foundation of new theories in this field (Jimenez et al., 2017) and although we do not plan to move to theory development in this study but our finding can play a role to be a small piece of contributing studies in building new theories about GVTs. In the current study, we plan to have some contributions in this regard and also it is clear that the research would assist managers, executives, and organizations working with GVTs to be more effective in the management and operations of their teams. Empirical findings would help further understand the leadership styles and management techniques that could be adopted to enhance the performance of the GVTs.

LITERATURE REVIEW

This section is presented to give a clearer view about the practical definitions of the variables which are going to be used in the current study and also as all items used for our Fuzzy DEMATEL analysis come from the literature review, it is crucial to share the academic background of them in this section.

Selection Process

The selection process for the literature review was based on various parameters that were designed to find the most relevant literature on the subject matter. The first parameter was the subject on which the literature was searched. The key databases used to search for the respective literature included JSTOR, Emerald, Google Scholar, Microsoft Academic Search, Refseek, and Virtual LRC. The selected databases were considered due to the need for quality resources to develop the literature review. The selected databases, based on piloting done by the researcher, proved to have sufficient sources for the subject of global virtual teams. As held by Boslaugh (2017), secondary research serves as a method of research that relies on data that has been gathered by someone else. The research literature that acts as the data for the current exploration is sampled using the Boolean search strategy. The Boolean search strategy uses logical arguments to identify, streamline, or expand the spectrum of the research studies that are considered in the exploration endeavour (MacFarlane et al., 2021). The logical Boolean operators used in expanding the search spectrum include AND and the () parenthesis. The boolean operators used in streamlining the search spectrum are OR, NOT, and AND NOT. They are used alongside the key search words, which primarily involved GVT, GVTs IN THE IT INDUSTRY, GVTs IN THE UK, GVT Success Factors, GVT Leadership, etc. Moreover, the following search strategies were applied using Boolean operators: GVT and success factors; GVT and leadership impact, among others Therefore, in the search engines of each of the identified databases, the attempt is to combine the keywords to obtain all the available resources in the form of journals. The journals were further filtered to retain the best and highest-rated literature that meets the inclusion criteria as prescribed next in the study.

Inclusion and exclusion criteria were also set for the literature review. Inclusion criteria specified that all selected literature must be no older than five years in terms of year of publication. All studies must focus on the success factors of global virtual teams and not on physical organisational teams, etc. The sources must bear the full bibliographic details of the authors, year of publication, journal title, and methodology disclosure. The exclusion criteria for the studies specified that sources that address GVT as a personal phenomenon as opposed to a workplace situation are excluded. Similarly, sources that are supported by outdated referential materials, especially older than 10 years, were also excluded.

Considering all above-mentioned inclusion and exclusion criteria, which tries to consider the high quality and recent publications about GVTs, we used 31 main papers to be used in the literature review of our study and to use them as the input for finalizing the main critical success factors of GVTs.

Review of literature

Reviewing the main literature, Morrison-Smith and Ruiz (2020) argue that global virtual teams face various challenges and difficulties that are unique to the problems faced by the on-site teams. Virtual groups are bound to face multiple challenges, such as cognitive, social, and emotional ones. If the teams are able to overcome five distinct challenges such as

the configuration of dispersed teams, geographical distance, diversity of workers, perceived distance, and temporal distance, by overcoming these obstacles, the team could emerge as highly productive and robust. In contrast, Maduka et al. (2018) highlight a different perspective and suggest that effective team leadership is an essential prerequisite for the success of global virtual teams. In this regard, the competencies of transformational leadership could play an important role as they are known to select high-performing teams. Consequently, unlike Morrison-Smith and Ruiz (2020), who emphasize group efforts, Maduka et al. (2018) place more emphasis on leadership qualities.

In comparison, Hacker (2019) discusses the role of trust in the success of global virtual teams and argues that trust is the most important factor that is least considered in the context of GVT but holds the most importance. With the establishment of trust between the global virtual team members, different challenges could be overcome with their combined and coordinated efforts (Ramkissoon, 2023a; 2023b). Small challenges, on the other hand, can lead to global team breakdowns when team members are primarily focused on operations and procedures and trust and confidence building are not prioritized. Breuer et al. (2020) also support these views and argue that while trust is generally essential for organizational success, it is also essential for the success of global virtual teams. With high levels of trust among the GVT members, greater cooperation and collaboration could be observed.

Garro-Abarca et al. (2021) note that GVTs more specifically lack in the area of communication. Consequently, GVTs cannot overlook the factor of communication and have to ensure that a lack of communication does not lead to a difference in understanding of the team and organizational goals. Trust in leadership, cohesion, and empowerment all play important roles in team success. In agreement, Castellano et al. (2021) introduces the concept of self- and shared leadership in the context of Global virtual teams. The self-oriented leaders who are committed to their tasks could more effectively manage the global virtual teams if they had potency. The effectiveness of teamwork can be significantly increased if trust exists in team relationships. Chamakioti et al. (2021), on the other hand, argue that the concept of GVTs is still in its early stages and that current information about GVTs may not be sufficient to determine success factors. In contrast, Shamim (2022) claims that an integrative approach by the project manager and the team members leads to a successful team. Nguyen (2014) contends that structure, member' competencies, commitment are all important factors that could be considered integral for the success of the Global virtual teams. The findings are in stark contrast to the studies that associate the success of GVTs to leadership capacity.

Eseryel et al. (2021) explored the role of functional and visionary leadership in understanding their contribution to the effectiveness of the global virtual teams. It is argued that a combination of both is required in the context of global virtual team members, even though it might seem paradoxical. Functional leadership, complemented by centralized visionary leadership, could lead to the accomplishment of the goals. Presbitero (2020) shows a different side of the picture and argues that cultural intelligence is an important element in the context of global virtual teams. This is because as the members' cultural intelligence quotient grows, they will be better able to understand and accommodate the views and opinions of their team members. In comparison, Zuofa and Ochieng (2021) contend that the ultimate responsibility for leading the team to success lies with project management. Through the use of robust technology and communication strategies, the project manager builds trust among the members of the global virtual team. As a result, they tend to be more focused on organizational objectives. Mangla (2021) shows a completely different picture and argues that managing and running a global virtual team is a major cultural and organizational shift. Both the managers and the team members may be required to re-evaluate the cultural values, as until the values

are aligned, the team members may find it quite difficult to integrate and collaborate. While their individual cultures would be significantly different, the professional values of the team members must be aligned so that shared organizational objectives may be easy to obtain.

Based on the literature review, the below 9 factors were recognized as the main success factor of GVTs: Overcoming perceived and temporal distance (Morrison-Smith and Ruiz, 2020), Effective team leadership (Maduka et al., 2018), Trust (Hacker, 2019 ; Breuer et al., 2020 ; Castellano et al., 2021), Empowerment (Garro-Abarca et al., 2021), Commitment to task (Castellano et al., 2021), Integrative approach (Shamim, 2022), Member's competencies (Nguyen, 2014), Cultural intelligence (Presbitero, 2020) and Communication (Zuofa and Ochieng, 2021).

