ABSTRACT

Flood is considered a serious disaster worldwide, causing loss of life and property and costing governments millions of dollars in annual economic losses. Moreover, flood management is chaotic, particularly in the response phase. Many Non-Government organizations are facing the challenge of tackling emergency response tasks during the flood emergency response such as communication, collaboration between team members working in dispersed areas, in addition to coordinating, sharing and integrating knowledge and information during the response phase to decide the appropriate course of action. The aims of this research is to fill the gaps in literature associated of knowledge integration, and emergency response in terms of how to empirically assess knowledge integration in performance in the perspective of efficiency and effectiveness in the context of emergency response, Moreover, to bridge the gap of the literature overlooked using social media in knowledge integration throughout investigate the use of social media for facilitating knowledge integration. Which could be a good contribution to the academics field represented by the importance of research in information system discipline because it adds a new function to KI which represented in teams' efficiency and effectiveness in context emergency response. This study proposes a research model by combining knowledge-based theory of the firm as the theory of knowledge integration (KBT) with Task-Technology Fit (TTF) theory used for technology. This research applied a quantitative approach using survey method. Based on purposive sampling, questionnaires were distributed to more than 700 staff and volunteers of 12 NGOs in Sudan to examine the achievement of the objective. Data were analyzed using Smart PLS 2.0 M3 and IBM SPSS Statistics version 24. The results showed knowledge integration has significant relationships with emergency response task performance and social media usage has significant relation with knowledge integration. Also, this study found significant differences between the different experience of employees and volunteers on using social media for integration mechanisms. The proposed model in this study can be used by both government and Non – government organizations to improve task emergency management.

# INTRODUCTION

## 1.1 Overview

Throughout the course of history, natural disasters such as floods have led to huge economical losses as well as endangered human lives. Due to its destructive nature, floods are usually considered as one of the most severe forms of natural disasters; it can lead to loss of life directly or even indirectly via the spread of numerous diseases. According to [Oluwasegun (2016)](#_ENREF_250) and [Zhao *et al.* (2017)](#_ENREF_381), floods can result in increased mortality, displacement of millions of people and the destruction of property. One-third of deaths, damages and injuries caused by natural disasters can be attributed to floods and disaster intension is gradually becoming more and more serious ([Adedeji *et al.*, 2012](#_ENREF_4); [Zhao *et al.*, 2017](#_ENREF_381)). Both developed as well as developing countries have borne the brunt of these impacts with a focus on quick expansion in an urban area, which often takes place in many flood-prone areas ([Nkwunonwo *et al.*, 2016](#_ENREF_236)). Floods are estimated to contribute to 30% of all economic losses incurred due to natural disasters globally; this is particularly true in developing countries ([Latif and Arshad, 2014](#_ENREF_193)). According to [Cradduck and Teale (2016)](#_ENREF_68), floods can be described as a phenomenon that leads to dry land being submerged by water that has overflown from any waterbody or lake.

For instance, in Sudan (the context of this research), the Blue Nile river gets flooded frequently as a result of the geographic location of the Ethiopian plateau, which can lead to unpredictable surges in water levels. Subsequently, recurrent floods caused substantial losses of human lives in addition to damages to infrastructures such as schools, hospitals, and governmental offices. The current floods happen in 2017and 2016. According to [Ocha (2017 )](#_ENREF_243) on 20 June, heavy rains and subsequent flash floods destroyed or damaged 2,121 houses (affecting about 10,600 people) in North and South Darfur. In the city of Shangil Tobayeh, 162 houses were destroyed (affecting about 800 people) 89 houses (affecting some 450 people) were damaged. In addition, 144 toilets were completely destroyed in the town. On 10 July 2016, continued heavy rain across Sudan caused a flood, which affected over 122,000 people, 29 had been killed, and 21,500 houses were destroyed over in many parts of Sudan. The flood hit In 15 of 18 states in Sudan. However, states that are most affected were west Kordofan, South Kordofan, North Darfur, Blue Nile and South Darfur. While the total damages amounted to approximately $242.7 million ([Ocha, 2016](#_ENREF_242)). From the above mentioned this highlights the need for enhancement in flood emergency response as the main tool to provide safety for civilians in such cases ([Mirfenderesk, 2009](#_ENREF_222)).

When the running water is rising more than the capacity of its channel and overﬂows its borders it referred to a flood ([Djimesah *et al.*, 2018](#_ENREF_80)). While it is not possible to stop disasters like flood, it is essential to have sound and effective flood disaster management (FDM), which can be referred to as the collaborative decision-making activities, where a high level of complexity is characterized involving several sources of knowledge that are disseminated across time, space and people especially in the emergency response, which begins when a flood occurs, should be concerned. In this phase, there is a need for emergent and informal co-operative relationships to address emerging problems between teams. This is only feasible if there are proper and effective means to collect the right information for appropriate decision-making. According to [Dorasamy *et al.* (2013a)](#_ENREF_84) for achieve such enhanced management, proper planning, a well-prepared response and a guided effort is necessary. More specific in developing countries, for the response during the flood, there is a need for many improvements such as; ensure the effectiveness and efficiency of Non-government organizations has improved as well as the teamwork through a very concise goals, roles, responsibilities, procedures as well as the processes based on the entire emergency flood management lifecycle ([Othman *et al.*, 2014a](#_ENREF_255)).

Consequently, situational knowledge is not always available immediately, the decisions making will not be dependent on one person, and not all knowledge will be coming from the same place ([Othman *et al.*, 2014b](#_ENREF_256)). Through this process, the knowledge is being gathered from multiple sources, combined with existing knowledge and being shared to be applied where it is needed for handling a significant and complicated situation and called KI ([Haddad and Bozdogan, 2009](#_ENREF_121)). According to [Zakaria *et al.* (2016)](#_ENREF_379), the KI is considered as one factor contributing to flooding management. This issue is the core concern of the current research, which aims to solve the problem of lack of coordination, communication, and collaboration between teams via knowledge integration in emergency work.

## 1.2 Problem Background

In the world today, flooding is considered one of the most natural disasters that are dangerous and disruptive occurring in highly developed and densely populated regions globally ([Qiu *et al.*, 2017](#_ENREF_278)). Flood is now a significant threat to sustainable development and human existence. For example, a 2015 report by the World Resource Institute (WRI) predicts that people who would be affected by flood globally would be over 54 million by 2030 from 21 million affected in 2015 ([Ganiyu *et al.*, 2017](#_ENREF_106)). [Lai *et al.* (2015)](#_ENREF_191) Reported that flooding caused losses of more than US $600 billion and approximately 7 million deaths worldwide. Taken Western Europe for instance, each year there is a significant occurrence of ﬂoods. In 2010 for example, Belgium, France, and Germany were mostly hit by ﬂoods during which more than 30 people died. The damages caused as a result of a flood was estimated to be more than 1.8 billion US$ ([Leskens *et al.*, 2014](#_ENREF_200)). In some developing countries, floods are one of the most costly natural hazards in the context of human and economic loss. In the context of Sudan, a developing country and an Arab republic in the Nile Valley of North Africa with 38,435,252 populations, each year floods occur and hit large parts of the country and regions. This is because of the location of the country geographically, which has a low-lying terrain and the flow of rainwater from the neighboring countries.

The Blue Nile is a seasonal river, which is subjected to flooding events that cause devastating damage along its path. During exceptional wet periods, most significantly in the floodplain areas of Ethiopia and Sudan, the Blue Nile can give rise to large-scale flooding. Sudan has experienced devastating floods from previously and until now. Particularly, in 1988 which appeared to be the first of a series of high floods that struck Sudan most recently in 2017,2016, 2013, 2012, 2007 and 1988 respectively ([Mekawi, 2010](#_ENREF_220)). Recently at the end of June 2017, heavy rains following flash floods affect 10,600 people (1,780 families) in Kalma IDP camp, South Darfur and destroyed infrastructures such as schools and houses. In this flood was took approximately three months, around 42,700 children have been suffered from acute malnutrition in a state of Jebel Marra, it cost UNICEF approximately US $22 million to provide needs to affected area as well as to provide a lifesaving response for over 100,000 children ([Ocha, 2017](#_ENREF_243) ).

Subsequently, in mid-June 2016, the rainy season had brought several challenges with flash floods where people across the thirteen states of Sudan are affected with a number approximately 122,000 people. The most effects area were Kassala, North Darfur and El Gezira. Whereby, houses and latrines had been destroyed. In addition, schools, health facilities, roads, bridges among other infrastructure were destructed. At least 70 people are reported to have died (according to the Sudan National Council of civil defence and 40 injured across Sudan since the start of heavy rains. Over 19,338 houses are reported to have been destroyed, with over 10,220 houses partially damaged, over 616 latrines damaged and 70 public institutions, mostly schools, have been affected ([Un, 2016](#_ENREF_344)). In August 2013, the intensive downpour was recorded across states in Sudan such as Khartoum, North Darfur, Blue Nile, South Darfur, River Nile, West Kordofan, with varying degrees of magnitude and impact flash floods estimated by SRCS at almost $7,384,813. According to the Federal Ministry of Health, as seen in World Health Organization report (2013) 38 localities in 13 states had been affected. 49,664 families and about nearly quarter of a million population had been forced to leave their homes. Moreover, flooding destroyed many social infrastructures such as hospitals, health facilities, schools, mosques, community facilities and government offices ([Ifrcs, 2014](#_ENREF_149)). Also, many livestock had been washed away and killed. In the further development, the flooded wells and latrines caused the contamination of water points which resulted in increased health problems and water-associated diseases such as malaria, diarrhea, and fevers. The personal belongings and livelihoods of the displaced inhabitants are lost, and living conditions are becoming alarming without any source of safe water and sufficient sanitation facilities. Therefore, the situation has called for the urgent need of emergency shelter, safe water, food as well as the need for sanitation facilities. According to on the SRCS estimated assessments with several other actors in the country, 17 states were affected in Sudan as a consequence of the flood, and at least 28,621 households (177,724 individuals) were displaced. The estimated damage in the whole country included 16,225 completely destroyed houses and 18,616 others partially damaged.

In 1988, the floods came sooner than usual and were regarded as the worst in 20 years. It resulted in the death of 49 people, displacement of 7,000 families, and devastation of schools, mosques for the full villages. The cost was estimated at $1, 09,553. The reports by the Sudanese authorities indicated that the River Nile State northern the capital Khartoum was the worst affected area of the country. As a result of this flooding, more than 36,000 people had lost their homes. Besides, according to the Sudanese Red Crescent Society (SRCS), government authorities, UN agencies and NGOs, productive land that comprises of 70,000 acres located in the Nile State had been affected ([Ifrcs, 2001](#_ENREF_146)). Due to the nature of flood hazard, severe damage can be posted if the response fails. This can raise the risk imposed on the community and individuals who are involved in such a case. Since different failures in case of emergency response happened repeatedly, an urge for minimizing the hazards of such tragedies through the improvement in the emergency response operations is felt. Thus, to provide safety for civilians in such cases and mitigate the losses, flood disaster management should be enhanced. Reports from several studies revealed that flood disaster management fails due to a constraint in term of resources, poor communication that impacts the performance of organizations and teams in dealing with disaster operations and lack of coordination ([Comfort, 2005](#_ENREF_64); [Yates and Paquette, 2011b](#_ENREF_373); [Latif and Arshad, 2014](#_ENREF_193)). As an important asset in dealing with disaster management, all of these factors must rely on the information and knowledge. This is because the information and knowledge are seen as most crucial for supporting interaction amongst agencies and team’s individuals that is disaster response operations and in developing coordination among them as well as the use of knowledge, skills and equipment ([Latif and Arshad, 2014](#_ENREF_193)).

Emergency response team’s tasks are characteristically complex and dynamic in terms of required accurate, speed information and sharing with organizations and teams to locate and deliver required supplies and evacuate affected people ([Grolinger *et al.*, 2013](#_ENREF_118)).

Besides collecting reliable information and knowledge, it should be shared quickly and efficiently among the responsible parties inappropriate time and place ([Li and Goodchild, 2012](#_ENREF_202); [Debnath *et al.*, 2016](#_ENREF_75)). Hence, effective communication is vital to provide proper knowledge and information to emergency managers and decision makers to execute evacuation plans and share this information with volunteers and staff teams to help people in the affected area. However, obtaining accurate and reliable data and sending the required information to the volunteers and staff teams existing in the affected area in which they need to be present is difficult especially in NGOs ([Debnath *et al.*, 2016](#_ENREF_75)). Choosing the most efficient way to approach emergency response tasks is valuable, while, ensuring improve performance in emergency response grossly rely upon public officials ability, division managers, volunteers and staff teams to coordinate and share their knowledge and information. Fully comprehend the complexities of operating in the areas affected by flood without complete knowledge; the tasks fail ([Kapucu and Hu, 2016](#_ENREF_169)). To ensure better coordination, there is a need for dissemination of quick knowledge as well as providing better decision coordination amid multiple organizations and teams across several locations are required. So the KI can assist teams with an improved emergency response teams performance ([Mehta and Mehta, 2017](#_ENREF_219)).

In addition, organizational problems, communication, collaboration and coordination in large-scale emergencies is one of the most reported concerns that became a major issue in the disasters ([Caunhye *et al.*, 2012](#_ENREF_47); [Özdamar and Ertem, 2015](#_ENREF_260)). Many emergency response systems fail because the teams are not externally aligned with each other ([Owen *et al.*, 2013](#_ENREF_259)). The response phase follows the event triggering when the flood disaster hits. In this phase, stressful changes are featured most especially in situations and the need for speedy coordination of those involved to make sure an operational response on time with appropriate decision-making ([Lapierre *et al.*, 2015](#_ENREF_192)). According to [Firth *et al.* (2015)](#_ENREF_98), the coordination between teams (i.e., integrating the actions of functionally specialized knowledge teams) is a critical process, and coordination problems can be exacerbated if the teams are geographically distributed ([Crowston *et al.*, 2016](#_ENREF_70)). Whenever there exist evidence of inadequate communication as well as coordination and cooperation processes in teams, it shows there is a possibility a problem exists ([Bearman *et al.*, 2017](#_ENREF_33)).

Previous studies confirm that the biggest problem faced by organizations during a disaster in developing countries is the communication ([Van Wassenhove, 2006](#_ENREF_347); [Jahre *et al.*, 2007](#_ENREF_155); [Glenn Richey Jr *et al.*, 2009](#_ENREF_110)). As [Dorasamy *et al.* (2017)](#_ENREF_86) reported that disaster management demands life-saving communication, either information or knowledge as well making sure proper coordination among several and unknown roles and actors which needs to collaborate between different groups through socialization. There are challenges during activities of emergency response representative on poor communication, coordination, and collaboration ([Dorasamy *et al.*, 2017](#_ENREF_86)). NGOs in Sudan as a developing country are suffering from miscommunication and coordination among the teams or different level of non-government organizations in dispersed places. Especially during the first phase of the emergency with roads blocked, and bridges damaged by the flooding while radio equipment may not be functioning ([Ifrcs, 2013](#_ENREF_148)). Communication and coordination teams tasks when managing emergencies for successful implementation are crucial in term of activities, task and actions aimed to ensure proper prevention of events that are risk, certainly their frequency used on occurrence are reduced severity of disaster as well as making sure to mitigate the effects on humans to avoid possible effects on them and environment ([Božović and Živković, 2016](#_ENREF_42)). The emergency response organizations have the possibility of sharing information while making sure their effects are effectively coordinated in response to disasters through the process of building and sustaining inter-organizational networks that are functional ([Kapucu and Hu, 2016](#_ENREF_169)). However, during an emergency, communication can be difficult for various reasons. Therefore all sources of information can be helpful, and they need to be integrated to achieve better performance and provide real-time information that can be crucial during the extreme event ([Francalanci *et al.*, 2017](#_ENREF_101)).

There is a need for a process that combined KI and good communication, coordination among teams members, which team members typically assimilate knowledge by communicating verbally by using one of KI mechanisms such as rules and direction, routines, sequencing, and group problem solving and decision making ([Grant, 1996](#_ENREF_116)). In the meantime, ensuring their expertise is coordinated and sharing information about who knows what in the team. These active inter-personal communications and coordination activities allow the team members to develop a well-known perspective on the problem and potential solutions ([Mehta and Mehta, 2017](#_ENREF_219)). Studies have also shown that the social interactions such as social media and coordination mechanisms involved in KI process promote a common understanding of team objectives and how to achieve them, resulting in better performance ([Mehta and Mehta, 2017](#_ENREF_219)). KI is formal processes provides guidelines or directions to ensure new routines and development are well coordinated and enable open communication between team members by face-to-face ([Tsai *et al.*, 2015](#_ENREF_338)). Furthermore, [Enberg (2012)](#_ENREF_93) Stated integration mechanisms mentioned their positive effect on horizontal communication. The first three of KI mechanisms (as rules and direction, sequencing and routines) “ cost of communication and learning can be avoided by seeking efficient integration”, while the later one cluster problem solving as well as decision making presupposes like interactions and costly communication.

In addition, knowledge is considered an organizational asset and has significant influences on organizational performance ([Oztekin *et al.*, 2015](#_ENREF_261)). Flood knowledge was integrated into teams having a diversity of authorities, agencies, backgrounds, and disciplines. In other words, in order to have better KI, those authorities, and agencies need to realize their different roles and responsibilities. There is a tremendous help in term of integration of knowledge put forward by several actors for developing successful strategies for managing the impact of the flood ([Zakaria *et al.*, 2016](#_ENREF_379)). KI involves the process of identifying knowledge in similar fields and integrating that knowledge to create new knowledge that can deliver the expected solutions to problems or minimize the complexity of tasks ([Rodzi *et al.*, 2016](#_ENREF_291)).

Through establishing and sustaining knowledge interactions, emergency response performance improves by organizations due to its importance as an organizational and procedural mechanism ([Becerra-Fernandez *et al.*, 2008](#_ENREF_35)) for providing requiring knowledge on time with low cost. Since KI impact on organizational performance and value, the literature has the slight emphasis on its importance ([Cao *et al.*, 2015](#_ENREF_45)). Furthermore, KI has been associated with outcomes such as team learning, team memory, team creativity, team decision quality, and project completion times ([Janz and Prasarnphanich, 2003](#_ENREF_159); [Tiwana and Mclean, 2005a](#_ENREF_331); [Mitchell, 2006](#_ENREF_223); [Mehta and Mehta, 2017](#_ENREF_219)). However, there is still a shortcoming in term of tools and theory to be used by teams in different organizations in case of emergency response success via KI and handling task complexity ([Becerra-Fernandez *et al.*, 2008](#_ENREF_35)).

The impact of KI has been observed in few studies on both efﬁciency and effectiveness (performance) of the team ([Mehta and Mehta, 2017](#_ENREF_219)). There is limited research that exists in the field of investigation of KI as well as its relation to teamwork and team performance in both efficiency and effectiveness, As a result, is known to potentially support team and organizational learning efforts and to reveal key issues in team training ([Körner *et al.*, 2016](#_ENREF_180)). There is a potential solution to explore in the use of automated-based knowledge management and integration operations in circulating the advanced automated IT system to overcome the barriers of employee unwillingness in allocating knowledge and of complicated documentation ([Rodzi *et al.*, 2016](#_ENREF_291)). According to [Tsai (2014)](#_ENREF_336), automated-based knowledge management and integration operations, supported by an advanced automated IT system, to overcome the barriers of employee unwillingness in allocating knowledge and of complicated documentation ([Rodzi *et al.*, 2016](#_ENREF_291)). There are a “rich presence services” facilitated by the speedy development of Web 2.0 for massive social network partnership, which is to expose information, and knowledge assembled over online social networks with growing number of firms integrating social media inside their establishments to support communication and collaboration, which supports intelligent decision-making and analysis ([Fung and Hung, 2013](#_ENREF_102)). Previous research recommended the adoption of IT permit the integration of knowledge to facilitate communication while lowering its cost compared to face-to-face communication and interaction ([Enberg, 2012](#_ENREF_93)).

Besides, IT could improve the performance of the team by enabling the interaction of team members to allow people to get related information to their tasks. By integrating the core knowledge, which is in line with an organizations mandate, there can be an enhanced information technology in changing knowledge into action, which then helps employees share and integrate their knowledge ([Basaglia *et al.*, 2010](#_ENREF_29)). Moreover, a substance of evidence proposals that has information about the integration of collaborative work is incorporated into social activities as well as that of social interactions. KI processes about micro-social interactions beyond individual with various communication media. The individual mind is characterized by Knowledge and the social networks ([Hong and Liang, 2015](#_ENREF_134)). Irrespective of the growing interests on KI, the impact of social media has been overlooked, which form the gap in the literatures ([Cao *et al.*, 2015](#_ENREF_45); [Hong and Liang, 2015](#_ENREF_134)).

## 1.3 Problem Statement

Considering the above discussions and the case of Sudan context, lack of communication and coordination among several individuals and teams across diverse levels and locations has instigated many flood responses to fail. Hence, the importance of KI for effective decision-making and coordinating tasks in emergency floods response is more often highlighted. Although the KI coordinates activities between teams to improve organization’s performance, yet, there is a lack of studies that discuss the role of KI in teams’ performance. On the other hand, social media role in knowledge integration is overlooked as well. Although these innovations can ease the processes of widespread distribution of knowledge, provide sufficient communication that helps to combine knowledge for improving flood management in a team.

The main problem of this study is the lack of a comprehensive model to investigate the important role of knowledge integration by using social media as a strategy to improve emergency response team’s performance context.

## 1.4 Research Questions

In order to address the above mentioned main problem, the major question addressed in this research is “*How to enhance emergency response team’s performance through Knowledge Integration using social media platform?*” To find the answer, this main question is broken down into three sub-research questions as follows:

1. What are the factors that influence the emergency response team’s performance?
2. What is the relationship between social media usage and knowledge integration in the context of flood emergency response?
3. How to develop and validate a model for emergency response team’s performance through knowledge integration via social media?

## 1.5 Research Objectives

The main objective of this study is to contribute to a theoretical understanding that allows developing a model of “Emergency response team’s performance through Knowledge Integration using social media platform”. A reflection on the problem statement and the search for the study questions led to the identification of the following set of specific objectives to guide the study.

1. To identify the factors that influence the emergency response team’s performance.
2. To examine the relationship between social media usage and knowledge integration in the context of flood emergency response
3. To develop and validate a model for emergency response team’s performance through knowledge integration via social media.

## 1.6 Scope of Research

This study focuses mainly on the team, staff, and volunteers working in NGOs in the emergency response context. Thus, the individual working is based on the unit of analysis in NGOs in context of flood disaster emergency response in Sudan. The data is collected using a questionnaire distributed to volunteer, and staff of 12 NGOs using purposive sampling technique. The Structural Equation Modelling (SEM) using the Partial Least Squares (PLS) which is Smart PLS 2.0 approach was used to test the collected data. Several analysis tools including MS Excel 2013, IBM SPSS 24 are used to analyze and validate the research model.

## 1.7 Significance of Research

The research has contributions in two different perspectives, research and practical we summarize them as follows:

### 1.7.1 Research

This research is significant in the information system as it contributes to the body of knowledge in management; moreover, it adds new functionality to knowledge integration represented on using social media as a platform to integrate knowledge. The advancement of technology and emerging software innovation such as social media applications as a tool that brings a new wave of possibilities and opportunities for knowledge integration within Non-governmental organizations (NGOs) to reach greater contribution of how KI can manage emergency flood disaster task. This study highlights the significance to bridge the gap of overlooked social media in KI (Cao et al., 2015; Hong & Liang, 2015). Furthermore, this study claims needs for more comprehensive assessment of the impact of KI on team performance (efficiency and effectiveness). This is especially important in the context of the complex nature of non-routine knowledge emergency response during disaster response.

This research provides a better contribution to the growing body of literature on KI, social media and, emergency response. Due to the developing and testing an emergency response team’s performance model, which integrates two theories of Knowledge-Based Theory of the Firm and Task-Technology Fit. Alongside this study provides details on how KI coordinates and communicates between members of teams to assist managers in proper decision making that in turn, improves the emergency response team’s performance.

### 1.7.2 Practical

The social media is useful hence, facilitating integrate the knowledge that is held by individuals as specialized about the past experience knowledge by share knowledge between individuals in teams to combining and create knowledge which generates current procedures and forecasts future responses that enhance task performance. In term of critical emergency response, it is insignificant to analyze virtually every single inﬂuential factor existing for the relationships among factors. A better alternative can be seen in term of focusing on the most crucial and important factors. A quantitative assessment of most important factors influenced on improving emergency response teams’ performance that can enable decision-makers to highlight, and therefore priorities their efforts towards the most important critical factor of a system.

The findings of this study could guide emergency managers and team members in NGOs into turning each emergency response into an opportunity for the creative use of social media as the platform to integrate knowledge. Furthermore, this study should be useful in the team task emergency response of alignment of NGOs towards performance where KI has the ability to coordinate, communicate members of teams during flood disaster.

## 1.8 Research Structure

This research is structured to provide a critical review of the information related to the topic of the study. This thesis is organized into three main sections as illustrated in Figure 1.1 comprising of six chapters:

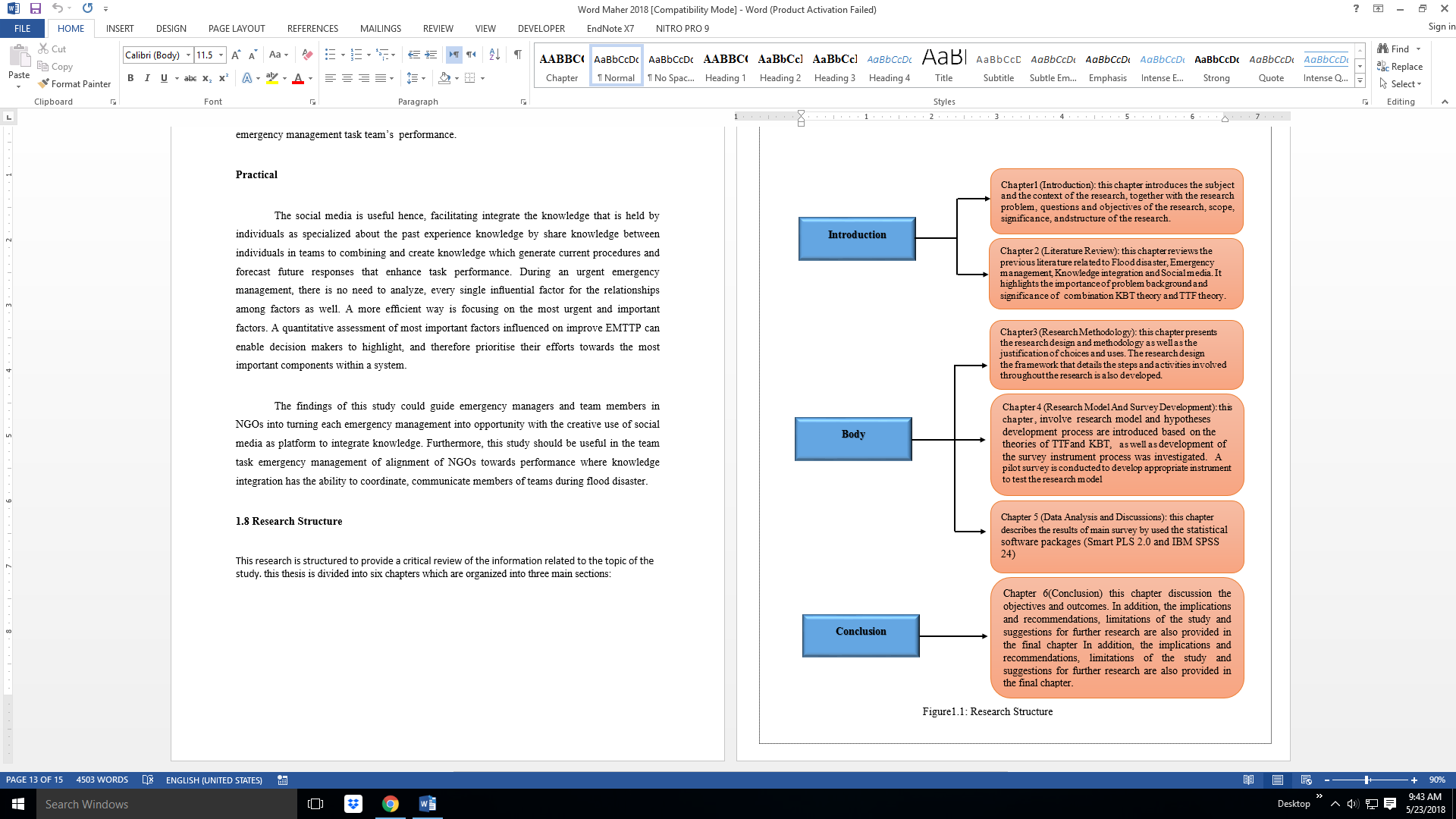


Figure ‎1.1 Research Structure

## 1.9 Key Definitions

In this section, the definitions of important terms for the thesis are defined as below:

1. **Emergency management (EM) and emergency response (ER)**

The concept of emergency management and emergency response is widely used in the flood disaster-related literature. Emergency management is defined as act of handling an unexpected event through a guided routine procedures and can be handled by agencies to reduce impacts of large scale disaster. Failure to respond adequately to emergency situation may leads to a disaster which is a bigger in terms of scale with diverse range of problems and may involve different players from one or more agencies to coordinate their efforts ([Haddow *et al.*, 2017](#_ENREF_58)) classifies Emergency Management into four categories: mitigation, preparedness, response, and recovery. Whereas Emergency Management, also known as disaster management, can be defined as a discipline dealing with disasters related impacts ([Anaya-Arenas *et al.*, 2014](#_ENREF_22)).

