

# COMPARING THE COMMUNICATION METHODS IN IRAQI CONSTRUCTION PROJECTS DURING THE IMPLEMENTATION STAGE

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## Abstract

Construction projects are complex projects and their organisations are characterised by a high degree of fragmentation since they are distributed in large areas and clearly they involves of many activities, each one being divided into sub-activities and so on. Hear clear and good communication between projects stakeholders leads to the project being more successful in contrast to when the communication is weak. This paper compares two methods of communication used in Iraqi construction projects during the implementation stage, namely the Face to Face (FTF) approach which is characterised as expensive and disruptive and Computer Mediated Communication (CMC) which represents the modern method in the communication field. The results show that the CMC method is more productive and economic than FTF and takes less time when completing an implementation work; in addition, the people are less affected by emotional factors in the construction project in contrast to FTF.

**Keywords:** Construction, Communication, Face to Face (FTF), Computer mediated Communication (CMC).

## مقارنة طرائق الاتصال في مشاريع العراق الانشائية خلال مرحلة التنفيذ

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## الخلاصة

تعتبر المشاريع الانشائية من المشاريع المعقدة وتتميز تركيباتها بدرجة عالية من التجزء وهذا بسبب انتشارها في مساحات واسعة اضافة الى ذلك ان كل مشروع يتكون من عدد كبير من الفعاليات وكل فعالية تتجزء الى عدة فعاليات ثانوية وهكذا. ان الاتصال الجيد بين شركاء العمل يقود الى ان المشروع يكون اكثر نجاحا مقارنة عندما يكون الاتصال ضعيف. هذا البحث يقارن بين نوعين من الاتصالات في المشاريع الانشائية في العراق اثناء مرحلة التنفيذ وتسمى (وجها الى وجه) وهذه الطريقة تتميز بانها مكلفة وتأخر من عمر المشروع والطريقة الاخرى هي الاتصال عن طريق الشبكة العنكبوتية والتي تمثل الطريقة الاحدث في حقل الانصالات. ان النتائج بينت افضلية طريقة الاتصال بواسطة الكمبيوتر من حيث الانتاجية والاقتصاد وكذلك ان الفعالية تحتاج الى وقت اقل لانجازها مقارنة بطريقة التقليدية، بلاضافة الى ذلك ان الناس يتأثرون في العوامل العاطفية في هذه الطريقة اقل من طريقة (وجها الى وجه).

## 1. Introduction

Communication has become one of the most important factors as regards the

success or failure of a project particularly, since advanced technology for communication underwent a huge development to cover different fields,

including the construction industry. Communication can be defined as the transfer of knowledge from one entity to another and it may be divided into two main types, verbal and non-verbal [1,2]. Verbal communication includes spoken discussions between people, whereas non-verbal communication uses gestures and body language. Communication traditionally occurs between two or more people who are face to face (FTF) but can also involve the exchange of information in other styles, such as diagrams and the exchange of paper-based documents. Nowadays, communication has come to include the process of exporting and importing information in various arrangements (3D models, text, tables and ideas), and since the development of high speed networks, this has been extended to include chatting, shared desktop and visual communication via webcams. Here, network-based communication is grouped together under the collective name of Computer Mediated Communication (CMC) [3].

Communication channels are designed for both geographically close contacts as well as distant connections [4] and valuable communication occurs in two types: formal and informal. Informal communications are vital for securing useful personal relationships as well as for work associated tasks. Formal communication is essential to find agreement and reach a decision; this may be made by informal means to briefly record the main causes for the decision and to communicate the relevant information to others who have not been participants in the decision making [5]. The improvement of modern multi-media technologies, particularly the internet and network, has had a considerable impact on the construction industry and in particular its communication methods. It is hypothesised that these new systems of communication have resulted in a rise in productivity at every phase of the work [6]. In addition to

this, these methods of communication have led to a change in the organisational structure of organizations from the traditional “functional” to the “matrix form” [7]. Organizational structure for any company is affected by many factors, such as the organization’s size, and life cycle as well as the strategy, environment and new technologies [8].