Research Gap

The extensive review of the literature validated the findings of the preliminary literature review. The critical analysis of the literature suggested that every scholar has evaluated the success factor of the GVTs from a different perspective. Maduka et al. (2018) associates it with leadership while Garro-Abarca et al. (2021) specifies it with trust and cohesion among the team members. On one side, this could be termed a significant contribution to the literature; on the other, it creates serious challenges for the teams working in the industry to build the required competencies that are essential for GVT's success. The lack of consensus, therefore, emerges as an important research gap. Nguyen (2014) notes that the current studies on the subject of GVTs have not effectively covered the IT sector. When the gap is evaluated from the context of current study, the lack of GVT studies from the perspective of British IT industry emerges as an important gap. Zakaria and Yusof (2020) point out that role of leadership in creating trust between the GVT members is another area which requires significant research. This has therefore been identified as another research gap. The study aims to address these gaps in the current research.

METHODS

Research Design

The current study tries to answer the main research questions using a quantitative approach and collecting the opinions of the experts by a researcher designed questionnaire and performing the analysis using the Fuzzy DEMATEL technique.

The population for the study consisted of the team leaders and members of the GVTs working in British information technology firms. The main reason for selecting this industry is that as per previous studies, the IT industry could be termed as one of the industries that could have the largest number of GVTs working in the United Kingdom (Glikson and Erez, 2020).

The experts used in the current study are experienced practitioners in IT industry who also have the experience of being a part of policy-making bodies and organizations in local and national levels. We started with three of them who were supporting their city councils by consulting them and then following a snowball sampling method, we found other respondents. We also need to mention that for decision making tools like DEMATEL there is no need for a specific minimum sample size, and we can use as many experts as possible based on the nature of the research (Mahmoudi et al., 2019). As the main criteria for DEMATEL technique is to find available experts to join the research, here are many examples of studies which have used small group of experts for their studies such as Lin et al. (2018) with just 6 experts to study the sustainable supply chain management, or Chang et al., (2011) for supplier selection criteria analysis in Taiwanese electronic industry with 17 experts on their panel, or Feng and Ma (2020)

who analysed the factors influencing service innovation globally with 18 experts, Or Mahmoudi et al. (2019) with 4 experts used as their panel to identify critical success factors of heart failure self-caring, or Patel et al., (2021) who used 15 experts to identify CSFs of BIM software selection, or Mangla et al., (2018) who used 7 industry experts and 8 academic experts to do their research on logistic management success factors or Shamsadini et al., (2023) who used 6 experts to do their Fuzzy DEMATEL analysis on factors affecting environmental audit.

In order to develop the fuzzy DEMATEL matrix as our main part of the questionnaire, we used the 9 main success factors shared in the previous sections.

Importance of the Fuzzy DEMATEL

The fuzzy DEMATEL technique was found to be the most relevant analytical technique for a variety of reasons. In many decision-making situations, the factors or criteria involved are complex and interconnected, meaning that the decisions made for one factor can have an impact on others. The Fuzzy DEMATEL technique helps in understanding the cause-and-effect relationships among these factors and how they influence each other. Another important factor in selecting Fuzzy DEMATEL is the uncertainty and subjectivity of evaluations in decision making (Abdullah and Zulkifli, 2019) and using the Fuzzy logic is well suited for dealing with uncertain and imprecise information as this reduces the biases related to uncertainty and on how different people evaluate different factors. By using the fuzzy sets and membership functions, the Fuzzy DEMATEL allows for the representation of subjective judgements and linguistic terms, providing a more comprehensive analysis. In the Fuzzy DEMATEL method, same as all other Fuzzy approaches, instead of using values such as 1 to 5 scales, we use linguistic terms such as “no influence” to “very high influence” and using fuzzy set equivalents for each one of these linguistic terms, the mathematical analysis is performed.

The Fuzzy DEMATEL is particularly useful in multi-criteria decision analysis (MCDA), where multiple factors or criteria need to be considered simultaneously. By considering the interrelationships among these criteria, the fuzzy DEMATEL helps in determining the relative importance and influence of each criterion on the overall decision (Soner, 2021). The aspect that is most important from the perspective of the current study is prioritisation and ranking. The Fuzzy DEMATEL provides a systematic approach to prioritising and ranking the factors or criteria involved in decision-making. It enables decision-makers to identify the key factors that have the most significant influence on the decision's outcome, allowing for more focused and effective decision-making. Consequently, the ranking feature has also been used in the current study to rank the success factors in terms of degree of importance and degree of impact.

Application of the Fuzzy DEMATEL

The Fuzzy DEMATEL technique is used to analyse the survey data. We can use the benefits of the DEMATEL approach and Fuzzy logic methods together, and by following the following steps, the Fuzzy DEMATEL analysis could be performed to analyse and find the interconnection between the factors found in the literature review. This will allow us to analyse and find out how the different factors are specifically related.

In the Fuzzy DEMATEL method, we go through three main steps as shared below and in the current study these three steps are followed to identify, analyse and interpret the critical success factors of GVTs.

Step 1 is to determine the purpose of the decision as well as the elements that will influence the objective of the investigation (Saunders et al., 2015). During this phase, it will be

necessary to conduct a deep and comprehensive literature reviews in order to search for and collect relevant information. A committee of experts is required to provide expert opinions on the subject. In this technique, prospective elements that influence the decision objective are determined by taking into account both the information that was gathered through the literature review and the opinions of experts. In the current study, these prospective elements are the CSFs of GVTs. After reaching a consensus on the criteria, the next step is to conduct a poll with an expert panel to examine the interaction between each set of parameters (Taherdoost, 2016). By following the steps outlined above, it is possible to obtain linguistic evaluations of which components have direct effects on each other. In the current research all experts agreed on the relevancy of the factors identified in our literature review and after gaining their consensus, the factors have entered the pairwise comparison matrix which will be used in the step 2. Therefore, the experts' opinion is used both in finalizing the CSFs and then to make a pairwise comparison of them on the next step.

In the second step, the expert evaluations will be combined to generate the first direct-relation matrix. Convert the language evaluations into Fuzzy integers formed from three triangles (Sharma, 2017). After that, make crisp scores based on the Fuzzy DEMATEL equations by aggregating these Fuzzy numbers using the CFCS technique. As a consequence of this, the term "Aij" represents the direct influence that factor i has on component j. Because of this, the first direct-relationship matrix, denoted by the letter A, is constructed. Practically, on this stage, experts compared all CSFs of GVTs in a pairwise manner and shared their opinion on the comparative importance of them for GVTs.