1. **Flood Disaster Management (FDR)**

Flood disaster management principles highlight the accuracy and speed that is required for a compilation of information to enable decision-making and forecasting purposes ([Zakaria et al., 2016](#_ENREF_379)). Flood disaster management is described as a concepts, policy, plan and operation which includes four cyclic steps namely: Preparedness, readiness, emergency response, recovery and rehabilitation ([Tingsanchali, 2012](#_ENREF_329)).

1. **Emergency Response (ER)**

While the emergency response is considered to be one of the stages of the former which ability to take actions to deal with disasters effectively as they occur ([Shan *et al.*, 2012](#_ENREF_306); [Shan and Yan, 2017](#_ENREF_307)). The terms Emergency Management, Disaster Management are often used to convey nearly the same thing. Similarly, emergency response or crisis response are used interchangeably to describe the same idea. However, in this thesis, the author likes to use emergency response and emergency management to convey the following meaning: *Emergency Management (EM)* is used to refer to the context of flood disaster management to the application domain (Sudan) as the term is more prevalent and is used to describe the same concept. Emergency Response (ER) on the other hand deals with the general idea of systems and humans used in the process to address disaster situation.

1. **Social media (SM)**

Social media as an emerging technologies consist of tools and applications that plays a very important role during emergency response to enable field responders to communicate within their respective agencies as well as collaboration, communication and coordination with other relevant authorities.

## 1.10 Chapter Summary

This chapter presented an overview of the research conducted. The background of the problem was discussed in addition to the statement of the problem. This was followed by the research questions and objectives in addition to the scope of research were presented. The importance of research was discussed, and the structure of the thesis was outlined. The next chapter presents the literature review.

# LITERATURE REVIEW

## Introduction

The main objective of this study is to contribute to a theoretical understanding that allows developing a model of “Emergency response team’s performance through Knowledge Integration using social media platform”. Therefore, this chapter discusses the literature related to the flood, coordination and communication activities during emergency response. Knowledge Integration (KI), and social media are also discussed in relation to the area. The chapter is categorized into five main sections as follows: The first section describes flood disaster, its causes and the serious impacts on community thereof. The second section explores flood disaster management and identifies its phases with concern to emergency response; the focus of this research. Furthermore, it includes a discussion on the challenges encountered by Non-government organizations during emergency response. The third section provides details about knowledge integration and its role in emergency response management. In addition to the comprehensive discussion about social media functions on KI and emergency response with related case studies, are explained on the fourth section. Finally, the fifth section includes a review of related theories to determine the constructs for developing the model and highlights the importance of integrating the theories based on the previous studies.Figure 2.1 demonstrates organization of Chapter 2 in the form of literature map. Literature map is a summary of previous related research in the form visual is the best tool for this purpose, and it is typically represented in a figure. Literature map can simply present an outline of previous related literature.

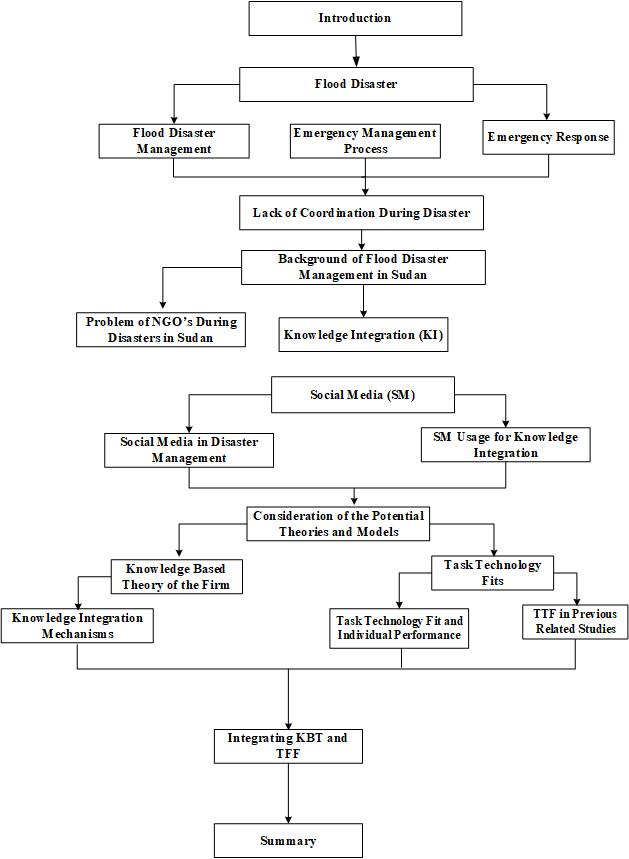


Figure 2.1 Literature Map

## Flood Disaster

In the world today, the flood is one of the most known natural disasters that are common while its impact considered as the most significant disaster ([Islam *et al.*, 2016](#_ENREF_154); [Nordin *et al.*, 2018](#_ENREF_238)). The disaster caused by flooding is one of the costliest in both property damage as well as human casualties. It leads to human injury or death and destruction of infrastructure. Furthermore, due to it is annually and repeated occurrence, it causes a high volume of life losses and undeniable effects on people’s property, livelihoods, and infrastructure ([Nordin *et al.*, 2018](#_ENREF_238)). Its overwhelming effect results in millions of displaced inhabitants, losses of human lives, crops, epidemic eruption, and infrastructural and economic collapses. By definition, an overflow that arises from a river is referred to as a flood. It can also be referred to as another body of water that causes or threatens damage ([Latif and Arshad, 2014](#_ENREF_193)). [Ahmad *et al.* (2014)](#_ENREF_6) Defined flood disaster as “the phenomenon leading to water rising thereby overflowing land”.

The main contributors towards floods have been identified as a result of several factors. These comprise heavy rain, disposal of waste materials as well as land clearance sediments into rivers. Normally, the rainfall is directly linked to the main causes of flooding in many parts of the world most especially in the catchment areas with major river systems ([Oluwasegun, 2016](#_ENREF_250)). However, the flood damage is noted to be high most in areas comprising of a very large population ([Maidin *et al.*, 2014](#_ENREF_217)). Hence, human factors can be seen as the most blamed cause of floods in recent years. With the perception that the floods occur naturally, several occurrences can be linked to man-made failures like the bursting of dams, urban flooding as well as debris flow especially in areas that are densely populated. Thus, natural factors can also be seen as the cause of floods or both natural and human factors as well ([Islam *et al.*, 2016](#_ENREF_154)).

The flood degrees are one of the dependents of flood hazard, which can be linked to flooding speed, depth as well as duration ([Islam *et al.*, 2016](#_ENREF_154)). As the growth of the world increases exponentially towards strengthening economic activities and growing architecture industries, there is an escalation in term of degradation of the natural-ecological environment. The vulnerability of the socioeconomic unabatedly causes flood production and disaster intention is becoming gradually serious more and more ([Woodward *et al.*, 2013](#_ENREF_361); [Zhao *et al.*, 2017](#_ENREF_381)).

Flood has now become a major threat to sustainable development and human existence. For example, a report in 2015 by the World Resource Institute (WRI) predicts that people that would be affected by flood globally would be over 54 million by 2030 from 21 million affected in 2015 ([Ganiyu *et al.*, 2017](#_ENREF_106)). A wide variety of flood threats are faced by several countries normally in terms of frequency, duration as well as magnitude ([Latif and Arshad, 2014](#_ENREF_193)). Developed and developing countries are grossly affected by flood as one of the major hazards leading to serious destruction. [Doocy *et al.* (2013)](#_ENREF_83) Unveil that the flood formed a globally devastating disaster. Furthermore, Disaster losses reported internationally (1990-2014) by the Disaster Research and Epidemiology Center indicate that flooding is the most frequent disaster (62.5%) compared to other disasters. Furthermore, in terms of death, floods contributed second position after the storm with 24.1% deaths. According to economic issues, flooding is the first place by 60% compared to the earthquake, wildfires and storms ([Nordin *et al.*, 2018](#_ENREF_238)). In recent years, there is a significant increase in flood disaster in places like Europe and worldwide. This is as a result of the on-going accumulation of people and economic assets in risk-prone areas. Floods affect around 200 million people from 2011 to 2012 all over the world comprising of total losses accumulating to about $95 billion ([Bui *et al.*, 2016](#_ENREF_44)). The Elbe and Danube catchments affected by large-scale flood in June 2013 losses around €10 billion in Germany, these cause the German federal government to implement a superior reconstruction aid fund of €8 billion ([Schröter *et al.*, 2015](#_ENREF_300)). The 2013 flood is similar to that of the most affected summer flood in 2002, which caused damage to €11.6 billion in Germany ([Kreibich *et al.*, 2015](#_ENREF_185)).

Similarly, the damages caused by the flood in terms of economic losses by natural hazards constitutes around 30 percent, particularly in countries that are now developing. Considering Nigeria as a country, flooding is a major hazard most especially in recent years. Therefore, in Nigeria alone, it was estimated that the country suffered a significant loss of more than $16.9b in damaged properties, agriculture, oil production as well as other losses due to flood events in 2012 alone ([Oladokun and Proverbs, 2016](#_ENREF_246)). Statistically, a flood takes 83.3% of all disaster that happened in Nigeria from 1990 -2014 and 84.4% of death recorded during the period is from the flood ([Ganiyu *et al.*, 2017](#_ENREF_106)). Malaysia is considered as one of the flood-affected country with gross losses amounting to about MYR1 billion cost annually due to losses thereby affecting around 21% of the country's population residing in about 9% of the total 328,938 square km of the country ([Othman *et al.*, 2014a](#_ENREF_255)). According to [Nordin *et al.* (2018)](#_ENREF_238) the 2014 year-end downpour and flood was the worst ever in Malaysian history, affecting more than half a million people with damages to public infrastructure estimated at RM 2.851 billion

### Flood Disaster Management

The systematic flooding management and flood risks by state and non-state actors are known as flood disaster management. The strategies mostly applied to flood management include the short to long terms, which normally aim towards reduction of damages as well as losses ([Latif and Arshad, 2014](#_ENREF_193)). The management of flood disaster can be a view from two basic perspectives 1) flood disaster risk management and 2) flood disaster management. In light of ‘flood risk’ and ‘disaster’ reveal that, even though they can be considered as closely related towards each other, the two terms are not, however, consider been synonymous ([Lumbroso, 2007](#_ENREF_211); [Maidin *et al.*, 2014](#_ENREF_217)). While risk whose consequence can be determined by measurement, a large or catastrophic event can be referred to as a disaster. The two terms, therefore, are determined by different way of management ([Vanneuville *et al.*, 2011](#_ENREF_348)).

There are four phases required for the management of flood disaster that includes cyclic steps namely: 1) preparedness before flood impact, for instance, flood forecasting and warning; 2) readiness upon flood arrival; 3) emergency responses during flood impact; and 4) recovery and rehabilitation after flood impact ([Tingsanchali, 2012](#_ENREF_329); [Nordin *et al.*, 2018](#_ENREF_238)). For the response phase, the actions covered are performed during the emergency with the application of a joint effort to ensure lives and minimize structural damage saves. The response can also be divided into sub-phases, whose effects can be determined by the amount of detection, preparation, response travel, and clearance that may affect outcomes ([Haddow *et al.*, 2017](#_ENREF_122)). Based on the response and recovery phase, the reactions that normally arise in an event are term as the flood disaster management ([Maidin *et al.*, 2014](#_ENREF_217)). Therefore, the flood disaster management often concerns about the decision-making process ([Maidin *et al.*, 2014](#_ENREF_217)). Flood disaster management involves the processes and structures leading to interventions, measures and instruments for reducing flood hazards ([Atanga, 2016](#_ENREF_26)). During flood disasters, emergency services are opposed to circumstances for which decisions have to be made fast ([Reuter *et al.*, 2014](#_ENREF_285)). The accuracy and speed which is mostly required for the flood disaster management principles are determined to enable decision-making and forecasting purposes ([Zakaria *et al.*, 2016](#_ENREF_379)).

#### Emergency Response

One of the most important concerns in flood disaster management is the response, where actions are taken in expectation of, during, and immediately afterward an emergency to minimized its effects, and that immediate relief and support are given to the people concern ([Al-Dahash and Kulatunga, 2015](#_ENREF_10)). The response in a short-term is notable among the four flood disaster management functions with the greatest immediate potential for being the most time-sensitive and saving lives ([Coppola, 2011](#_ENREF_66); [Bram and Vestergren, 2012](#_ENREF_43)). The survivors are both rescues during the response phase from immediate danger and stabilization. Most of the tasks adopted could result from that of relief, emergency health, water and sanitation, emergency shelter and settlement and tracing and restoring family links ([Wex *et al.*, 2014](#_ENREF_356)). As part of the emergency response, the shelter must be accompanied by clothing, mattresses, blankets, stoves, fuel, and access to services that include sanitation and water. There is a covered shelter offer by the NGOs, livable space, which is clean, private, green, secure, and humane basically for the individuals making use of it as their shelter in a disaster situation, pending when their availability id been provided to regular housing, example of disaster response shelters comprise of plastic sheets, tents, prefabricated housing ([Bashawr *et al.*, 2015](#_ENREF_30)). In this phase many NGOs and teams work to minimize the impacts of flood disaster.

The emergency response often takes actions to mitigate disasters effectively as they occur. This process normally is carried out from when the detection of an emergency began period to when it ends at the stabilization of the situation ([Shan *et al.*, 2012](#_ENREF_306); [Shan and Yan, 2017](#_ENREF_307)). The response to emergencies is a complex, dynamic, and information-intensive process During an emergency response, measures are put in place with the priority to reduce effects that can be adverse, as well as the duration involve in the event; Activities or tasks are exercised their impact independently without concise integration or coordination ([Thieken *et al.*, 2016](#_ENREF_327)). Most importantly, at the emergency response phase, plans that involves the emergency response are implemented which begins by coordinating responders as well as several other resources. Furthermore, this phase been the command and control phase often requires the emergency response team that monitors the conditions as well helps in the coordination of response respectively ([Wex *et al.*, 2013](#_ENREF_357)).

There are high complexities and unpredictability characterized by the flood emergencies response (Reuter et al., 2014). As the result of the nature of emergency response tasks comprise numbers of the diverse organization that are large in population across various levels and locations ([Xia *et al.*, 2011](#_ENREF_367)). Regularly, exclusive and surprising events often occur in each emergency. The decisions made based on their nature, persons that make them, information and data resources needed to make and monitor them, as well as the available location of knowledge to engineer them, may be unknown at times, unavailable or both ([Xia *et al.*, 2011](#_ENREF_367)). Many teams work in dispersed sites. Under time pressure, they have to make substantial decisions and ensure that task under pressure is coordinated ([Sophronidis *et al.*, 2016](#_ENREF_311)). Moreover, to ensure minimum socio-economic and environmental impacts, emergencies are needed to provide fast and effective treatment. In this context, there is a need for expertise to communicate, interact, and cooperate with one another. In addition, members of teams and decision-making managers, and authority from different fields and with varying backgrounds and expertise ([Luokkala and Virrantaus, 2014](#_ENREF_213)). Hence, the response operations carried out should be based on the relevant facts concerning the state involves, and therefore timely access to information is essential ([Luokkala and Virrantaus, 2014](#_ENREF_213)). Achievable emergency-response operations need proficient systems to withstand more efficient information sharing, communication, and coordination of the numerous safety agencies that are involved ([Sophronidis *et al.*, 2016](#_ENREF_311)).

Effective emergency communication can improve human responses during disasters and can prevent or lessen negative outcomes. First, emergency personnel need to be provided with information that allows them to cope efﬁciently and effectively ([Kehl *et al.*, 2014](#_ENREF_171)). The resources and the emergency procedures employed immediately after the disaster comprise the response stage ([Leiras *et al.*, 2014](#_ENREF_199)). The phase of emergency response is such that assistance is provided by most affected populations. This activity is immediate and short-term which often begins promptly after the disaster ends within a very short time ([Shafique and Warren, 2015](#_ENREF_305)).

The response phase is an action-oriented. When disaster strikes, there is an activation of the search and rescue measures. Some of the key activities in lace are the medical care, food distribution and evacuation shelter ([Maidin *et al.*, 2014](#_ENREF_217)). The relief stage involves in the emergency, is the actual time involved when emergency assistance is provided at the occurrence of the disaster with the goal of ensuring that a more intelligent rescue operation and evacuation efforts could save as many lives as possible. This also ensures the means at which foods and shelter are provided to the people ([Bashawr *et al.*, 2015](#_ENREF_30)). Minimizing the disasters effects can be done by the response phase through help rendering to people as quickly as possible as well as making sure any more losses are prevented while the support of the community in its effort to return to a normal state is carried out by the recovery phase ([Anaya-Arenas *et al.*, 2014](#_ENREF_22)). The emergency response goals are to make sure lives and properties are protected based on emergency equipment partitioning and supplies, evacuating potential victims, providing food, water, shelter, and medical care to those in need, and making sure public services that are critical are restored ([Shan and Yan, 2017](#_ENREF_307)).

Multiple teams involved in the emergency response management are required to coordinate their efforts and work at the multi-team level, for appropriately decision making on time. This will cause significant human and economic consequences ([Power and Alison, 2017](#_ENREF_276)). Due to time sensitive and challenging tasks involved in the decision-making, the emergency response requires the immediate and effective response that could provide decision makers surrounded by a variety of uncertain information and under huge pressures to effectively provide supportive information and judge the situation ([Shan and Yan, 2017](#_ENREF_307)). A significant challenge for emergency responders revolves around by providing timely and accurate information ([Kapucu and Haupt, 2016](#_ENREF_168)). From the above-mentioned problems regarding emergency response management, as it is well known, is a diversity of management complex problem diversity that includes agencies as well as members of teams required to ensure better collaboration, communication, and coordination associated with real-time and with an urgency. Which is not mostly found in the other domains. This confirm the need of, there exist precise information of varying kinds (e.g. available skills and expertise, geographical and weather conditions; current dispositions and deployments state-of-play) requirements to be made available to the organization in a timely fashion.

## Lack of Coordination and Communication during Disaster

Collaboration is the best and right approach while working in emergency situations. Timely, efficient, reliable information exchange is critical, which require flexible and accessible communication channels for such collaborations ([Power, 2018](#_ENREF_275)). To realize a collective performance, the broader definition of coordination is applied as “a temporally unfolding and contextualized process of tasks regulation and interaction articulation” ([Houtman *et al.*, 2014](#_ENREF_136)). The coordination includes “the activities responsible for ensuring the effectiveness of the collaborative work ([Kożuch and Sienkiewicz-Małyjurek, 2016](#_ENREF_184)). Activities that are coordinated comprising shared managing resources, segmenting and assigning tasks and information flows management are needed to make sure consistency are maintained within a project or to ensure dependencies manage activities. Therefore, functionalities coordinating for the member of the team include scheduling, calendaring, routing of information as well as progress monitoring of activities ([Lee *et al.*, 2009](#_ENREF_197)).

According to [Kotlarsky *et al.* (2014)](#_ENREF_182), a central feature of contemporary organizations is the effort applied in the coordination within and among diverse groups of expert. In fact, support given for coordination of such kind is viewed as one of the most significant contributions required for information systems towards the performance of the organization. In a similar way, [Krumay and Brandtweiner (2015)](#_ENREF_186) elaborated the coordinated and fast response with a view of the collection and access several kinds of data is key to successful flood disaster management. Many studies in the area have investigated coordination problems. One of this literature [Chandrasekhar (2012)](#_ENREF_49); [Al-Dahash and Kulatunga (2015)](#_ENREF_10), which unveiled that, to save lives and property, there is a need for disaster response efforts to making sure timely interaction of public emergency services are coordinated.

Also, per [Al-Dahash and Kulatunga (2015)](#_ENREF_10) elaborate further that, the issue of coordination when considering the aspect of the emergency response is given less attention by the research communities. This is one of the most important problems due to the fact that it influences life and property in most affected areas. In the same vein, [Glenn Richey Jr *et al.* (2009)](#_ENREF_110); [Cozzolino (2012)](#_ENREF_67); [Kabra *et al.* (2015)](#_ENREF_163) shared more light for ensuring better coordination among the response players, such that they would have reduced the impact of this calamity. In addition, better coordination help to provide the opportunity for analyzing situation more precisely as well can help to articulate a more robust better strategy for the welfare of disaster victims in the short term. Besides, inappropriate coordination in history could result to decrease in productivity as well as slowing the objectives ([Kabra *et al.*, 2015](#_ENREF_163)). Several literature consents of the significance of coordinated response activities to responding to the assistance of the individuals that are affected by the disasters ([Van Wassenhove, 2006](#_ENREF_347); [Kabra *et al.*, 2015](#_ENREF_163); [Power, 2018](#_ENREF_275)).

In a comparable way, the coordination of agency and groups in emergency response management is considered as one of the greatest challenge for these agencies and teams ([Power, 2018](#_ENREF_275)). Whilst, direct coordination is lacking among first responders, which can be viewed as one of the main problems of operation that could be experienced, when the system tends to respond to large-scale emergencies ([Salmon *et al.*, 2011](#_ENREF_296); [Rauner *et al.*, 2018](#_ENREF_282)). Furthermore, as put forward by [Saeed (2012)](#_ENREF_294), the problem that is the main concern in flood disaster response management lies at the coordination and communication of activities of diverse organizations that are both involved at the level of inter- and intra-organization. During an emergency response, operations and specialized operational expertise need to coordinate their actions across and organizational boundaries ([Wolbers and Boersma, 2013](#_ENREF_360)). It is well documented that the emergency response organizations and teams often struggle when it comes to information sharing, coordination, and communication ([Wolbers and Boersma, 2013](#_ENREF_360)). Coordination is one of the most commonly studied topics in disaster and emergency response, yet the capacity for coordination in emergency teams remains poor ([Power, 2017](#_ENREF_274)). Organization increasingly set up the multi-team project with the better understanding of inter-team coordination to ensure complex; large-scale projects are developed ([Crowston *et al.*, 2016](#_ENREF_70)).

The existence of various members of teams presents a set of skills and experience in emergency response that create a dynamic and complex environment ([Dorasamy *et al.*, 2017](#_ENREF_86)), which leads to complexity in flood emergency response that claimed coordinated teams’ tasks. The team of people working together for the purpose of coordinating their activity through these relationships is based on effective coordination strategy. The term teams are defined when two groups or more people interdependently interact both dynamically and adaptively especially having the same goal ([Bearman *et al.*, 2015](#_ENREF_32)). The understanding of team members regarding each other’s roles and responsibilities before an emergency occurs known as effective coordination ([Mohammadfam *et al.*, 2015](#_ENREF_224)).

It has become a great challenge for the organizations’ performance due to lack of coordination of various groups, and this has been recognized as a problem that is crucial and has been ignored. This has become widely accepted as the most crucial challenge that normally results in breakdowns from the response among teams ([Mohammadfam *et al.*, 2015](#_ENREF_224)). Managing emergency is difficult whereby success in such situations normally is most often dependent on the coordination of the team effectively. However, the breakdowns in the coordination of a team can result in significant disruption to an operational response ([Bearman *et al.*, 2015](#_ENREF_32)). Scholars have highlighted challenges associated with the coordination of specialized knowledge that is distributed among individuals in co-located or virtual teams ([Houtman *et al.*, 2014](#_ENREF_136)).

Failures in communication are considered one of the shortcomings in federal emergency response as regards to communication during the 2005 Katrina flood ([Al-Dahash and Kulatunga, 2015](#_ENREF_10)). [Ahmed (2011)](#_ENREF_7); [Kim and Hastak (2018)](#_ENREF_175) stated that flood emergency response is more effective for organizations having strong communication links inside and outside, as they put efforts to improve coordination and execution. Similar to communications channels must be established and sustained both at inter and intra-organizational level ([Ahmed, 2011](#_ENREF_7)). Communication links become the vital coordination lifeline during flood response and improve acceptability, and cooperative behaviors among involved organizations. However, multiple agencies and teams working for an emergency response may cause barriers to the field of communication, and overlapping roles can suffer from it ([Power, 2018](#_ENREF_275)).

Communication between all emergency responders has been established as a key factor that positively affects coordination as well as cooperation ([Van Gorp *et al.*, 2015](#_ENREF_346)). Hence, emergencies can be successfully managed by the barrier-free communication ([Fischer *et al.*, 2016](#_ENREF_99)). However, different tasks boundaries create obstacles for communication between organizational members ([Houtman *et al.*, 2014](#_ENREF_136)). The coordination problems faced when working across boundaries are due to the differences in actions, attitudes, and expectations ([Crowston *et al.*, 2016](#_ENREF_70)). At the organizational boundaries, communication and coordination often occur due to large systems that require knowledge from more domains and involve many more requirements that can be managed by a single team ([Crowston *et al.*, 2016](#_ENREF_70)).

To have better disaster planning, the emergency response focused on the execution of operations inter coordination and collaborations is the key ([Ahmed, 2011](#_ENREF_7)). Many literature consensuses of the importance of coordinated response activities to responding to the needs of people affected by disasters ([Van Wassenhove, 2006](#_ENREF_347); [Tsai and Yau, 2013](#_ENREF_339); [Kabra *et al.*, 2015](#_ENREF_163); [Shafique and Warren, 2015](#_ENREF_305)). Prior research has found that working across geographic boundaries may increase conflict and miscommunication ([Crowston *et al.*, 2016](#_ENREF_70); [Rauner *et al.*, 2018](#_ENREF_282)). To coordinates activities, the effectiveness of emergency response must solely depend upon its memberships’ ability to communicate among one another for the purpose of coordinating activities, share information as well making sure the best strategies are implemented appropriately ([Bergstrand *et al.*, 2016](#_ENREF_39)). The key factor in an emergency response work is based on its ability to make sense of dynamic situations, and it is reliant on communication ([Bergstrand *et al.*, 2016](#_ENREF_39)).

