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

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

### Summary

**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

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3 the configuration of dispersed teams, geographical distance, diversity of workers, perceived  
4 distance, and temporal distance, by overcoming these obstacles, the team could emerge as  
5 highly productive and robust. In contrast, Maduka et al. (2018) highlight a different perspective  
6 and suggest that effective team leadership is an essential prerequisite for the success of global  
7 virtual teams. In this regard, the competencies of transformational leadership could play an  
8 important role as they are known to select high-performing teams. Consequently, unlike  
9 Morrison-Smith and Ruiz (2020), who emphasize group efforts, Maduka et al. (2018) place  
10 more emphasis on leadership qualities.  
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13 In comparison, Hacker (2019) discusses the role of trust in the success of global virtual  
14 teams and argues that trust is the most important factor that is least considered in the context  
15 of GVT but holds the most importance. With the establishment of trust between the global  
16 virtual team members, different challenges could be overcome with their combined and  
17 coordinated efforts (Ramkissoon, 2023a; 2023b). Small challenges, on the other hand, can lead  
18 to global team breakdowns when team members are primarily focused on operations and  
19 procedures and trust and confidence building are not prioritized. Breuer et al. (2020) also  
20 support these views and argue that while trust is generally essential for organizational success,  
21 it is also essential for the success of global virtual teams. With high levels of trust among the  
22 GVT members, greater cooperation and collaboration could be observed.  
23  
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25 Garro-Abarca et al. (2021) note that GVTs more specifically lack in the area of  
26 communication. Consequently, GVTs cannot overlook the factor of communication and have  
27 to ensure that a lack of communication does not lead to a difference in understanding of the  
28 team and organizational goals. Trust in leadership, cohesion, and empowerment all play  
29 important roles in team success. In agreement, Castellano et al. (2021) introduces the concept  
30 of self- and shared leadership in the context of Global virtual teams. The self-oriented leaders  
31 who are committed to their tasks could more effectively manage the global virtual teams if they  
32 had potency. The effectiveness of teamwork can be significantly increased if trust exists in  
33 team relationships. Chamakioti et al. (2021), on the other hand, argue that the concept of GVTs  
34 is still in its early stages and that current information about GVTs may not be sufficient to  
35 determine success factors. In contrast, Shamim (2022) claims that an integrative approach by  
36 the project manager and the team members leads to a successful team. Nguyen (2014) contends  
37 that structure, member' competencies, commitment are all important factors that could be  
38 considered integral for the success of the Global virtual teams. The findings are in stark contrast  
39 to the studies that associate the success of GVTs to leadership capacity.  
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43 Eseryel et al. (2021) explored the role of functional and visionary leadership in  
44 understanding their contribution to the effectiveness of the global virtual teams. It is argued  
45 that a combination of both is required in the context of global virtual team members, even  
46 though it might seem paradoxical. Functional leadership, complemented by centralized  
47 visionary leadership, could lead to the accomplishment of the goals. Presbitero (2020) shows a  
48 different side of the picture and argues that cultural intelligence is an important element in the  
49 context of global virtual teams. This is because as the members' cultural intelligence quotient  
50 grows, they will be better able to understand and accommodate the views and opinions of their  
51 team members. In comparison, Zuofa and Ochieng (2021) contend that the ultimate  
52 responsibility for leading the team to success lies with project management. Through the use  
53 of robust technology and communication strategies, the project manager builds trust among the  
54 members of the global virtual team. As a result, they tend to be more focused on organizational  
55 objectives. Mangla (2021) shows a completely different picture and argues that managing and  
56 running a global virtual team is a major cultural and organizational shift. Both the managers  
57 and the team members may be required to re-evaluate the cultural values, as until the values  
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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)

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3 who analysed the factors influencing service innovation globally with 18 experts, Or  
4 Mahmoudi et al. (2019) with 4 experts used as their panel to identify critical success factors of  
5 heart failure self-caring, or Patel et al., (2021) who used 15 experts to identify CSFs of BIM  
6 software selection, or Mangla et al., (2018) who used 7 industry experts and 8 academic experts  
7 to do their research on logistic management success factors or Shamsadini et al., (2023) who  
8 used 6 experts to do their Fuzzy DEMATEL analysis on factors affecting environmental audit.  
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11 In order to develop the fuzzy DEMATEL matrix as our main part of the questionnaire,  
12 we used the 9 main success factors shared in the previous sections.  
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### 14 **Importance of the Fuzzy DEMATEL**