In the third step, a cause-effect relationship diagram and a structural model of system factors are created by following the DEMATEL methodology in the third step of the process (Ishak et al., 2014). It is possible to easily construct the total-relation matrix by making use of the primary direct-relation matrix that was generated in Step 2. After that, the importance degree and the net impact degree are computed, and the cause-effect relationship diagram is constructed; this helps to visualize the structural relationship that exists between the elements. Step four is to investigate the structure of the system factors and locate the CSFs. Consider each component of the system in light of the indices ri, ci, ri + ci, and ri ci. When the position of each aspect is considered within the larger system as a whole, it becomes convenient to establish which factors have the greatest influence on the system and, if given higher priority, can considerably improve the overall effectiveness of the system (Clarke et al., 2015). These CSFs could be considered significantly important for the system. In simple words, the outputs of step three are 1) the ranking of CSFs of the GVTs which shows the most important CSFs of them and 2) the cause-and-effect relationship between those factors, based on experts' opinions, which shows which factors are perceived as cause factors and which ones are identified as effect factors.

FINDINGS

Demographic Analysis

Six out of seven experts have 9 years and above work experience in the industry and one of our experts has 6 years of management experience in the industry and therefore of an acceptable level of experience to share their opinion on the success factors of GVTs. 5 of out experts had bachelor's degree and 2 were master's degree holders. All 7 of them were familiar with GVTs and have worked in them and managed them as well (ranging from 2 to 6 years).

Fuzzy DEMATEL Analysis

Table 1 in appendix 1, shows the first step of the analysis which is the generation of the fuzzy direct relation matrix. The table above indicates the direct relation matrix, which is the same as the pairwise comparison matrix of the experts.

Table 2 in appendix 1, shows the second step of the analysis which is normalizing the fuzzy direct relation matrix.

Table 3 in appendix 1, shows the calculation of the fuzzy total-relation matrix. The inversed normalized matrix was first calculated, and then it was subtracted from matrix I. Finally, the normalized matrix has been multiplied by the resulting matrix.

Table 4 in appendix 1, shows the CFCS method proposed by Ogricovic and Tzeng to obtain a crisp value of the total-relation matrix. The output of the CFCS algorithm is crisp values.

Table 5 in appendix 1, is based on step 5 and reflects the crisp matrix in relation to the crisp values. In this study, the threshold value is equal to 0.2940. All the values in matrix T (Table 4) which are smaller than 0.2940 are set to zero, that is, the causal relation mentioned above is not considered. The model of significant relations is presented in the following table.

Table 6 in appendix 1, shows the final output. On the basis of the values of the final output, a causal relation diagram has been created.

Please add Figure 1 here

Figure1: Cause-and-Effect Diagram

Figure 1 shows the model of significant relations. This model can be represented as a diagram in which the values of (D+R) are placed on the horizontal axis and the values of (D-R) on the vertical axis. The position and interaction of each factor with a point in the coordinates (D+ R, D-R) are determined by the coordinate system. The Horizontal vector (D + R) represents the degree of importance between each factor plays in the entire system. In other words, (D + R) indicates both factor's impact on the whole system and other system factors' impact on the factor. The vertical vector (D-R) represents the degree of a factor's influence on the system. In general, the positive value of D-R represents a causal variable, and the negative value of D-R represents an effect.

DISCUSSION

Temporal Distance and role of leadership

The Fuzzy DEMATEL analysis conducted on the primary responses of the participants provided significant information on the factors responsible for the success of the Global Virtual Teams. The results showed that overcoming perceived and temporal distance was of high importance to the participants, and the analysis also termed the factor a causal factor. As a result, the factor's importance surpasses that of the effect factors. The importance of the perceived and temporal distance, therefore, validates the assertions of Morrison-Smith and Ruiz (2020), who suggested that if the teams are able to overcome five distinct challenges, they could emerge as highly productive and robust. One of the difficulties was effectively overcoming perceived and temporal distance. The results also showed that to work as an effective team, overcoming these distances is important. This could be associated with the fact that when global virtual teams are able to focus on eliminating perceived as well as temporal distances, they tend to operate more cohesively. Consequently, an atmosphere is created where

the element of virtual contact vanishes, and the team members start to believe that they are working together in a unified geographical setting. The results are also in contrast to the findings of Patterson (2022) who suggested the Tuckman model of team development for effective team development. The results therefore also agree with the postulates of Bachrach and Mullins (2019), who contend that global virtual teams work in an environment that is rapidly changing. The results also showed that one way to overcome perceived and temporal distances are to limit the factor of change so that the team members have a strong and unmoving ground to firmly stand on.

The results revealed an important perspective: the participants placed a high value on leadership. The significance was even greater than the factor mentioned in the preceding paragraph. Still, however, the nature of the factor is that of the effect, not the cause. Consequently, it could be argued that when the conditions on the positive side of the quadrant are met, the results are the effects of the negative side of the quadrant. Effective leadership is one such effect. The results, therefore, do not agree with the postulates of Maduka et al. (2018), who suggest that effective team leadership is an essential prerequisite for the success of global virtual teams. In essence, the postulate could be termed "having strong weight," and leadership has rightfully been identified as a success factor. However, the emergence of effective leadership is conditional on various factors that could be observed in the positive quadrant. Effective leadership could therefore be termed a by-product rather than the main factor, as claimed by Maduka et al. (2018). In contrast, the results are in line with the findings of Siangchokyoo et al. (2020) who suggested that leaders inspire by providing freedom and autonomy. The results also tend to invalidate the findings of Breevaart and Zacher (2019) that transformational leadership is most ineffective for virtual teams. The results only suggest the contrary: when global virtual teams go through an evolutionary phase in which success factors in the positive quadrant are met, the emergence of effective leadership becomes a matter of high probability. When effective leadership takes over the GVT, it provides a stronger push for overall success and allows the team to work more efficiently. The disputes and conflicts that emerge in the team are addressed by the leader with the contribution of the team members. Consequently, leadership could be termed an important factor but not a critical one due to its being an effect factor rather than a cause.

Trust and communication

The results showed that, compared to other factors, trust was found to be of comparatively lower importance. The position on the quadrant does not mean that trust is not an essential factor; rather, as compared to others, it may have a comparatively lower effect on the success of the global virtual teams. The results, therefore, tend to partially support the findings of Hacker (2019), who argued that trust is the most important factor that is least considered in the context of GVT but holds the most importance. The results, on the other hand, show that trust has been given due importance by the participants but that it cannot supersede other success factors. Also, the nature of trust is more effective than causal. For this reason, it could be argued that the success of GVTs has a process, and once the required conditions are met, effective leadership would emerge, which would lead to the establishment of trust among different team members. The results support the findings of Hildebrandt, and Marr (2020) who suggested that conflicts may occur and be resolved based on different ideas shared by the team members. The conflict resolution could be associated with trust. The findings corroborate with assertions of Breuer et al. (2020) that trust is not only essential for organisational success but for the success of global virtual teams as well. The level of importance assigned to "trust" by respondents' shows that when trust is strongly established among the team members, they can deal with different challenges in a seamless manner as compared to situations where the team lacks trust. Consequently, it could be argued that while trust is an effective factor, its emergence

among team members is vital. While the team may be able to work successfully without trust in normal times, in challenging times, the success of the team may shatter without trust.