Numerous researchers have studied the differences between FTF and CMC and their results may be divided into two categories. The first one shows that the performance of CMC groups is higher than that of FTF groups because the lack of a social presence in the CMC requires less individual and socio-emotional interaction, thereby producing a greater degree of collaboration [9, 10], and this method has the ability to overcome the restrictions of time and place. In contrast, the second category from these authors indicated that the FTF method was still the most powerful from the point of view of human interaction with the intimacy and immediacy of people conversing in the same place [11, 12] being impossible to substitute. Here, trust between participants in FTF during communication is at a higher level in CMC teams working collaboratively.

## 2. Related Work

In the construction industry, many researchers have studied and developed new communication and collaboration tools as established by (Hatem, 2012) [13]. Dawood et al [14] developed a methodology that assists with the communication and mixing of the information between construction project stakeholders. This system was tested by making a comparison with a normal paper-based system in one construction project in the UK, and the results of the test illustrated a saving of more than 90% in man-hour, i.e. a large saving in costs. Deng et al. [15] developed an internet-based system that supported engineers, enabling them to control and follow the progress of the

construction industry project on a small-scale (a residential housing) project in China. The results demonstrated how CMC communication improved the degree of control in the cost of the project, providing an excellent opportunity to monitor the project progress on a daily basis; it also enhanced the management and decision making, and improved the performance of the construction companies. Faraj et al [16] explained how an IFC-based “Industry Foundation Class” collaborative computer environment enables communication throughout a networked system. Their environment supports design (CAD) “Computer Aided Design” visualization (VR) “Virtual Reality” & (DWF) “Design Web Format”, estimating, planning and supplier information.

Kasun et al. [17] studied the use of modern communication technology in the construction project site with hand-held devices and personal digital assistance, in addition to, the access opportunities for the use of these devices. The research was divided into three separate clusters (composed of construction workers, construction managers and technology providers) with each category consisting of 15 people. Here, the methodologies used to collect the data were those of interviews, questionnaires and observation. The results proved that the use of CMC among skilled workers increased team productivity and reduced the total amount of time wasted in the project. Rezgui [18] explains that the successful use of CMC in the construction industry projects depends not only on the adoption and use of efficient information communication technology (ICT), but also on an integrated analysis of social and organisational concepts, such as trust, team identification and motivation. This study was conducted on small to medium sized projects in Finland and France, and addressed the aspects of technology introduction adoption, organisational structure and social relationships.

Pena-Mora et al. [19], for their part examined the impact of team interaction spaces in FTF and CMC on total performance by using quantitative and qualitative data. The information was collected through interviews with 500 people distributed across three construction companies. The researches argued that the advanced technology used by the dispersed teams required of skills and reliability for interaction technology. Here, as well as their ability to use and access this technology from different locations, they found a close link between the support provided from these forms of technology and team effectiveness. Hatem et al. [20] made a comparison between FTF and CMC throughout solving the problem in engineering design task during the design phase for the construction project. They concluded that team productivity in CMC was higher than FTF, which provides a good indicator that CMC is superior to FTF from a productivity point of view. Therefore, the working time was higher in CMC while the time wasted was higher in FTF.

In Iraq, no research has made a comparison between FTF and CMC in the construction industry for any stage of a project. However, some research studies project efficiency in general, and project communication was one of the points studied. Muhammad (2006) [21] developed a system to control the management information for following up the construction industry. The information was collected by a questionnaire and was organised into eight sections communication, management responsibility, the implementation method, cost control, planning, organising, using advance software and Iraq laws, the latter relating to the construction industry. The analysis of these results showed many points, one of which was the weakness in the communication, a factor which reduced the performance of the project. Khild (2005) [22] studied the quality of

construction project implementation in the government contract companies in Iraq; the data was collected by questionnaires these being distributed among 100 engineers working in the Ministry of Construction and Housing. This study includes all the factors that have an effect on the construction quality of the projects, the results indicating that the importance of communication was 2.06% among the 25 factors that were studied in the research.