Given the flood disaster emergency failures, many challenges are as a result of what the responders have faced due to the many communication-related challenges, scholars have dedicated a considerable amount of attention on the role of communication in emergency response ([Netten and Van Someren, 2011](#_ENREF_234); [Allen *et al.*, 2014](#_ENREF_20); [Fischer *et al.*, 2016](#_ENREF_99)). Hence, effective communication can literally be a matter of life and death most especially under such stressful and highly dynamic situations ([Fischer *et al.*, 2016](#_ENREF_99)). In order to develop an effective management plan, we need to collect enough relevant information in some ways ([Francalanci *et al.*, 2017](#_ENREF_101)). Whenever information delivery is done too late, there is tendency that it may fail to prevent damages or losses whereby if too early, it could be neglected. Information and communications are highly diverse when considering the needs for emergency response as well as unpredictable situations thereby reflecting numerous purposes for information and communication as well as needs that occur at various times and positions in term of flood disaster ([Janssen *et al.*, 2010](#_ENREF_158)). It is therefore fundamental in term of communication to transfer information among peoples, agencies, and organizations. Hence, it is important to strategize and ensures decision making most especially in cases of complexity and uncertainty and risk ([Khan *et al.*, 2017b](#_ENREF_174)). Communication means sharing visions, attitudes, objectives, knowledge, information, and opinions ([Khan *et al.*, 2017b](#_ENREF_174)). When the floods disaster hit, most often the society is affected, thereby requiring fast and accurate management of information and communication to increase the efficiency and effectiveness of the efforts of the disaster management ([Krumay and Brandtweiner, 2015](#_ENREF_186)).

During an emergency, communication can be difﬁcult for various reasons. Therefore many sources of information can be all helpful, but they need to be integrated with each other to achieve better performance and provide real-time information that can be crucial during extreme events ([Francalanci *et al.*, 2017](#_ENREF_101)). The scholars pointed out that, having information that is relevant and expertise at the right time that has an acceptable degree of accuracy could be a key task for all teams as well as a level of organizations ([Munkvold *et al.*, 2015](#_ENREF_230)). The emergency response may target the wrong areas without accurate information on the impact of disasters and humanitarian needs and could result to the provisioning of unsuitable response items with unnecessarily delayed ([Tsai and Yau, 2013](#_ENREF_339)). Collaboration in work environments increasingly involves complex interactions between individuals and teams working across geographical locations ([Li, 2016](#_ENREF_203)).

The accuracy and speed that is mostly required for the compilation of information are based upon emergency response principles to making sure decision-making is attained. By looking at the flood disaster management point of view, it has been perceived that the knowledge management (KM) is an important element for the disaster-related data procurement ([Zakaria *et al.*, 2016](#_ENREF_379)). Thus, delivering disaster information technology to deliver disaster information between on-site and off-site locations is a good solution ([Tsai and Yau, 2013](#_ENREF_339)). In another development, flood disaster management, stresses the need for effective communication of life-saving information and knowledge as well as coordination among several and probably unknown roles and actors as well as collaboration among several groups through socialization in the emergency response phase ([Turoff *et al.*, 2011](#_ENREF_340); [Dorasamy *et al.*, 2017](#_ENREF_86)).

The importance of emergency response management in the field of Information System (IS) research views information and communication technology as the key component, which makes sure emergency response information systems are well design ([Dorasamy *et al.*, 2013b](#_ENREF_85); [Dorasamy *et al.*, 2017](#_ENREF_86); [Wamba *et al.*, 2017](#_ENREF_354)). Flood disaster management has established some innovation with the IS research, especially for coordinating activities, processing information, and communicating with a member of teams, level of organization and decision managers ([Krumay and Brandtweiner, 2015](#_ENREF_186)). Based on the above-mentioned problems this study focused on integrated specialized knowledge held by individuals using social media.

## Background of Flood Disaster Management in Sudan

In Sudan, the term of the flood as dangerous disaster is common term due to recurrence annually because of change in weather, social, and poor economic conditions, heavy and clustered population, and unawareness in public, and limited resources. In most of its parts, Sudan has a vast flat terrain; these make the risk of flooding increases as a result of local rains as well as the flow of rainwater from countries within the neighboring region ([Ifrcs, 2013](#_ENREF_148)). In addition, over 70% of Sudan falls within the Nile basin. As a major source of lively hood for the people, there is a great dependent on the Nile River with about 85% of the population ([Hamad and El-Battahani, 2005](#_ENREF_128)). The White Nile flows from Lake Victoria which is one of the main tributaries of the Nile River, in Uganda to South Sudan, therefore the cause of flood in Sudan is not just heavy rain in the country, but also the weather conditions of bordering countries such as intensive rains in African countries (Uganda, Eritrea, and Ethiopia) ([Rebelo *et al.*, 2012](#_ENREF_284)). Furthermore, according, to the Central Bureau of Statistics 46.5 percent of Sudanese were below the national population live in 2010 of 1,366 SDG/person/year. The estimated average income per month was 927 SDG, which does not reflect the demand of 66 percent of the families. There is a significant increase in the poverty rate among the rural communities with 57.6 while the urban people only experience 26.5 percent ([Bashier Abbas and K. Routray, 2014](#_ENREF_31)).

Sudan is facing yearly flooding in the months of June - September rainy season. The frequent flooding in Sudan represents a larger problem for many families in various areas of the country ([Ifrcs, 2014](#_ENREF_149)). The worst floods hit Sudan in 2017, 2016, 2013, 2007, and 1988. On 20 June 2017, heavy rains and subsequent flash floods have either destroyed or damaged 2,121 homes (affecting about 10,600 people) in North and South Darfur. In Shangil Tobaya town, 162 homes were destroyed (affecting about 800 people), and 89 were damaged (affecting about 450 people). In addition, 144 latrines completely collapsed in the town ([Ocha, 2017](#_ENREF_243) ). On 10 July 2016, continued heavy rain across Sudan caused a flood, which affected over 122,000 people. According to the Government of Sudan, 29 people were killed, and over 13,000 houses in many parts of Sudan were completely destroyed. It hit 15 - 18 states in Sudan, but the states that are most affected were Kassala, South Kordofan, Sennar, West Kordofan and North Darfur. There is an estimated cost of $242.7 million ([Ocha, 2016](#_ENREF_242)).

In the month of August 2013 in most instances, there is a significant rain experience, and heavier floods were subsequently noted and more extensive, affecting nearly a half million people countrywide as stated by Humanitarian Aid Commission (HAC) of Sudan. Over 85,000 houses were destroyed by the flood. The capital (Khartoum) has experienced its worst flood in 25 years as reported by researchers. Various agencies in their assessment have revealed that needs that are most critical which often affect people remained within the emergency shelter, health, and water as well as sanitation services. Most of the vital health infrastructures were destroyed, with the shortage of basic medical supplies. Furthermore, forty-nine people died, and seventeen states were hit with different impact and nearly 99,000 people have been affected. It cost over $7 million ([Ifrcs, 2014](#_ENREF_149)).

In July 2007, intensive rains in all of Africa caused an intensive flood, which caught several unprepared. As a result of this flood, at least half million individuals were affected. Furthermore, Twenty- two states were flooded. Moreover, approximately sixty thousand people lost their homes and over fifty-one thousand houses were damaged and become inhabitable ([Ifrcs, 2010](#_ENREF_147)). It cost approximately $ 6,233,533, approximately 500.000 people were affected and 200 people killed by diseases caused by the floods ([Ifrcs, 2010](#_ENREF_147)). According to [Ifrcs (2001)](#_ENREF_146), in 1988, floods came sooner than usual and are regarded as the worst in 20 years. It displaced over 7,000 families and destroying schools, mosques, and complete villages. The Sudanese authorities report that the worst affected region of the country was the north of the capital Khartoum in the River Nile State where more than 36,000 population lost their homes. The SRCS shared an assessment of the damage with, government authorities, UN agencies, and NGO that show that floods damaged about 70,000 acres of productive land in the Nile. It costed about $ 1, 09,553 ([Ifrcs, 2001](#_ENREF_146))

### Problems of NGO’s During Flood Disasters in Sudan

The immediate effects of an NGO influence the challenge of physically reaching victims. Physical infrastructure that is destroyed which includes the roads, railroads, and bridges that are affected by floods often make it difficult to reach out to the victims. Similarly, it also becomes difficult to reach out to the remotes locations or to operate in a country with little existing infrastructure. For instance, the sand-ridden roads in a country like Sudan formed major obstacles for the NGOs to attempt transporting large loads consisting of supplementary foods into the neighboring villages during emergency response ([Kabra *et al.*, 2015](#_ENREF_163)). In a flood response situation, it is often difficult to draw a conclusion on the fact that vulnerable people could have access to assistance and eventually take part in most decision-making process due to the fact that communications infrastructure are inundated while transportation logistics are seriously lacking ([Alam, 2008](#_ENREF_11)).

As the studies confirm that, the biggest problem faced by NGOs during a disaster in developing countries is the lack of communication ([Jahre *et al.*, 2007](#_ENREF_155); [Glenn Richey Jr *et al.*, 2009](#_ENREF_110); [Kabra *et al.*, 2015](#_ENREF_163)). NGOs in Sudan faces difficult similarity challenges faced by NOGs in developing country such lack of communication, collaboration, and coordination. In addition, teams are facing difficulties to access some areas cause of damages of the main roads. [Ifrcs (2014)](#_ENREF_149) Reported that, the Sudanese Red Crescent Society (SRCS) is the main overseer and coordinates the effort in Sudan's emergencies. Since the beginning of the emergency, there is a partnership between the SRCS and that of the Sudanese Government as well as other relevant agencies and international organizations to tackle the acute needs of the flood-affected population across Sudan. As a result of the flood, there is timely assistance provided to most of the affected areas through the floods response operation. It complains from how coordination, in terms of integrated information during phases of flood disasters ([Ifrcs, 2013](#_ENREF_148)). For example, NGOs teams are facing difficulties to access some areas such as Sharg Alnniel locality cause of damages of the main roads Additionally, NGOs on flood occurred on 2010, complains that communication with remote member’s units was hard, especially during the first phase of the emergency with roads blocked, and bridges damaged by the flooding, radio equipment was not functioning ([Ifrcs, 2010](#_ENREF_147)). There is a need for proper coordination at both national and local levels NGOs that is a necessity to ensure proper coordination nationwide ([Wiles *et al.*, 2005](#_ENREF_358); [Jensen and Hertz, 2016](#_ENREF_161)). During response flood in Sudan, UN there is a large-scale mobilized a large-scale by the international and local response team that helped to ensure that the relief supplies were able to reach out to people in need without looking at the problems of coordination as well as that of considerable expense.

Throughout the floods in Sudan, there are several challenges, which are intensified by both internal and external factors such as lack of communication, and coordination among team members is the most important. There is often an enormous constraint that is often posed as a result of difficult terrain and lack of infrastructure for organizing logistics. Similarly, the recurring inter-tribal clashes (most especially in the south) make it difficult to reach out to most flood-affected communities. In several months, some of the secondary roads remained waterlogged where the NGOs tent to struggling in order to reach out to the areas affected. Distributions of non-food items (NFI) in some areas, therefore, were delayed ([Ifrcs, 2013](#_ENREF_148)). The challenge faced by logistics staff also is associated with the phase of disaster relief they are currently in. Similarly, the intensity of challenges faced by disaster relief organization also identify is associated with the phase of disaster it’s in now. Accordingly to [Albahari and Schultz (2017)](#_ENREF_15) in Sudan when the flood hit, many individuals survive the initial disaster only to die later due to lack of access to basic public health resources such as shelter and clean water, due to incoordination on the activities during emergency response and lack of communication to provide accurate in information on proper time.

To enhance the entire problem mentioned above due to lack of coordination and communication, this study tackles this challenge by using social media to communicate members teams, share, and integrate the specialized knowledge of individuals inside the team, which improve teams performance.

## Knowledge Integration (KI)

Knowledge is a ‘justified personal belief ’ ([King, 2007](#_ENREF_177)). Knowledge is a critical resource for the ﬁrm ([Hemsley and Mason, 2013](#_ENREF_131)), and it can be considered as been strategically important to the firm’s resources ([Grant, 1996](#_ENREF_116)). Knowledge could be tacit or explicit. The tacit knowledge cannot be articulated in words, while knowledge that is explicit tend to describe knowledge that can be described using words as well as numbers ([Alavi and Leidner, 2001](#_ENREF_12); [Dorasamy *et al.*, 2013b](#_ENREF_85)). The knowledge that is explicit can be organized, and formally transmittable as a language that is systematic while for the tacit knowledge it is very hard to formalize as well as communicated in formal ([Nonaka and Peltokorpi, 2006](#_ENREF_237); [Takhtravanchi and Pathirage, 2015](#_ENREF_320)). Thus, explicit knowledge can be relatively easy to search and share with others in comparison to tacit knowledge, documented best practices, formal standards, mathematical formulas, training manuals, instructions, or simple factual information a common example for explicit knowledge ([Park and Gabbard, 2018](#_ENREF_269)).

Knowledge, especially tacit from expertise, and individuals’ actions ([Park and Gabbard, 2018](#_ENREF_269)). Such knowledge is revealed during action only, which originally resides in its application. In a team, each team member has different tacit knowledge based on the individual experiences, skills, and personal values and beliefs, this knowledge is a valuable resource for the team and it is important to team performance ([Ractham and Srisamran, 2018](#_ENREF_279)). There is a need for these kinds of knowledge to be collected, stored, and recombined to make a sure higher group of knowledge is created and integrated ([Alavi and Tiwana, 2002](#_ENREF_14)). As put forward by [Szulanski (1996)](#_ENREF_317), there is a tendency to achieving interaction, participation, and engagement by incorporating diverse’ kinds of knowledge.

In recent perspectives on KI, knowledge is described as inclusive of information, technology, know-how, and skills ([Grant, 1996](#_ENREF_116); [Haddad and Bozdogan, 2009](#_ENREF_121)). Information can be view as an organized part of knowledge, which is already captured in documents or electronic format. The term known as the Know-how, can be referred to as the knowledge of individuals that is either tacit or subjective which is established through experience that can be embodied or embedded in technologies, tools, and products. The term skills refer to the essential knowledge of individuals that is personal which often evolved as a result of practice and learning-by-doing ([Haddad and Bozdogan, 2009](#_ENREF_121)). With the support of knowledge in coping with daily works, it can also set up peoples to ensure situations are dealt with and utilize it each time it is required ([Obermayer *et al.*, 2017](#_ENREF_241)).

Knowledge itself cannot provide an advantage that is competitive; hence, effective application of existing knowledge tends to be the driver of values creation. In addition, improved organizational performance is not in any way engineer the transfer of knowledge creation, storage/retrieval, and transfer, rather, an effective application of knowledge ensure such occurrences ([Alavi and Leidner, 2001](#_ENREF_12)). While there is a direct influence on knowledge application towards organizational performance and value, the process has however received less attention as portrayed in most of the literature ([Cao *et al.*, 2015](#_ENREF_45)).

Therefore, the integration of knowledge has become a fundamental aspect of knowledge, which is referred to as the individual's specialized knowledge ([Cao *et al.*, 2015](#_ENREF_45)). KI is explained by reference to knowledge application ([Ahmad *et al.*, 2014](#_ENREF_6)). The KI process requests the knowledge to be practical in nature and applicable when needed by the organization (Grant, 1996). It involves the process of identifying knowledge of similar fields, integrates that knowledge to create a new knowledge that is able to deliver the expectation as solutions to problems or complexity of tasks. Furthermore, KI produces knowledge with certain documents that later archived in the repository ([Jane Austin, 2013](#_ENREF_156)). As discovered from the literature, the approaches of KI are carried out by either enabling communication-based on knowledge sharing or relying on structural mechanisms ([Enberg, 2012](#_ENREF_93); [Mäenpää *et al.*, 2016](#_ENREF_216)).

As a shown in Table 2.1, that presents a brief overview of how previous works define the KI and summarizes how it has been applied in tasks. [Alavi and Tiwana (2002)](#_ENREF_14) Define KI as the mixture of people has specialized knowledge that is often consistent with the systematic knowledge, which is situation-specific. Though other researchers sought that KI is the process of coordinating specialist knowledge ([Tiwana and Mclean, 2005b](#_ENREF_332); [Olivier, 2008](#_ENREF_249)), and the remaining have sought KI as a collective process such as ([Huang and Newell, 2003](#_ENREF_141); [Chirico and Salvato, 2008](#_ENREF_57); [Hong and Liang, 2015](#_ENREF_134)). Based on [Rodela *et al.* (2017)](#_ENREF_290) focused in KI that is a process of mixing and blending diﬀerent knowledge to produce an improved understanding of the issue at hand . [Huang and Newell (2003)](#_ENREF_141); [Hong and Liang (2015)](#_ENREF_134); [Yoo (2015)](#_ENREF_377) suggested KI has occurred through social interactions, while [Chen *et al.* (2017)](#_ENREF_53) defined KI as the synthesis of collective individual information derived from members of teams via social interactions. [Okhuysen and Eisenhardt (2002)](#_ENREF_244); [Lindgren and Widén (2016)](#_ENREF_207) argued KI is combined individuals knowledge to create new knowledge and as [Haddad and Bozdogan (2009)](#_ENREF_121) suggested KI applied to solve the problem. Table 2.1 shown different definition for knowledge integration.

Table 2.1 Knowledge integration definitions

|  |  |
| --- | --- |
| **Source** | **Knowledge integration definitions** |
| ([Alavi and Tiwana, 2002](#_ENREF_14)) | “The synthesis of individuals‟ specialised knowledge into situation-specific systemic knowledge”. |
| ([Okhuysen and Eisenhardt, 2002](#_ENREF_244)) | “The actions of group members by which they share their individual knowledge within the group and combine it to create new knowledge”. |
| ([Huang and Newell, 2003](#_ENREF_141)) | “An ongoing collective process of constructing, articulating, and redefining shared beliefs through the social interaction of organisational members”. |
| ([Tiwana and Mclean, 2005b](#_ENREF_332)) | “The coordinated application of individually held specialist expertise in the accomplishment of tasks at the project level”. |
| ([Olivier, 2008](#_ENREF_249)) | “Knowledge integration is the process of coordinating the usage of specialized knowledge in organizations, work units, and teams.” |
| ([Chirico and Salvato, 2008](#_ENREF_57)) | “a collective process through which different pieces of specialized knowledge from different individuals are recombined.” |
| ([Haddad and Bozdogan, 2009](#_ENREF_121)) | “Knowledge is transferred through knowledge integration, both tacit and explicit, across organizational boundaries, sharing it with individuals and teams at the recipient site, and applying the resultant knowledge to solve problems.” |
| ([Hong and Liang, 2015](#_ENREF_134)) | “Knowledge integration is an ongoing collective process of constructing, articulating, and redefining. Moreover, combining different types of component knowledge from the distributed environments into architectural knowledge with media-enabled interaction beyond the individual, which includes importation and synthesis of knowledge”. |
| ([Yoo, 2015](#_ENREF_377)) | “Knowledge integration is described as the “synthesis of individual team members’ information and expertise through social interactions.” |
| ([Lindgren and Widén, 2016](#_ENREF_207)) | “Knowledge integration involves the combination of new and existing knowledge”. |
| ([Li *et al.*, 2017](#_ENREF_201)) | “Knowledge integration refers to a particular form of dynamic capability that enables firms to develop learning processes directed at the exchange of information and resources between buyers and suppliers in the effort to provide sustainable offerings”. |
| ([Rodela *et al.*, 2017](#_ENREF_290)) | “ knowledge integration, deﬁned as a process of mixing and blending diﬀerent knowledge to produce an improved understanding of the issue at hand” |
| ([Chen *et al.*, 2017](#_ENREF_53)) | “Knowledge integration is defined as the synthesis of collective individual information from team members through social interactions”. |

Considering several definitions from the literature regarding KI, one can conclude that the KI could depend upon how people can integrate most of their individually held knowledge in such a way that such kind of knowledge could be integrated into multiple ways. For instance, sharing or combining knowledge, shifting knowledge in the group or asking others to contribute, individuals create new knowledge from the combination of the previous knowledge. As justified by [Tiwana and Mclean (2005b)](#_ENREF_332), though expertise is “owned” at the level of the individual, there is the tendency of integrating by individually held knowledge into team knowledge in order to explore it benefits. The significant of team knowledge occurs because of new knowledge that is derived from the interactions that often become an occurrence among team’s members, rather than based from knowledge of the individual gains a single team member ([Basaglia *et al.*, 2010](#_ENREF_29)). In other words, there is a need for individuals belonging to a team to integrate their knowledge, which is often shared at the team level for the realization of its value. The shared knowledge, coming from the various individuals, is accessible and sustained through media enabled interaction.

KI is quite effortful and requires a significant investment of team’s cognitive and social energies in activities such as combining multiple expertise and skills to develop a shared understanding of non-routine problems or blending new knowledge with what the team already knows ([Mehta and Mehta, 2017](#_ENREF_219)). Teams provide a viable platform for integrating knowledge across multiple domains ([Alavi and Tiwana, 2002](#_ENREF_14); [Robert Jr *et al.*, 2008](#_ENREF_289)). Team members possess diverse portfolios of requisite know-how, skills, and abilities, and teams perform KI to actively assimilate, combine, and synthesize these knowledge resources to achieve their goals ([Alavi and Tiwana, 2002](#_ENREF_14)). Furthermore, KI not only requires team members to jointly solve team-level problems, but also requires them to build on each other’s ideas, skills, and expertise, and to gain new learning for accurate decision-making ([Mehta and Mehta, 2017](#_ENREF_219)). Team performance is defined as the extent to which a team is capable of achieving the required quality and costs in a timely manner and performance can be composed of such indicators as finance, customer, internal procedures, learning and growth ([Chen *et al.*, 2017](#_ENREF_53)). According to [Mehta and Mehta (2017)](#_ENREF_219), prior research has affirmed that KI deeply influences team outcomes, such as creativity, despite this little of research focus that examine the influence of KI on both team effectiveness and efficiency outcomes (performance). The knowledge within an organization is highly distributed and not readily available where it is needed. Due to the design nature of the work for teams that are dispersed on the diverse location. The problem of dispersed knowledge advocates that the value attached to the integration of knowledge that denotes the combination and systematization of individuals’ knowledge, which make it available to others as context-sensitive and valuable knowledge ([Loebbecke and Myers, 2017](#_ENREF_208)).

The domain associated with the KI has been discussed extensively by several researchers over a few decades ago. [Grant (1996)](#_ENREF_116) Elaborated further that, KI within an organization is seen as a process upon which knowledge is integrated based on the experts amid the employees. There is a greater emphasis on grant’s approach, which is based on knowledge application compared to knowledge creation. Further elaborated that the KI is a problem-solving process, which involves how organizational perceptions analyze actors’ activities as well as practices. Viewing from diverse angles, [Enberg *et al.* (2010)](#_ENREF_94), explored the dynamism of KI from the perspective of acting and interacting with project teams. KI will deliver the creation of new knowledge and improvise existing knowledge for the purpose of decision- making ([Rodzi *et al.*, 2016](#_ENREF_291)). In KI term it is important to get group member action that shares and combine their knowledge to construct knowledge, which consists of the combined knowledge emerged from the interactions besides the individuals’ knowledge ([Okhuysen and Eisenhardt, 2002](#_ENREF_244)). KI, which is a form of interaction among knowledge resources, is the very essence of organizational capabilities ([Taher, 2012](#_ENREF_319)).

The process of integrates knowledge which could promote a common understanding of the objectives of the task and make sure those objectives are reached ([Sandhawalia and Dalcher, 2016](#_ENREF_298)). The integration of business firms’ needs people to organize their actions, help to ensure critical knowledge related to business are shared as well as help one another most especially in a complex situation ([Caya *et al.*, 2014](#_ENREF_48)). Expertise integration can be defined as the harmonized application of people’s specialist in the accomplishment of tasks at the project level”. Expertise coordination fosters team performance ([Yoo, 2015](#_ENREF_377)). Team performance is not a just function of having the right expertise and skills, but as a result of coordinating it ([Yoo, 2015](#_ENREF_377)). The literature is addressing integrating knowledge across specialized organizational units, which has viewed coordination as dependent upon the characteristic of the process of the technology deployed (Grant, 1996). This description can be seen in the procedure unveiled by the Grant which is called formal mechanisms, that include: rules and directives, routines, sequencing, group problem solving and group decision-making ([Sousa, 2014](#_ENREF_312)).

### Knowledge Integration as Strategy on Emergency Response

In the context of emergency response, there should be an awareness in team members on the performance implications of their actions as well as the increase in understanding of these causal links to introduce all services during response flood disaster ([Zollo and Winter, 2002](#_ENREF_386); [Tsai *et al.*, 2015](#_ENREF_338)). Hence, an individual’s knowledge is expressed via cooperative discussion and routine processes for evaluation. In addition, employing formal mechanisms enables team members to organize their performance implications and codify their routines by means of memos or other forms of written tools ([Zollo and Winter, 2002](#_ENREF_386); [Denisi, 2003](#_ENREF_77); [Tsai *et al.*, 2015](#_ENREF_338)). The tools can henceforth serve as a procedure of the main direction towards coordinating the development of a novel routine. Moreover, codifying knowledge could be anticipated to help members of the team in recognizing further as well as understanding the casual link among most decisions and the expectation of the outcome based on performance. Based on articulating knowledge in face-to-face meetings, past experience can be analyzed by the team members for ensuring that opinions of the individuals are expressed which could possibly challenge each other's viewpoints ([Tsai *et al.*, 2015](#_ENREF_338)).

The integration of knowledge is realized through the process of synthesizing variable expectations as well as the expertise at the period of decision-making processes, thereby enabling diverse views to be merged. Members of the team bring diverse sets of expectations based on the optimal ways to proceed, thereby prioritizing diverse values as well as perspectives that are united among the process to which the solutions are to be developed ([Sandhawalia and Dalcher, 2016](#_ENREF_298)). Tasks required to handle emergencies are not the simple, rather they are ever demanding and inherently mesh-linked ([Becerra-Fernandez *et al.*, 2007](#_ENREF_34)). Similarly, the happening of events is most often on un-common and unique based on their associated attributes. According to [Zakaria *et al.* (2016)](#_ENREF_379) accuracy and the speed required to gather information to enable decision-making in emergency response flood. Furthermore experiences of the past and decisions are taken need to be recorded in a manner that is accessible, even though there is most likely that they will not match all issues at hands. Frequent expectation will be low; the events of emergency will require unique handling by experienced personals ([Becerra-Fernandez *et al.*, 2008](#_ENREF_35)). The collection and recording of experience is not actually a task that can be regarded as being simple; there are certain challenges like decisions types, who took, where they were executed, what were data members associated, what was the information generated, which resources were employed and where is the interlinked knowledge. Furthermore, the handling of the emergency requires coordinating and performing with different organizations and teams working with diverse objectives and geographical areas ([Becerra-Fernandez *et al.*, 2008](#_ENREF_35)).

There is wide recognition in the difficulties of managing emergency tasks; this often results due to lack of framework that helps in describing as well assess both complex, dynamic and inter-organizational nature that is involved in an emergency response tasks ([Ishak *et al.*, 2014](#_ENREF_153)). Likewise, the chances towards misunderstanding might be higher most especially when considering the nature of assessing and rating the emergency process while breaking it into tasks of the emergency response in order to relate it with the knowledge. The privileges involved in the emergency response comprises of proper assessment and quantification, conceptualization involves in the emergency response activities in such a way to formulate the actions involve for an organizations’ plans while making sure the procedures are activated which need to help to carry out their function. Due to the significant number of information and knowledge required to ensure quick assessment and decision-making, the emergency response involves knowledge that is most intense, identification and sharing across diverse organizations and locations ([Becerra-Fernandez *et al.*, 2008](#_ENREF_35)).

