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Unified Communication and Collaboration Model for Virtual Distributed Team Work: A Study in Malaysia

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Abstract

Technology today has made it possible for people to opt for 'Teleworking or virtual distributed team work', which seems to be received unarguably and positive acceptance as an alternative work practices globally. In this context, Information and Communication Technology (ICT) has to be credited as one of major 'change elements' which enable to drive constructive changes in a working environment and arrangement in an organization, that enable employees to work from anywhere, at any time around the globe and across geographical boundaries regardless of differences in languages, cultures and time zones. The new transformation indirectly demands significant challenges to the organization in order to conform the needs and necessities for these current working practices. The challenges include ICT investment in the infrastructure and applications particularly to overcome the communication and collaboration barrier, which is the result of lack of social, physical and face-to-face interaction. However, it is occasionally difficult to find the best model to support services that can suit the needs of virtual team work or telework in certain domain. The primary objective of this study is to develop a model for distributed working group that supports unified communication and collaboration, particularly in the context of public sector in Malaysia. The sample consists of 92 respondents from the Malaysia Ministry of Rural and Regional Development (MRRD) and the Rural Transformation Centres (RTC). The statistical analysis found that among the main features that meet the needs of the group work are, the ability to share and access the information, the capability to submit reports periodically and provides an interactive environment. The unified communication and collaboration model proposed by this study focuses on synchronous and asynchronous activities. In this model, the ultimate goals of telework are defined and categorised into three groups of users which are the individual, team work and organisation.

Keywords: *virtual team work, telework, communication and collaboration model, empirical study*

1. Introduction

Information and communication technology (ICT) has a great impact to the organisation. The ultimate usage of ICT will influence the changes or transformation of the organisation as well as the strategic development and increase efficiency of the organisation as a whole [1]. In order to increase competitive advantage, organisations in all sectors always look for enhancement in assessing information for decision making. Nevertheless at the same time there are more challenging in the way works are conducted in the organisation. Work structure is getting more complex where people are working

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and moving in a more dynamic ways to form a virtual working environment or virtual distributed team work. Therefore, organisations must ensure the productivity is increased while travelling cost, physical resources and other operational cost decrease.

In this new scenario, ICT development strategy can be used to maintain respectable communication and collaboration among staff, vendors and clients [2]. It is also enable for a good systematic human resource planning which will improve operations, improve human relationships among people surrounding and eliminate barriers for horizontal integration internally and externally [2, 3].

In line with the organisation strategy and direction toward globalisation through wider scope and functions, the change and demand for new organisational work structure has emerged. The new structures such as distributed computing, virtual organisation and telework have been defined and demanded from the various categories of people and environment. There are advantages and benefits in this new working environment (i.e. teleworking, virtual organisation). For instance, it reduces local logistic cost, shifting and transportation cost require in traditional operation of organisation. In addition, continuation of business operation will be guaranteed even though such damage of main or headquarters building, or during environmental harms or disaster. Furthermore, distributed placement of employees will encourage high collaboration with diverse and multi creativity, knowledge and experience to solve problems with different approaches and methods [5].

Telework or virtual team work or telecommuting can be defined in general as a flexible work structure where employees are placed in a location far from the main office of the organisation or central headquarter office without social contact or face interaction with the team members or colleagues but enable to reach and communicate the team work through ICT [6].

Previous works discovered that emergence of new technologies in ICT has encouraged employees to involve working in virtual teleworking environment. These new technologies provide opportunities to enhance organisation's choices in distributed telecommuting from various angles and locations [7, 8]. Computer supported cooperative work (CSCW) addresses how collaborative activities and their coordination can be supported by means of computer systems and tools. Some authors consider CSCW and groupware are synonyms. CSCW is normally used in teleworking environment which requires collaborative work, and multiple relationships with the same objective and goal [9]. The development of Internet has seen the increase of collaborative works which more communication and information sharing between entities or individuals can be adapted everywhere in the globe [10]. Therefore, it is essential for organisation to grasp the opportunities and potential provided by the technologies such as CSCW, groupware and other communication and collaborative tools available today to stay competitive and sustainable in the current globalisation and new economic era.

2. Background Study

The main key for successful management of an organisation is the effective communication practices. It is a big challenge for organisation to manage people in a distance in multiple locations or known as telework. Study done by Cascio revealed that the weaknesses and constraints in this environment were the limitation of physical interaction and social as well as limited face-to-face communication [11]. This situation leads to misunderstanding and conflict between teleworkers and managers [12]. It is also a challenge for the organisations to setup the environment and ICT support to ensure that communication and interaction between teleworkers and managers are at the optimum phase even though in limited social and physical interactions [13, 14, 5]. Telework could fail because of incapability of the workers to interact effectively in their environment with distance communication [15].