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16 The fuzzy DEMATEL technique was found to be the most relevant analytical technique  
17 for a variety of reasons. In many decision-making situations, the factors or criteria involved are  
18 complex and interconnected, meaning that the decisions made for one factor can have an impact  
19 on others. The Fuzzy DEMATEL technique helps in understanding the cause-and-effect  
20 relationships among these factors and how they influence each other. Another important factor  
21 in selecting Fuzzy DEMATEL is the uncertainty and subjectivity of evaluations in decision  
22 making (Abdullah and Zulkifli, 2019) and using the Fuzzy logic is well suited for dealing with  
23 uncertain and imprecise information as this reduces the biases related to uncertainty and on  
24 how different people evaluate different factors. By using the fuzzy sets and membership  
25 functions, the Fuzzy DEMATEL allows for the representation of subjective judgements and  
26 linguistic terms, providing a more comprehensive analysis. In the Fuzzy DEMATEL method,  
27 same as all other Fuzzy approaches, instead of using values such as 1 to 5 scales, we use  
28 linguistic terms such as “no influence” to “very high influence” and using fuzzy set equivalents  
29 for each one of these linguistic terms, the mathematical analysis is performed.  
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33 The Fuzzy DEMATEL is particularly useful in multi-criteria decision analysis  
34 (MCDA), where multiple factors or criteria need to be considered simultaneously. By  
35 considering the interrelationships among these criteria, the fuzzy DEMATEL helps in  
36 determining the relative importance and influence of each criterion on the overall decision  
37 (Soner, 2021). The aspect that is most important from the perspective of the current study is  
38 prioritisation and ranking. The Fuzzy DEMATEL provides a systematic approach to  
39 prioritising and ranking the factors or criteria involved in decision-making. It enables decision-  
40 makers to identify the key factors that have the most significant influence on the decision's  
41 outcome, allowing for more focused and effective decision-making. Consequently, the ranking  
42 feature has also been used in the current study to rank the success factors in terms of degree of  
43 importance and degree of impact.  
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### 45 **Application of the Fuzzy DEMATEL**

46  
47 The Fuzzy DEMATEL technique is used to analyse the survey data. We can use the  
48 benefits of the DEMATEL approach and Fuzzy logic methods together, and by following the  
49 following steps, the Fuzzy DEMATEL analysis could be performed to analyse and find the  
50 interconnection between the factors found in the literature review. This will allow us to analyse  
51 and find out how the different factors are specifically related.  
52  
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54 In the Fuzzy DEMATEL method, we go through three main steps as shared below and  
55 in the current study these three steps are followed to identify, analyse and interpret the critical  
56 success factors of GVTs.  
57

58 Step 1 is to determine the purpose of the decision as well as the elements that will  
59 influence the objective of the investigation (Saunders et al., 2015). During this phase, it will be  
60

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  $r_i$ ,  $c_i$ ,  $r_i + c_i$ , and  $r_i - c_i$ . 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 our 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 supplementary 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 supplementary appendix 1, shows the second step of the analysis which is normalizing the fuzzy direct relation matrix.

Table 3 in supplementary 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 supplementary 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 supplementary 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 supplementary 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

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3 the element of virtual contact vanishes, and the team members start to believe that they are  
4 working together in a unified geographical setting. The results are also in contrast to the  
5 findings of Patterson (2022) who suggested the Tuckman model of team development for  
6 effective team development. The results therefore also agree with the postulates of Bachrach  
7 and Mullins (2019), who contend that global virtual teams work in an environment that is  
8 rapidly changing. The results also showed that one way to overcome perceived and temporal  
9 distances are to limit the factor of change so that the team members have a strong and unmoving  
10 ground to firmly stand on.  
11