[Tiwari (2015)](#_ENREF_333) Stated that the coordination of knowledge is a very significant intermediate process of integrating knowledge, most especially when considering multi team’s environment, where presupposes collaboration is established. This calls for a KI process as well as for good communication, coordination, and cooperation within emergency response management teams ([Körner *et al.*, 2016](#_ENREF_180)). [Grant (1996)](#_ENREF_116) Discovered that the KI within an organization forms a process that expert’s knowledge can be integrated among the employees. From a diverse point of view, KI is defined as the process where within an organization; peoples organize the use of their respective knowledge. In addition, it can be regarded as the core concepts involved in the knowledge-based view of the firm. [Grant (1996)](#_ENREF_116); [Caya *et al.* (2014)](#_ENREF_48) put forward individuals’ knowledge and expertise as the most precious assets needed for any organization as well as the key factor for optimization powerful capabilities and teams’ performance. However, while there is an establishment of the virtual teams in support of KI, from the general point of view, the virtual collaboration environment has been recognized to inhibit the team’s knowledge processes. Similarly, the geographic dispersion provides a hindrance to the team members to create, transfer, share, store, and apply knowledge ([Fang *et al.*, 2014](#_ENREF_96)). However, there is a need for KI when knowledge is specialized and dispersed among individuals to solve complex problems ([Mäenpää *et al.*, 2016](#_ENREF_216)).

During the occurrence of the flood, the teams work in dispersed places that faces difficulties to share and exchange knowledge face-to-face. Latest technologies can help them a lot in obtaining real-time information and integrated the knowledge on accurate time. For example, the social media ([Francalanci *et al.*, 2017](#_ENREF_101)). The interaction with social media permits participants to as well freely produce, locate, organize, and share content. In the platform of the social media, it is open, and the participatory nature can be considered as the best exemplified (Facebook, Twitter and WhatsApp) where collaboration among people can be carried out to create, compile, and update knowledge. In this regards, there is a sense of knowledge in virtual communities as created by the social media, which formed the collective knowledge resulting from the integration of knowing among community members ([Cao *et al.*, 2015](#_ENREF_45)).

## Social Media (SM)

In the last twenty years, as a self-organizing an open-activity, the SM platform establishes a shared practice using IT-mediated communication. The SM platform guarantee set of IT- enabled capabilities where the information exchange is encouraged.

The enabling technology can be seen in the number of people connected while considering the quality of the processed information on the platform ([Shang *et al.*, 2017](#_ENREF_308)). Existing studies elaborated on the SM as “the set of platforms that enable people to connect, communicate, and collaborate ([Jue *et al.*, 2009](#_ENREF_162); [Hemsley and Mason, 2013](#_ENREF_131)) and share experiences ([Katzy *et al.*, 2012](#_ENREF_170)). The SM platforms comprise of Wikipedia and Facebook with integrated interactive mechanisms that permit sharing of information among individuals while Internet content is retrieved in a virtual learning and collaborative environment ([Shang *et al.*, 2017](#_ENREF_308)). Per [Hemsley and Mason (2013)](#_ENREF_131) stated that the social media could as well ensure the facilitation of collective actions that often lead to institutional changes.

Moreover, the internet tools could help in reducing the cost involve in the process of social exchanges while permitting social interaction to become much easier, more usage; and as such, based on how individuals communicate with each other, the variety of platforms tend to provide increased ﬂexibility. Furthermore, dynamic and complex information infrastructure is easily created by the social media, which is faster, and more widespread sharing of information, as well as changes our ability to work and organize ([Hemsley and Mason, 2013](#_ENREF_131)). Organizational members often explore the social media platform to contact each other, facilitating superior and faster information within the firm and in interaction with team’s members or between teams ([Benitez *et al.*, 2018](#_ENREF_37)). With these large volumes of data, the social media enables more visible communication and superior information flows ([Limaj *et al.*, 2016](#_ENREF_205)).

Through instants information sharing and collaborative feature, the social media's instant connectivity, and open platform have successfully shortened response times in efforts to coordinate onsite and online activities ([Kaewkitipong *et al.*, 2016](#_ENREF_165)). The social media can provide necessary data collection that is timely and widespread for improving situational awareness during serious situations and provides a reliable communication channel with each team members ([Luna and Pennock, 2018](#_ENREF_212)). The tasks of the teams are facilitated through social media and collaborate with the teams instead of face-to-face meetings ([Yang *et al.*, 2018](#_ENREF_371)).

### 2.6.1 Social Media in emergency response

Some of the prominent issues involved in the disaster management are a common platform to allow the flow of information seamlessly, and the absence of the system that is integrated for the support of emergency activities ([Dorasamy *et al.*, 2017](#_ENREF_86)). According to [Francalanci *et al.* (2017)](#_ENREF_101), an important aspect to achieve emergency response is an information exchange, sharing and coordinating actions in the shortest possible time. For addressing these issues, latest technologies can help a lot to obtain real-time information, in particular, social media.

The scale-free network topology formed the backbone of social media. Therefore, the properties of the network permit the dissemination of information at faster rates that can support emergency response during its operational phases. At a point of emergency situations, the information forms the key for coordination, response, and recovery actions. The information not provided on time could lead to life and death or millions of dollars lost in infrastructure. There is agile coordination support by the social media among participants before, during, and after a disaster ([Luna and Pennock, 2018](#_ENREF_212)). In varying situations, the social media can be used in time of crisis because of their information sharing capability. Information can be shared among the citizens, coordinate diverse disaster-relief events while collaborating to execute these events ([Kaewkitipong *et al.*, 2012](#_ENREF_164)). In the emergency response, the social media has gained significant interest, since the first time they were employed in 2005 during Hurricane Katrina ([Houston *et al.*, 2015](#_ENREF_135)). Similarly, it has been observed that during disaster, individuals explore social media as a means of communication due to its ability to continue operating even when other methods fail ([Luna and Pennock, 2018](#_ENREF_212)). Some types of knowledge are most readily shared through direct interaction. To this end, SM can occur among participants before, during, and after a disaster ([Luna and Pennock, 2018](#_ENREF_212)).

In times of a crisis, disaster, or extreme events, affected people can use social media solutions to share information about the situation. Hence, the use of this information for supporting humanitarian operations is becoming a valuable source to develop a real-time understanding of the situation ([Mukkamala and Beck, 2016](#_ENREF_229)). In case of disaster, social media can play a crucial and promising role in the participation of public to respond to a hazard. The implication of social media for this aim can lead to a quicker decision cycle and a more reliable and comprehensive knowledge source ([Edenius *et al.*, 2010](#_ENREF_90)). SM is a prominent platform for creating a real-time communication bridge used to share knowledge in the face of natural disasters and man-made disasters ([Ahmed *et al.*, 2018](#_ENREF_9)).

SM is applied to include the repurposing of knowledge for new and innovative uses. It permits the greater conversion of knowledge to be used on a scale that is more space. Through the social media’ ability, the extended boundaries were spanned for sharing and transforming knowledge. As a result of the practices on how knowledge should be managed were altered based on an enhanced social dynamic which is normally created by the system ([Yates and Paquette, 2011a](#_ENREF_372)). In a case that is so complex, the knowledge needed there can be a combination of tacit personalized expert knowledge, which is normally spread across several stakeholders. The tacit knowledge is personal, context-specific, and difficult to transfer without shared in social interaction ([Mäenpää *et al.*, 2016](#_ENREF_216)). There is an increasingly used of the social media to enable sharing of information during disasters and emergencies ([Yates and Yates, 2016](#_ENREF_374)). Such sharing of information includes knowledge sharing to and from the public ([Palen *et al.*, 2010](#_ENREF_263)) and among organizations that comprise of government, non-government and corporate ([Alberghini *et al.*, 2014](#_ENREF_17); [Graham *et al.*, 2015](#_ENREF_115)). For multi-organizational projects involving cross-border cooperation and cooperation across space, social media can greatly enhance team communication, relationships and performance ([Yang *et al.*, 2018](#_ENREF_371)).

In addition, SM provides collaboration and communication tools to connect people ([Loebbecke and Myers, 2017](#_ENREF_208)). In the disaster area where the NGOs operates, they are normally involved in the intra-organizational and teams communication based on the use of the social media like (messaging apps like WhatsApp), for interaction among their groups, which help towards realizing data that are meaningful for the purpose of situational analysis and need assessment ([Debnath *et al.*, 2016](#_ENREF_75)). For instance, Queensland Police Services (QPS) make use of social media as their strategic tools to share relevant information, most especially during and/ or after the Queensland floods.

The communities within the local region also relied significantly on these tools to make sure the latest flood information are gain, so that friends can be kept in touch with their families ([Taylor *et al.*, 2012](#_ENREF_325); [Ahmed and Sinnappan, 2013](#_ENREF_8)). On September 4th, 2010, there is a great utilization of social media in tackling the earthquake in Canterbury by many New Zealanders where experiences are shared, and the information is gathered as well. There were virtually more than 27,000 comments that were made available on sites like the Twitter and Facebook that received virtually greatest posts to a public forum, with photos and video ([Rive *et al.*, 2012](#_ENREF_288)). Beside, above a hundred sites were put up to support efforts for earthquake recovery and response. Many social network websites became alive in direct response to help the affected people to share and integrate knowledge. For example, many websites helped to find residences for people in search (e.g. ‘find a room’ by finding a room danielwylie. me or Google Person Finder). Another area is a provision of a website where people can exchange information regarding each other and still it is searchable. Missing people can be found using the Internet too, and the message can be sent to them ([Rive *et al.*, 2012](#_ENREF_288)).

One of the greatest roles of the social media evolved after the catastrophic Haiti earthquake on 12 January 2010. There are numerous publications published by individuals based on texts and photos that involve their own personal experiences during the period of the earthquake through social media sites such as Facebook, Twitter, Flickr, and blogs, and videos were posted on YouTube. Within the period of virtually 48 hours, the organization of Red Cross received US$8 million directly in donations from texts messages, which shows one of the benefits on the powerful propagation capability display of the SM sites ([Gao *et al.*, 2011](#_ENREF_107)). Combating and managing emergency disaster through the social media has become a new global phenomenon. SM has been explored in its roles towards combating several recent disasters that natural. SM itself has established itself has been one among the important information carriers in the field of disaster management ([Debnath *et al.*, 2016](#_ENREF_75)).

SM has been used for coordinating and facilitating knowledge most especially by the disaster response management. During Hurricane Katrina that took place in 2005, the prevalence of social media in facilitating disaster relief has grown exponentially. Through it adaptation, there was a great help in collecting online knowledge which helps in finding missing persons and locate emergency housing as well as coordinate the participation of the volunteers in disaster-relief ([Goldfine, 2011](#_ENREF_111)). Besides, there is a guarantee for disaster responders in using social media during a disaster to pass most information that is very critical, volunteers and help reconnect families. The use of social media enables people to share partial information most especially in a disaster-prone area, and these may contribute to the fuller understanding of a disaster through the continued addition of information. Furthermore, social media has proven its productivity during the emergencies by providing people with information about the disaster planning, guidelines of survival, routing to rescue centers ([Palen *et al.*, 2009](#_ENREF_264)).

Unprecedented utilization of social media applications, especially Twitter and Facebook, during the Queensland (Australia) has been observed in term of floods most especially in the year 2010-2011. There are many success stories involving the use of social media applications from the survivors during such disaster ([Yanay *et al.*, 2011](#_ENREF_369); [Rive *et al.*, 2012](#_ENREF_288); [Ahmed and Sinnappan, 2013](#_ENREF_8)). There is significant growth in the social media in the forms of communication that presents an opportunity for emergency managers. Access to timely, accurate, and consistent information is of high importance in emergency events ([Leadbeater, 2010](#_ENREF_194); [Rive *et al.*, 2012](#_ENREF_288)).

From the previous studies, the response phase of flood disaster management has received the most attention on the use of social media in disaster management. Thus, social media plays a crucial role in the occurrence of the flood disaster ([Ngamassi *et al.*, 2016](#_ENREF_235)). Through social media, the affected people and emergency teams could be supplied with information about the specific situation in the town such as roads and traffic conditions and where to gain access to essential supplies ([Rive *et al.*, 2012](#_ENREF_288)). In all cases in many countries and different types of disaster, social media plays a vital role in emergency response. With the emergency floods disaster risen up globally, taking more lives and devastating valuable resources, disaster communication is being reshaped too; social media is one of the components providing basis and connectivity to fight with emergencies ([Ulmer *et al.*, 2014](#_ENREF_343)).

The importance of social media and associated information in emergency response represents a focus on enormous literature. Many researchers recognized that social media could create awareness and flexibility for disaster response by the people of the area ([Yates and Yates, 2016](#_ENREF_374)). According to [Wamba *et al.* (2017)](#_ENREF_354) SM have been considered as pioneering for an emergency service operation. Furthermore, to narrow the gap in response time among on-site and online emergency response activities, the social media is helping in that regards. This is because of their instant connectivity on the open platform ([Kaewkitipong *et al.*, 2012](#_ENREF_164)). These connectivity and open platforms have effectively ensured response time is shortened in efforts to coordinate onsite and online activities ([Kaewkitipong *et al.*, 2016](#_ENREF_165)).

### Social Media Usage for Knowledge Integration

In view of the emergency response context, the IS used to ensure ER knowledge are capture and reuse through the process that involves the application of knowledge derived from the previous experience to support decision-making in ER. The effective decision-making can result in the efficiency of the organization as well as its effectiveness ([Jennex, 2012](#_ENREF_160)). Obviously, Information Systems (IS) has the capability of making sure the prominent ER issues are easy to solve that include the lack of coordination and collaboration (3Cs), integrated systems and poor communication ([Turoff *et al.*, 2011](#_ENREF_340); [Dorasamy *et al.*, 2017](#_ENREF_86)).

Researchers have unveiled that the IS has the capability to provide real-time accessibility, visibility, and availability of information and knowledge ([Dorasamy *et al.*, 2017](#_ENREF_86)). With the need to understand that, every function required sufficient communication results to the combined knowledge needed for the improvement of a team of flood management ([Zakaria *et al.*, 2016](#_ENREF_379)). The Information and Communication Technology (ICT) is considered as one of the main enablers of knowledge sharing activities ([Panahi *et al.*, 2013](#_ENREF_268)). The existing literature considered the social media technologies as being more encouraging in term of the knowledge management of the firms’ as a result of their presence and interactivity towards assisting effort of the firms’ management knowledge ([Mueller *et al.*, 2011](#_ENREF_228); [Pan *et al.*, 2015](#_ENREF_265); [Benitez *et al.*, 2018](#_ENREF_37)).

With the development of social media, tools that comprise of blogs, online social networks, and wikis, researchers have argued that the technology provides novel opportunities for facilitating the sharing of both tacit and experiential knowledge among experts ([Wagner *et al.*, 2014](#_ENREF_352); [Panahi *et al.*, 2016](#_ENREF_266)). Social media platform provides the means of ensuring the creation of a social communication infrastructure that enables users to discover and share information, knowledge, collaborating, facilitating collective actions, and communication between members of teams at the organizational level ([Hemsley and Mason, 2013](#_ENREF_131)). Numerous processes involved in the widespread distribution of knowledge that arises from the emergence of new innovations can be ease using the social networks together with the communication instrument ([Zakaria *et al.*, 2016](#_ENREF_379)).

Since the SM is the potential tool for sharing knowledge that combat the flood disaster. To have clear understanding in emergency response it should be used effectively ([Kaewkitipong *et al.*, 2016](#_ENREF_165)). For instance, considering the Facebooks feed, it shows updates from friends that comprises text, hyperlinks, and/ or photos, that are embedded or content of the video. One of the way of promoting such service ids to easily link together with other services through hyperlinks, thereby ensuring the distribution of content across platforms based on the minimal effort ([Hemsley and Mason, 2013](#_ENREF_131)).

The teams provide a platform for the team member’s diverse’ knowledge as well as the expertise, which is required to be assembled, applied to the organization that is complex in tasks and integrated. In addition, formal organizational structures are not followed by a large amount of KI; instead, it depends on relationships that are interpersonally developed based on informal interactions ([Cao *et al.*, 2015](#_ENREF_45)) such a social media. While knowledge per se resides solely in the minds of individuals. The knowledge within an organization is highly distributed and not readily available where it is needed. The value of KI (KI) as suggested denotes the individual's knowledge that is combination and systematization ensuring it becomes available to others as valuable, context-sensitive knowledge ([Alavi and Tiwana, 2002](#_ENREF_14); [Loebbecke and Myers, 2017](#_ENREF_208)).

[Grant (1996)](#_ENREF_116) Stated that the specialized integration knowledge of the individuals is the focus of the organizations’ capability. [Hong and Liang (2015)](#_ENREF_134) Discovered that the integration of individuals depends on how participants integrate and know their individually held knowledge. The procedures of the KI are eventually based upon the micro-social interactions that go beyond people having various communication media.

Accordingly, in this research, social media is a platform that can be used to facilitate sharing knowledge between individual’s teams and combine individuals’ knowledge together to create new knowledge, which can help to solve the emergency response problems. KI is done through a process of sharing knowledge from individual’s teams dispersed on many areas in social media platform to where it is required, joining it with already existing knowledge for its application to making the sure a complex task are accomplished and ensure major problems are solved.

The ubiquity of social media has caused an application that is most extensive. There are several companies that are exchanging their mastery of social media, thereby ensuring their utilization for improving operations as well as making sure the new market's opportunities are explored. From the point of view of flood disaster management, knowledge management (KM) has been an important element in the obtaining of disaster data ([Zakaria *et al.*, 2016](#_ENREF_379)). Meanwhile, some complementary insights are provided by the academic-based o knowledge management in social media’s influence ([Fung and Hung, 2013](#_ENREF_102); [Cao *et al.*, 2015](#_ENREF_45)). Regardless of these growing interests, knowledge integration in social media is overlooked in previous literature ([Cao *et al.*, 2015](#_ENREF_45)).

## Consideration of the Potential Theories and Models

Since this study seeks to establish a theoretical model that can be used to explain the factors influencing performance of teams during emergency response and understand the relationship between the utilization of social media in order to integrate individuals’ teams’ knowledge. The following Subsubsection covers and describes the theories and models which were found during the review.

### Knowledge-Based Theory of the Firm

[Zakaria (2011)](#_ENREF_378) elaborated that, from the literature, 240 articles were critically analyzed for identifying the widely used theories that are in line with the knowledge management. From their results, the researchers were able to identify five theories as well as Knowledge-Based Theory (KBT) associated with the firm, resource-based theory, organizational theory, grounded theory as well as the theory of social exchange. According to their results, the KBT was actually one of the most cited in KM research, and then the organizational theory follows, grounded theory, resource-based theory, and social exchange theory respectively. Figure 2.2 illustrate all the employed theories in the KM articles, thereby showing most of the five most cited theories. The number of articles that are most cited is referred to as the -axis, while the theories are shown on the -axis. As seen from the figure, the KBT shows that it was top-ranked in KM studies with more than 25 citation compared with other theories that has less than 10 citations.

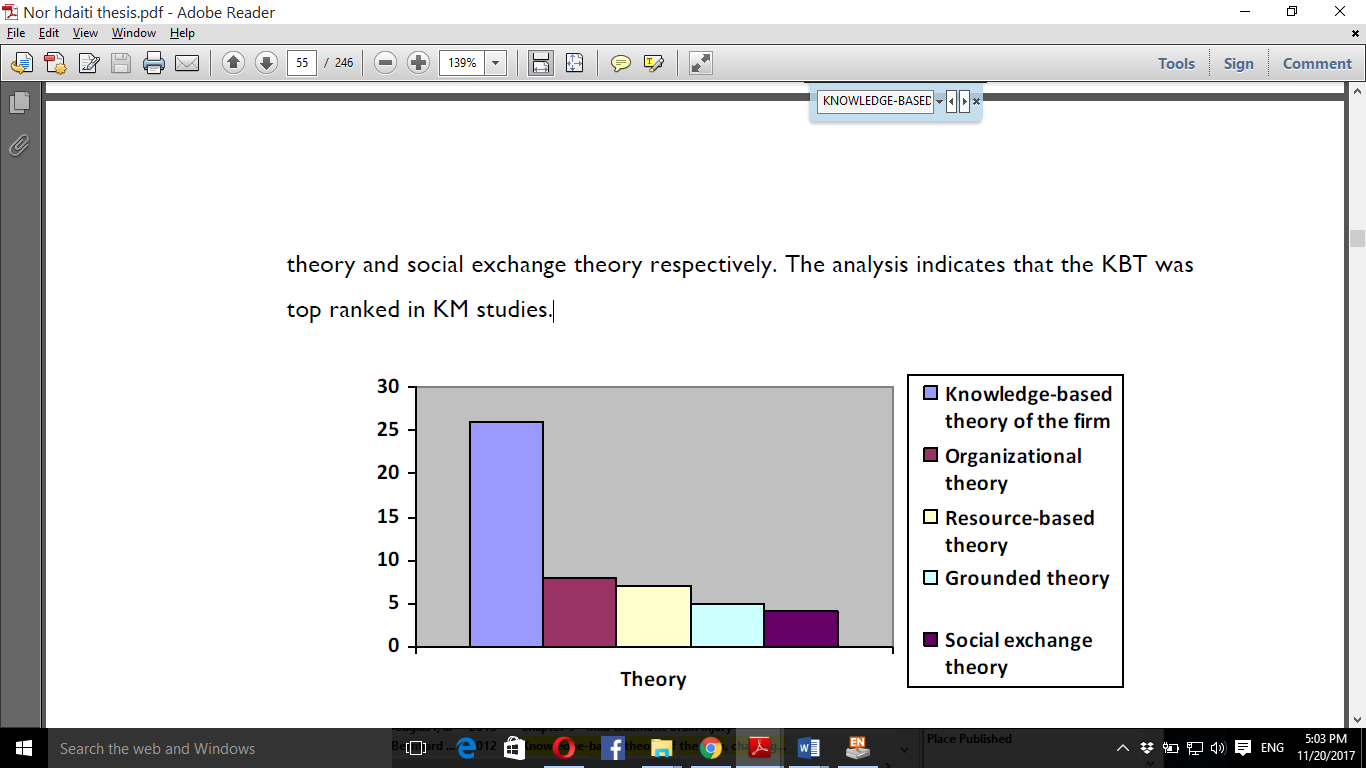


Figure 2.1 The theory used in knowledge management articles (Zakaria, 2011)

In recent studies the researcher analyzed 320 articles ranging from 2011 to June 2018. By using Google Scholar as online database, two search operations were conducted. The first search operation was conducted using five keywords; knowledge management “Knowledge-based view of the firm” or “Knowledge-based theory of the firm” or “knowledge-based perspective of the firm” or “Organizational Learning Theory” or “Organizational Theory” or “Social Exchange Theory” or “Resource-Based Theory” or “”The resource-based view of the firm”. From the results, a new theory emerged in many studies which is social capital theory. Therefore, a second search was conducted using six keywords, the previous keywords and social capital theory, as an additional keyword.

The result of the review compared with above-mentioned studies highlighted six theories as the most addressed by scholars in Knowledge Management (KM); KBT associated with the firm, resource-based theory, organizational theory, grounded theory, social exchange theory and social capital theory related to social interaction. From the findings, the KBT was still the most addressed theory in KM research, followed by the organizational theory and grounded theory, then social exchange theory and Resource-based theory, and finally social capital theory. Figure 2.3 summarizes all the employed theories in the KM articles, thereby showing the six most addressed theories. The number of articles addressed is referred to as the -axis, while the theories are referred to the-axis. From the analysis of the results, the KBT shows to be at the top rank while the social capital theory at the lowest rank in the KM studies.

Figure 2. 2 Most applied theories in knowledge management

The research conducted by [Grant (1996)](#_ENREF_116) unveiled the extended version of Resource-Based View (RBV) that is, the theory associated with the KI with mostly focusing on the addition of values internally. Grant’s theory of KI is coordinate and integrates the specialized knowledge held by individuals ([Huang and Newell, 2003](#_ENREF_141)). The critical factor that is affecting the firm’s competitive advantage is viewed as the KI ([Grant, 1996](#_ENREF_116)). KBT describes knowledge as the primary strategic resource, which, when properly managed, allows the firm to create value from its utilization of production ([Donate and De Pablo, 2015](#_ENREF_81)). The advantage of the KBT represented in the applied knowledge rather than the knowledge itself, which is the source of competitive advantage ([Alavi and Leidner, 2005](#_ENREF_13)). In order to ensure that, competitive advantages are created, there is need for a firm to create new knowledge through the process of exploring and exploiting the knowledge acquired ([Hsu *et al.*, 2013](#_ENREF_140)). However, the most assumption in-line with the KBT shows that the advantages of the firm-level competitiveness show that it needs to be had from knowledge, more precisely looking from tacit knowledge perspective ([Alavi and Leidner, 2005](#_ENREF_13)). The knowledge that is residing in each individual through collective discussions is very articulated as well as on the part of the performance evaluation processes. Secondly, team members tend to codified their knowledge to understands the implications of performance routines based on the use of written tools which comprises of either memos or reports that are formal ([Tsai *et al.*, 2015](#_ENREF_338)). Also, knowledge in term of codifying could help members of the team to recognize further as well as understand the causal link between expected performance outcomes and decision. Therefore, the documentation in its part can eventually lead to clariﬁcation of action-outcome relationships ([Lechner and Floyd, 2007](#_ENREF_195)). Furthermore, KI has strategic implications in formal structures and processes. Firstly, the application of formal mechanisms permits members of the organization to acquire knowledge. In a face-to-face meeting, by acquiring knowledge, the members of the team ensure past experience are analyzed with a view for individuals to express their opinion that could possibly challenge the point of view of each other. Members of the team become even more aware of the implications of their actions and increase understanding of these causal links ([Tsai *et al.*, 2015](#_ENREF_338)). These links are known as knowledge integration mechanisms.

#### Knowledge Integration Mechanism

To integrate knowledge, members must follow the integration mechanisms, abiding rules, following directives, going in set routines and obeying formal protocols targeted to synchronize the work of employees. Hence, this process focuses mainly on how individuals can reveal effectively their knowledge based on its unique and complementary with better coordination to carry their assigned task ([Caya *et al.*, 2014](#_ENREF_48)). According to [Grant (1996)](#_ENREF_116), there is four mechanisms coordinate knowledge to integration such as mechanisms: i)sequencing, ii) rules and directives (communication, manual, directives, policies, procedures), iii) communication independent routines, to develop sequential patterns of interaction that permit the integration of the knowledge base without the need for communicating the knowledge; and iv) Unit based problem-solving and decision-making ([Grant, 1996](#_ENREF_116)).

Yet despite disasters are impossible to avoid, preparedness, and having proper knowledge and information to handle and recover from disasters is the possibility to minimize the impacts of disaster ([Dorasamy *et al.*, 2013b](#_ENREF_85)). While [Lindgren and Widén (2016)](#_ENREF_207) elaborated further that, [Grant (1996)](#_ENREF_116) defined mechanism as a departure point where a scale of integration of specialized knowledge is achieved from a scale of low to high interaction. Some methods such as rules and directives are un-personal which includes the schedules, plans, rules, forecasts, policies, as well as systems that are communication. The production activities’ organization is a treat, which can result from sequencing to ensure the whole specialist, was able to do what he or she should. Therefore, routing performance is done automatically as well can be conducted. Considering the first three, this can be seen as a way by which the cost of learning, as well as communication, can be avoided, whereby the last group of mechanism towards solving and decision-making shows a mechanism with communication and interaction. The need for this mechanism increases with the growing complexity and insecurity in the activities that should be conducted as stated by [Grant (1996)](#_ENREF_116). According to [Hurnonen *et al.* (2016)](#_ENREF_144) group problem solving is interaction-intensive, and it is a major source of knowledge-integration, beside an increase in task complexity increases the need for interaction.

KI method is related to formal processes and structures that assure synthesis by ﬁrms, integration, reconﬁguration, and use different types of knowledge among team members ([De Luca and Atuahene-Gima, 2007](#_ENREF_72); [Tsai *et al.*, 2015](#_ENREF_338)). The existing processes and the structure which comprises of meetings of information sharing and successful analysis as well as reviews of failed project, provides understanding on the team members to actually understand the learning that took place and to articulate knowledge ([Tsai *et al.*, 2015](#_ENREF_338)) in order to combine their varied skills together with their functional backgrounds, to ensure resources are transferred and recombine within the ﬁrm, and to make sure knowledge is exploited effectively ([Tsai *et al.*, 2015](#_ENREF_338)). KIMs has been defined as the formal processes and structures that ensure the capture, analysis, interpretation, and integration of market and other types of knowledge among different functional units within a firm ([Chang *et al.*, 2016](#_ENREF_50)).