Bayrak revealed that it was difficult to identify the suitable and appropriate model for ensuring the requirements of telework [16]. Most of the models, software or groupware that supported telework were specialised for certain domains and scopes and the designs were not appropriate to support other domains [17]. On the other hands some other models only support communication or coordination but do not emphasis on communication and collaboration [18]. This is due to that most available and current models support asynchronous only, not a real time communication environment [19].

Findings by Dekker & Rutte [20] discovered eleven characteristics or critical behaviour to differentiate the effective or ineffective communication in virtual team workers. The characteristics were:-

- Clear and complete communication
- Use appropriate media
- Manage, plan, and structure the work process and meeting
- Predictable and reliable communication
- Involve all team members
- Participate activity
- Prosocial behaviour
- Take into account language, time zone, and cultural differences
- Tension control
- Superfluous communication
- Non-task-related communication

This study discovered that clear and complete communication characteristics were the most important criteria in virtual team work. It was because the members in the virtual team need to understand solely through communication while in traditional team, members or workers could understand through other methods such as observation and body language.

Previous study conducted by Min, *et al.,* [21] identified two factors affecting communication effectiveness and how they work. After a review of prior studies, two aspects were identified by this study, namely critical success factors (CSFs) and team characteristics, each represented by a series of technological, managerial, or structural elements of the team. Other findings in this study were factors that influence effectiveness in virtual team: criteria of task, degree of difficulty, requirement change and sub-tasks dependency.

Previous study by Bayrak [16] identified ICT support services needed by telework. The services were technical support, management support, supervisor and management support, and task support. These services were required to maintain and improve communication and collaboration in team work. Ngugen [22] stated that in telework environment where there was geographical distance between team workers it was necessary to have an electronic communication media and computer-mediated communication. It was believed that the diversity of communication and collaboration media in telework could improve and enhanced teleworker to become a better team work [23].

Hence, further study needs to be carried out to identify features or characteristic of a model to support telework that capable or focus on effective communication and collaboration in distributed environment. The most attention is given toward development of a model that supports communication and collaboration in synchronous and asynchronous within the same platform. Thus, the objectives of this study are to identify characteristics of features that support telework environment to enhance collaboration and communication, and second is to develop a communication and collaboration model based on the characteristics. This study is carried out in Malaysia and sample of the respondents are obtained through Rural Transformation Centre (RTCs) which are the ICT projects under Ministry of Rural and Regional Development (MRRD).

3. Research Approach

This study is conducted in three main phases which are: (1) Theoretical Study, (2) Empirical Study, and (3) Model Development.

In first phase which is the theoretical study involves literature review activities to come up with the current state-of-the-art in this domain. The conceptual framework of this research is defined and developed.

In second phase which is the empirical study involves questionnaire designs, data collection, analysis and findings. This study was conducted using a purposive sampling where the respondents were identified from the Rural Transformation Centre (RTCs). The RTCs are one of the ICT projects under implementation by the Malaysia Ministry of Rural and Regional Development (MRRD). The MRRD is a ministry which responsible for development of rural community in the aspects of facilities such as road & transportation, water and electricity, economy boost and enrichment in rural areas and human resource development. In addition, the ministry contributes to the Bridging Digital Divide (BDD) programme in the nation. The main objective of BDD is to ensure the rural people and society have accessed to ICT as the urban society receives the new technology and facilities. In line with the MRRD's goal and objective, a new ingenuity to develop the ICT One Stop Centre (OSC) was introduced to the nation. This initiative intended to develop 243 OSCs throughout the country. The OSC was then renamed as Rural Transformation Centre or RTCs. The communications in between the RTCs are done through internet via telework [24].

The third phase of this research is development of unified communication and collaboration model for virtual team work. This model is developed based on theoretical findings as well as results from empirical study.

4. The Empirical Study

The aims of the empirical study are to investigate and identify the communication and collaboration process in virtual team work and to identify the important features of effective virtual team work in real environment. As mentioned earlier the sampling of this empirical study is obtained through collaborative work with the Ministry of Rural and Regional Development through the RCTs which spread throughout the country of Malaysia. This ministry is chosen as the main respondent because this ministry has involved with tele centre for more than seven years and has developed more than 240 Rural Transformation Centres throughout the country.

Sampling technique used is purposive sampling and respondents are selected based on their experiences and knowledge in this area [25]. This technique is appropriate as the target samples have good experience with the issues that being studied and investigated. There are two groups of respondent involved in this study. They are the teleworkers who work in virtual team environment. The first group is the project managers who are sited at the ministry offices in Putrajaya, Malaysia and the second group is the supervisors of the tele centres. The whole groups encompass of 10 project managers and at the community, 90 tele centres out of 180 total number of tele centre are contributed voluntary. The selection of tele centre is done randomly by the project managers.