The results revealed that communication was the one factor that was given the highest importance by all the participants. In the fuzzy decomposition analysis, communication was observed to be ahead of all the factors. However, as its nature was that of an "effect" rather than a cause, its importance was found to be comparatively less than that of cause factors. Still, however, communication between team members cannot be overlooked and holds significant importance for the team's success. The results, therefore, support the argument of Garro-Abarca et al. (2021), who noted that GVTs more specifically lack in the area of communication. The fuzzy analysis also shows that GVT members are more concerned about communication than any other factor in terms of importance. Evaluating from an evolutionary perspective, it also becomes clear that when communication between the team members is effective and they can understand the views and opinions of each other without any obstacle, they can share their concerns and grievances without any hesitation, and when they can share innovative ideas regarding the team, the performance of the team reaches a new level. The results were found to be in contrast to the findings of Serenhov et al. (2021) proposing that the team members would work through their differences. The difference resolution is largely dependent on the effectiveness of the communication. The results, also, do not seem to agree with the points of Aquino et al. (2022), who argued that a team is built by following the Tuckman model of team development and is expected to achieve unexpectedly high results. The results, on the other hand, suggest that communication is the essence of effective teams and high results. When communication is not given due importance, either by the team members or the team leader, the group cannot provide exceptional performance.

Integrative approach and Members' competencies

The results showed that the integrative approach was to be in close proximity to overcoming perceived and temporal distances and was also found to be important as, unlike other factors, it is a causal factor, which means that the success of the GVTs is fundamentally based on it. When an integrative approach is adopted, the success of the team is expected to be greater. The situation arises because an integrative approach could be termed a two-way street. The leader is responsible for proposing the approach, but the team members are responsible for actually implementing it and integrating it effectively into the projects that are in process. For integration, the leader or the managers must be aware of the competencies of the members, while the members themselves should also be aware of the tasks and operations that they could perform more effectively. The collaboration of both leads to integration, which in turn leads to team success. The results validated the findings of Mui et al. (2022) who suggested that Tuckaman model is not the ultimate team building model. Data shows that integration overlooked by Tuckman is an integral factor. The results, therefore, seem to validate Shamim's (2022) assertions that an integrative approach by the project manager and the team members leads to a successful team. The results, on the contrary, invalidate the assertion of Lartey (2020), who argued that the contingency theory of team management emphasises that effective management largely depends on the particular condition and underlying situation. The results, on the contrary, show a different situation, and it could be observed that effective management and the success of the team are not random but rather require a number of factors. Those factors have been mentioned on the positive side of the quadrant in figure 1. Consequently, the logic of contingency does not seem to apply to at least the virtual teams.

The results indicated that members' competencies are also one of the important factors that lead to the success of the GVTs. The results are understandable, as a team cannot effectively perform until the members are qualified enough to perform the jobs that are assigned to them. Competency is thus related to factors other than skills, such as educational

qualifications, experience, and work approach, all of which contribute to competency. Consequently, if members are competent enough, there will be less conflict among the members; on the contrary, if members are not qualified, a higher level of conflicts and complaints could be expected from the team. Most importantly, the competency of the members enables a less hostile environment. The results therefore show that Solomon's (2020) validation is correct, and team development could not be specified to specific phases. The results, therefore, tend to agree with the postulates of Nguyen (2014), who emphasised that structure, member competencies, and commitment are all important factors that could be considered integral to the success of global virtual teams. The results also show that global virtual teams should have the minimum qualifications to work smoothly and without any hassle. The results, therefore, do not agree with the findings of Castellano et al. (2021), who focused on shared leadership as the only factor for the success of the GVT. The findings, on the other hand, suggest that, while leadership is important, the entire group must work together to make the project a success. Leadership alone cannot be held responsible for the outcome. If the team members are not competent enough, leadership alone may not be able to fulfil the objective of team success.

Cultural intelligence and empowerment

The results showed that empowerment and cultural intelligence were the least important of all the factors in terms of the degree of importance but were found to be highest in terms of the degree of impact. Based on our experts' opinion, both of the elements were on the positive side of the quadrant, which therefore indicated that there were cause and effect factors. Consequently, having them was essential for the success of the teams. Empowerment could be expected from both the team members and the leader. If either of the stakeholders is not empowered, this could lead to challenges and obstacles, which may impact the performance of the group overall. The results therefore invalidate McAdam et al's (2019) view that GVT success is based on contingency. In contrast, the results were found to support the findings of Garro-Abarca et al. (2021), who identified that trust in leadership, cohesion, and empowerment all play important roles in team success. The higher position of empowerment in terms of the degree of impact reveals that higher empowerment has a greater impact on team success than any other factor. The fuzzy analysis revealed that cultural intelligence also has a significantly higher impact on the GVT's success. This is because, with higher cultural intelligence, the team members are able to better understand their teammates. They can accommodate their cultural values and understand their challenges and problems. Consequently, the cohesion between the members becomes stronger, which ultimately leads to a strong and coherent team. The results were found to be in line with the findings of Presbitero (2020), who suggested that cultural intelligence is an important element in the context of global virtual teams. The results also show that when cultural intelligence takes precedence, the team emerges more successful and coherent.

The results and discussion, therefore, show that based on the ranking and categorization, cultural intelligence, overcoming perceived and temporal distance, empowerment, integrative approach, members' competencies, commitment to the task, effective team leadership, trust, and communication are the factors that are important in terms of the degree of impact. The first five are fundamental to the success of the GVT, while the last four are important success factors but are effects and could only occur once the conditions for the first five are met. In terms of the degree of importance, communication, effective team leadership, overcoming perceived and temporal distance, members' competencies, commitment to the task, trust, an integrative approach, cultural intelligence, and empowerment are ranked in sequential order.

Theoretical and practical contributions

Our study brings some important theoretical contributions and offers important implications for practice. One of the notable contributions of our study is that trust and communication need to be further investigated. Although, our findings in this study showed that trust had lower importance, it does remain an important construct deserving attention where multiple stakeholders are involved. Researchers have called for further investigation of trust and communication (e.g. Ramkissoon, 2021; 2023a; Scott & Wildman, 2015). The cultural intelligence test or simulations should be designed by IT firms. Considering their prior expertise in information technology, the task is not expected to be challenging for them. A period of 4 to 5 months could be invested in developing the simulation or survey that could be used to separate culturally intelligent people from non-intelligent people. The purpose of the test is to ensure that people who are unable to accommodate and support other cultures are not accepted into the team. IT companies could collaborate with psychologists and cultural experts to create simulations for them.