Through the adoption of the KI mechanisms, specialized knowledge can now be shared among the team members that can ensure a more rapid diffusion of knowledge that is newly gained within the organization. Such mechanisms also permit each of the team members to ensure concrete experience are built with a common experience and the language that could facilitate members of the team to arrive at common in order to achieve a well-integrated efficiency ([Tsai *et al.*, 2015](#_ENREF_338)). Some knowledge is tacit, making it difficult to use unless the knowledge integrates into the firm’s operation ([Grant, 1996](#_ENREF_116)). The task of KI is often accomplished by the use of structures and processes. [Hsu *et al.* (2013)](#_ENREF_140) Used formal processes and structures to access and integrate knowledge among different functionality units within the same organization. By using KIMs, explicit knowledge can be explained in codified knowledge, so information or knowledge can be spread in formal and systematic language and is an easier means by which to enhance the efficiency of knowledge transmission ([Chang *et al.*, 2016](#_ENREF_50)).

The previous literature recommends that the use of KIMs empowers an organization to make it internalize and reorganize the learning's and to deciding the uses of knowledge for newer situations ([Luca and Atuahene-Gima, 2007](#_ENREF_210)). In order to utilize internally embedded knowledge that lies with individuals or possessed by certain social groups; teams have to integrate knowledge for use in emergency response management ([Hsu *et al.*, 2013](#_ENREF_140)). Organizations neglecting KI processes may fail to have product innovation ([Luca and Atuahene-Gima, 2007](#_ENREF_210); [Hsu *et al.*, 2013](#_ENREF_140)).

Past research suggests that in order to cope with the impacts of environmental changes, organizations may develop structural mechanisms to process information within the context of organizational decision-making ([Tsai and Hsu, 2014](#_ENREF_337)). KIMs comprise the formal processes and structures ensuring accessibility and KI among functionally different groups inside ([Tsai and Hsu, 2014](#_ENREF_337)). Formal integration mechanisms are a means to coordinate and integrate differentiated activities through pre-established mechanisms and interfaces ([Jansen *et al.*, 2009](#_ENREF_157)). The task teams offer a platform for diverse knowledge of each team members’ as well as the expertise that is needed to be assembled, integrated as well as making sure complex organizational tasks are applied. In addition, there is a tendency that KI that is very large may possibly not follow the procedures of a formal organizational structure; instead, there will be a dependency on the interpersonal relationships which is developed through most interaction with the informal way the social media ([Cao *et al.*, 2015](#_ENREF_45)).

### Knowledge-Based Theory of the Firm in Previous Related Studies

Besides, organizational members, the knowledge can play a critical role; hence, the need to ensure individual specialized knowledge is integrated is consider has been imperative for the emergency response management. KBT theory with organizational performance has been used by many researchers ([Hustad, 2007](#_ENREF_145); [Omotayo, 2015](#_ENREF_251); [Qi and Chau, 2018](#_ENREF_277)). However, [Qi and Chau (2018)](#_ENREF_277) Elaborated that the KBT of the firm presume that the knowledge it stands to the substantial providers of the sustainable competitive advantage, and thus, the attention of the firms and decision-making need to focus mainly on knowledge. Hence, knowledge has become the most significant resource that an organization explores to push a transformation in terms of capabilities based on experiences that are old experiences combined with current knowledge ([Hustad, 2007](#_ENREF_145)). KBT, which sheds light on the relationship between knowledge and firm performance ([Qi and Chau, 2018](#_ENREF_277)).

KBT describes the process through which the specialized knowledge of individuals is combined and synthesized at different levels of an organization (e.g., teams, work unit, organizations, organizational networks), and illustrates how this process influences the performance of work units ([Hustad, 2007](#_ENREF_145)). Furthermore, the integration of individuals’ specialized knowledge is the essence of organizational capability ([Loebbecke and Myers, 2017](#_ENREF_208)). Previous researchers suggested the used of KI Mechanisms to ensure access, and as well as the integration of knowledge within a firm, that is among diverse functional units thereby creating new knowledge ([Hsu *et al.*, 2013](#_ENREF_140)). Several empirical studies in existence unveiled that the role which is related with the KI mechanisms on formal processes like elaborated by several researchers (e.g., ([De Luca and Atuahene-Gima, 2007](#_ENREF_72); [De Luca *et al.*, 2010](#_ENREF_73); [Koch, 2011](#_ENREF_179); [Zhou and Li, 2012](#_ENREF_382)); can easily be development of a new product which is based on KI mechanisms and this can be used easily as formal process to ensure flood disaster are managed.

While [Mohannak and Javanmardi Kashan (2015)](#_ENREF_225); [Wu *et al.* (2015b)](#_ENREF_364), concern with using KBT with business process capabilities and organizational learning, from the authors perspective of this theory, the main problem lies in assuring the most effective integration of individuals’ specialized knowledge at the lowest attainable cost, whereas [Inkinen *et al.* (2015)](#_ENREF_152); [Inkinen (2016)](#_ENREF_151) state the KBV using for knowledge management practices and firm performance , many studides confirm employed KBT with organizational leadership lead to competitive advantage as well as, improve firms and marketing and bussiness performance in one of aspect efficiency or effectiveness ([Zhou and Li, 2012](#_ENREF_382); [Tzortzaki and Mihiotis, 2014](#_ENREF_342); [Villar *et al.*, 2014](#_ENREF_351); [Wu and Chen, 2014](#_ENREF_365); [Donate and De Pablo, 2015](#_ENREF_81)). Despite of many studies confirm the effect of KI on team performance but they concern on single aspect of performance, rarely studies focus on examine the influence of KI on both efficiency and effectiveness ([Mehta and Mehta, 2017](#_ENREF_219)). Another studies [Loebbecke and Myers (2017)](#_ENREF_208) states of the importance of using technology such as KP to integrate KI. Despite of , [Zhang *et al.* (2015)](#_ENREF_380) confirmed the utilization of social media in knowledge management (SMKM) development is the future trend, studies overlooked using social media in KI ([Cao *et al.*, 2015](#_ENREF_45)). Beside little studies focus on using KI to improves flood disaster management as knowledge of researcher such as [Zakaria *et al.* (2016)](#_ENREF_379). Table 2.3 summarize the previous studies which used KBT on different field.

* 1. Knowledge-Based Theory of the Firm in Previous Related Studies

|  |  |  |
| --- | --- | --- |
| **Researchers** | **Context** | **Description** |
| ([Hustad, 2007](#_ENREF_145)) | Organizational capabilities | Knowledge-based view of the firm this paper develops a conceptual framework for understanding how integration of various sources of knowledge takes place in a complex, geographically distributed context. |
| ([Koch, 2011](#_ENREF_179)) | Relationship between organizational knowledge and innovation. | Firm-Internal Knowledge Integration and the Effects on Innovation. |
| ([Zhou and Li, 2012](#_ENREF_382)) | Market knowledge, radical innovation. | This paper examines how existing knowledge base interacts with knowledge integration mechanisms to affect radical innovation. |
| ([Hsu *et al.*, 2013](#_ENREF_140)) | Knowledge-based theory in on new product performance. | This study tries to examine how a company utilizes knowledge integration mechanisms (KIMs) to achieve the success of product innovation in a new product development (NPD) process. |
| ([Tzortzaki and Mihiotis, 2014](#_ENREF_342)) | KBT for competitive advantage and performance. | This study attempts to deliver two outcomes 1) a historical account of KM theory identifies the current stage as the third phase of its development, whereby KM represents a social process. 2) The comprehensive literature review of KM provided proffers a new way of categorizing scholarly contributions into positivistic. |
| ([Villar *et al.*, 2014](#_ENREF_351)) | Internationalization of businesses | Knowledge-based View (KBV) have been widely used to explain the internationalization of businesses. |
| ([Wu and Chen, 2014](#_ENREF_365)) | Business Process Capabilities And Organizational Learning. | This paper aims to defining a model to properly evaluate knowledge management (KM) value by using KBT theory. |
| ([Donate and De Pablo, 2015](#_ENREF_81)) | KBV with organizational leadership. | This study confirmed the role of knowledge-oriented leadership in knowledge management practices and innovation with using KBV. |
| ([Zhang *et al.*, 2015](#_ENREF_380)) | Social media-supported knowledge management with used knowledge-based theory of the firm. | This paper mapped important references that lead trends of social media knowledge management (SMKM) development, authors contributing greatly to this field and hot topics of all the related articles. |
| ([Mohannak and Javanmardi Kashan, 2015](#_ENREF_225)) | KI, product innovation and capability development. | This study investigates the interrelationships between knowledge integration (KI), product innovation and capability development to enhance our understanding of how firms, through pursuing product innovation at the project level, can develop capability at the firm level. |
| ([Inkinen *et al.*, 2015](#_ENREF_152)) | Using KBT with business process capabilities and organizational learning. | The purpose of this paper is to concentrate on the conscious and systematic managerial activities for dealing with knowledge in firms. |
| ([Omotayo, 2015](#_ENREF_251)) | KBT using with organizational performance. | The paper is able to demonstrate that knowledge management is a key driver of organizational performance and a critical tool for organizational survival, competitiveness and profitability. |
| ([Inkinen, 2016](#_ENREF_151)) | Using KBV for knowledge management practices and firm performance. | This study focus on utilization KM practices is significant driver for innovation. Also, specific leadership characteristics and organizational arrangements are likely to support firm performance through more efficient and effective management of knowledge resources. |
| ([Zakaria *et al.*, 2016](#_ENREF_379)) | Knowledge integration improves flood disaster management. | In this study the result shows the importance of knowledge integration as one of the factors contributing to the success of the district’s flood management plan. |
| ([Loebbecke and Myers, 2017](#_ENREF_208)) | Deploying internal knowledge portals (KPs) | KPs should provide mechanisms to integrate extensive and dispersed knowledge in various facets and from diverse sources. |
| ([Mehta and Mehta, 2017](#_ENREF_219)) | Knowledge integration and team effectiveness. | In this study investigate how learning- and performance-oriented teams utilize knowledge integration as an intervening mechanism to achieve outcomes such as team viability, satisfaction, and performance on both efficiency and effectiveness. |
| ([Qi and Chau, 2018](#_ENREF_277)) | Social Networking Systems Promote Knowledge Management and Organizational Learning | This study used KBV to explain the important roles of knowledge creation and sharing in enhancing organizational performance. |

### Task-Technology Fit

In order to show how relevancy of the TTF in the context of this study, [Furneaux (2012)](#_ENREF_103) stated that, several literature reviews which were conducted from 1995 to 2009 were analyzed to identify only research that explicitly used or developed TTF theory. This analysis resulted in the identification of a total of 81 articles that had incorporated TTF theory in a substantive manner. Continue with similar points but in recent years from 2011 to 2018 researcher analyze 31 studies shown in Figure 2.4 derived from Table 2.4 which summarizes the Journal articles published. The -axis refers to the year of published, with the number of articles shown on the-axis.

Figure 2.4 Task-Technology fit articles published by year

[Goodhue and Thompson (1995)](#_ENREF_114) discover the relationships among information systems as well as the performance of the individuals carried out the development of TTF, this model is utilized widely in evaluating how the use of technology affects performance. Besides, it can also be used to affect positively the utilization of technology ([Furneaux, 2012](#_ENREF_103); [Lu and Yang, 2014](#_ENREF_209)). this theory adopted the technology utilization only with the fit between task requirements and technology characteristics ([Goodhue and Thompson, 1995](#_ENREF_114)).

The TTF theory tends to maintain a relationship that is positive between the technology available as well as a performance of the individuals on the fact that “the technology must be utilized whereby the technology must be a good fit with the tasks it supports”([Agnihotri and Troutt, 2009](#_ENREF_5)). TTF in another development is a generalized theory of information systems that then suggests that the information technology could be more likely to contain impact that is positive on performance whenever the features of the information system tend to match the tasks that the organizations need to carry out ([Hahn and Wang, 2009](#_ENREF_123)). There is greatly influenced by the utilization of technology between the task and technology characteristics. The tasks are broadly defined as the actions carried out in turning inputs into outputs in order to satisfy information needs ([Goodhue and Thompson, 1995](#_ENREF_114)). Therefore, a task can be defined as a piece of works that an individual performs using a sequence of actions to reach a certain goal. These include the process of problem-solving decision ([Lu and Yang, 2014](#_ENREF_209)). Since its inception for the initial publication, TTF model has been utilized effectively on various information systems ([Okoli and Oh, 2007](#_ENREF_245); [Kwai Fun Ip and Wagner, 2008](#_ENREF_190); [Lin and Huang, 2008](#_ENREF_206); [Zhou *et al.*, 2010](#_ENREF_383); [Lu and Yang, 2014](#_ENREF_209); [Yadegaridehkordi *et al.*, 2014](#_ENREF_368); [Durcikova and Fadel, 2016](#_ENREF_88); [Almujally and Joy, 2017](#_ENREF_21); [Huang *et al.*, 2017](#_ENREF_142); [Abbas *et al.*, 2018a](#_ENREF_2)).

There are five key factors constructs associated with the TTF: technology characteristics and task characteristics which combine to affect the TTF as well impacts on the outcome(performance or utilization), TTF elements are as below ([Goodhue and Thompson, 1995](#_ENREF_114)):

1. Task characteristics - refers to the action or behavior performed by individuals to change the inputs to outputs.
2. Technology characteristics - defined as the characteristics of technology used by individuals in performing their tasks.
3. Task-technology fit - defined as the degree to which technology helps an individual in completing his or her tasks.
4. Utilization - the behaviour of using the technology in completing a task.
5. Performance impact- relates to the accomplishment of tasks by an individual. Higher performance implies more efficiency and more effectiveness. TTF argues that fit among tasks and technology (support) impact the work performance and utilization of technology (Goodhue & Thompson, 1995). Figure 2.5, illustrates the original model of TTF.



Figure 2.3 TTF model ([Goodhue and Thompson, 1995](#_ENREF_114))

#### 2.8.4 Task-Technology Fit in Previous Related Studies

Many studies used this theory for different outcomes some used for utilization, other for performance and other used for examine the fit between technology and task characteristics. The theories of TTF argue on the fact that the use of technology could result in different outcomes, which depend upon its tasks and configuration ([Lin and Huang, 2008](#_ENREF_206); [El Said, 2015](#_ENREF_92)) and to evaluate how information technology like social media leads for performance and usage effect; it used the task-technology fit (TTF) model widely. Theory associated with TTF justified that the application of technology could actually result in diverse outcomes, which relies upon its configuration as well as the task which it is then used ([Lin and Huang, 2008](#_ENREF_206)). This theory justified that utilization information system, as well as the performance, tend to benefits the especially when the system is well suited to the tasks that could be performed ([Furneaux, 2012](#_ENREF_103)).

TTF model is commonly used to evaluate how information technology can lead to a performance by assessing the match between the task and technology characteristics ([Aljukhadar *et al.*, 2014](#_ENREF_18); [Ariffin *et al.*, 2017](#_ENREF_24); [Wu and Chen, 2017](#_ENREF_362)). In other word, this model is used to evaluate how information technology normally could lead to performance, assessing the impacts of usage as well as judging the match among task as well as the technology. The task-technology can be affected by both the task characteristics and that of the technology fit, where users’ performance and utilization can be determined. Right from its initial proposal, the TTF has then gained the attention of the research communities and has been applied to a very broad range of information systems ([Aljukhadar *et al.*, 2014](#_ENREF_18); [Wu and Chen, 2017](#_ENREF_362)). Previous studies discovered that the TTF is much applicable across a wide range of tasks and technologies while using the TTF to explain the utilization of the IS ([Teo and Men, 2008](#_ENREF_326); [Lu and Yang, 2014](#_ENREF_209); [Almujally and Joy, 2017](#_ENREF_21)). Therefore, it is reasonable that TTF can also be applicable to the utilization of social media as a platform to integrate knowledge. Moreover, related literatures used TTF model ([Lim and Lee, 2014](#_ENREF_204); [Wu *et al.*, 2015b](#_ENREF_364)).

In recent years, there is an increase in the use of TTF as evidenced by several numbers of publications which incorporated most of the theories that appeared in peer-reviewed journals. This trend suggests that the growing interest in the theory and how such theory can be applied to understand the problems of interest in IS researchers. Previous studies discovered that the TTF is much applicable across a wide range of tasks and technologies while using the TTF to explain the utilization of the IS ([Teo and Men, 2008](#_ENREF_326)). Therefore, it is reasonable that TTF can also be applicable to the utilization of social media as a platform to integrate knowledge. As stated by [Lu and Yang (2014)](#_ENREF_209), the exploration of the TTF is not as expected in evaluating most of the information systems that has features which are social, these include the social networking sites. The TTF model are applied in several applications that consists of future technology such as mesh app, smartwatch and cloud-based m-retail application ([Ghani *et al.*, 2017](#_ENREF_109); [Hsiao, 2017](#_ENREF_137); [Hsiao, 2018](#_ENREF_138)), mobile Banking and mobile money service ([Chung *et al.*, 2015](#_ENREF_59); [Tam and Oliveira, 2016b](#_ENREF_322); [Tam and Oliveira, 2016a](#_ENREF_321); [Changchun *et al.*, 2017](#_ENREF_52); [Osah and Kyobe, 2017](#_ENREF_253); [Abbas *et al.*, 2018a](#_ENREF_2)), Online shopping ([Ariffin *et al.*, 2017](#_ENREF_24)), Massive Open Online Courses, blog-based learning ([Wang *et al.*, 2016](#_ENREF_355); [Huang *et al.*, 2017](#_ENREF_142); [Khan *et al.*, 2017a](#_ENREF_173)). In another hand TTF which using in many studies with social media ([Ishak *et al.*, 2014](#_ENREF_153); [Lu and Yang, 2014](#_ENREF_209); [Wu *et al.*, 2015b](#_ENREF_364)). Furthermore, many studies state the substantial function of using TTF on knowledge management practice ([Teo and Men, 2008](#_ENREF_326)) ([Durcikova and Fadel, 2016](#_ENREF_88)) ([Moreno Jr and Cavazotte, 2015](#_ENREF_227)), also [Chung *et al.* (2016)](#_ENREF_60) confirmed the The role of task-individual-social software fit in knowledge creation in the context of manufacturing industry as well as KMS usage ([Lin and Huang, 2008](#_ENREF_206); [El Said, 2015](#_ENREF_92)). Moreover, [Ishak *et al.* (2014)](#_ENREF_153); [Lim and Lee (2014)](#_ENREF_204); [Almujally and Joy (2017)](#_ENREF_21) elaborated using TTF in sharing knowledge for many function such as examining social media fitness with disaster knowledge, determine the factors effect behavioral and explain the relationship through different users group respectively. Despite of TTF mentioned on different domain of knowledge but TTF utilization with knowledge integration is still little on the literature ([Pai, 2012](#_ENREF_262)). Table 2.2 shows TTF model that are used in different domain in information system. Further, the model context varies from using behavioral intention, utilization of KM, and to use of social networking technology respectively. Description of the model shows how TTF model generate different outcomes which include utilization or performance.

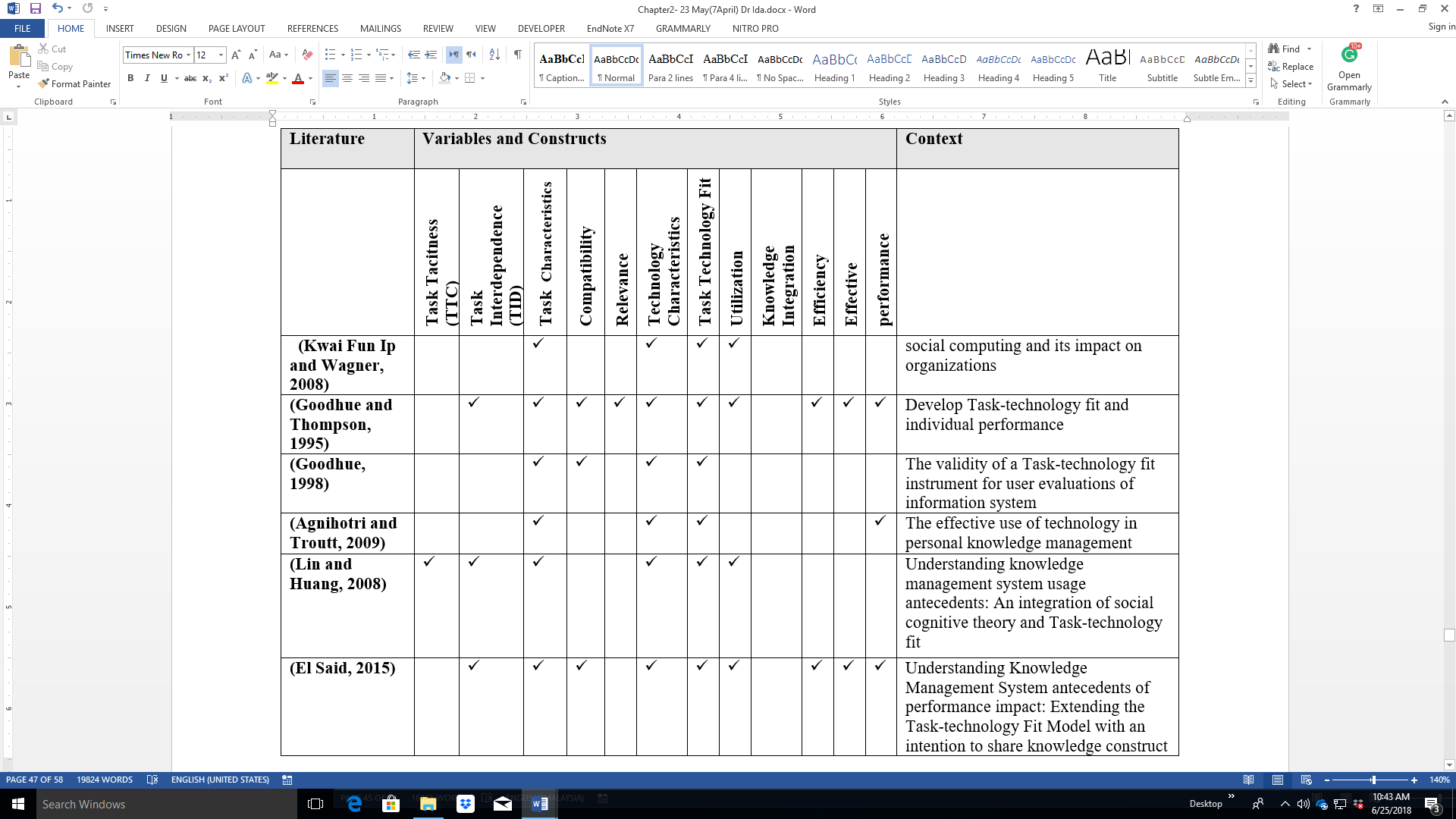
### The Constructs Proposed for Research Model Development

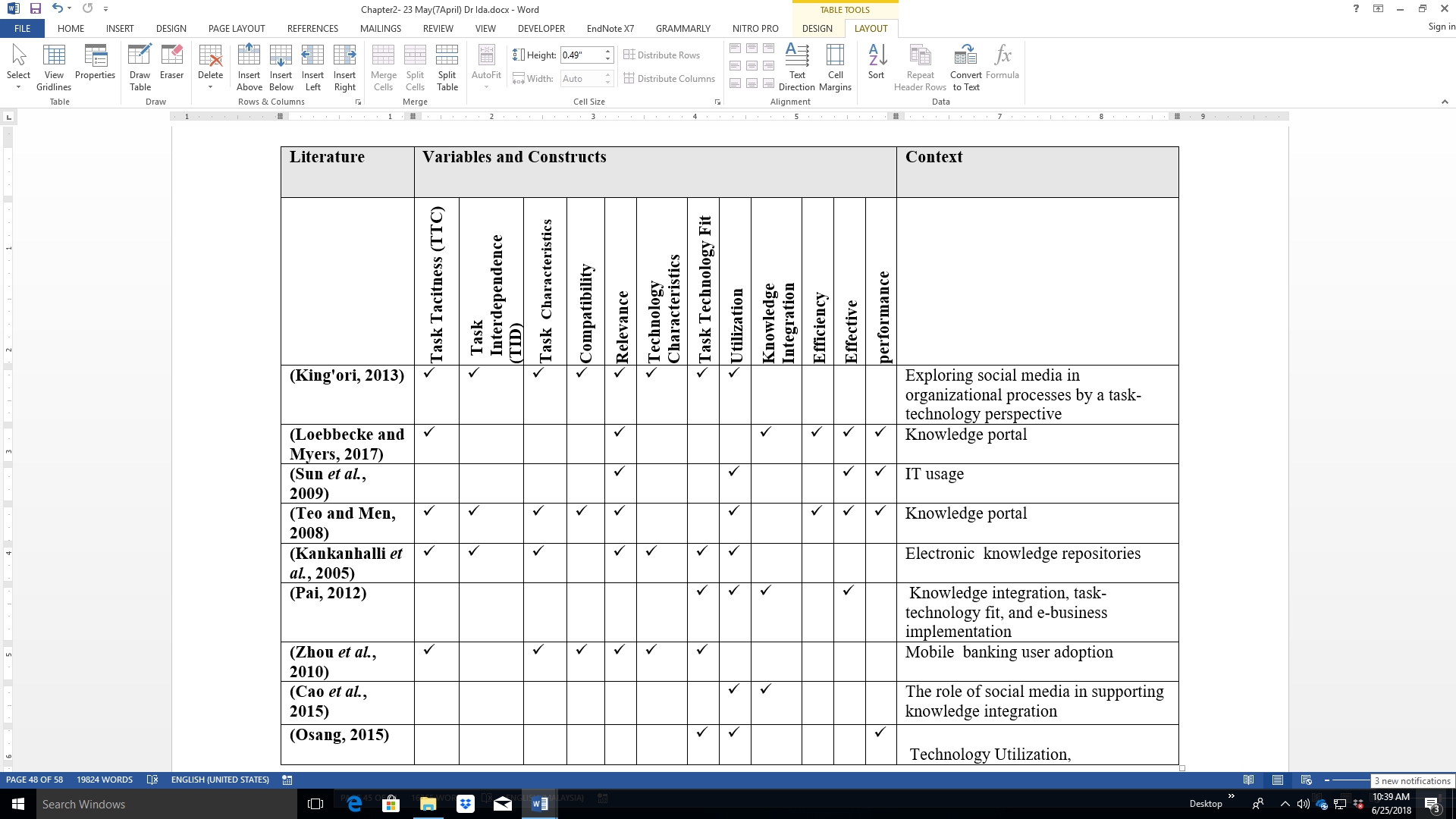
As discussed above, the conceptual model of this research has been developed according to combined two theories which KBT and TTF, and relevant literature. Table 2.3 presents findings of the most frequently-used factors of emergency response teams’ performance.