4.1 Instrument Design

The instrument for this empirical study is the questionnaire which is designed and composed of three main sections:-

- Section A: Demography
- Section B: Background Information on Employment and ICT readiness
- Section C: Information on ICT support, communication and collaboration

Table 1. Objectives, Questions and Sources of the Instrument Design

Objective	Questions	References
To gather and obtain information on the awareness and usability of the technology in tele centres.	• Appropriateness of ICT infrastructure with the work requirements. • Do you find any problem with ICT infrastructure to effectively and efficiently complete your work? • What is the network used in your organisation/centre? • Do you have experience using other applications for collaborative distributed team?	[5, 26]
To obtain the communication and collaboration level among respondents.	• In average, how often do you communicate or collaborate virtually with your project manager in a week? • In average, how often do you communicate or collaborate virtually with your team work in a week?	[22]
To identify media used in communication and collaboration between tele workers and managers	• What are the medium used to communicate and collaborate with your team workers virtually? • State the frequency of used of the media listed. • Do you agree that the medium currently used is effective to enhance the team work communication and collaboration?	[22, 20, 26]
To identify suitable and recommended features of the computer supported collaborative work (CSCW)	• State the relevancy of the medium listed in your team work to support communication and collaboration activities. • What are the factors for determining media to be used in your virtual team work activities?	[22, 26, 20, 13]
To recognise the problems faced by teleworkers during communication and interaction between managers and virtual team works	• Do you have a feeling of marginalized or isolated within your team work because of ineffective communication and collaboration process? • In your opinion, how far the importance of effective communication and collaboration tool affect your work? • Have you experience and face problems in communication and collaboration with your virtual team work? • What are the problems you face during communication and collaboration with your team work?	[15, 20, 26]
To identify functional and physical features of a model that meet the requirements of virtual team works.	• Do you agree that if there is a new system that can support your activity in communication and collaboration will increase your productivity and your work satisfaction? • In your opinion, what are the functional	[27, 20, 18]

	features needed to enhance and improve effective communication and collaboration with your virtual team works? • What are the intended outcomes or ultimate aims that you wish to obtain through the new virtual team work model and environment?	

The questionnaire consists of questions with nominal and ordinal scale measurement depending of the type of questions. For questions in form of nominal the Likert scale used normally are: 1-strongly disagree, 2-disagree, 3-agree, 4- strongly agree. The other scales used are: 1-never, 2-infrequently, 3-frequently, and 4-very frequently.

4.2 Pilot Study

The pilot study was conducted to verify the suitability and reliability of the questions and techniques chosen before the actual survey would be carried out. The pilot study was conducted through a series of interview sessions in a workshop which involved five project managers and the other five managers are through online interview. Each interview session took 10-15 minutes to complete.

Outcomes from the pilot study were the amendment of the questions. Some of the amendments are the usage of simpler terminology such as project supervisor to change to Project Manager and RTC Supervisor to RTC Manager. This is to make the terminologies consistent with the term used in the real environment. The other recommendation for amendment is the use of five nominal Likert scale to only four nominal scales. In this case the third nominal scale which is normally the neutral answer was abolished to remove the uncertainty in the answer which later will affect the accuracy of the data collected [28].

4.3 Analysis and Findings

The final questionnaire was modified and distributed to one hundred respondents through online. They represent the project managers and RTC managers in different states in Malaysia. From one hundred distributed online questionnaires, 92 respondents (92%) answered and submitted their forms back to the researcher.

4.3.1 Demography: We find out that 69 (or 75%) of the total respondents are female and 23 respondents (or 25%) are male. In term of age, majority of the respondents (80.4%) are between 25 to 35 years old, 9.8% are between 36-45 years old, 8.7% are below 25 years old and only 1.1% above 40 years old.

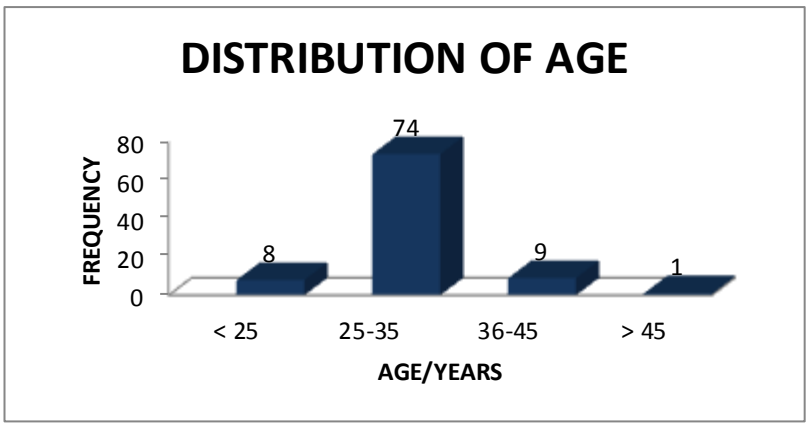

Figure 1. Distribution of Respondent's Age

Table 2 shows the distribution of respondents based on their job positions in the RTC. The distribution shows that majority or 89% are Administrative Assistant and Clerical staff.