### 3. Methodology

The purpose of the research illustrated in this paper is to make a comparison between the two communication methods used in the Iraqi construction projects through the implementation phase: the first of these is the old style which is still used today in face to face communication (FTF); this approach has many requirements, such as collecting people in one place, which leads to greater management overheads such as hotel costs, travelling fees and so on (see Figure 1). The second approach, on the other hand, represents a more modern style, through computer mediated communication (CMC) and has become increasingly universal in the past two decades because of the rapid improvement in computer software and communication methods, especially with the use of the internet (see Figure 2).



Figure 1: FTF Communication



Figure 2: CMC Communication

This research was conducted on four types of projects in different construction fields; each project belonging to a separate ministry, Table (1) shows details of those construction projects. Altogether, 51 people participated, these being designers, site engineers, consultants, quantity surveyor, contractors, project managers and material suppliers, all of whom completed the questionnaire which was distributed to them by the researchers. Everyone who participated in the questionnaire had experience with both types of communication style. Table (2) sets out the details of those who took part.

Table (1) Details of those construction projects

Number	Ministry Name	Number of Participated People
1	Ministry of Higher Education and Scientific Research	8 people
2	Ministry of Education	15 people
3	Ministry of Construction and Housing	16 people
4	Ministry of Municipalities	12

Table (2) Details of those participating in the questionnaire

Job	Number	Educational Level
Site Engineer	20	17 BSc 3 MSc
Designer	7	2 PhD 3 MSc 2 BSc
Consultants	4	2 PhD 1 MSc 1 BSc
Quantity Surveyors	4	1 MSc 3 BSc
Contractors	5	4 BSc 1 Secondary
Project Mangers	6	1 MSc 5 BSc
Material Suppliers	5	5 BSc

The methodology used in this research was that of a questionnaire (as shown in the Appendix 1) and was designed to compare the effectiveness of each method of communication. The questionnaire included:-

**A**-Personal information about the people participating in the questionnaire, e.g. age, experience, educational level, job and so on.

**B**-Questionnaire details, divided into three categories, the first one consisting of 10 general questions. The questionnaire had five areas of interest (time, productivity, economic aspects, emotion effects and experience). This was completed by the participants giving a general indication about which method was the best. The second and the third parts had more specific items which were similar and since they applied to each type of communication method: face to face (FTF) and computer mediated communication (CMC). Each questionnaire consisted of 10 issues measuring a specific point. The second and third parts of the questionnaire were analysed separately, each item in the

questionnaire having five possible ratings, with 5 denoting “strongly disagree”, 4 “disagree”, 3 “neutral”, 2 “agree” and 1 “strongly agree”; these ratings were taken from the Likert questionnaire [23]. Here, to make the research results even more valid, the t-test statistical analysis was also applied. This test determines the differences between the means of two independent samples and establishes whether the differences may be considered as statistically significant or not [24].

Table 3 explains coding for each point in the questionnaire as regards the second and the third parts and to make the discussion more understandable. This also makes the figure easier to read since there are long sentences in the questionnaire and it is difficult to make them clear in the figure.

Table (3) Coding for questionnaires items

Item Code	Description
A	This method is hard to carry out.
B	This method is affected by emotional factors.
C	Decision making is difficult to generate in this method.
D	Communication management is difficult in this method.
E	The discussion was not clear or understandable in this method.
F	Your opinion was unimportant and negligible during the discussion in this method.
G	Trusting the opinions of others was difficult to generate during the discussion in this method.
H	This method dose not convinces people about the decisions of others during the discussion.
I	This method has no demonstration tools suitable for discussion.
J	This method is affected by factors external to the discussion.

## 4. Results and Discussion

This paper has chiefly focused on establishing which types of communication

method are more necessary in the construction industry during the implementation stage. A significant degree of thought and effort went into determining the best method by making a full analysis of the questionnaires to find the strong and weak points for each technique.

Here, time represented one of the most important aspects in team performance; Figure 3 shows 63% of the participating people indicated that FTF wasted time more than CMC when completing the work and this means that the latter method (i.e. CMC) encourages people to be more focused on their work compared with FTF. It could be also indicated that they feel there is less need for social interaction, so decreasing the time wasted. Figure 4 shows the time taken to achieve the work; here it is clear there are no significant differences between the two methods in spite of 56% of the people saying that the CMC required less time to accomplish the work in comparison to FTF. The results concerning the time item concurred with [3] in spite of the latter study being concerned with the design phase in the construction industry.