* 1. Task-Technology Fit Theory in Previous Relevant Studies

|  |  |  |
| --- | --- | --- |
| ([Lin and Huang, 2008](#_ENREF_206)) | Knowledge management system use. | This study proposed new model by integrating of social cognitive theory and task-technology fit for performance knowledge management system usage. |
| ([Teo and Men, 2008](#_ENREF_326)) | Utilization of KM technologies | The results of this study shows that knowledge tastiness and compatibility are positively related to utilization. Furthermore, utilization and compatibility are positively related to performance. |
| ([Hahn and Wang, 2009](#_ENREF_123)) | KMS for organizational knowledge processing. | The theory of TTF provides general guidelines on how to align the goal of Knowledge management system design with the knowledge tasks, and provides a useful extension to the theory of task-technology fit by offering a theoretical explanation for when and why the fit between task and technology leads to enhanced performance. |
| ([Alkhalifah and D'ambra, 2011](#_ENREF_19)) | Adoption of identity management systems | Proposed a task model for identity management systems intention to use, specifically information card technology based on the TTF model. |
| ([Furneaux, 2012](#_ENREF_103)) | A survey and a synopsis of the literature for TTF | A review of prior TTF research indicates that further effort to better understand the relationships that may exist between individuals-, group- and organizational level, TTF could be of significant value given the potential that has in relation to multilevel and cross-level theory development. |
| ([Pai, 2012](#_ENREF_262)) | Knowledge integration, task-technology fit and e-business implementation. | The survey results of this study indicate that knowledge integration and task-technology fit influence the implementation effectiveness of e-business applications. |
| ([Ishak *et al.*, 2014](#_ENREF_153)) | Examining the fit of social media as a tool to share disaster related knowledge. | Examining the fit of social media as a tool to share disaster-related knowledge, from the task-technology fit theory perspective. |
| ([Aljukhadar *et al.*, 2014](#_ENREF_18)) | Investigation TTF theory in an online user context. | TTF theory examined the drivers and consequences of successful task completion by a user in an online context for predict behavioural intention. |
| ([Yadegaridehkordi *et al.*, 2014](#_ENREF_368)) | TTF and user adoption of cloud based collaborative learning technologies. | The results of the study provided evidence of testing TTF model in understanding the factors that play significant roles in predicting student adoption of cloud-based collaborative learning technologies in university settings. |
| ([Lu and Yang, 2014](#_ENREF_209)) | Toward an understanding of the behavioral intention to use SNSs | This study used TTF for understanding the relationships between a user’s intention and the utilization of social networking site. |
| ([Oliveira *et al.*, 2014a](#_ENREF_247)) | Extending the understanding of mobile banking adoption. | Proposing a model for understanding the importance and relationship between the user perception of m-banking, by integrating three theory which are TTF, unified theory of acceptance and usage of technology (UTAUT), and initial trust model (ITM). |
| ([Lim and Lee, 2014](#_ENREF_204)) | fit between task categorization and knowledge sharing systems | The study used Task-Technology and Needs-Technology Fit models to explain the relationship between different groups of users and their needs by using these two models. |
| ([El Said, 2015](#_ENREF_92)) | Utilization TTF model with knowledge management system | A good fit between KMS characteristics and the tasks they support increases the impact of the system on users’ performance. Organizations establishing KMS have to ensure the good fit between task and technology. |
| ([Moreno Jr and Cavazotte, 2015](#_ENREF_227)) | Using TTF and IS in knowledge management activities | This study focus on how an individual’s particular work context, job characteristics and knowledge-related job requirements affect the relationship between TTF and the use of IS in knowledge management activities. |
| ([Wu *et al.*, 2015b](#_ENREF_364)) | The role of task-individual-social software fit in knowledge creation in the context of manufacturing industry. | The current study presents a research model and empirically examines the role of task-individual-social software fit model (TISF) in knowledge creation Performance. |
| ([Raven and Park, 2015](#_ENREF_283)) | Importance of information quality in modern systems. | The importance of information and knowledge content in modern systems, information quality can contribute to the fit evaluation as another determinant of fit. |
| ([Chung *et al.*, 2015](#_ENREF_59)) | The role of enterprise mobile applications on perceived job performance and creativity. | This study examines enterprise mobile applications (EMA) to explain how creative job performance is revealed from both the habitual use and task-technology fit for EMA. |
| ([Tam and Oliveira, 2016b](#_ENREF_322)) | Understanding the impact of m-banking on individual performance. | This study propose a model combining the DeLone & McLean IS success model (D&M IS Success Model) and the TTF model to evaluate the impact of mobile banking (m-banking) on individual performance. |
| ([Tam and Oliveira, 2016a](#_ENREF_321)) | M-banking. | This paper is to investigate the determinants of m-banking for individual performance. |
| ([Durcikova and Fadel, 2016](#_ENREF_88)) | Using TTF with knowledge management. | This paper draws on the knowledge management literature to develop hypotheses that relate key knowledge repository (KR) characteristics and psychological climate to KR knowledge sourcing behavior. |
| ([Wang *et al.*, 2016](#_ENREF_355)) | University students' learning performance using blog-based learning systems. | This study propose conceptual model for assessing blog-based learning system. Based on D&M IS Success Model and TTF model. |
| ([Ariffin *et al.*, 2017](#_ENREF_24)) | Online shopping behaviour. | Reveal an integrated conceptual framework in exploring consumer behavioural intention. |
| ([Ghani *et al.*, 2017](#_ENREF_109)) | The technology utilization (cloud-based m-retail application) associate with tasks which are required to be performed. | The study investigate the influences of TTF model and theory of planned behavior (TPB) towards textile cyberpreneur’s intention. |
| ([Gan *et al.*, 2017](#_ENREF_105)) | Understanding mobile learning adoption in higher education | This study aims to examine the factors driving an individual’s behavioural intention to adopt mobile learning in higher education. Which both task and technology characteristics have significant impacts on TTF construct. |
| ([Osah and Kyobe, 2017](#_ENREF_253)) | Mobile money service. | An integration of post-acceptance model (PAM) and task-technology fit (TTF) to test determinants of user continuance intention within Kenya toward a proliferated mobile money service. |
| ([Huang *et al.*, 2017](#_ENREF_142)) | TTF theory to understand MOOCs factors. | This study uses TTF theory to understand how Massive Open Online Courses (MOOCs) technological factors in three dimensions (i.e., course vividness, teacher subject knowledge, and interactivity) inﬂuence students’ intention revisiting of MOOCs. |
| ([Hsiao, 2017](#_ENREF_137)) | Smartwatch adoption intention. | The purpose of this study is twofold. First, an integrated model will be developed based on task-technology fit, innovation diffusion theory and the new product adoption model in order to explore the factors that affect smartwatch adoption. Second, the differences in the factors that affect users’ intention to adopt the Apple Watch and other smartwatches will be examined. |
| ([Yang *et al.*, 2017](#_ENREF_370)) | Virtual collaboration effectiveness in multi-organization projects. | This study investigates the factors that influence the effectiveness of multi-organization project teams using the exemplary mobile instant messaging platform WeChat as a collaboration tool. |
| ([Ariffin *et al.*, 2017](#_ENREF_24)) | Online shopping behaviour. | This study reveal an integrated conceptual framework in exploring consumer behavioural intention. |
| ([Changchun *et al.*, 2017](#_ENREF_52)) | Examine the effects of task technology fit on intention to adopt mobile banking. | This study examined the effects of TTF, attitude and trust on intention to adopt m-banking. |
| ([Khan *et al.*, 2017a](#_ENREF_173)) | Acceptance of MOOCs in a developing country | This study examines the factors inﬂuencing students’ adoption of MOOCs in a developing country by applying an integrated framework incorporating the task-technology ﬁt model, social motivation, and self-determination theory. |
| ([Almujally and Joy, 2017](#_ENREF_21)) | TTF in knowledge sharing. | The aim of this research is to determine the factors that affect academics’ behaviours toward using web technology to share knowledge in Saudi universities. |
| ([Abbas *et al.*, 2018a](#_ENREF_2)) | Integration TTF theory with other theories for m-banking adoption. | Integration of TTF, UTAUT, and ITM for m-banking adoption. |
| ([Hsiao, 2018](#_ENREF_138)) | Technology-enabled and technology dependent user behaviour toward device mesh and mesh app. | This study integrate TTF and motivation theory (mainly expectancy-value theory) with an emphasis on the importance of expectation and subjective value in activity and task engagement, and build a conceptual framework to explore how future technology can create benefits for people by increase task performance. |

**Table 2.2 :** Investigated construct and variables in related research





Based on the summaries presented in the above table , [Kankanhalli *et al.* (2005)](#_ENREF_166); [Teo and Men (2008)](#_ENREF_326) confirmed task tacitness and task interdependence are two important characteristics for task characteristic, while some authors consensus using TTC and TID for measuring task characteristic ([Lin and Huang (2008)](#_ENREF_206). Whereas some authors used task tacitness separately such as [Zhou *et al.* (2010)](#_ENREF_383); [Loebbecke and Myers (2017)](#_ENREF_208) while [Goodhue and Thompson (1995)](#_ENREF_114); [El Said (2015)](#_ENREF_92) just used task interdependence as measuring. Many authors agree with use all TTF constructs model (task characteristic, technology characteristic, task technology fit, utilization and performance) ([Goodhue and Thompson, 1995](#_ENREF_114); [El Said, 2015](#_ENREF_92)), while the remaining authors used merely part of TTF model constructs. Many studies consensus with compatibility and relevance are considering as measuring for technology characteristic ([Goodhue and Thompson, 1995](#_ENREF_114); [Teo and Men, 2008](#_ENREF_326); [Zhou *et al.*, 2010](#_ENREF_383); [King'ori, 2013](#_ENREF_176)). Whereas some authors focus at one of them relevance or compatibility ([Goodhue, 1998](#_ENREF_113); [Kankanhalli *et al.*, 2005](#_ENREF_166); [Teo and Men, 2008](#_ENREF_326); [El Said, 2015](#_ENREF_92)).

In aspect of performance many authors agree with the performance impact in the information systems context refers to the accomplishment of set of tasks by an individual with improved efficiency and effectiveness ([Goodhue, 1995](#_ENREF_112); [Teo and Men, 2008](#_ENREF_326); [El Said, 2015](#_ENREF_92); [Loebbecke and Myers, 2017](#_ENREF_208)). While some studies mentioned one of them efficiency or effectiveness ([Sun *et al.*, 2009](#_ENREF_315); [Pai, 2012](#_ENREF_262)). Although, the previous studies confirmed that using IT to integrate knowledge is useful to integrate extensive and dispersed knowledge in various facets and from diverse sources such as [Loebbecke and Myers (2017)](#_ENREF_208). From the existence literature there is still of seldom empirical research that focused on service industry has been conducted from the perspectives of knowledge integration and task-technology fit ([Pai, 2012](#_ENREF_262)).

### Integrating Knowledge-Based Theory of the Firm and Task-Technology Fit

On the knowledge management activities and performance, a precise focus is geared towards information systems on its effects in the use of IT ([Tanriverdi, 2005](#_ENREF_323); [Choi *et al.*, 2010](#_ENREF_58); [El Said, 2015](#_ENREF_92); [Moreno Jr and Cavazotte, 2015](#_ENREF_227)). These organizations demand better good performance from several people to attain their objectives. With the alarming rate of technology, it has become of most important to understand what performance all is about in the context of information systems. Recently, both researchers and practitioners have started to realize the importance of the information technology (IT) for effective KM activities ([Wu *et al.*, 2015a](#_ENREF_363)).

Valuable tools such as social media is applied for ensuring knowledge are effectively managed within the firms as they enable proper establishment of relationships and exchange of ideas, innovative enhancement, upon which an employee's normally interacted to carry out job tasks as well as to convert knowledge of the organization into solutions that are innovative in order to solve problems ([Ishak *et al.*, 2014](#_ENREF_153); [Benitez *et al.*, 2018](#_ENREF_37)). At the same time, previous authors suggested the importance of KI to achieve team performance such as [Mehta and Mehta (2017)](#_ENREF_219). KI involves having one’s knowledge built upon, or combined with others’ ideas, to generate new insights. Engaging in such activities would make team members feel important, as they would deem their own knowledge key to achieving team goals. KI assist for accurate decision making on suitable time that results to solve the problem ([Haddad and Bozdogan, 2009](#_ENREF_121)). KI can enhance team performance through coordinate product development through communication and organizational routines ([Körner *et al.*, 2016](#_ENREF_180)). [Revilla and Knoppen (2015)](#_ENREF_286) Stated that there is a positive relationship between KI towards team performance. From the above studies that call to add a social media usage as antecedence for KI construct as well as add KI an antecedent for team performance.

There is a significant extension to TTF model with attitude/ behaviour models thereby providing a better explanation of users’ choices of technology. Additional, [Dishaw and Strong (1999)](#_ENREF_79); [Yen *et al.* (2010)](#_ENREF_375) combined the Technology Acceptance Model (TAM) that was previously derived from attitude/ behaviour model to explain technology acceptance behaviour, into the TTF model. The experimental results showed that their combined TTF with TAM provides more variance than either of the model. In another development, [Lin and Huang (2008)](#_ENREF_206) combined TTF with social cognitive theory and were able to discover that the TTF provides more significant results for the KM system usage. Moreover, numerous discoveries shows that the TTF joined with other models that includes the UTAUT to elaborate further on the user adoption of m-banking ([Zhou *et al.*, 2010](#_ENREF_383)). As well as that, some study investigate the influences of TTF model and theory of planned behavior (TPB) ([Ghani *et al.*, 2017](#_ENREF_109)).

While many authors confirmed the benefit from integrated TTF with D&M IS Success Model ([Tam and Oliveira, 2016b](#_ENREF_322); [Wang *et al.*, 2016](#_ENREF_355)), whereas, Many study stated integrated TTF with UTAUT, and ITM for technology utilization that results in the great achievement ([Oliveira *et al.*, 2014a](#_ENREF_247); [Abbas *et al.*, 2018a](#_ENREF_2)). However, insufficient research is noted in the study of social media usage while considering the application of the TTF model. Similarly, lack of cognizance toward the fit of using a social media in disseminating knowledge in the event of a natural disaster (flood) has been noted ([Ishak *et al.*, 2014](#_ENREF_153)). The TTF model is focused on the impacts on task performance without addressing the factor of KI to understand its impacts on team performance. The essence of organizational capability formed the integration of specialist knowledge to perform a discrete productive task. Thus, diverse specialized knowledge of different individuals is based on the benefit of KI ([Pai, 2012](#_ENREF_262)). As the TTF model is applied to social media, such model may be insufficient, as the TTF model itself does not address KI construct. To handle this, the TTF model can be extended by combining it with a KI construct adopted from the knowledge-based theory of the firm.

From the perspectives of KI and TTF, seldom-empirical research focused on service industry has been conducted. The previous studies used the internet to integrate knowledge such as [Loebbecke and Myers (2017)](#_ENREF_208) which suggested one way of achieving KI is to deploy a knowledge portal (KP), a type of knowledge management system (KMS) and KPs provide mechanisms to integrate extensive and dispersed knowledge in various facets and from diverse sources. The models have not been modified to apply KI in the context of task emergency response (task-technology fit and KI). Although rarely extended TTF model with KBT.

It is, therefore, significant to carry out further studies on the TTF model in order to ensure more insights into its validation across different contexts ([Lu and Yang, 2014](#_ENREF_209)). The extended theory helps to understand the KI from the perspective of the organizational task and technology as a predictive factor for team performance. In an effort to understand the social media utilization factors and the influence of using social media to integrate knowledge to improve team performance in context of flood emergency response, we integrate TTF into the knowledge-based theory of the firm. As previously quantified, one of the mean reasons for extending the task-technology fit model with KI for the purpose of moving theory expansion in the way that could include the work-related issues.

Our main proposition is that extended TTF model with KI to explaining the determinants of teams’ performance emergency response. Beside identify the factors influencing on social media usage. Furthermore, there is a specific moderating role played by experience to strength the relationship of technology usage ([Lwoga and Komba, 2015](#_ENREF_214)). Considering studies on technology as well as service adoption/utilization, there is a need to include individuals with experience as survey respondents using the technology in question ([Sanakulov and Karjaluoto, 2015](#_ENREF_297)).

[Goodhue and Thompson (1995)](#_ENREF_114) discovered that the actual experience for the purpose of utilizing the importance of technology could actually cause users to draw a conclusion on the fact that the technology has a better (or worse) impact than expected on performance, changing their anticipated consequences in term of utilization as well as the therefore which affects future utilization. Also, there is a tendency for an individual to be able to learn from experience better ways towards utilizing the technology, where individual technology fit can be improved and hence the overall TTF. In another development, the experience can be defined as “an opportunity that is mostly used to explore the technology which is operationalized from technology usage.” Experience individual competence to be build up most especially in term of system utilization, which in turn sustains the level of usage ([Albashrawi *et al.*, 2017](#_ENREF_16)). Beside experience helps to decrease uncertainty and increase the sense of control over information system ([Albashrawi *et al.*, 2017](#_ENREF_16)).

## Chapter Summary

This chapter starts with the overall definitions of flood disaster and the effect of it in the developing and developed countries particularly in Sudan the case study for this research. It shows the necessities for emergency response to reduce the impact of flood, as well as the challenges faced the emergency response in response phase. Inadequate communication and coordination among members teams work in dispersed place during has been the main problem that needs urgent attention in order to achieve tasks properly on time with certain budget. Therefore, the research looks into the KI as the better strategy to improve teams performance, since the location for teams are in different places thus, other problems emerged for integrating knowledge sharing and communication between members of the teams during the flood disaster that call for integrating social media platform for knowledge integration. Although the substantial role play in disaster knowledge and sharing knowledge, researcher studies overlooked using social media to integrate knowledge besides the scare studies utilize KI on teams’ performance. Meanwhile, the main problem on this study is lack of inclusive model consisting of social media utilization to integrate knowledge, combine with KI strategy to enhance task team’s performance in emergency response flood. By considering the main points discussed in previous sections, this chapter highlighted the importance of developing emergency response team’s performance model to assistant teams and manager to achieve their tasks properly and choose the best decision on time that leads for solve problems. Finally, the study reviewed the potential theories and model used in integrating the knowledge-based theory of the firm and task-technology fit.



# RESEARCH METHODOLOGY

## 3.1 Introduction

Research is a structured inquiry upon which a utilized scientific methodology is acceptable to address problems and to generate a novel knowledge that could possibly be applicable in general. The research methodology is defined as a sequence of steps which should be systematically followed in order to achieve special objectives and goals. Therefore, in order to sustain the growth of the discipline, there is a need for sound research undertakings. In view of this, it becomes important to pay a careful attention to the study’s research methodology which is seen as the tools that ensure the right research approach to solve a particular research problem. The purpose of this study is to contribute to a theoretical understanding that allows developing a model of “Emergency response team’s performance through Knowledge Integration using social media platform”. To achieve the objectives of this research and consequently leads to the desirable research findings, this chapter explains in details the methodology applied in this research. This process includes the selection of research paradigm, research approach and the appropriate research methods for data collection and analysis as well as describing the research design stages in four main phases. The last section provides a summary of this chapter.

## 3.2 Research Paradigm

A research paradigm provides clarity as being a framework upon which theories are built; it also forms the view on how several researchers tend to view how the world looks like and direct them on shaping their opinion of the world as they seek to acquire knowledge. Two frequently used paradigms exist in IS scholarship, namely, positivist and interpretivist ([Orlikowski and Baroudi, 1991](#_ENREF_118)). A research paradigm enables researchers to determine their role in the process of research, and to recognize other perspectives. This paradigm also unveiled that as long as the reality is objective, it can be described quantifiably independent of the researcher and the applied tools. The aim purpose of positivist paradigm is to increase the understanding associated with the phenomena predictively by testing the theory ([Myers, 2013](#_ENREF_231)). In most instances, these are seeing as evidence whose measures are quantifiable in term of variables, formal propositions as well as testing the hypotheses*,* and defined well in prior studies ([Orlikowski and Baroudi, 1991](#_ENREF_252)).

In addition, it focuses on verifying the relationships among some individual and organizational-level constructs. Therefore, positivist studies are mostly based on quantitative studies and statistical analysis of large sample size. The validity of such studies’ outcomes is generally based on quantitatively aggregating responses for the purpose of theory testing based on the establishment of the inferences of common trends ([Armstrong and Shimizu, 2007](#_ENREF_25)). Within phenomena, the term positivist studies could actually be based according to the existing relationships which are prior within phenomena, and are investigated with structured instrumentation ([Orlikowski and Baroudi, 1991](#_ENREF_252)).

This study primarily employs a positivist approach that systematically observes the social behaviour to study the society and the information obtained from empirical evidence as the source of reliable knowledge regarding this paradigm for many reasons, there are many studies focusing on technology utilization used TTF theory and knowledge integration applied KBT, which follow positivist paradigm ([Lin and Huang, 2008](#_ENREF_206); [Cao et al., 2015](#_ENREF_45); [El Said, 2015](#_ENREF_92); [Shuradze and Wagner, 2018](#_ENREF_310)). The purpose of this research is basically to develop a model that is well comprehensive to improve emergency management teams’ performance and therefore it is required to test a set of hypotheses regarding the model by collecting quantitative data using a survey and statistical analysis. Furthermore, both dependent and independent variables should be identified, and the researcher test the relationships and interdependence between these variables, accordingly, opting for the positivist quantitative approach to address the problem of this research is both appropriate and justified.

## 3.3 Research Approach

The research approach is a way of specifying the adopted methods used in term of data collection and analysis. These methods can be classified as been qualitative and quantitative. The way of generating data that can be transformed into usable statistics in order to quantify the problem is known as quantitative research. To ensure that there is a possibility at which characteristics across relationships are summarizing or groups, the quantitative approach based on information gathering is determined to ensuring a large number of participants are described ([Creswell and Creswell, 2017](#_ENREF_69)). In a précised and much more structured approach, the Quantitative data collection methods are considered rather than the Qualitative data collection methods ([Denscombe, 2014](#_ENREF_78)). In order to choose an appropriate method for data collection and research analysis, the pattern should be specified through the selected research approach ([Creswell and Creswell, 2017](#_ENREF_69)).

The positivist paradigm; quantitative research approach has been selected to be suitable in terms of considering this research because of the following reason:

• Nature of this research: the explanatory nature of this study represented on the current study the researcher tested theories by been specific on narrow hypotheses to support or refute the hypotheses by the collected numerical data.

• Research problem and questions: the quantitative research approach is best selected for this research since the current study tries to investigate the important factors influencing social media to integrate knowledge for emergency response enhancement by extending well-established and combinations of two models. Furthermore, there is overlooked for using social media tool to integrate knowledge in the literature and shortcoming studies investigated the role of KI on teams’ performance. Hence, it becomes imperative to extend a model based on previous theories and studies and to check its validity in the context of improving emergency response teams’ performance.

The second concern in choosing the research approach is selecting suitable research method. Research methods involve forms of conducting data collection, the analysis method, and writing. Since the research paradigm of this study is positivist, and the research approach is quantitative, a questionnaire-based survey was used as a research method for the collection of data purposely to verify the proposed hypotheses. According to [Straub (1989)](#_ENREF_313) suggested that quantitative approach through survey questionnaires as the appropriate method for studying a large number of population in a short time-frame. Similarly, many previous studies have applied TTF theory in the different context like knowledge management and knowledge management system using quantitative approach (i.e. [Tiwana and Mclean (2005b)](#_ENREF_332); [Lin and Huang (2008)](#_ENREF_206); [Zhou *et al.* (2010)](#_ENREF_383); [Lu and Yang (2014)](#_ENREF_209); [El Said (2015)](#_ENREF_92); [Ouyang *et al.* (2017)](#_ENREF_258); [Wu and Chen (2017)](#_ENREF_362)). Furthermore, there are several previous studies that based on a quantitative approach to investigates the knowledge-based theory of the firm ([Blome *et al.*, 2014](#_ENREF_40); [Donate and Guadamillas, 2015](#_ENREF_82); [Revilla and Knoppen, 2015](#_ENREF_286); [Qi and Chau, 2018](#_ENREF_277); [Shuradze and Wagner, 2018](#_ENREF_310)). This is because a predictive understanding of the phenomenon is enhanced through this research approach, and it also provides a greater degree of reliability than qualitative methods ([Pinsonneault and Kraemer, 1993](#_ENREF_272); [Mingers, 2001](#_ENREF_221)).

## 3.4 Research Methods

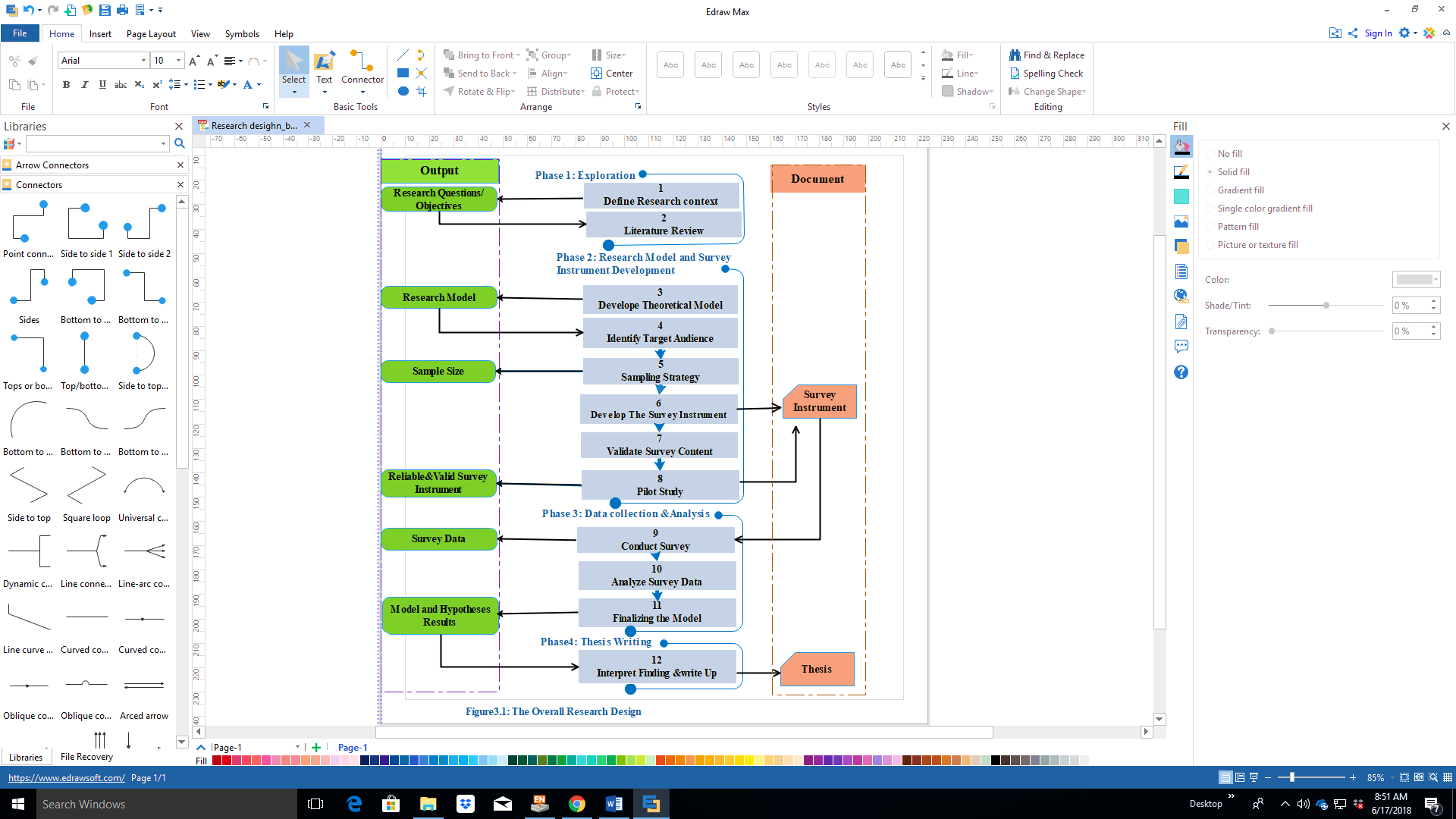
According to the [Scott (2017)](#_ENREF_301) research methods include data collection, analysis and interpretation methods that scholars use to conduct their studies. Since the paradigm of this study is positivism, and the research approach is quantitative, a questionnaire-based survey basically is used as well to examine the hypotheses of the study. According to the [Creswell and Creswell (2017)](#_ENREF_69) research methods include data collection, analysis and interpretation methods that scholars use to conduct their studies. Since the paradigm of this study is positivism, and the research approach is quantitative, similarly, the examination of the study hypothesis was based on the questionnaire survey. Designing a questionnaire is widely based on the research objectives and the kinds of information needed by researchers. The questionnaire is well designed and highly structured to permits information of same calibres to be collected from a large number of individuals in a similar manner so that the data can be analyzed systematically. In this regard, relevant literature and sample questionnaires are carefully reviewed, and questionnaire is designed to be aligned with the proposed model and objectives of the research. Based on the designed questionnaire and the responses from the respondents, the hypotheses derived from the conceptual model which well developed (see Chapter 4 (see Section 4.2).) of this study are tested.