Table 2: Respondent's Job Position in the RTC

Job	Frequency (%)
Administrative Assistant and Clerical	82 (89%)
IT Officer	2 (2%)
Others	6 (7%)

In term of respondent's experience in using IT at work, the distribution shows that 33 respondents (35.9%) experience between 3-4 years using IT at work, 30 respondents (32.6%) use IT between 1-2 years, 15 respondents (16.3%) use IT more than 6 years and 10 respondents (9.9%) experience in using IT less than one year. This distribution can be referred in Figure 2.

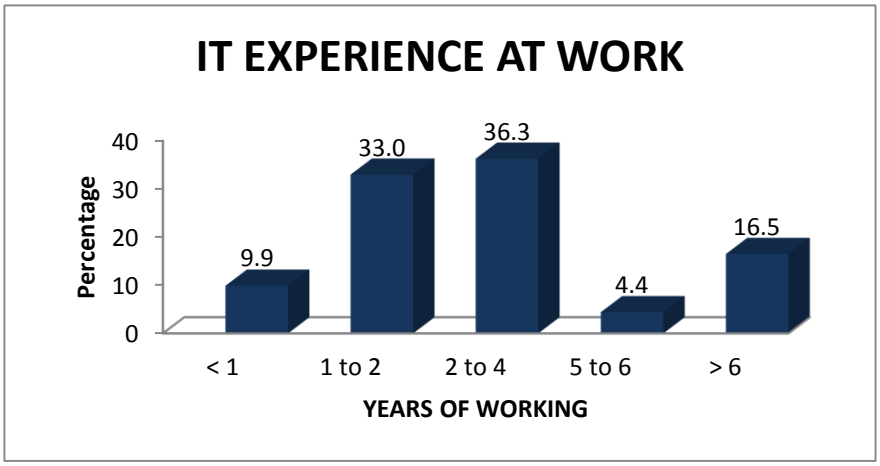

Figure 2. Distribution of Respondent's IT Experience at Work

Figure 3 shows the distribution of respondents regarding their experience in working in virtual teleworking environment. From the data provided by the respondents, 33 of them (35.9%) have experience in telework for 3-4 years, 30 of the respondents (32.6%) have experience between 1-2 years, 15 respondents (16.3%) have experience more than 6 years, 5 respondents have experience in telework for 5-6 years and 9 respondents have experience less than one year.

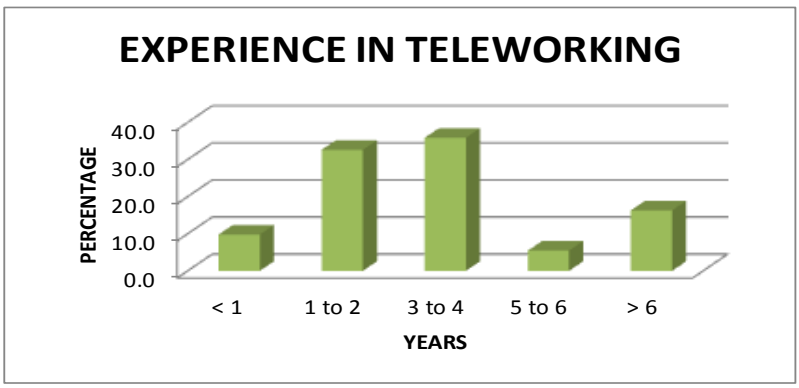

Figure 3. Experience in Telework

The respondent's work scope represents their roles in telework. In this survey, we found out that majority (89.1%) of them involve in management of RTC and 56% involve in management of information systems and ICT in the RTC.

4.3.2 Findings and Discussion: *The Use of Computer Supported Collaborative Work (CSCW) Software.*

In this survey, we investigate the experience of the respondents in using CSCW software such as *Office Communicator*, *Sharepoint* or other related software. From 92 respondents, majority of them (87%) confirm that they never used any CSCW software while 13% said that they have used such software before (see Figure 4).