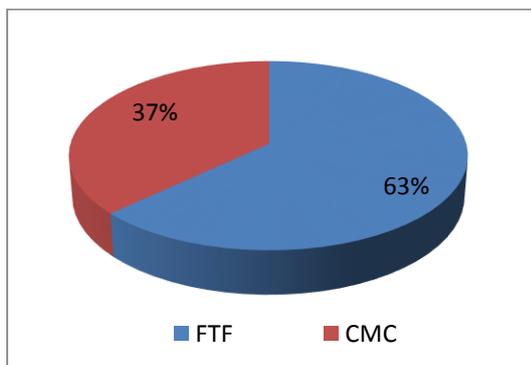


Figure 3: Wasted Time in FTF & CMC

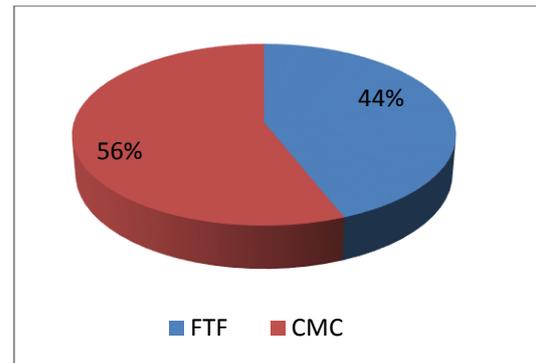


Figure 4: Time Consumed in FTF & CMC

As regard the economic side, this also being one of the important parameters for selecting which method is optimal, Figure 5 illustrates that 65% of the participants asserted that CMC is more economic than FTF since it uses the modern devices and the internet for communication, which is very cheap in comparison to FTF interviews.

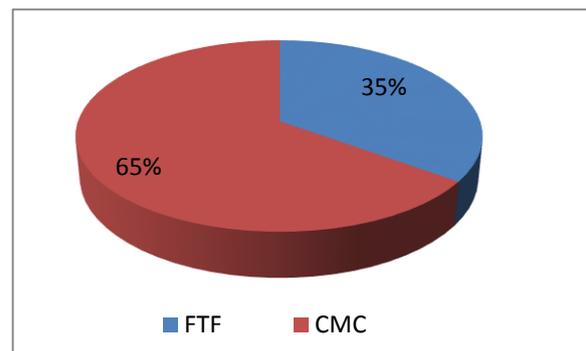


Figure 5: Economic Side for FTF and CMC

However, and particularly as regards the Iraqi case, the security situation and violence could be one of the important points that prevents FTF communication at the present time. These results concur with [14] who indicated that CMC has the advantage of being more economical than FTF since the latter requires more expenses such as travelling and hotel costs, which can be avoided using CMC.

Productivity can be considered as one of the most significant points to determine which method is more suitable.

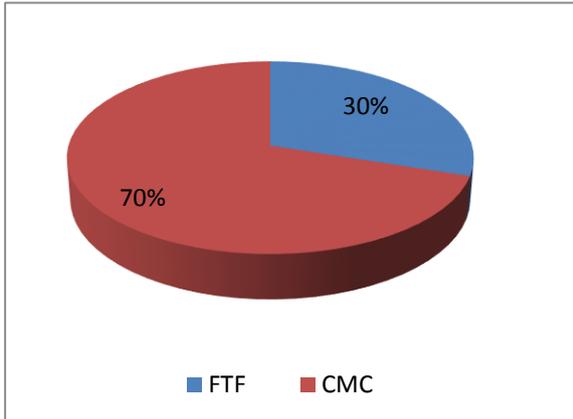


Figure 6: Productivity in FTF and CMC

Figure 6 shows that 70% of the participants expressed the view that CMC is more productive than FTF; this means that the CMC method has greater opportunities to find a solution during the discussion for the implementation stage in the project. These results consent with [17] & [20], in spite of the tasks in the latter studies being different.