The next step is to focus on the empowerment of team members. In this regard, it is proposed that the strategic management of the organisation considers the extent of power they are willing to provide to the GVT members. This is more of a strategic decision than an operational one. Once this has been decided by the strategic management, it is suggested that such a strategic plan be converted into operational milestones, roles, and responsibilities by the human resources departments of such organisations. The exercise could take six to eight months for framework creation, policy formulation, and implementation. The task could be completed with the help of upper management at the organisation and the human resources department.

Our study on global virtual teams (GVTs) within the UK context significantly contributes to the existing literature by providing a nuanced understanding of the critical success factors (CSFs) and their interrelationships, which are essential for the effective functioning of GVTs. Previous research has often examined these factors in isolation, leading to fragmented insights (Gibbs, Sivunen, & Boyraz, 2017). By ranking these factors and exploring their perceived cause-and-effect dynamics, using experts' views, our study offers a comprehensive framework that can be adapted and tested in different contexts, such as different cultural settings in international level or in different industries. This is particularly valuable as GVTs continue to proliferate globally, with diverse teams encountering varying challenges based on their specific environments (Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015).

Moreover, the UK context, characterized by its multicultural workforce and strong emphasis on technology adoption, serves as a representative case for developed economies, thereby allowing the findings to be generalizable to similar contexts. These insights can be particularly useful for organizations aiming to optimize virtual team performance by focusing on the most impactful factors within their specific operational contexts. Furthermore, the methodological approach used in our study can be applied to similar research in other geographical areas, enabling scholars and practitioners to compare and contrast findings across different regions, thereby enriching the global understanding of GVT dynamics (O'Leary & Cummings, 2007).

Limitations and recommendations for future research

Despite its contributions, our study has some limitations. The study was conducted in the United Kingdom and findings might not be generalizable. Whilst our study is limited to the UK, it does provide some insights for future researchers to draw on and conduct further research in the domain across different contexts. Further, it would be interesting to have some

cross-country comparisons for more conclusive findings. Future researchers are also recommended to evaluate other industries and regions to explore their success factors for their GVTs. By examining industries and regions beyond the current focus, researchers can uncover unique practises, cultural nuances, and contextual elements that may influence the effectiveness and efficiency of GVTs.

From a methodological standpoint, future researchers could also evaluate the possibility of a qualitative study so that more thoughtful and in-depth insights can be obtained. By employing qualitative research methods such as interviews, observations, and focus groups, researchers can gain a deeper understanding of the subject matter at hand, allowing for a more comprehensive analysis of various factors and perspectives. The role of leadership and its impact on GVT need more research in the context of current findings. By examining different leadership styles, behaviours, and approaches within the context of GVTs, researchers can provide valuable insights to guide organisations in cultivating strong leadership in virtual team environments. There is scope also for a mixed-methods study for more robust results. Finally, using larger sample size can help future studies to dive deeper into this research field.

References

Abdullah, L. and Zulkifli, N., (2019). A new DEMATEL method based on interval type-2 fuzzy sets for developing causal relationship of knowledge management criteria. Neural Computing and Applications, 31, pp.4095-4111.

Aquino, J.F., Riss, R.R., Multerer, S.M., Mogilner, L.N. and Turner, T.L., (2022). A step-by-step guide for mentors to facilitate team building and communication in virtual teams. Medical Education Online, 27(1), p.2094529.

Bachrach, D.G. and Mullins, R., (2019). A dual-process contingency model of leadership, transactive memory systems and team performance. Journal of Business Research, 96, pp.297-308.

Boslaugh, S. (2017). An introduction to secondary data analysis. Secondary data sources for public health: A practical guide, pp.2-10

Breevaart, K. and Zacher, H., (2019). Main and interactive effects of weekly transformational and laissez-faire leadership on followers' trust in the leader and leader effectiveness. Journal of Occupational and Organizational Psychology, 92(2), pp.384-409.

Breuer, C., Hüffmeier, J., Hibben, F. and Hertel, G., (2020). Trust in teams: A taxonomy of perceived trustworthiness factors and risk-taking behaviors in face-to-face and virtual teams. Human Relations, 73(1), pp.3-34.

Castellano, S., Chandavimol, K., Khelladi, I. and Orhan, M.A., (2021). Impact of self-leadership and shared leadership on the performance of virtual R&D teams. Journal of Business Research, 128, pp.578-586.

Chang, B., Chang, C. W., & Wu, C. H. (2011). Fuzzy DEMATEL method for developing supplier selection criteria. Expert systems with Applications, 38(3), 1850-1858.

Cheng Soon, C., & Salamzadeh, Y. (2020). The impact of Digital Leadership Competencies on Virtual Team Effectiveness in MNC companies in Penang, Malaysia, Journal of Entrepreneurship, Business and Economics, 8(2), 219–253.

Clarke, V., Braun, V. and Hayfield, N., (2015). Thematic analysis. Qualitative psychology: A practical guide to research methods, 222(2015), p.248.

Eseryel, U.Y., Crowston, K. and Heckman, R., (2021). Functional and visionary leadership in self-managing virtual teams. Group & Organization Management, 46(2), pp.424-460.

Feng, C., & Ma, R. (2020). Identification of the factors that influence service innovation in manufacturing enterprises by using the fuzzy DEMATEL method. Journal of Cleaner Production, 253, 120002.

Gibbs, J. L., Sivunen, A., & Boyraz, M. (2017). Investigating the impacts of team type and design on virtual team processes. Human Resource Management Review, 27(4), 590-603.

Gilson, L. L., Maynard, M. T., Jones Young, N. C., Vartiainen, M., & Hakonen, M. (2015). Virtual teams research: 10 years, 10 themes, and 10 opportunities. Journal of management, 41(5), 1313-1337.

GitLab. 2021. The remote work report by GitLab: The future of work is remote.

Glikson, E. and Erez, M., (2020). The emergence of a communication climate in global virtual teams. Journal of World Business, 55(6), p.101001.

Hacker, J.V., Johnson, M., Saunders, C. and Thayer, A.L., (2019). Trust in virtual teams: A multidisciplinary review and integration. Australasian Journal of Information Systems, 23.