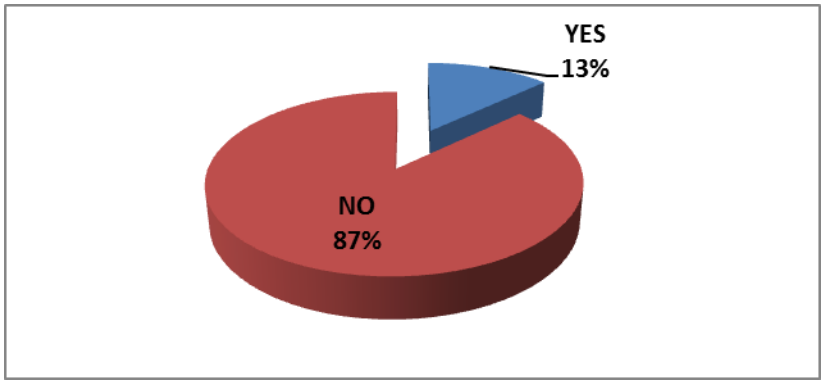

Figure 4. Experience in using CSCW Software

The finding indicates that even though respondents work in the virtual and distributed environment, they do not have any experience using specific CSCW software to support their daily activities at work. This may be due to lack of knowledge and awareness of using a suitable CSCW software to support and improve decision making, interaction and collaboration with team works in carrying out daily activities in virtual team work.

Frequency of Current Communication and Collaboration Activities in Telework

In order to discover the level of communication and collaboration between telework team which in this survey consisted of the project managers and RTC managers, respondents were requested to answer the frequency of interaction between them in a week.

The results show that 70.7% of the respondents say that they communicate and collaborate with each other every day while 52.2% says that they communicate with the project managers almost every day. This shows that periodic communication and collaboration are necessary to conduct the daily tasks either among the team works as well as with the managers where in this case are placed at the ministry level and located hundred miles away from the teamwork. This result also shows that respondents are more tendencies to communicate among the same peers compares to with their managers.

Collaboration and Communication Media

In this study, the current media used during communication and collaboration activities were investigated among respondents. In this survey, the media is referred to communication and collaboration media between team works and with project managers vice versa.

Analysis shows that the top three medium used are telephone (94.6%), social media (92.4%) and email (89.1%). This analysis also indicates that 66.3% of the respondents choose face-to-face meeting as one of their main and effective medium of communication (see Figure 5). These results reveal that even though telephone, social media and emails are important media in communication and collaboration, but interactive face-to-face meeting is still being used and chose by respondents.

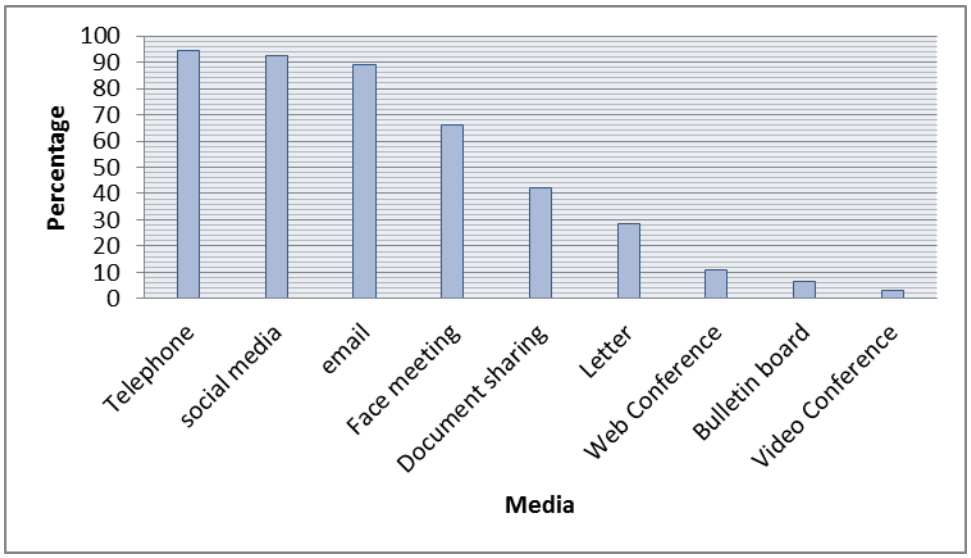

Figure 5. Communication and Collaboration Media

Frequent of Use

Respondents were asked how frequent they used these media in their daily work in the scale of 1=never use, 2=sometimes, 3=regularly and 4=very regularly. This analysis discovers that similar to previous result, respondents preferred more to use media social, telephone and email in communication compared to video conference, bulletin board or web conference. This finding is demonstrated in Table 3.

Table 3. Communication and Collaboration Media: Frequent of use

Media	Minimum Score	Maximum Score	Mean
a) Social Media	1	4	3.79
b) Telephone	2	4	3.54
c) Email	1	4	3.44
d) Document/Fail sharing	1	4	3.04
e) Interactive face Meeting	1	4	2.71
f) Letters	1	4	2.23
g) Bulletin Board	1	4	1.79
h) Web Conference	1	4	1.61
i) Video Conference	1	2	1.29

Suitability of Communication and Collaboration Media

The result shown in Table 5 reveals that respondents believe the chosen media are still relevant and appropriate to be used now and in the near future. This can be concluded that there is a similar relationship between type of media, frequent of use and relevancy of the media now and future indicated by the respondents in this survey.