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

40 The results showed that, compared to other factors, trust was found to be of  
41 comparatively lower importance. The position on the quadrant does not mean that trust is not  
42 an essential factor; rather, as compared to others, it may have a comparatively lower effect on  
43 the success of the global virtual teams. The results, therefore, tend to partially support the  
44 findings of Hacker (2019), who argued that trust is the most important factor that is least  
45 considered in the context of GVT but holds the most importance. The results, on the other hand,  
46 show that trust has been given due importance by the participants but that it cannot supersede  
47 other success factors. Also, the nature of trust is more effective than causal. For this reason, it  
48 could be argued that the success of GVTs has a process, and once the required conditions are  
49 met, effective leadership would emerge, which would lead to the establishment of trust among  
50 different team members. The results support the findings of Hildebrandt, and Marr (2020) who  
51 suggested that conflicts may occur and be resolved based on different ideas shared by the team  
52 members. The conflict resolution could be associated with trust. The findings corroborate with  
53 assertions of Breuer et al. (2020) that trust is not only essential for organisational success but  
54 for the success of global virtual teams as well. The level of importance assigned to "trust" by  
55 respondents' shows that when trust is strongly established among the team members, they can  
56 deal with different challenges in a seamless manner as compared to situations where the team  
57 lacks trust. Consequently, it could be argued that while trust is an effective factor, its emergence  
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3 among team members is vital. While the team may be able to work successfully without trust  
4 in normal times, in challenging times, the success of the team may shatter without trust.

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

32 The results showed that the integrative approach was to be in close proximity to  
33 overcoming perceived and temporal distances and was also found to be important as, unlike  
34 other factors, it is a causal factor, which means that the success of the GVTs is fundamentally  
35 based on it. When an integrative approach is adopted, the success of the team is expected to be  
36 greater. The situation arises because an integrative approach could be termed a two-way street.  
37 The leader is responsible for proposing the approach, but the team members are responsible for  
38 actually implementing it and integrating it effectively into the projects that are in process. For  
39 integration, the leader or the managers must be aware of the competencies of the members,  
40 while the members themselves should also be aware of the tasks and operations that they could  
41 perform more effectively. The collaboration of both leads to integration, which in turn leads to  
42 team success. The results validated the findings of Mui et al. (2022) who suggested that  
43 Tuckman model is not the ultimate team building model. Data shows that integration  
44 overlooked by Tuckman is an integral factor. The results, therefore, seem to validate Shamim's  
45 (2022) assertions that an integrative approach by the project manager and the team members  
46 leads to a successful team. The results, on the contrary, invalidate the assertion of Lartey  
47 (2020), who argued that the contingency theory of team management emphasises that effective  
48 management largely depends on the particular condition and underlying situation. The results,  
49 on the contrary, show a different situation, and it could be observed that effective management  
50 and the success of the team are not random but rather require a number of factors. Those factors  
51 have been mentioned on the positive side of the quadrant in figure 2. Consequently, the logic  
52 of contingency does not seem to apply to at least the virtual teams.  
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56 The results indicated that members' competencies are also one of the important factors  
57 that lead to the success of the GVTs. The results are understandable, as a team cannot  
58 effectively perform until the members are qualified enough to perform the jobs that are  
59 assigned to them. Competency is thus related to factors other than skills, such as educational  
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3 qualifications, experience, and work approach, all of which contribute to competency.  
4 Consequently, if members are competent enough, there will be less conflict among the  
5 members; on the contrary, if members are not qualified, a higher level of conflicts and  
6 complaints could be expected from the team. Most importantly, the competency of the  
7 members enables a less hostile environment. The results therefore show that Solomon's (2020)  
8 validation is correct, and team development could not be specified to specific phases. The  
9 results, therefore, tend to agree with the postulates of Nguyen (2014), who emphasised that  
10 structure, member competencies, and commitment are all important factors that could be  
11 considered integral to the success of global virtual teams. The results also show that global  
12 virtual teams should have the minimum qualifications to work smoothly and without any  
13 hassle. The results, therefore, do not agree with the findings of Castellano et al. (2021), who  
14 focused on shared leadership as the only factor for the success of the GVT. The findings, on  
15 the other hand, suggest that, while leadership is important, the entire group must work together  
16 to make the project a success. Leadership alone cannot be held responsible for the outcome. If  
17 the team members are not competent enough, leadership alone may not be able to fulfil the  
18 objective of team success.  
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### 23 **Cultural intelligence and empowerment**