Hildebrandt, A. and Marr, J., (2020). Nick Saban–A Case Study for Recruitment Methods And Application Of Tuckman's Model Of Team Development. Global Journal of Business Pedagogy, 4(1), p.214.
Hoang, T.M., (2022). Managing global virtual teams in the London FinTech industry (Doctoral dissertation, University of Wales Trinity Saint David).
Ishak, N.M. and Abu Bakar, A.Y., (2014). Developing Sampling Frame for Case Study: Challenges and Conditions. World journal of education, 4(3), pp.29-35.
Jimenez, A., Boehe, D. M., Taras, V., & Caprar, D. V. (2017). Working across boundaries: Current and future perspectives on global virtual teams. Journal of International Management, 23(4), 341-349.
Jones, D., (2019). The Tuckman's Model Implementation, Effect, and Analysis & the New Development of Jones LSI Model on a Small Group. Journal of Management, 6(4).
Lartey, F.M., (2020). Chaos, complexity, and contingency theories: a comparative analysis and application to the 21st century organization. Journal of Business Administration Research, 9(1), pp.44-51.
Lin, K. P., Tseng, M. L., & Pai, P. F. (2018). Sustainable supply chain management using approximate fuzzy DEMATEL method. Resources, Conservation and Recycling, 128, 134-142.
MacFarlane, A., Russell-Rose, T. and Shokraneh, F., (2021). Search Strategy Formulation for Systematic Reviews: issues, challenges and opportunities. arXiv preprint arXiv:2112.09424.
Maduka, N.S., Edwards, H., Greenwood, D., Osborne, A. and Babatunde, S.O. (2018). Analysis of competencies for effective virtual team leadership in building successful organisations. Benchmarking: An International Journal, 25(2), pp. 696-712. https://doi.org/10.1108/BIJ-08-2016-0124
Mahmoudi, S., Jalali, A., Ahmadi, M., Abasi, P., & Salari, N. (2019). Identifying critical success factors in Heart Failure Self-Care using fuzzy DEMATEL method. Applied Soft Computing, 84, 105729.
Mangla, N., (2021). Working in a pandemic and post-pandemic period–Cultural intelligence is the key. International Journal of Cross Cultural Management, 21(1), pp.53-69.
Mangla, S. K., Luthra, S., Jakhar, S. K., Tyagi, M., & Narkhede, B. E. (2018). Benchmarking the logistics management implementation using Delphi and fuzzy DEMATEL. Benchmarking: An International Journal, 25(6), 1795-1828.
McAdam, R., Miller, K. and McSorley, C., (2019). Towards a contingency theory perspective of quality management in enabling strategic alignment. International Journal of Production Economics, 207, pp.195-209.
Morrison-Smith, S. and Ruiz, J., (2020). Challenges and barriers in virtual teams: a literature review. SN Applied Sciences, 2(6), pp.1-33.
Mui, N., Rooney, E., Zhang, W., Berkowitz, M., Gofur, E., Thompson, K., Dobtsis, J., Meshekow, J. and Gerard, P., (2022). " Dream Team": Building Effective Nuclear Medicine Teams Using the Tuckman 5 Stage Team Development Mode.
Nguyen, D.S., (2014). Success factors for building and managing high performance global virtual teams. International Journal of Sciences: Basic and Applied Research, 9(1), pp.72-93.
O'Leary, M. B., & Cummings, J. N. (2007). The spatial, temporal, and configurational characteristics of geographic dispersion in teams. MIS quarterly, 433-452.
Ons.gov.UK. (2022) Is hybrid working here to stay?, Is hybrid working here to stay? - Office for National Statistics. Office for National Statistics. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/ishybridworkingheretostay/2022-05-23 (Accessed: December 7, 2022).
Patel, T., Bapat, H., Patel, D., & van der Walt, J. D. (2021). Identification of critical success factors (CSFs) of BIM software selection: A combined approach of FCM and fuzzy DEMATEL. Buildings, 11(7), 311.
Patterson, D., (2022). In-depth Look: Tuckman's Model–Five Stages of Team Development. Strategic Project Management: Theory and Practice for Human Resource Professionals
Presbitero, A., (2020). Communication accommodation within global virtual team: The influence of cultural intelligence and the impact on interpersonal process effectiveness. Journal of International Management, 27(1), p.100809.
Ramkissoon, H. (2021). Social bonding and public trust/distrust in COVID-19 vaccines. Sustainability, 13(18), 10248.
Ramkissoon, H. (2023a). Perceived social impacts of tourism and quality-of-life: A new conceptual model. Journal of Sustainable Tourism, 31(2), 442-459.
Ramkissoon, H. (2023b). An introduction to tourism and behaviour change in Haywantee Ramkissoon (ed) The Handbook of Tourism and Behaviour Change, Edward Elgar, Cheltenham, UK.
Richter, N.F., Martin, J., Hansen, S.V., Taras, V. and Alon, I., (2021). Motivational configurations of cultural intelligence, social integration, and performance in global virtual teams. Journal of Business Research, 129, pp.351-367.
Saunders, M.N., Lewis, P., Thornhill, A. and Bristow, A., (2015). Understanding research philosophy and approaches to theory development.

Scott, C. P., & Wildman, J. L. (2015). Culture, communication, and conflict: A review of the global virtual team literature. Leading global teams: Translating multidisciplinary science to practice, 13-32.
Serenhov, O. and Kaldera Hollu Pathiranage, P.P., (2021). Team Development in Global Virtual Teams: Application of Tuckman's Team Development model.
Shamim, M.I., (2022). Exploring the Success Factors of Project Management. American Journal of Economics and Business Management, 5(7), pp.64-72.
Sharma, G., (2017). Pros and cons of different sampling techniques. International journal of applied research, 3(7), pp.749-752.
Siangchokyoo, N., Klinger, R.L. and Campion, E.D., (2020). Follower transformation as the linchpin of transformational leadership theory: A systematic review and future research agenda. The Leadership Quarterly, 31(1), p.101341.
Solomon, D., (2020). The Worth of Steady Digital Team Formation Strategy A Case Study of Bruce Tuckman's Model in Software Industry.
Soner, O., (2021). Application of fuzzy DEMATEL method for analysing of accidents in enclosed spaces onboard ships. Ocean engineering, 220, p.108507.
Taherdoost, H., (2016). Sampling methods in research methodology; how to choose a sampling technique for research. How to choose a sampling technique for research (April 10, 2016).
Tavoletti, E. and Taras, V., (2022). From the periphery to the centre: a bibliometric review of global virtual teams as a new ordinary workplace. Management Research Review, (ahead-of-print).
Zakaria, N. and Yusof, S.A.M., (2020). Crossing cultural boundaries using the internet: Toward building a model of swift trust formation in global virtual teams. Journal of International Management, 26(1), p.100654.
Zuofa, T. and Ochieng, E.G., (2021). Investigating barriers to project delivery using virtual teams. Procedia Computer Science, 181, pp.1083-1088.