Table 5. Suitability of Media for Now and Future

Type of Media	Minimum Score	Maximum Score	Mean
a) Social Media	2	4	3.69
b) Telephone	2	4	3.64
c) Email	2	4	3.60
d) Interactive Face Meeting	3	4	3.48
e) Document/Fail Sharing	1	4	3.20
f) Letter	1	4	2.87
g) Web Conference	1	4	2.62
h) Bulletin Board	1	4	2.59
i) Video Conference	1	4	2.58

Media Selection Criteria

Respondents were asked about criterion for selection of using communication and collaboration (CnC) media. The highest scores are given to accuracy and speed of the media in selection criteria. The other criteria are flexibility, comfortable, transaction record and ease of use. The finding is shown in Table 6.

Table 6. Criterion of Selection of using CnC Media

Criteria	Minimum Score	Maximum Score	Mean
a) Accuracy	3	4	3.76
b) Speed	3	4	3.76
c) Flexibility	2	4	3.73
d) Comfortable(feel confident, secure and happy)	1	4	3.70
e) Transaction Record	3	4	3.67
f) Ease of Use	3	4	3.65
g) Cheap (Use available resources and devices)	1	4	3.59
h) Confidentiality level	1	4	3.54

Feeling Isolated in Telework

In some circumstances, teleworks are associated with difficulties in building good social relationship with the teams and thus resulting of feeling alone and isolated. In this survey, respondents were asked if they have experience of the same feeling during their works. From the data collected discovered that 38% indicated that they never feel such isolated feeling, and 51.1% indicated that they have the feeling sometimes during their works, while 10.9% indicated that they always have such feeling throughout their works (refer to Figure 7).

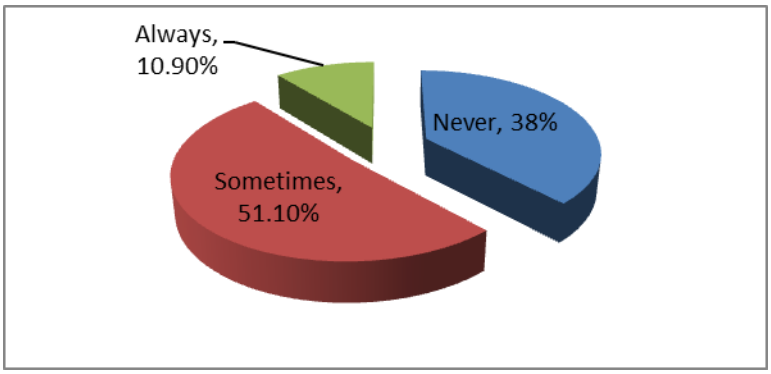

Figure 7. Feeling Isolated by Respondents during Telework

Difficulties in Communication and Collaboration in Telework

Respondents were asked to state how often they faced difficulties in communication and collaboration (CnC) in telework. The scales used were: 1= never, 2=sometimes, 3=frequent and 4=very frequent. Based on the data collected, 72 of respondents (78%) indicate that they infrequent having difficulties and 13 respondents (14%) indicate that they never have difficulties in communication and collaboration during telework. The analysis also reveals that they are a small number of respondents (8%) who are facing difficulties in communication in the daily work (frequent and very frequent). These findings need to be highlighted to ensure that information is distributed to teleworkers and the team evenly and fast to all recipients. Figure 8 shows this finding.

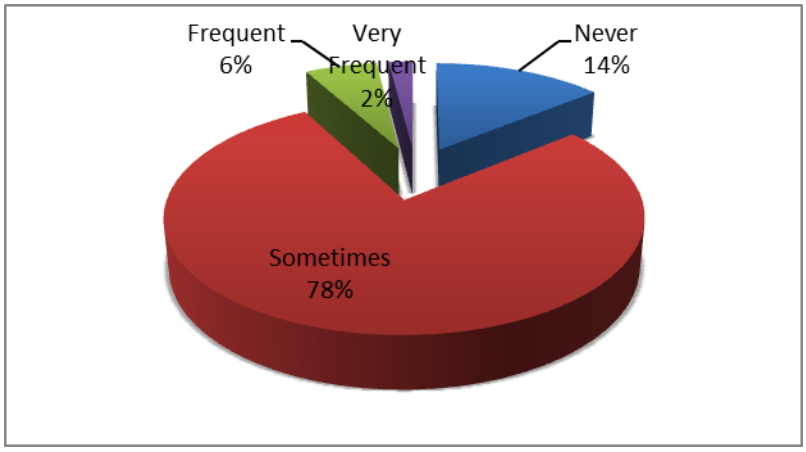

Figure 8. Frequent of having Difficulties in Communication and Collaboration

Nature of difficulties in communication and collaboration (CnC) in telework

In order to investigate further on nature of difficulties by respondents, questions were asked to list down the identified problems. The analysis shows that the nature of difficulties faced by teamwork respondents are related to technical weaknesses such as the network, system tools and appropriate applications. The results are shown in Table 7.