24 The results showed that empowerment and cultural intelligence were the least important  
25 of all the factors in terms of the degree of importance but were found to be highest in terms of  
26 the degree of impact. Based on our experts' opinion, both of the elements were on the positive  
27 side of the quadrant, which therefore indicated that there were cause and effect factors.  
28 Consequently, having them was essential for the success of the teams. Empowerment could be  
29 expected from both the team members and the leader. If either of the stakeholders is not  
30 empowered, this could lead to challenges and obstacles, which may impact the performance of  
31 the group overall. The results therefore invalidate McAdam et al's (2019) view that GVT  
32 success is based on contingency. In contrast, the results were found to support the findings of  
33 Garro-Abarca et al. (2021), who identified that trust in leadership, cohesion, and empowerment  
34 all play important roles in team success. The higher position of empowerment in terms of the  
35 degree of impact reveals that higher empowerment has a greater impact on team success than  
36 any other factor. The fuzzy analysis revealed that cultural intelligence also has a significantly  
37 higher impact on the GVT's success. This is because, with higher cultural intelligence, the team  
38 members are able to better understand their teammates. They can accommodate their cultural  
39 values and understand their challenges and problems. Consequently, the cohesion between the  
40 members becomes stronger, which ultimately leads to a strong and coherent team. The results  
41 were found to be in line with the findings of Presbitero (2020), who suggested that cultural  
42 intelligence is an important element in the context of global virtual teams. The results also  
43 show that when cultural intelligence takes precedence, the team emerges more successful and  
44 coherent.  
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48 The results and discussion, therefore, show that based on the ranking and  
49 categorization, cultural intelligence, overcoming perceived and temporal distance,  
50 empowerment, integrative approach, members' competencies, commitment to the task,  
51 effective team leadership, trust, and communication are the factors that are important in terms  
52 of the degree of impact. The first five are fundamental to the success of the GVT, while the last  
53 four are important success factors but are effects and could only occur once the conditions for  
54 the first five are met. In terms of the degree of importance, communication, effective team  
55 leadership, overcoming perceived and temporal distance, members' competencies,  
56 commitment to the task, trust, an integrative approach, cultural intelligence, and empowerment  
57 are ranked in sequential order.  
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### **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.

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Dear Editor,

Thanks a lot for your constructive comments. Below we have answered the comments in blue color. The updated paper is also submitted to the system now.

- I must be very insistent on not using the suggestion of being able to study cause-and-effect relationships in a non experimental study. This is still mentioned in the abstract both in the introduction and in the findings. You should rephrase this in more appropriate terms, e.g. : “the perceived cause-and-effect relations by experts” “..are perceived by experts to be causal.”

Thanks for the comment. It is now amended in the whole paper and in 9 different parts of the paper, the “perceived” or “experts’ opinion” (in different ways) are added now.

- Please have the grammar of the manuscript checked as there are several minor grammar mistakes. E.g. in the abstract “shedding light to the cause-and-effect” should be “shedding light on”. No use of an ampersand “&” in regular text. Throughout the text, check the use of articles (e.g. “In Fuzzy DEMATEL method” should be “in the Fuzzy DEMATEL method).

All above-mentioned corrections and a few more grammatical amendments are done on the paper now. Thanks for the comment.

- Please reformulate the subtitle “A Review of Information Technology (IT) Industry”. Note that this is not a review of the IT industry. A more apt title would indicate that it is a review of the literature on global virtual teams and a subject expert analysis with professionals in the field. Also exclude abbreviations from the title.

The new title is updated and is changed accordingly now.

Given that the tables are not explained in the text, and are not crucial for understanding the text, they should be moved to an online appendix. Emerald has a specific supplementary files function for this.

<https://www.emeraldgroupublishing.com/journal/aeat/supplementary-files-functionality-now-live-emerald-insight-platform>