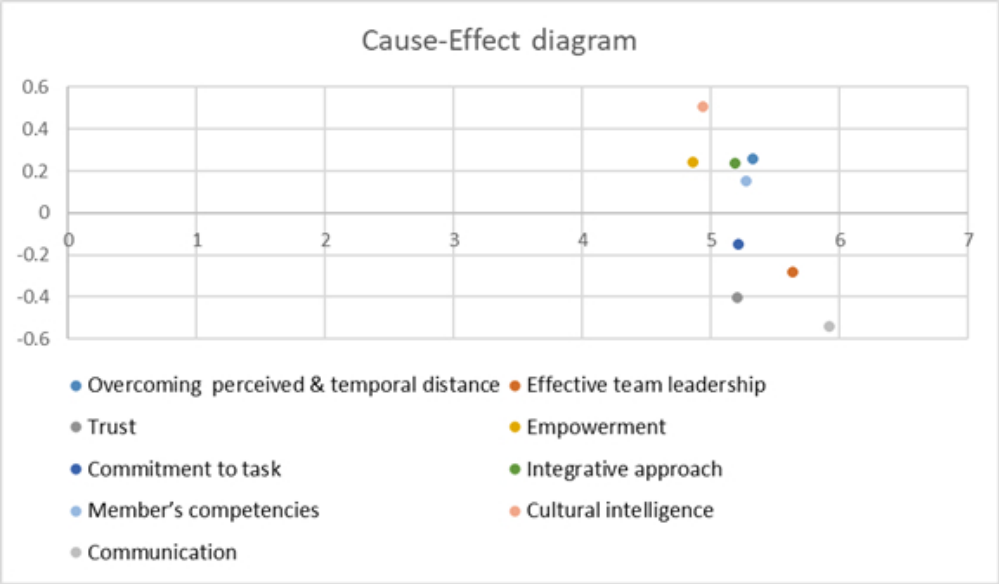

Figure 1: Cause-and-Effect Diagram

311x182mm (47 x 47 DPI)

Appendix 1:

Table1: The direct relation matrix

	Overcoming perceived & temporal distance	Effective team leadership	Trust	Empowerment	Commitment to task	Integrative approach	Member's competencies	Cultural intelligence	Communication
Overcoming perceived & temporal distance	(0.000,0.000,0.000)	(0.607,0.857,1.000)	(0.571,0.821,1.000)	(0.107,0.357,0.607)	(0.429,0.679,0.929)	(0.464,0.714,0.964)	(0.321,0.571,0.821)	(0.286,0.536,0.750)	(0.679,0.929,1.000)
Effective team leadership	(0.429,0.643,0.821)	(0.000,0.000,0.000)	(0.571,0.821,1.000)	(0.393,0.643,0.821)	(0.357,0.607,0.786)	(0.321,0.571,0.821)	(0.357,0.607,0.857)	(0.286,0.464,0.714)	(0.571,0.821,0.929)
Trust	(0.393,0.643,0.893)	(0.500,0.750,0.929)	(0.000,0.000,0.000)	(0.179,0.357,0.607)	(0.286,0.536,0.786)	(0.214,0.464,0.714)	(0.179,0.429,0.679)	(0.250,0.429,0.679)	(0.500,0.750,0.929)
Empowerment	(0.250,0.500,0.750)	(0.393,0.643,0.857)	(0.286,0.536,0.786)	(0.000,0.000,0.000)	(0.393,0.643,0.893)	(0.286,0.536,0.786)	(0.429,0.679,0.929)	(0.179,0.429,0.679)	(0.536,0.786,0.929)
Commitment to task	(0.286,0.536,0.786)	(0.393,0.643,0.857)	(0.286,0.536,0.786)	(0.321,0.571,0.821)	(0.000,0.000,0.000)	(0.250,0.500,0.750)	(0.321,0.571,0.821)	(0.286,0.536,0.786)	(0.571,0.821,0.929)
Integrative approach	(0.250,0.500,0.750)	(0.536,0.786,1.000)	(0.500,0.750,1.000)	(0.393,0.643,0.893)	(0.429,0.679,0.929)	(0.000,0.000,0.000)	(0.286,0.536,0.786)	(0.214,0.464,0.714)	(0.571,0.821,1.000)
Member's competencies	(0.393,0.643,0.893)	(0.429,0.679,0.929)	(0.464,0.714,0.893)	(0.321,0.571,0.821)	(0.357,0.607,0.786)	(0.357,0.607,0.857)	(0.000,0.000,0.000)	(0.250,0.500,0.750)	(0.643,0.893,1.000)
Cultural intelligence	(0.250,0.500,0.750)	(0.357,0.607,0.857)	(0.357,0.607,0.786)	(0.286,0.536,0.786)	(0.536,0.786,0.964)	(0.357,0.607,0.857)	(0.429,0.679,0.929)	(0.000,0.000,0.000)	(0.679,0.929,1.000)
Communication	(0.500,0.750,0.857)	(0.607,0.857,0.929)	(0.393,0.643,0.821)	(0.357,0.536,0.714)	(0.393,0.643,0.786)	(0.393,0.571,0.750)	(0.464,0.714,0.857)	(0.429,0.607,0.786)	(0.000,0.000,0.000)

Table2: The normalized fuzzy direct-relation matrix

	Overcoming perceived & temporal distance	Effective team leadership	Trust	Empowerment	Commitment to task	Integrative approach	Member's competencies	Cultural intelligence	Communication
Overcoming perceived & temporal distance	0.000,0.000,0.000) (	0.079,0.111,0.130) (	0.074,0.106,0.130) (	0.014,0.046,0.079) (	0.056,0.088,0.120) (	0.060,0.093,0.125) (	0.042,0.074,0.106) (	0.037,0.069,0.097) (	0.088,0.120,0.130) (
Effective team leadership	0.056,0.083,0.106) (	0.000,0.000,0.000) (	0.074,0.106,0.130) (	0.051,0.083,0.106) (	0.046,0.079,0.102) (	0.042,0.074,0.106) (	0.046,0.079,0.111) (	0.037,0.060,0.093) (	0.074,0.106,0.120) (
Trust	0.051,0.083,0.116) (	0.065,0.097,0.120) (	0.000,0.000,0.000) (	0.023,0.046,0.079) (	0.037,0.069,0.102) (	0.028,0.060,0.093) (	0.023,0.056,0.088) (	0.032,0.056,0.088) (	0.065,0.097,0.120) (
Empowerment	0.032,0.065,0.097) (	0.051,0.083,0.111) (	0.037,0.069,0.102) (	0.000,0.000,0.000) (	0.051,0.083,0.116) (	0.037,0.069,0.102) (	0.056,0.088,0.120) (	0.023,0.056,0.088) (	0.069,0.102,0.120) (
Commitment to task	0.037,0.069,0.102) (	0.051,0.083,0.111) (	0.037,0.069,0.102) (	0.042,0.074,0.106) (	0.000,0.000,0.000) (	0.032,0.065,0.097) (	0.042,0.074,0.106) (	0.037,0.069,0.102) (	0.074,0.106,0.120) (
Integrative approach	0.032,0.065,0.097) (	0.069,0.102,0.130) (	0.065,0.097,0.130) (	0.051,0.083,0.116) (	0.056,0.088,0.120) (	0.000,0.000,0.000) (	0.037,0.069,0.102) (	0.028,0.060,0.093) (	0.074,0.106,0.130) (