Designing a questionnaire is widely based on the research objectives and the kinds of information needed by researchers. In this regard, relevant literature and sample questionnaires are carefully reviewed, and questionnaire is designed to be aligned with the proposed model and objectives of the research. Based on the designed questionnaire and the responses from the respondents, the hypotheses derived from the conceptual model which well developed (see Chapter 4 (see Section 4.2).) and tested for this study.

## 3.5 Research Design

The design of the research indicates the plan or guidelines to follow in order to conduct the study. This includes specific methods, the intersection of philosophy and strategies of inquiry ([Creswell and Creswell, 2017](#_ENREF_69)). According to [Kumar (2012)](#_ENREF_187), explanation of how the research objectives could be answered formed the main function of the research design. This also leads the researcher from assumptions that are broad enough to the most detailed methods associated with the collection of data and analysis. [Yin (2009)](#_ENREF_376) Provided a precise definition of research design as “sequence that is logical that linked the data in its empirical form to the initial research questions main studies and, ultimately as well as link to its conclusions”. Furthermore, [Creswell and Creswell (2017)](#_ENREF_69), argued that design of the research indicates the plan to conduct research and it includes all aspects of a research project, which includes the method of investigation, arrangement in term of data collection and the analysis of the data. In the absence of a clear research design, which guides a researcher in the process of conducting the research, an effective research plan is impossible. The research plan should answer the following questions: Where is the data located? How many cases and materials will the research need? How will the data be collected? How will the data be analysed? Moreover, research design guides the researchers to accomplish their research properly ([Kothari, 2004](#_ENREF_181); [Hair, 2015](#_ENREF_124)).

This study comprises four main phases, including Exploration (Phase 1), Developed Research Model and survey instrument development (Phase 2), Data collection and analysis (Phase 3), Thesis writing (Phase 4), is shown in figure 3.1, which, depicts the detailed research procedure that was followed in this study.



**Figure 3.1** The overall research design

### 3.5.1 Phase 1: Exploration

This phase of the study is a highly significant phase in term of the research design. This formed the phase upon which foundation of research was formulated and also regarded as the exploration phase. In this phase, based on the literature review that has been done (see Chapter 2), the research problem was formulated and research objectives defined (see Chapter 1). Furthermore, the scope of the research was also determined. By extensively reviewing the literature, the theoretical model with corresponding variables that are suitable for the research objectives of this study was elicited. According to [Creswell and Creswell (2017)](#_ENREF_69), there are possibilities for the theories to be used for enabling a lens that could possibly reshape what the research is focusing at and the questions that should be asked. Furthermore, theories can be employed to unveil an overview in term of what the research is examining and the related questions to be queried. Table 3.1 summarizes the main steps of this phase alongside the outputs from this phase of research design.

Table 3.1 Summary of the exploration phase

|  |  |  |  |
| --- | --- | --- | --- |
| **Step** | **Objectives** | **Activities** | **Deliverables** |
| 1 | * To identify the research problem * To define questions and objective of the research | Define research context | Problems, research questions & objectives |
| 2 | * To identify the current research trends and gaps in using social media for knowledge integration in the context of emergency response. * To identify the theoretical frameworks and the variables to answer the research we * To identify the factors influencing the use of social media for knowledge integration in the context of emergency response and determine the relationships. | Diagnoses and review Literature. | Selected theoretical frameworks and variables. |

### 3.5.2 Phase 2: Research Model and Survey Instrument Development

The purpose of this phase of research design was to construct the research model and develop the questionnaire that can be used to conduct the survey in the next phase. This phase includes six steps, which are discussed in the following subsections. Table 3.2 summarizes the steps included in this phase.

Table3.2 Summary of the research Model and survey instrument development phase

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Objectives** | **Activities** | **Instrument/**  **Technique** | **Deliverables** |
| 1 | To identify the constructs of the research model and propose the hypotheses. | Develop theoretical model |  | Research model and variables |
| 2 | To identify the target audience | Recognize the population |  | Identified population |
| 3 | To sampling strategy | Identify the sampling method and determine the size of the sample. | Non-probability sampling  Purposive sampling method | Sample size |
| 4 | To develop the survey instrument | Design the questionnaire | Data collection objectives  Minimizing the CMV  Formulating measurement model | Developed questionnaire |
| 5 | To validate survey content | validation questionnaire | Face validity  Content validity | Validated questionnaire |
| 6 | Pilot testing | Achieve the reliability and validity of the questionnaire | SPSS version 24, Smart PLS M2  - Internal consistency  - Indicator reliability  - Convergent validity  - Discriminant validity | Reliable & valid questionnaire |

According to Table 3.2, the outcome of the second phase is the conceptual model and the initial survey instrument.

#### Research Model Development

This phase aimed at developing a research model based on combination two-theory task-technology fit and knowledge-based theory of the firm. According to [Creswell and Creswell (2017)](#_ENREF_69), a lens that shapes what the research is looking at can be obtained by using the theories as well as providing questions that should be asked. In this study develop of research model conducted in two-stage first 1) develop model 2) propose the research hypotheses based on study’s conceptual model see Section 4.2 in Chapter 4. All the research constructs derived from the theories included (emergency response teams’ performance, knowledge integration, social media usage, task-technology fit, and task characteristic and social media characteristic).

#### Identify Target Audience

The major entity that is being analyzed in this study is defined as the unit of analysis ([Trochim *et al.*, 2015](#_ENREF_335)). It is the “who or what” that the researcher will study. Based on [Sekaran and Bougie (2016)](#_ENREF_303) the typical unit of analysis include; individuals, groups, organization, and culture. Choosing the suitable analysis in term of the unit can be viewed according to the nature of the research questions based on how the study portrayed. Therefore, the organization in particular is the units of analysis used in this study due to the fact thatthe main objective of the study is to examine team’s performance factors leading to improve emergency response in context of NGOs, which survey the questionnaires for staff and volunteers working within twelve Non- governmental organizations in Sudan they must have flood knowledge. These NGOs were chosen because of their voluntary contributions and long-term partnerships existing between them and the Sudanese government. Most of these NGOs work that are in control by the umbrella of the International Federation of Red Cross and Red Crescent Societies (IFRC) and United Nations known as dominant contributors to the emergency response disaster and the world’s largest humanitarian organization ([Wisner, 1998](#_ENREF_359); [Forsythe, 2005](#_ENREF_100); [Shropshire, 2013](#_ENREF_309)). Which are considered relevant in addressing areas affected by massive flood disaster across Sudan.

The respondents include volunteers and staff’ working in the various department in the NGOs such as finance department, health and emergency management department, emergency management operations and emergency department, besides the volunteer who work during flood disaster. Which is called for an urgent need for research using larger samples of volunteer staff working in NGOs in Sudan to achieve the objective of this study. The researcher is focusing on ascertaining the phase of flood disaster management, quick response to emergency situations.

#### Sampling Strategy

According to Kumar (2012), samplings involved “the procedure by which a few (a sample)) from a bigger group (the population) to virtually be seen as becoming the basis at predicting an unknown piece of information that is prevalence bas3ed on the situation, or outcome regarding the bigger group.” In another definition, sampling is viewed as a subgroup of the population in which the researcher is interested. To obtain the accurate knowledge from the target population, the use of sampling is essential ([Cooper and Schindler, 2003](#_ENREF_65))*.* The probability or non-probability sampling methods can be based on choosing a sample for a survey. Thus, it could become appropriate (nonprobability sampling method) when the population and size becomes challenging to identify([Cater-Steel, 2008](#_ENREF_46)), and as highlighted by Kumar (2012), as the number of elements in the target population becomes either unidentified or unknown, the non-probability sampling designs could be used at this instance. Therefore, participants that are not chosen by chance are selected by the non-probability sampling.Usually, every individual based on the sampling probability method when considering a large population is required to attain an equal chance of being included (Cater-Steel, 2008), thereby removing potential sampling bias.

In this study, the sampling technique applied is non-probabilistic sampling method. In this sampling approach, the findings of the survey are unique for a particular set of individuals, and the individuals are invited to participate in the survey, and they do if they wish.In addition, as subjective techniques are adopted to suggest basically which of the elements that should be among the sampling*.* The sampling procedures that is non-probability has been selected for this study for following reasons. Firstly, if the target population to conduct this research was volunteer and staff of NGOs within Sudan, in this population the number of elements is unknown and may not be identified individually. Secondly, access to all organizations’ volunteer and staff in Sudan is not promising since the staffs are dispersedly located in Sudan and such process of identifying them would be costly and time-consuming.

The purposive sampling method is similar to that of non-probability sampling that is competence in such a way that should enable reliability of informant should be ensured([Tongco, 2007](#_ENREF_334)). The abovementioned reasons make purposive sampling technique the appropriate one for this study. In this technique, the researcher chooses the sample“according to his or her opinion on few appropriate attributes required of the sample member”([Zikmund *et al.*, 2013](#_ENREF_384)). In purposive sampling technique, the researcher selects the target respondents to conform to some criterion. As per above reasons, the purposive is the appropriate one for the current study and used to select the target and the criterion the target should have at least some knowledge in emergency response was considered during the selection of target respondents.

##### 3.1.1.3.1 Sample Size

One of the challenging tasks for the researchers of behavioural science is the determination of appropriate sample size which directly affects the quality and accuracy of the research under investigation ([Kotrlik and Higgins, 2001](#_ENREF_183)). The much smaller sample size is considered as insignificant. It cannot determine the target population and the accuracy of the study results ([Salkind, 2000](#_ENREF_295)). Determining the sample size of quantitative studies, the researchers need to consider the level of confidence to test the hypotheses, the degree of accuracy to estimate the parameters of the population, and level of variation ([Kumar, 2012](#_ENREF_187)).

In the literature, there is no such a set of rules to identify the adequate sample size; although different approaches and methods have been introduced ([Kish, 1965](#_ENREF_178); [Barcikowski and Stevens, 1975](#_ENREF_28); [Thorndike, 1976](#_ENREF_328); [Moreno-Rebollo *et al.*, 2000](#_ENREF_226); [Dell *et al.*, 2002](#_ENREF_76)). [Thorndike (1976)](#_ENREF_328) Suggests that sample size is estimated based on a formula incorporating the number of variables. Furthermore, [Thorndike (1976)](#_ENREF_328) suggested a more rigorous method in which the number of minimum responses is the function of the square of the number of variables in the research plus 50 to 100 more responses as the modifier to assure the reliability of the results., This approach is expressed in the following equation:



Where N represents the minimum number of desirable replies, and V represents a number of variables in the research model. Responses plus 50 more as the modifier in order to assure the reliability in case of small sample sizes. In this approach, the number of acceptable sample size increases exponentially as the number of variables rises. Applying the methodology proposed by Thorndike (1976) to this study based on the conceptual model (See Figure 4.1) (6 variables and 75 as the sample modifier) results in the minimum responses of the following magnitude:



Seventy-five was selected as moderator value as suggested by Thorndike (1976) and since it appeared to be the mid-point value between 50 and 100.

As regarded to previous studies related to this study in the study conducted by [Pai (2012)](#_ENREF_262), they made use of data from 195 service enterprises in Taiwan to study the nature of knowledge integration and task-technology fit in term of e-business applications.Similarly, in the study by [Hsu *et al.* (2013)](#_ENREF_140) in Taiwan, a minimum of 128 responses was applied where they investigated how a company utilizes knowledge integration mechanisms to achieve the success of product innovation in new product development. A survey of 192 participants was applied in a study focusing on investigating the key factors affecting knowledge management system (KMS) usage in IT([Lin and Huang, 2008](#_ENREF_206)). In addition, the study by [El Said (2015)](#_ENREF_92) validated the study on appreciative knowledge management system antecedents which is based on the performance impact model that is constructed by extending the task-technology fit model with an intention to share knowledge, by a survey with 95 technical and administrative staff of various managerial levels. Based on aforementioned studies; the researcher calculated the average of sample size used in these studies and the result is 153.

Furthermore, the researcher also utilized the G\*Power software suggested by [Faul et al. (2007)](#_ENREF_97), [Hair Jr *et al.* (2016b)](#_ENREF_127) supported using G\*power for minimum sample size, is considered statistically powerful”. Which is a statistical power analysis tool to calculate the minimum sample size for our study? The statistical analyses of this study were performed using multiple regression analysis. Following the settings proposed [Cohen (1988)](#_ENREF_62) (f2= .15 for effect size, α = .05 for error type I, and power (1- B error prob) = .95 for error type II) and for five predictors, the suggested sample size was 138. The full setting and the result of G\* power software is presented in Figure 3.2.

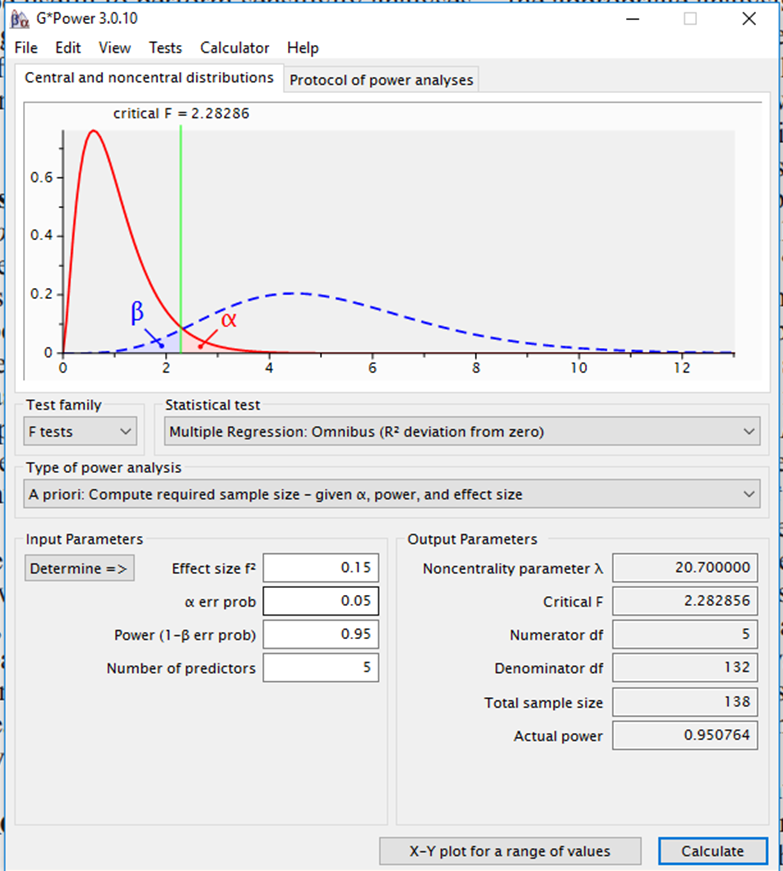
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Figure 3.2 G\* power software results

By considering all of the suggested values of the sample size for this study (111 from the methodology proposed by Thorndike, 138 resulted from the results of power analysis using G\*Power and 153 as the average of sample size used in the related studies), the average of (111+153+138)/3 is 134. However, following the recommendation of [De Vaus (2013)](#_ENREF_74) who stressed that the sample size should be 20% larger than the minimum one due to non-proper responses, the appropriate minimum sample size to be able to analyze this study’s research model was 161.

#### Develop the Survey Instrument

The goal of this research is to investigate impact and influence of factors on emergency response teams’ performance. This study follows a four-step approach as recommended by [Netemeyer *et al.* (2003)](#_ENREF_233) to develop and measure a multi-item instrument of emergency response team’s performance. This approach focuses on developing and validating measures of latent social-psychological constructs. Because emergency response teams’ performance in the context of flood incorporates both psychological and behaviour connections with social activities, using this approach was appropriate for this study. The four steps of instrument development include 1. How the constructs and content domain are defined *2*. How judging and measurement items are generated 3. Constructing studies to develop and refine thescale 4. Finalising the scale. Beginning with formulating measurement model in this phase all constructs on the model should be defined.

These constructs are extracted from the literature relevant to TTF model and KBT theory. In this step, the steps taken to minimize the common method variance (CMV) of the developed questionnaire are explained. Then the measures for each construct) are adapted for the context of the current study, and the questionnaire is developed to be initially administered in a pilot study ([Creswell and Creswell, 2017](#_ENREF_69)). All the items used for measurement model is multiple items except demography characteristics of respondents such as age and gender, experience were single items and followed [Hair  *et al.* (2013)](#_ENREF_125) criteria for choosing measurement model all constructs of this study model are reflective constructs. Chapter 4 (Research Model and Survey Development) provides a detailed discussion on this stage of the research design.

After developing an initial research instrument, series of quantitative and qualitative pre-tests should be conducted with the focus on the items’ refinement and exclusion of bad ones from the initial survey. Hence, the objectives of this stage are twofold, (1) to enhance the quality of measurement model by conducting content validity and face validity, and (2) to further refine the items and discard the ambiguous ones. All the items relating to the measurement model constructs (emergency response team’s performance, knowledge integration, social media usage, task-technology fit, and task characteristic and social media characteristic), addition to demography characteristics should be assessed against face validity and content validity.

#### Survey Instrument Validation

The development and validation of an instrument is an important stage in information systems research ([Boudreau *et al.*, 2001](#_ENREF_41)). The main goal of developing a measurement instrument is to create valid and reliable measures of the model construct. Therefore, constructs that are based on a strong foundation of theory and high degrees of validity and reliability are prerequisites to the knowledge that is cumulative in IS research ([Cheung *et al.*, 2011](#_ENREF_55)). This research following two steps to validity the measurement items which are face validity and content validity.

1. *Face Validation*

Face validity is defined as “the appearance of the instrument to the layman; that is if upon cursory inspection an instrument appears to measure what the test constructor claims it measures” ([Waltz *et al.*, 1991](#_ENREF_353)). In other words, face validity can be defined as the a which measure reflects what is basically needed to be measure ([Nunally and Bernstein, 1994](#_ENREF_240)). Basically, concepts measured by an instrument are a demand to measure basically on the logical link among the questions as well as the objectives of the study. Henceforth, it is easy to apply to be the main advantages of this type of validity([Ranjit, 2009](#_ENREF_280)). In order to perform the face validity, the panel of experts, i.e. the researchers with the solid method knowledge, have been selected to validate whether the questionnaire appears to make sense([Bell, 2005](#_ENREF_36)).

In this current study, the face validity will be conducted by distributed the questionnaire to the three researchers in the field of information systems to examine the appropriateness of the questionnaire items’ clearness, appearance and every question or item within the research instrument should contain an objective together with a logical link that should reflect what it is supposed to measure. This has become essential for validating the survey instrument, as to whether to looks valid to the respondents and ensure all the questions meet the research intention which can be understood easily by the respondents. The detailed regarding face validity is discussed in chapter 4.

1. *Content Validity*

The degree at which a mechanism has an appropriate sample of items for the construct being measured is defined as the content validity ([Polit and Beck, 2004](#_ENREF_273)). In other words, to what degree the operational definition of constructs is reflected by its sample items. The validity of the content is evaluated by the experts according to the items instrument which are established from the review of the literature. The items are thus selected based on the confidence of the experts that are in the field ([Ranjit, 2009](#_ENREF_280)). Therefore, the content validity of the instruments is utilized by the expert judgment. Consequently, there are two steps adopted by this research to guarantee the questionnaire content validity, based on the discussion by [Mackenzie *et al.* (2011)](#_ENREF_215). According to them, the two judgments that need to be done during the assessment of content validity are: (1) can the items representing that of the individuals represents that of the aspect of the content domain of the construct? And (2) are the items reflect the collective representative of the whole content domain of the construct ([Mackenzie *et al.*, 2011](#_ENREF_215)). The detailed regarding content validity is discussed in chapter 4.

This research used two steps followed by [Mackenzie *et al.* (2011)](#_ENREF_215) to ensure the content validity and the questionnaire are established. At the first phase, previous literatures in the field of knowledge integration itemized the underlying constructs, utilization of technology and emergency response. In step two, content validity was evaluated by 5 experts (two academics in the field of information system and three from NGOs work in emergency response) and professional translator to translate from English to Arabic.

#### Pilot Testing

To ensure reliability as well as the validity of a study, the pilot test is conducted. The desirability of pilot test is not solely to do with checking its validity and reliability; pilot testing also has a role in ensuring that the designed questionnaire functions well. In a pilot study which also is called feasibility study (Kumar, 2012), the researcher conducts a small-scale study to decide whether it is worth to carry out a detailed investigation. The sample size of the pilot study, which is recommended to be conducted before the main data collection procedure, could possibly ranges from 25 to 100 subjects, but the respondents may not have to be statistically selected([Cooper and Schindler, 2003](#_ENREF_65)). In this study were distributed 100 printed questionnaires into 4 Non-government organizations (NGOs) selected from 12 flood emergency response NGOs which called (Sudanese red crescent society, United nations educational scientific and cultural organization, Al Manar organization Sudan and El sugya charity organization Sudan) located in Khartoum, targeting staff and volunteers.

There are different tests for assessing the validity and reliability of both formative and reflective measurement models. For the reflective constructs, for internal consistency, indicator reliability, convergent validity, and discriminant validity, the psychometric properties of them are evaluated while the formative constructs are evaluated against their convergent validity, collinearity between their indicators, and significance and relevance of outer weigh*ts* ([Hair  *et al.*, 2013](#_ENREF_125)). In this study, based on the followed [Hair  *et al.* (2013)](#_ENREF_125) guidance discussed in detail in chapter4 (table4.1) All of the models constructs proposed to be reflective indicators, so the criteria used in pilot testing are evaluated for internal consistency, indicator reliability, convergent validity, and discriminant validity. As based on indicator reliability all the items met the criteria threshold value (0.7) as shown in chapter4 (Table 4.5), the value of all external loadings of measurement items are exceeding threshold value (0.7), except 4 items and furthermore, all constructs met the acceptable values for criteria of Cronbach’s alpha and  which should be more than 0.7 accordance’s to internal consistency criteria’s. The detailed discussion of the pilot study is provided in chapter 4 .**Table 3.4** shown the criterion for assessing measurement model the [Hair  *et al.* (2013)](#_ENREF_125).

Table ‎0.4 Criterion for assessing measurement model based on the [Hair  *et al.* (2013)](#_ENREF_125).

|  |  |  |
| --- | --- | --- |
| **Criterion** | **Definition** | **Acceptable Value** |
| Indicator reliability | The consistent of a set of variable is tested with what it intends to measure. The extent to which a latent variable is able to explain its indicator’s variance. | Item’s loading > 0.6. |
| Construct reliability | Is issued to indicate the internal consistency of constructs as measured. | Cronbach‘s Alpha  coefficient (CA)> 0.7  Composite Reliability  (CR)>0.7 |
| Convergent validity | Convergent validity formed “the extent at which there is a positive correlation with alternative measures having similar kinds of construct.” | Average Variance Extracted  (AVE)>0.5 |
| Discriminant validity | Discriminant validity formed “the extent at which a construct tends to basically portrayed a truly distinct from other constructs through the means of empirical standards.” | Construct-level discriminant validity: square root of a construct’s AVE should be greater than the correlations of the other constructs in the model |

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### 3.5.3 Phase 3: Data Collection and Analysis

After designing a valid and reliable measurement instrument and based on the sampling technique and the target population identified in the previous phase, the survey data are collected by distributed questionnaires cross SurveyMonkey website, self-administrated and foot-in-door. The data are analyzed using PLS-SEM Smart PLS M 2.0 statistical software. The results of the analysis provide an insight on the possibility of ensuring the provision of the conceptual model, as discussed in details in Chapter 5. Table 3.5 summarizes the steps taking during this phase to provide an input for the next phase that also is the final one.

Table 3.5 Summary of the data collection and analysis phase

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Objectives** | **Activities** | **Instrument/**  **Technique** | **Deliverables** |
| 9 | To collect the data from the target sample of audiences | Conduct survey | Online  self-administrated  foot-in-door | Survey data |
| 10 | To elicit the hidden knowledge from the collected data | Analyze survey data | Smart PLS M2  - Collinearity assessment  - Significance of relationships  - Coefficient of determination  - Effect size | Analysed data |
| 11 | To accept or reject the hypothesized relationships | Finalizing the model |  | Model and hypotheses results |

#### Conduct Survey

By ensuring the measurement model has been formally specified, the data required to be obtained from the target population in this study is based on the purposive sampling technique, which required the target respondents must have flood knowledge. [Earl (2012)](#_ENREF_89); [Edmonds and Kennedy (2016)](#_ENREF_91) stated the importance of the data collection phase to interact with the subject organization, to have sufficient field resources, to set up the sequence of activities when collecting data, and to tackle unexpected occurrences. There are many data collection methods that can be used for the survey method and these include mail questionnaires, internet questionnaires, self-administrated questionnaires or even telephone interviews and foot-in-door.

In the present study, to collect the data, the volunteers and staff work in 12 Non-government organizations, within Sudan have been targeted: in the field of flood emergency response. These organizations have been selected because they have a strong contribution to flood emergencies management task within Sudan. The duration of the collected data basically took place ranging from September 2016 to December 2016. To elicit the list of organizations categorized under flood emergency, several resources were used which the main ones are Humanitarian Aid Commission (HAC), second Sudanese Red Crescent Society (SRCS) and finally, the resource has searched the internet. The survey targeted more than 700 volunteers and staff selected from 12 NGOs elicited from the abovementioned resources.

1. The Sudanese Red Crescent Society (SRCS) formed the widespread humanitarian organization operating in Sudan as the biggest and most decentralized. The society is formed from the Sudan branch of the British Red Cross Society. The SRCS law become available by the authority, providing the National Society with a very rigid legal as well as clear directive to facilitate First Aid, emergency response, health interventions and other humanitarian operations. The general public tend to be conversant with thehumanitarian work as well as the community service through many years of emergency relief and community-based programming.
2. The United Nations High Commissioner for Refugees (UNHCR) is a United Nations programme that has the goal of making sure the refugees are protected, forcibly displaced, such that permits the agency to lead and co-ordinate foreign action to protect refugees and resolve refugee problems communities and assist in their voluntary repatriation. Its primary purpose is to safeguard the rights and well-being of refugees.
3. The United Nations Educational, Scientific and Cultural Organization (UNESCO) its declared aim was to contribute to peace and security by promoting international collaboration through educational, scientific, and cultural reforms for the purpose of making sure the universal respect is increase for the purpose of justice, UNESCO pursues its objectives through five major programs: [education](https://en.wikipedia.org/wiki/Education), [natural sciences](https://en.wikipedia.org/wiki/Natural_science), [social](https://en.wikipedia.org/wiki/Social_science)/[human sciences](https://en.wikipedia.org/wiki/Human_science), culture and communication/information.
4. El Sugya Charity Organization was registered in July 1999 as a voluntary organization in accordance with the "Voluntary and Humanitarian Work, its aim to Improvement of living standards of the population in the targeted areas by availing potable water for communities especially in rural areas and empowerment of communities through awareness campaigns, participation and training on management of water works to achieve sustainable use of water facilities.
5. Jafra foundation organization Sudan, a relief organization that works to alleviate human suffering in emergencies and disasters and contributes to raising the standard of living in Sudanese society and activating the various segments of society through targeted projects and activities. It aims in particular to:
   1. Mitigating suffering in crisis and disaster situations by providing essential needs and services
   2. Providing materials and emergency relief services (water, shelter, medication)
   3. Coordinated relief operations and support services (management and logistics).
   4. Training courses in the management of crises, disasters, and development and community skills.
6. Almanar Voluntary Organization is one of the leading women organizations that are formed in Sudan which is currently working in partnership with and is sustained by European Commission (EC), ICCO, United Nation International Children Emergency Fund (UNICEF), beside protection interventions of the Almanar focus on supporting refugees through trained community volunteer paralegals. The protection associated with the committees community which is in term of ensuring the protection awareness tend to facilitates how the sessions is raised in their communities thereby conducting forums and networking that could possibly provide as a whole members of the community as well as National Institutions with the opportunity of making sure the information are distributed and adopted and solutions and recommendations regarding community issues and problems encountered, provides legal aid and consultations to communities.
7. United Nations African Mission in Darfur (UNAMID) is a United Nations programme is the first joint UN/AU force, and the largest mission in term of peacekeeping thus allowed the use of force to ensure that civilians are protected as well as humanitarian.
8. Nawafil El khayrat organization it is objectives provide the highest medical services to the poorest strata of society, seeks to investigate health phenomena and endemic diseases in rural and least developed regions and to improve therapeutic and preventive health.
9. The Arab Organization for Agricultural Development (AOAD) was established in 1970, upon the desire of the Arab countries. Appreciating how vital the agriculture plays within the region's economy, the need for coordination was recognized by the Arab between their divers’ policies in agriculture, natural and human resources as well as economic development, to achieve the collecting and disseminating information and data relevant to the fields of food and agriculture.
10. The Sudan Social Development Organization, which is also known based on the acronym SUDO, formed the non-profit organization o thee Sudanese non-profit organisation working in Sudan, with offices located around the country, aiding civilians affected to provide basic health services, sanitation, and safe drinking water. A partnership with international organizations helps to provide shelter to people.
11. Al Rahma Islamic organization Sudan Humanitarian organization its objectives are providing access to inclusive life-saving and protective quality education for pre-school-aged children (boys and girls) from IDPs in gatherings the area in Khartoum, Assistance to disaster victims, helping needy people in different sectors of society and Contribute to solving the problems of society and the family.
12. The Sudanese Environment Conservation Society (SECS) had inspired the formation of the council of higher environment and natural resources at both the national and state levels. The environmental articles are addressed through societal advocates, similarly, at the community level, the SECS have a vital impact at the community level when it comes to environmental rehabilitation and conservation; to ensure the climate changes are being addressed to change impacts to water, sanitation, health and hygiene.