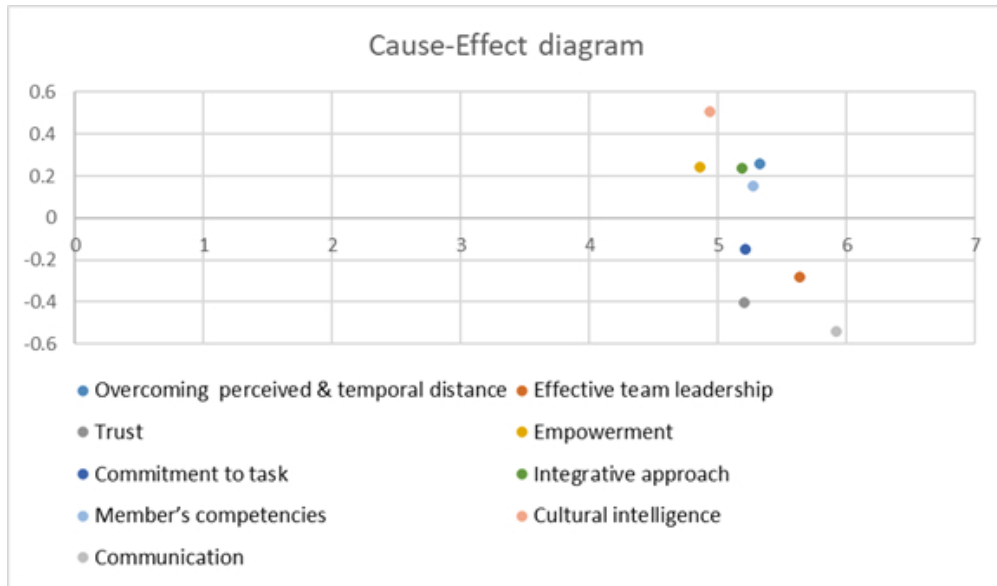


Figure 1: Cause-and-Effect Diagram

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### Contribution

The contribution of the research question should be fully clear by the end of the introduction. In the introduction, p2. you state that how GVTs operate has not been investigated from a regional perspective. But you do not clearly indicate why this is important (the fact that it has not been studied does not mean it is important). You have added some reasoning to the contributions section in the discussion but this should be fully clear for readers at the beginning of the paper.

- Last 2 lines of page 2 and first line of page 3 the below sentence is added to show why this UK approach can be of importance: "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."
- Thanks for the comment. A new paragraph is added to the page 3, sharing a bit more about the contributions of this research to give this summary at the beginning of the paper as well: "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 cause-and-effect analysis results adds a unique contribution to this emerging field. Also, practitioners and policymakers can use the cause-and-effect analysis result to focus on the cause factors and to save time and resources by not prioritizing the effect factors to them. By ranking the critical success factors and exploring their cause-and-effect dynamics, this study adds a new methodological approach in the research on GVTs as well."

The introduction also refers to "integrative approaches and functional and visionary leadership" without explaining what these terms mean or why they are relevant. Also note that the sentence on p 2. "A review of the literature...." is incomplete.

- Both "integrative approach" and "visionary leadership" variables are explained on two separate paragraphs on page 5 in LR section.
- Thanks a lot for the comment. The mentioned sentence is corrected and completed now.

Similarly, the contribution of the design Literature review + Fuzzy Dematel technique does not become clear from the introduction. You added info to the discussion and conclusion but this should be clear at the outset of the manuscript.

- Thanks for this constructive comment. It is now added to the above-mentioned and new paragraph in the introduction section.

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3 You argue that the technique can provide cause-and-effect relationships. You cannot  
4 make this claim ad for cause-and-effect relationships you would require either an  
5 experiment or a longitudinal panel study (Granger causality). I belief you refer priority  
6 ranking and causal indications perceived by the experts.  
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10 - With due respect to the above opinion, as per many different academic papers, the  
11 Fuzzy DEMATEL method provides a cause-and-effect relationship analysis  
12 between the studied factors and here in our research among the success factors  
13 of GVTs. However, as you have shared in your comment, correctly, the way we  
14 reach to this cause-and-effect relationship (diagram) is fully based on the  
15 perceived opinion of experts.  
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18 The final paragraph regarding the practical contributions “As shared by previous research,  
19 while doing research on GVTs...” starts unnecessarily vague, referring to novel theory  
20 building, which is not clearly followed upon in the remainder of the paper.  
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- 22 - Thanks a lot for this comment. The sentence amended and made clearer.  
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#### 25 Description of method 26

27 The way the manuscript is built up is that you first conduct a literature review and then  
28 use the outcome of this as input in the Dematel approach. It is not clear at the end of the  
29 introduction (the review is not clearly mentioned there).  
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32 - Thanks for the comment. It is added as per the above suggestion. It is explained  
33 clearer now. “The main objectives of the present study are: (1) to determine the  
34 critical factors that influence the success of global virtual teams which is going to  
35 be done using a literature review; (2) to rank the critical factors for global virtual  
36 teams’ success based on the opinion of the experts; (3) to find the cause-and-  
37 effect relationship between the critical success factors of GVTs, again based on  
38 the opinion of the experts.”  
39  
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42 The critical sentence on p3 “In order to reach to these goals.....from effect factors.”,  
43 describing the technique is overtly complex and confusingly stated. This provides too  
44 little information for a reader to attain a first understanding of what the technique entails  
45 and what can be learned from it.  
46  
47