Member's competencies	0.051,0.083,0.116) (	0.056,0.088,0.120) (	0.060,0.093,0.116) (	0.042,0.074,0.106) (	0.046,0.079,0.102) (	0.046,0.079,0.111) (	0.000,0.000,0.000) (	0.032,0.065,0.097) (	0.083,0.116,0.130) (
Cultural intelligence	0.032,0.065,0.097) (	0.046,0.079,0.111) (	0.046,0.079,0.102) (	0.037,0.069,0.102) (	0.069,0.102,0.125) (	0.046,0.079,0.111) (	0.056,0.088,0.120) (	0.000,0.000,0.000) (	0.088,0.120,0.130) (
Communication	0.065,0.097,0.111) (	0.079,0.111,0.120) (	0.051,0.083,0.106) (	0.046,0.069,0.093) (	0.051,0.083,0.102) (	0.051,0.074,0.097) (	0.060,0.093,0.111) (	0.056,0.079,0.102) (	0.000,0.000,0.000) (

Table 3: The fuzzy total-relation matrix

	Overcoming perceived & temporal distance	Effective team leadership	Trust	Empowerment	Commitment to task	Integrative approach	Member's competencies	Cultural intelligence	Communication
Overcoming perceived & temporal distance	(0.034,0.148,0.679)	(0.119,0.278,0.872)	(0.110,0.263,0.846)	(0.043,0.175,0.708)	(0.089,0.237,0.814)	(0.088,0.225,0.785)	(0.072,0.215,0.787)	(0.063,0.189,0.705)	(0.134,0.308,0.903)
Effective team leadership	(0.084,0.217,0.746)	(0.042,0.168,0.725)	(0.107,0.253,0.815)	(0.074,0.200,0.704)	(0.078,0.221,0.769)	(0.069,0.201,0.742)	(0.075,0.212,0.762)	(0.061,0.174,0.675)	(0.119,0.286,0.862)
Trust	(0.074,0.197,0.708)	(0.094,0.233,0.782)	(0.030,0.135,0.651)	(0.043,0.150,0.638)	(0.062,0.192,0.721)	(0.050,0.171,0.685)	(0.047,0.172,0.697)	(0.051,0.154,0.630)	(0.100,0.251,0.809)
Empowerment	(0.059,0.190,0.727)	(0.084,0.232,0.812)	(0.068,0.210,0.780)	(0.023,0.115,0.597)	(0.077,0.214,0.768)	(0.060,0.188,0.727)	(0.079,0.210,0.758)	(0.044,0.162,0.661)	(0.107,0.268,0.849)
Commitment to task	(0.062,0.193,0.725)	(0.084,0.232,0.805)	(0.067,0.209,0.773)	(0.062,0.183,0.687)	(0.029,0.137,0.658)	(0.056,0.183,0.717)	(0.066,0.197,0.741)	(0.057,0.173,0.666)	(0.111,0.271,0.842)
Integrative approach	(0.062,0.201,0.766)	(0.106,0.261,0.870)	(0.097,0.245,0.844)	(0.074,0.201,0.737)	(0.085,0.229,0.812)	(0.028,0.132,0.673)	(0.065,0.204,0.782)	(0.051,0.174,0.700)	(0.117,0.286,0.901)
Member's competencies	(0.080,0.218,0.770)	(0.095,0.251,0.851)	(0.094,0.243,0.822)	(0.066,0.193,0.719)	(0.078,0.223,0.786)	(0.073,0.207,0.762)	(0.030,0.140,0.679)	(0.056,0.180,0.694)	(0.127,0.296,0.889)
Cultural intelligence	(0.063,0.203,0.755)	(0.086,0.244,0.843)	(0.081,0.232,0.810)	(0.063,0.191,0.716)	(0.100,0.244,0.805)	(0.073,0.208,0.762)	(0.084,0.223,0.787)	(0.025,0.120,0.605)	(0.131,0.301,0.889)
Communication	(0.095,0.232,0.730)	(0.119,0.273,0.810)	(0.090,0.239,0.775)	(0.073,0.192,0.674)	(0.086,0.230,0.748)	(0.080,0.206,0.715)	(0.090,0.228,0.742)	(0.079,0.194,0.664)	(0.055,0.196,0.731)

Table 4: The crisp total-relation matrix

	Overcoming perceived & temporal distance	Effective team leadership	Trust	Empowerment	Commitment to task	Integrative approach	Member's competencies	Cultural intelligence	Communication
Overcoming perceived & temporal distance	0.235	0.364	0.348	0.257	0.322	0.309	0.301	0.267	0.391
Effective team leadership	0.297	0.26	0.337	0.277	0.304	0.285	0.295	0.252	0.37
Trust	0.277	0.319	0.222	0.23	0.276	0.254	0.256	0.231	0.337

Empowerment	0.274	0.322	0.299	0.196	0.299	0.273	0.294	0.24	0.355
Commitment to task	0.276	0.32	0.297	0.261	0.224	0.267	0.282	0.25	0.356
Integrative approach	0.286	0.351	0.335	0.282	0.316	0.222	0.292	0.255	0.375
Member's competencies	0.301	0.341	0.33	0.274	0.308	0.292	0.23	0.258	0.381
Cultural intelligence	0.286	0.334	0.319	0.271	0.327	0.292	0.307	0.201	0.385
Communication	0.306	0.352	0.319	0.267	0.308	0.285	0.305	0.266	0.283

Table 5: The crisp total- relationships matrix by considering the threshold value

	Overcoming perceived & temporal distance	Effective team leadership	Trust	Empowerment	Commitment to task	Integrative approach	Member's competencies	Cultural intelligence	Communication
Overcoming perceived & temporal distance	0	0.364	0.348	0	0.322	0.309	0.301	0	0.391
Effective team leadership	0.297	0	0.337	0	0.304	0	0.295	0	0.37
Trust	0	0.319	0	0	0	0	0	0	0.337
Empowerment	0	0.322	0.299	0	0.299	0	0.294	0	0.355
Commitment to task	0	0.32	0.297	0	0	0	0	0	0.356
Integrative approach	0	0.351	0.335	0	0.316	0	0	0	0.375
Member's competencies	0.301	0.341	0.33	0	0.308	0	0	0	0.381
Cultural intelligence	0	0.334	0.319	0	0.327	0	0.307	0	0.385
Communication	0.306	0.352	0.319	0	0.308	0	0.305	0	0

Table 6: The final output

	R	D	D+R	D-R
Overcoming perceived & temporal distance	2.537	2.793	5.33	0.256
Effective team leadership	2.961	2.676	5.638	-0.285
Trust	2.805	2.401	5.206	-0.403
Empowerment	2.315	2.551	4.866	0.237
Commitment to task	2.684	2.534	5.218	-0.151
Integrative approach	2.479	2.714	5.193	0.236
Member's competencies	2.562	2.712	5.274	0.151
Cultural intelligence	2.22	2.721	4.941	0.502
Communication	3.232	2.69	5.921	-0.542

Tables by author