As regards emotional factors and which method affected the behaviour of people, Figure 7 demonstrates that 80% of the participants considered that FTF had more of an effect on the behaviour of the people than CMC.

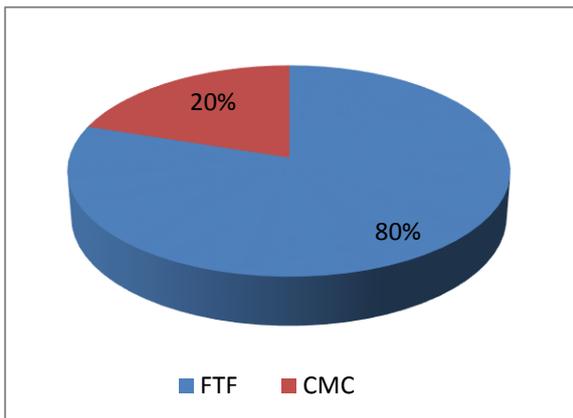


Figure7: Emotional effects of FTF & CMC

This is because when individuals are alone with the computer during the communication process, they have no need to be shy, disappointed, domineering and so

on. These types of emotions affect team performance since there is a relationship between team productivity and team emotions; the results therefore agreed with [18].

In terms of the training and additional experience of the participants, Figure 8 shows that 57% of those questioned asserted that FTF gives people more experience than CMC. This may be because direct contact sometimes encourages people to request further training and experience, which will inevitably be less in CMC. This result differs from [20], which could be because the task was experimental in the latter study while in the current research the methodology was a questionnaire.

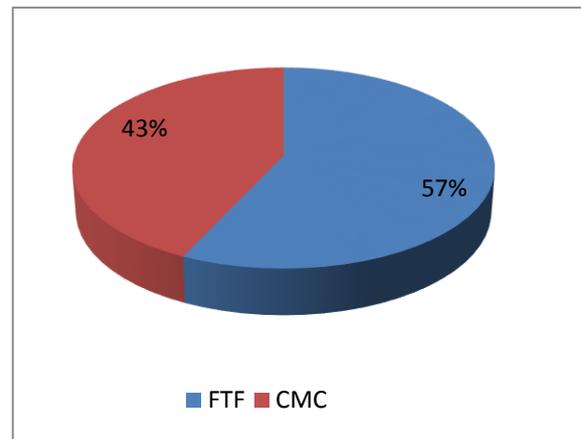


Figure8: Experience and Training in FTF & CMC

Figure 9 deals with the second and the third parts of the questionnaire; this makes a comparison between the two methods of communication (i.e. FTF & CMC) and each axis of the figure shows the average of 51 responses for each method. As previously mentioned, the value of each axis ranges between 1 “strongly agree” to 5 “strongly disagree”. Figure 9 shows a spider diagram visualisation to make a comparison between the means of the two methods from various points of view; here the blue line represents the FTF method while the red line designates the CMC method. Generally, the trend for each method is different and

there are significant differences between them. The CMC line was higher than the FTF line in most of the axes, except in axis A which represents the difficulty of carrying out this method; here FTF was higher but both methods were equal in axis G denoting trust.

Overall, and as seen in Figure 9, the CMC method was more acceptable for the participants by an average of 3.81, while for FTF this was 2.41, this average was calculated by taking an average for all the score elements in the questionnaire (i.e. the 10 axes). This demonstrates a significant statistical difference between the two averages because the t-value of the 'two-tailed test' from the analysis of the results was 3.34, which was greater than the corresponding t-critical value of 2.10, with a degree of freedom  $df=18$  and a probability of error  $<5\%$ . This could be attributed to a number of possibilities. For example, people feel free when using CMC communication and are removed from the pressure that can be applied when facing each other in FTF. Moreover, using advanced technology enables them to have many facilities which are missed in FTF. However, an aspect which may be more important was the economic one; and the participants preferred CMC to avoid additional expenses associated with the FTF method..