- 48 - Thanks for the comment. We made it simpler and more precise to make it easier  
49 to understand for different readers. “In order to reach to these research goals, we  
50 utilized fuzzy DEMATEL technique which uses a pairwise comparison  
51 questionnaire filled out by experts, in our study managers of UK IT industry. It is  
52 clear that the data for this method is gathered from the experts’ perception. After  
53 the Fuzzy DEMATEL analysis, there will be two different outputs presented to  
54 readers, firstly, the ranking of the critical success factors and secondly the cause-  
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3 and-effect relationship between them. This second output is very innovative and  
4 clearly categorizes the factors into two categories, the cause factors and effect  
5 factors. This output can help the practitioners and policymakers to mainly focus on  
6 the cause factors as they will influence the effect factors eventually.”  
7  
8

9 The literature review after the introduction is not clearly introduced. The section needs  
10 some introduction sentence, explaining why you start the process with a literature review  
11 and what the aim of this review is.  
12

- 13  
14 - Thanks for the comment. It is added as per the comment.  
15

16 At the end of the description of the literature review it would be expected to provide some  
17 description of the amount and types of studies identified.  
18

- 19 - It is added to this section at the end of “selection process” section.  
20

21 The description of the Fuzzy Dematel technique on p6. Remains very obscure and difficult  
22 to follow. The language should be much more precise in stating what actually is done.  
23 also the reasoning for the relevance of the technique remains too abstract to be  
24 sufficiently convincing.  
25

26 E.g. Sentences such as “Another important factor is uncertainty and subjectivity....a more  
27 comprehensive analysis” The steps are not fully clear and it is not clear how it has been  
28 applied in the current study. Does step 1 refer to the previous literature review? This  
29 should be made clear to the reader. Why does it refer to “a large number of literature  
30 reviews”?  
31

32 This step also mentions the use of a “committee of experts” to provide opinions. Is this  
33 not a second step?  
34

35 The sentence “In this technique, prospective elements that influence....and the opinions  
36 of experts.” is highly confusing using vague terminology (“prospective elements”) and  
37 making it unclear on whether the experts are involved twice in the process or once.  
38 The exact nature of the questionnaire the experts filled in is also not clearly explained.  
39 What were the exact questions they answered?  
40  
41

42 The term “linguistic evaluations” is unclear and requires an explanation.  
43 The description states that a direct-relation matrix will be generated but does not explain  
44 what this entails. Also the reasoning referring to “Fuzzy integers” should be made more  
45 accessible.  
46  
47

- 48  
49 - Thanks for all these comments. All above mentioned comments are considered  
50 precisely and we tried to simplify many sentences and to add a few more to transfer  
51 the details of the method to the readers of the paper, which resulted in about more  
52 than half page added content to the Fuzzy DEMATEL section.  
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### Sample

You argue that there is no need for a minimum sample size in the Dematel approach but provide no reason or justification for why a minimum is not required. The problem with a small sample size is that you cannot claim to have a sample that is representative for the whole industry. In the description of sample it is not convincingly argued that this group of participants is sufficiently representative.

- Thanks for this comment. We have added a few evidence (citations) on the above claim to support what we shared in this section. We also expanded the explanations to make it clearer.

In the sample description you state “all 7 of them were familiar with GVTs..” Why all 7 and not all 9?

- We had 7 experts in this study. While we considered 9 main critical success factors for analysis. Which results to 72 pairwise comparisons to be done by the experts.

The inclusion of the different tables in the document does not add relevant information to readers if they do not have a sufficient explanation of what the tables mean and how they are derived. Tables that are not immediately relevant for the interpretation of the results should be moved to an online Appendix, and all tables in the manuscripts should be clearly explained and interpreted in the document.

- Dear Editor, we just have put the tables which are useful for future researchers to see the outputs of different steps of our analysis. So, despite the initial view that some tables are difficult to understand but they are crucial for future researchers who plan to use this method. SO we may request to have all current tables in the paper, please.