Table 7. Nature of Difficulties during Communication and Collaboration in Telework

Nature of Difficulties	Frequency	Percentage
a) Internet & Network very slow and not stable	66	71.7
b) System tool inefficient and inconsistent	37	40.2
c) System tool and software do not support synchronise and real time communication and collaboration.	23	25
d) Inappropriate tools and technologies	20	21.7
e) The current system for CnC does not fulfil the team work requirements.	18	19.6
f) Systems and techniques used currently do not encourage iterative two ways communication and collaboration.	14	15.2
g) The current system is complex and difficult to use.	6	6.5
h) Not ready and confidence to use latest technology (example Facebook, twitter, blog, forum and etc.)	1	1.1

In this matter, it is relevant and pertinent to relate with the effort of enhancement of technology, software and tools to improve the team work working environment and facilities.

Features and Facility for Communication and Collaboration Tool

In this survey, questions were designed to recognize the need for telework software tool by respondents, discover software features needed by telework team as the respondents of this study and identify the ultimate goals to be achieved by respondents in using communication and collaboration software.

The analysis done on the collected data reveals that 62% of the respondents reply to strongly agree to the question on necessity of software tool to support telework, 36% of the respondents agree with the software tool while 2% do not agree. This shows that majority of the respondents aware of the necessity of having an appropriate software tool to support telework environment.

Next, respondents were asked their opinion on software, features and facilities to support their telework environment. The facilities identified from literature are shown in Table 8 and the results obtained are also demonstrated in Table 8. It shows that the most important facilities identified by respondents is the facility of sharing and accessing information follows by facility of sending and distributing periodical reports.

Table 8. Facility for Communication and Collaboration Support Tool in Telework

Facility	Frequency	Percentage
1. Facility for sharing and accessing information	81	88.0
2. Facility for sending/distributing periodical reports	76	82.6
3. Interactive environment (online activities)	73	79.3
4. Selection of software and tools to allow synchronise communication and collaboration	70	76.1
5. Central document management facility	66	71.7
6. Application for audio, video and image sharing	66	71.7
7. Centralise activity management facility	64	69.6

The third question is related to features for communication and collaboration support tool in telework. Based on the analysis done in this survey, we have discovered that respondents in telework preferred to have information delivered to them in simple, accurate and compact mode. This follows by diversity of information which is beneficial to the respondents. The results are shown in Table 9.

Table 9. Features of Telework Support Tool

Feature	Frequency	Percentage
1. Simple, accurate and compact information delivery	82	89.1
2. Diversity information delivered (in text, audio, video and graphic).	65	70.7
3. Available of achieve data/information	63	68.5
4. Diversity of information in one page	60	65.2
5. Access to documents and other related information	57	62.0
6. Information delivered in text	35	38.0

The last question was related to the ultimate goals of telework or virtual team work. The identified goals and the results from this survey are shown in Table 10. The highest score of these ultimate goals are to enhance iterative and social relationship between teleworkers (93.8%) and to enhance active communication and collaboration in team work (93.8%). The next highest answer given by the respondents is to improve organisation productivity through quick response and decision making (93.5%).

Table 10. The Ultimate Goals of Telework

Ultimate Goals	Min. Score	Max. Score	Mean	Percentage Score (%)
a) Enhance the interactive and social relationship between team work	3	4	3.75	93.8
b) Enhance active contribution and collaboration in team work	3	4	3.75	93.8

c) Improve organisation productivity through quick response and decision making	3	4	3.74	93.5
d) Improve human resource development and management	3	4	3.73	93.2
e) Improve team work competency in communication and collaboration	3	4	3.71	92.8
f) Enhance resource and information sharing for systematic information management	3	4	3.71	92.8
g) Enhance self- confident and trust level between team work and managers	2	4	3.68	92.0
h) Increase level of awareness and expertise un using appropriate technologies to support telework	2	4	3.64	91.0
i) Reduce logistic cost (telephone, mobile phone and *etc.*)	2	4	3.60	90.0

5 Unified Communication and Collaboration Model for Virtual Distributed Team Work (UCnC)

UCnC model is developed based on findings from literature and the empirical study discussed in previous sections. This model emphasizes on the unified model of communication and collaboration which consists of two main actors, the managers and the teleworkers. From the empirical study, we have identified and confirmed main features needed in the unified collaboration and communication which are fail sharing, archive data, email and forum. These features are contributed to asynchronous communication and collaboration activities. On the other hand, video conferencing and chatting are categorised in synchronous activities in telework environment.