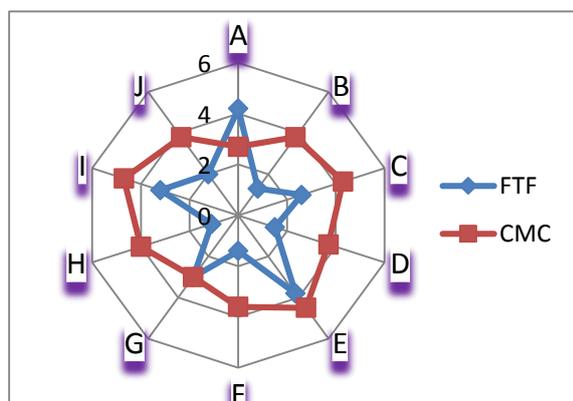


Figure 9: Making a comparison between FTF & CMC

## 5. Conclusions and Recommendations

This paper compares two methods of communication for construction projects in the implementation stage, those being the methods of FTF and CMC. During the analysis of the first part of the questionnaire, the results showed that FTF wasted time more than CMC and the time for completing the implementation work in CMC was less than FTF. The results also illustrate that CMC was more economic and resulted in higher productivity than in the FTF approach. In addition to this, FTF had a negative effect in terms of the emotional factors for people working at the implementation stage, despite this method being a good experience for people in comparison to CMC.

For the second and third parts of the questionnaire, the results show that CMC was more acceptable than FTF by 36% in most of the questionnaire items with the exception of it being difficult to carry out, where FTF was easier. In terms of the trust aspect, both approaches were equal.

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### Questionnaire

**\*The object of this questionnaire is to select which method could be adopted in communication work within the construction industry during the implementation stage.**

**Please read all the sections of the questionnaire and complete the items below by ticking one box to identify the statement that most closely matches your opinion.**

#### A. Personal information:

1. Full name:
2. Which group do you belong to?  
Employee  Contractor  Consultant  Customer  Designer  Others
3. What is your job in the office?  
Manager  Consultant  Site engineer  Quantity surveyor  Others
4. Work experience:  
Less than 5 years  5-15 years  16-25 years  more than 25 years
5. Educational level:  
Diploma  Bachelor  Master's degree  PhD degree  Others

#### B-General Questions

	Question	FTF	CMC
	<b>Time</b>		
1	Which method wasted time?		
2	Which method takes less time to achieve work items?		
	<b>Economic</b>		
3	Which method is more economical?		
4	Which method is useful for managing emergent errors?		
	<b>Productivity</b>		
5	Which method is more productive for the specified time?		
6	Which method is faster and better for decision making?		

7	Which method is better for selecting alternatives?		
<b>Emotions</b>			
8	Which method is more affected by the participant's emotions?		
<b>Training and Experience</b>			
9	Which method utilise experience more?		
10	Which method is better for training the participants and increases their experience?		

**C-The Face to face meeting method:**

1. This method is hard to carry out.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

2. This method is affected the emotional factors.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

3. The decision making is difficult to generate in this method.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

4. The communication management in this method was difficult.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

5. The discussion in this method was not clear or understandable.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

6. Your opinion was unimportant and negligible during the discussion in this method.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

7. In this method, it was difficult to generate trust in the opinions of others during discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)  
 1       2       3       4       5

8. This method did not convince people about the decisions of others during the discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

9. This method has no demonstration tools suitable for discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

10. This method is affected by the factors external to the discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

#### **D-Computer mediated communication method:**

11. This method is hard to carry out.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

12. This method is affected by emotional factors.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

13. Decision making was difficult to generate in this method.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

14. The communication management was difficult in this method.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

15. The discussion in this method was not clear or understandable.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

16. Your opinion was unimportant and negligible during the discussion with this method.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

17. In this method, it was difficult to generate trust in the opinions of others during discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

18. This method did not convince people about the decisions of others during the discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

19. This method has no demonstration tools suitable for discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5

20. This method is affected by the factors external to the discussion.

(Strongly agree)  $\xrightarrow{\hspace{10em}}$  (Strongly disagree)

1       2       3       4       5