The UCnC model for unified communication and collaboration proposed in this research is developed to enhance the effectiveness, usefulness and satisfaction of tools that supports telework in virtual distributed team work. It is learned from this survey that for unified communication and collaboration among teleworkers, several components of features and facilities are necessary to be included as shown in the model. The features and facilities can be supported by a new tool (UCnC tool) which at the end of the process will attain ultimate goals for the individual, team work and organisation.

The ultimate goal of virtual distributed team work can be classified or grouped into 3 main groups of users: the individual, team work and organisation. The ultimate goals for individuals are enhance skill and motivation, and for team work the ultimate goals are better peer relationship and alliance, improve team work, and information sharing. While for organisation the benefits gained are improve productivity and cost effective. The UCnC model is demonstrated in Figure 9.

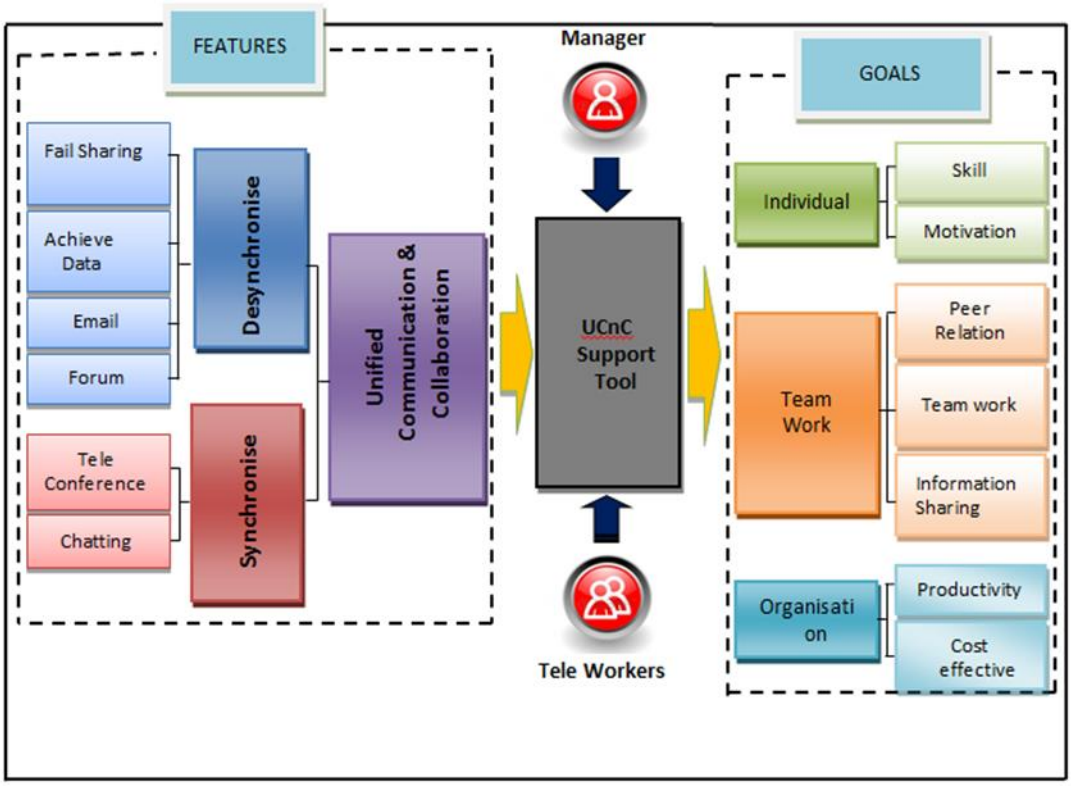

Figure 9. UCnC: Unified Communication and Collaboration Model

As discussed earlier in this paper, the proposed model of UCnC is developed based on case study conducted in Malaysia which collaborated with the Malaysia Ministry of Rural and Regional Development (MRRD). The main actors in this model are the project managers who are placed at the ministry office and the teleworkers who are the placed at the Rural Tele Centres (RTC).

6 Conclusion

This paper has presented issues in virtual distributed team work and discussed problems faced by teleworkers in having a suitable model of communication and collaboration in telework particularly in public sector. This study has contributed in identifying features and facilities of a unified communication and collaboration model that capable to support effective virtual distributed team work. The features and facilities are revealed from the empirical study conducted in Malaysia which involves ninety two (92) respondents from teleworkers in Rural Transformation Centres. The UCnC model proposed in this research focuses in synchronous and asynchronous communication and collaboration media and activities. The ultimate goals of telework are defined that contribute to three main categories of users which are the individual, team work and organisation.

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