Firstly, online questionnaire was designed hosted by the Survey Monkey([Surveymonkey, 2016](#_ENREF_316)), after more than one month the responses were weak just 33 response ,hence printed 700 questionnaire was sent to 12 organizations that their addresses were double-checked on their website, together with a cover letter explaining the purpose of the study and enclosing a self-addressed pre-stamped response envelope. The data collection took place from September 2016 through December 2016. One of the threats that organizational researchers are confronted is the potential threat of significant non-responses to a survey. Hence, to facilitate an increase on needof the response rate, the tailored-design method for the response-enhancing techniques “tailored design method (TDM) was followed. TDM comprises of an amount of rigorous methods and procedures that if followed accurately, could possibly proliferate the response rate considerably([Anseel *et al.*, 2010](#_ENREF_23)).

Based on the TDM, one of the techniques which helps to increase the response rate is the personalization of the questionnaire ([Anseel *et al.*, 2010](#_ENREF_23)), in which we personally addressed the participants in their cover letters. After two weeks of questionnaire distribution, the recipients were reminded and encouraged to participate.

Finally, According to [Berg *et al.* (2004)](#_ENREF_38) provides that the researcher takes into account practical considerations by selecting a site or setting which is reasonable in size and complexity so that the study can be completed within the time and budget available to the researcher. As such, it assumes four areas of study; first, the researcher must be able to access the site when conducting the search. Second, the site must have a good supply of targeted population, allowing the researcher sufficient opportunities to collect data. Third, there must be "a high probability that the focus of the study, processes, people, programs, interactions and structures that are part of the question (s) will be available to the investigator". Finally, the researcher is competent and acceptable. Based on the above idea some portion of the questionnaires was distributed individually foot-in-the-door among the volunteer and staff located within Khartoum of Sudan as it was convenient for the researchers. Within three months, there were 305 in total of all questionnaire that are finished which are received from 700 printed questionnaires beside 33 from an online questionnaire. After reviewing 338 responses, most of the questionnaires that have the missing values as the main variables as well as all those that have similar answers for mostly different variables were respectively removed. There were 240 usable ones, after making sure the unusable questionnaires resulting in about a 34 percent response rate. This amount is satisfied based on section (3.5.2.3.1) sample size.

#### Analyse Survey Data

This section presents the statistical procedures used to analyze the data. Following the recommendation of [Hair  *et al.* (2013)](#_ENREF_125); [Hair Jr *et al.* (2016b)](#_ENREF_127), analysis of data comprises of two phases of measurement and the assessment of the structural model utilizing Structural Equation Modelling (SEM) using the Partial Least Squares (PLS) software.

The purpose of using PLS elaborates on the relationships and criterion variables prediction of the model. As the researchers become concern about the prediction of the dependent variable primarily, it becomes the most appropriate to use ([F. Hair Jr *et al.*, 2014](#_ENREF_95)) Interestingly, PLS has been used among researchers in both IS research and other disciplines ([Urbach and Ahlemann, 2010](#_ENREF_345); [Roldán and Sánchez-Franco, 2012](#_ENREF_293)). Researchers as well as scholars are now accepting PLS as a powerful tool for evaluating the structural model ([Henseler *et al.*, 2009](#_ENREF_133)). While SPSS 24 used for collinearity assessment structural model see chapter5 (Table 5.7 and Table 5.8).

To analyze the data as well as examine the hypotheses of the research, the researcher has adopted the Partial Least Square (PLS) based Structural Equation Modeling (SEM). As stated by [Hair Jr *et al.* (2016b)](#_ENREF_127), PLS-SEM is causal modeling an approach which focuses on “maximizing the explained the dependence of the variance latent constructs”. This study used PLS-SEM for some reasons: First, this study aimed at identifying the determinants of social media utilization for integrating knowledge, which ultimately predict the factors enhances emergency response team’s performance. This is consistent with the rules of thumb proposed by Joe [F. Hair Jr *et al.* (2014)](#_ENREF_95) while the goal is to predict the key dependent and antecedent variables, PLS becomes an appropriate technique. Likewise, the proposed research model in this study included independent variables (i.e., task characteristic, social media characteristic, Task-technology fit, social media usage and Knowledge integration ) and one dependent variable (i.e., Emergency response team’s performance). Furthermore, it has been observed that PLS is appropriate for analyzing complex models ([F. Hair Jr *et al.*, 2014](#_ENREF_95)).

Secondly, the researcher also applied PLS technique because it makes the minimal demand on data distribution, sample size, measurement scales and since the nature of this study is explanatory, PLS was considered a better tool to explain the collected data. The Smart PLS M2 Version 2 ([Ringle *et al.*, 2005](#_ENREF_287)) was used to provide the analyses carried out on data in this research based on the following a two-step analysis approach. Within the PLS analysis, there are two (2) models: (1) the indicator items specifically to their relevant latent constructs based on the measurement model, and (2) the structural model on the other hand tend to relates the diverse latent constructs to each other ([Hair Jr *et al.*, 2016b](#_ENREF_127)). The construct is usually known as a variable that is unobserved can be possibly measured by few observed variables known as indicators or measurement items. To carry out the two-step analysis, this research has followed the stages recommended by [Hair  *et al.* (2013)](#_ENREF_125).

The assessment measurement models usually specified scale items which is a foundation for the SEM analysis ([F. Hair Jr *et al.*, 2014](#_ENREF_95)). In fact, one of the requirement that is preliminary in nature towards evaluating a model is to verify the reliability and validity of the measurement models to present the strength of the measures used for testing the proposed model. Section 3.5.2.5 provides a thorough explanation of the assessment of measurement model procedure. Table 3.6 exhibits different validity and reliability tests for reflective constructs together with their acceptable thresholds.

Table ‎0.6 Constructs’ reliability and validity assessments based on the Hair et al. (2013).

|  |  |  |  |
| --- | --- | --- | --- |
| Measurement model | Criteria | Measurement | Value |
| Reflective | Internal consistency | Cronbach’s alpha | ≥ 0.6 Acceptable  ≥ 0.7 Satisfactory |
| Composite reliability | 0.6–0.7 Acceptable 0.7–0.9 Satisfactory  >0.95 Redundancy |
| Indicator reliability | Outer loading | ≥ 0.7 |
| Convergent validity | Average variance extracted (AVE) | ≥ 0.50 Desirable |
| Discriminant validity | Cross loading | An indicator’s outer loading on the associated construct should be greater than all its loadings on other constructs. |
| Fornell-Larker | > highest correlation with any other constructs |

Typically, the principal criterion that should be evaluated against the model needed for the measurement is internal consistency. The traditional criterion to assess internal consistency is Cronbach’s alpha (Hair et al., 2013), which provides an estimation of the reliability of the inter-correlation of observed indicator variables. The indicators are prioritized by the PLS-SEM which is based in term of the reliability of the individual while the Cronbach alpha tend to be more sensitive when it’s come to the number of items in thescale and because it has some limitations regarding the population, it would be more appropriate to use another criterion to assess internal consistency that is composite reliability (ρc). The value of composite reliability varies between 0 and 1, which higher values indicate higher reliability([Hair Jr *et al.*, 2016b](#_ENREF_127)). The values of ρc are interpreted in the same way as Cronbach alpha. Specifically, in explanatory researches, the ρc values of 0.60 to 0.70 are acceptable, while in more advanced stages of the research the ρc values of 0.70 to 0.90 are considered as satisfactory, and the value below 0.60 for composite reliability indicates the lack of internal consistency([Hair Jr *et al.*, 2016b](#_ENREF_127)).

As put forward by [F. Hair Jr *et al.* (2014)](#_ENREF_95), the validity of the convergent is“ formed the extent at which a measure tend to positively correlates compared with the most measures that have the same construct.” This definition means that all items of the specific construct are required to have a high value of proportion of variance shared. To assess the validity of the convergent constructs, researchers basically tend to check the outer the loading process of the indicators and the Average Variance Extracted (AVE) ([Hair Jr *et al.*, 2016b](#_ENREF_127)). High outer loadings of indicators mean they have much in common to measure the specific construct. Furthermore, outer loadings are primarily associated in term of the results relationships which is based on the reflective measurement of the models; this described characteristic is therefore referred to as the indicator reliability ([F. Hair Jr *et al.*, 2014](#_ENREF_95))

As the outer loadings of all indicators of the specific construct should be significant, the outer loading for an indicator to be considered is known as the common rule of thumb and this can be seen as reliable at 0.7 or higher ([Hair Jr *et al.*, 2016b](#_ENREF_127)). In the social sciences and especially when newly developed scales are used, weaker outer loadings are observed by the researchers ([Hulland, 1999](#_ENREF_143)). Another measure, which is used to evaluate convergent reliability but at the construct level is average variance extracted (AVE). AVE of each construct is the sum of the squared loadings divided by the number of indicators. Following the applied logic in single indicators, “the AVE value of 0.50 or even higher indicates shows that on an average, more than half of the variance of its indicators are explain by the construct explains”([Hair Jr *et al.*, 2016b](#_ENREF_127)). The AVE values of less than 0.50 indicated that there are more errors remained in the items.

To assess discriminant validity is considered the last step to assess the reflective constructs of both validity and reliability*.* When a construct becomes distinct in nature when compared from other constructs that are empirical in nature, it is known as the Discriminant validity ([Hair Jr *et al.*, 2016b](#_ENREF_127)). Hence, by performing discriminant validity, we are proofing that the construct is unique and captures the phenomena, not represented by other constructs in the model. In the literature, two measures are proposed to assess the discriminant validity. The first measure is called cross loading, in which the indicators’ outer loading of the associated construct should be higher than all of its loadings on other constructs. This criterion for assessing discriminant validity is considered rather liberal because it is very likely that discriminant validity is exhibited based on either two or more constructs. The second and additional conservative technique adopted in the measurement of the discriminant validity is the Fornell-Larcker criterion. In this approach, the square roots of AVE values are compared with the latent variable correlations. Hence, for the construct to be considered as discriminately valid, its square root of AVE are required to be greater than its highest correlation with any other constructs ([Hair Jr *et al.*, 2016b](#_ENREF_127)).

As a result of the confidence gained in term of reliability and validity of the measurement models, to support the research model, a structural model was constructed to provide evidence. The relationship amongst constructs in the model to facilitate the evaluation of a structural model involves an assessment. In the PLS analysis, five criteria, including (1) collinearity among the predictor constructs, (2) significance of path coefficients, (3) coefficient of determination (R2), and (4) effect size ([Hair Jr *et al.*, 2016b](#_ENREF_127)) were employed to assesses the explanatory power of the structural model. Table 3.7 summarizes all the criteria needed to test the structural model together with their measures and acceptable levels. Table 3.7 Structural model assessment criteria.

#### Finalizing the Model

Upon the assessment of the measurement and structural model and based on the retrieved results, the proposed model is finalized regarding the significant and non-significant relationships. Supported and not supported hypotheses are discussed, and the model together with the final results is presented.

### Phase 4: Thesis Writing

The current thesis was written as the last phase of this research project. According to the results shown in Phase 4, the existing model of research was validated, which represents the contribution of the study. Table 3.8 exhibits the step taken during this phase.

* 1. Table 3.7 Structural model assessment

|  |  |  |
| --- | --- | --- |
| **Criteria** | **Measurement** | **Value** |
| Collinearity assessment | Variance inflation factor (VIF) | Acceptable ≤ 5 |
| Tolerance level | Acceptable > 0.20 |
| Significance of the structural model relationships | t value | Critical values for two-tailed test |
| 1.65 (significant at the 0.1 level) |
| 1.96 (significant at the 0.05 level) |
| 2.57 (significant at the 0.01 level) |
| Coefficient of determination | R2 value | 0.75 substantial |
| 0.50 moderate |
| 0.25 weak |
| Assess the f2 effect sizes | f2 value | 0.02 small effect |
| 0.15 medium effect |
| 0.35 large effect |

* 1. Table ‎3.8 Summary of the thesis-writing phase

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Step | Activities | Objectives | Instrument/ Technique | Deliverables |
| 12 | Interpret findings and write up | To write up the thesis based on the conducted steps in the previous phases and findings | MS Office 2013  EndNote x7 | Completed thesis |

## Chapter Summary

The essential steps to be taken and the considerations that are necessary to ensure the quality of the current research were presented in this chapter. An appropriate research design based on the positivistic nature of this study was proposed and elaborated in detail. The approach to design measurement instruments that is valid while and reliable is done by means of face and content validity, and further refining the initial instrument by application of statistical techniques was discussed thoroughly. Based on the detailed discussion, a purposive non-random sampling was proposed to be used to select 161 samples among the volunteer and staff of Sudanese Non- government organizations. The four different phases of the research procedure designed and followed in this research are exhibited in Figure 3.1. The operationalization of the research model together with its validity and reliability assessment are provided in Chapter 4, and the analysis of the final results is discussed in detail in Chapter 5.

# RESEARCH MODEL AND INSTRUMENT DEVELOPMENT

## 4.1 Introduction

Review of literature in Chapter 2 highlights the importance of used knowledge integration as a strategy in emergency response. However, based on the critical review in Chapter 2, there is lack of study in terms of social media as a platform to integrate team knowledge as well as scare studies in examining the impact of integrating knowledge on team efﬁciency and effectiveness (performance). Furthermore, the main problem the lack of comprehensive model to facilitate better realization of required solution.

Furthermore, from the literature review in Chapter 2 theories on related issues are carefully reviewed, and two theories were recognized and integrated to construct this study model. In addition, the factors affecting emergency response team’s performance are identified. In this chapter, the research model is developed. This chapter is divided into two main sections. First, research model and hypotheses development process are introduced based on the theories of Task-Technology Fit and Knowledge-based theory of the firm. Secondly, this chapter aims to develop the survey instrument to gather the data. It discusses the process of formulating the measurement model of this study. The validation of the survey content utilizing face and content validity was further discussed. Next, the pilot study was presented which to further assess the legitimacy and trustworthiness of the developed questionnaire. Then, the procedure of conducting the survey is described. Finally is a Summary of the chapter.

## 4.2 Theoretical Foundation of Model

The study proposes to examine the key factors affecting emergency response team’s performance through the combination of Task-technology fit (TTF) theory and knowledge-based theory of the firm (KBT). KBT is a theory of knowledge integration ([Grant, 1996](#_ENREF_116); [Huang and Newell, 2003](#_ENREF_141)) which explains the importance of knowledge as a resource in the firm or organization and identifies the important issues in the organization’s ability to integrate specialized flood disaster knowledge, staff and volunteer skills in NGOs.

Thus, it helps to make the decision at the appropriate time that result to improve team’s performance. Specific knowledge and skills could be coordinated utilizing many mechanisms such as (1) rules and directives (communication, schedules, plans, policies, procedures; (2) Routines also known as coordination by mutual adjustment can support a higher level of simultaneousness of individuals carrying their own specialized tasks; (3) Sequencing – in its own time slot, each specialist's input occurs independently (4) application of problem solving in group and decision making need more communication and contact personally ([Grant, 1996](#_ENREF_116)). All these mechanisms can be employed face-to-face meeting. According to Mehta and Mehta (2017) suggested the critical role for knowledge integration to enhance team’s outcome. Furthermore, knowledge integration can improve coordination product development through communication and organizational routines, which leads to improve team performance ([Körner *et al.*, 2016](#_ENREF_180)), from above mentioned that call for predictive the knowledge integration as antecedents for teams’ performance.

In this phase, valuable knowledge and skills are required during the flood disaster to make a decision on time and solve problems. Since the emergency response operations depend on teams work on dispersed places, it is difficult to share or transfer knowledge immediately and face-to-face meeting toward integrates knowledge for appropriate decision making on time. Consequently, it is important to use another tool such as social media to facilitate communication, collaboration, and coordination. Prior studies have found that by applied social media are effectively managed the relationship and exchange the knowledge through employees within the firm ([Benitez et al., 2018](#_ENREF_37)). According to [Cao *et al.* (2015)](#_ENREF_45), research that are empirical had demonstrated that ,social media has the tendency to facilitate knowledge integration as well impact positively*.* From the above-mentioned studies that call to add social media usage is antecedent construct for knowledge integration.

TTF theory disputes that there is possibility for the use of technology to result from divers’ outcomes. Utilization and performance, subject to its configuration and the task ([Lin and Huang, 2008](#_ENREF_206)). To evaluating how information technology such as social media can affect performance and usage, the task-technology fit (TTF) model is widely used. Technology utilization, to have a positive effect there should be a fit between technology and task that have impacted positively on the performance based on its supports. The TTF models focus on the ﬁt among the characteristic of the task and the technology ([Goodhue and Thompson, 1995](#_ENREF_114); [Lu and Yang, 2014](#_ENREF_209)). Various information systems studies have adopted the use of the TTF model ([Dishaw and Strong, 1999](#_ENREF_79); [Okoli and Oh, 2007](#_ENREF_245); [Kwai Fun Ip and Wagner, 2008](#_ENREF_190); [Lin and Huang, 2008](#_ENREF_206); [Zhou *et al.*, 2010](#_ENREF_383); [Lu and Yang, 2014](#_ENREF_209); [Yadegaridehkordi *et al.*, 2014](#_ENREF_368); [Tam and Oliveira, 2016b](#_ENREF_322); [Khan *et al.*, 2017a](#_ENREF_173); [Ouyang *et al.*, 2017](#_ENREF_258); [Abbas *et al.*, 2018b](#_ENREF_3)).

There are five key construct to TTF model: task characteristics, technology characteristics that jointly come together and impact the TTF while affecting the outcome (performance or utilization). To satisfy the information needs, the action taken in turning inputs into outputs is paramount. The technology comprises of a wide range of IT like the hardware, software, data, user support, etc. TTF cold totally rely upon the agreement between the technologies capacity and needs of the task, as well as the users’ competency ([Lin and Huang, 2008](#_ENREF_206)).

According to [Pai (2012)](#_ENREF_262), based on the service industry, the seldom empirical research has been carried out from the viewpoints of knowledge integration and task-technology fit. Which call to combination knowledge based theory of the firm theory of knowledge integration and task technology fit model is applied to social media. According [Dishaw and Strong (1999)](#_ENREF_79); [Lin and Huang (2008)](#_ENREF_206); [Teo and Men (2008)](#_ENREF_326); [Lu and Yang (2014)](#_ENREF_209); [Oliveira *et al.* (2014b)](#_ENREF_248); [Tarhini *et al.* (2016)](#_ENREF_324); [Wu and Chen (2017)](#_ENREF_362). There is a significant extension to TTF model with attitude/behavior models which thus ensured the provision of much more reliable choices of the users’ of technology. Consequently, In this study, the TTF model was extended by incorporating the constructs of knowledge integration from KBT theory of the firm, the proposed model constructs are ( Emergency response team’s performance(ERTP), Knowledge integration (KI), Social media usage, Task- Technology fit (TTF), Task characteristics (TCH) and Social media characteristics (SCH) ). An overview of the definition of all the constructs of this study is provided in table 4.1

Table 4.1: Definition of constructs

|  |  |  |
| --- | --- | --- |
| **Construct** | **Definition** | **Source** |
| Task characteristics | Task characterized by two important  requirements represent in task tacitness and task interdependence during emergency response | ([Subramaniam and Venkatraman, 2001](#_ENREF_314); [Kankanhalli *et al.*, 2005](#_ENREF_166); [Teo and Men, 2008](#_ENREF_326)) |
| SM characteristics | The characteristics of SM measured by relevance and compatibility and reflected in many dimensions such as sharing, connecting, accessibility, and collaborating, useful information quickly and easily, and coordinating that enable individuals to integrate flood knowledge within their organization. | ([Teo and Men, 2008](#_ENREF_326); [Jue *et al.*, 2009](#_ENREF_162); [Hemsley and Mason, 2013](#_ENREF_131)) |
| Task-technology fit | Task-Technology Fit (TTF) is the assistance level of fit provided by social media in performing emergency response team’s tasks. | ([Goodhue and Thompson, 1995](#_ENREF_114); [Teo and Men, 2008](#_ENREF_326); [Agnihotri and Troutt, 2009](#_ENREF_5)) |
| SM Usage | SM Usage (SMU) the degree of frequency and regularly use SM for searching purposes and flood knowledge contribution. | ([Lin and Huang, 2008](#_ENREF_206); [Teo and Men, 2008](#_ENREF_326); [El Said, 2015](#_ENREF_92)) |
| Knowledge integration | Knowledge integration (KI) is the process of sharing and integrate flood knowledge with expertise and specialist individuals and team members during the flood and coordinate the knowledge to solving emergency response problems and accurate decision-making. | ([Grant, 1996](#_ENREF_116); [Tiwana and Mclean, 2005b](#_ENREF_332); [Haddad and Bozdogan, 2009](#_ENREF_121)). |
| EER teams’ performance | ERT performance is the achievement of a set of emergency response tasks by individuals or team members with improved efficiency and effectiveness associated with using KI. | ([Lin and Huang, 2008](#_ENREF_206); [Teo and Men, 2008](#_ENREF_326); [Loebbecke and Myers, 2017](#_ENREF_208)) |

## 4.3 Research Hypotheses Development

The conceptual model shows the interrelationships among several variables which are very paramount for the study. The developed conceptual model should permit testing and hypothesizing of few relationships to determine the validity of the formulated theory or not ([Sekaran and Bougie, 2016](#_ENREF_303)). The related literature was reviewed, and a set of constructs was extracted to be used in this research’s conceptual model. In Chapter2 (Table 2.3) summarizes the factors investigated in previous studies on knowledge management and technology utilization. In this study, the proposed model posits predictors for improving emergency response team’s performance within NGOs during flood disaster in Sudan. The variables and hypotheses of this study are grounded from the combination of KBT theory and TTF theory. This section discusses the main dependent variable (emergency response team’s performance (ERTP)) and independent variables such as knowledge integration (KI) and social media usage (SM usage) and Task-technology Fit (TTF), Task characteristics (TCH) and finally Social media characteristics (SMCH). The relationships among dependents and independents variable are represented by defining a corresponding hypothesis.

### 4.3.1 Emergency response Team’s Performance (ERTP)

Performance in the context of the information systems (IS) can be viewed as an achievement of a set of tasks by someone having sufficient efficiency as well as higher quality. Measurement of the performance is constraint in the IS adoption and use models, although it could possibly be one of the main objectives of an information system is to ensure better improvement of the users’ efficiency in term of task. Accordingly, in this study, the emergency response teams’ performance referring to the achievement of a set of emergency response tasks by individuals or team members with improved efficiency and effectiveness associated with using knowledge integration.

According to [Goodhue and Thompson (1995)](#_ENREF_114); [Teo and Men (2008)](#_ENREF_326); [El Said (2015)](#_ENREF_92); [Loebbecke and Myers (2017)](#_ENREF_208) argue that the performance which may measure by two aspects; efficiency, and effectiveness. Efficiency can be defined as the extent at which the project make used of the least costly resources as possible to achieving the desired results. The extend at which the project meet its objective on time is term the effectiveness ([Gudi, 2008](#_ENREF_120); [Ika *et al.*, 2012](#_ENREF_150)).

### 4.3.2 Knowledge Integration (KI)

KI as integrated specialized knowledge held by individuals sharing or transforming to solve the complex problem such as flood emergency response. Past experience can be a specialized knowledge about previous flood disaster. In this study knowledge integration referring to the process of sharing and integrate flood knowledge with expertise and specialist individuals and team members during the flood and coordinate the knowledge to solving emergency response problems and for accurate decision-making. Knowledge during and after disaster possesses by individuals in teams, proactively integrate their knowledge before the flood hit the country in prepared and mitigation phase and after the flood-inundation as a response, recovery and rehabilitation phase. By exploring knowledge integration mechanisms, the members of the teams could share and codify dedicated knowledge and permits more rapid diffusion of newly gained knowledge that should exist within the organization. Such mechanisms could possibly permit each of the team members to build concrete experiences with several other individuals, thereby creating a common experience to gain integrated efficiency ([Atuahene-Gima, 2005](#_ENREF_27); [Tsai *et al.*, 2015](#_ENREF_338)).

KI has a positive impact on the reducing flood impacts. In fact, on response phase knowledge integration is a capture of the experience made by individuals and specialized knowledge to coordinate the use of their knowledge to improve their performance. Organizational performance in the knowledge era is no longer dependent on coordinating tasks and managing information only, but rather on the ability of the focal organization to continuously integrate its dispersed knowledge efficiently and effectively in order to carry out its production activities and maintain competitive advantage ([Harvey, 2017](#_ENREF_129)). Further, organizations can improve emergency response team’s performance by establishing and sustaining knowledge integration as an important organizational and procedural strategy (Becerra-Fernandez et al., 2008) by providing requiring knowledge on time with low cost. By following the idea, previous studies found that the important factor affecting performance is knowledge integration ([Pai, 2012](#_ENREF_262); [Loebbecke and Myers, 2017](#_ENREF_208)). Thus, the following hypothesis can be introduced:

H5: Knowledge integration will be positively related to the emergency response team’s performance.

### 4.3.3 Social Media Usage

Social Media as platforms and services for Internet-based applications that focus on the formation and interchange content that user-generated, share information or knowledge, interact with users and consume content almost in real-time. Presently, the social media have become a main channel of communication. For example as in (Facebook, Twitter) ([Kaplan and Haenlein, 2010](#_ENREF_167); [Luna and Pennock, 2018](#_ENREF_212)). Many studies used two dimensions to define technology usage which are frequencies and regularly in searching and contributing knowledge ([Lin and Huang, 2008](#_ENREF_206); [El Said, 2015](#_ENREF_92)). Along similar lines, in this research social media usage referring to the degree of frequency and regularly use SM for searching purposes and flood knowledge contribution.

During a flood disaster, there is generally an insufficient resource to guide the effective collaboration of most individuals to offer knowledge such as for instance road destroyed, the number of victims, and how many death and injure and needs for survival. This highlights the vast critical factors, as there are numerous unstructured tasks and deficiencies in skilled personnel to accomplish those, besides the lack of communication and coordination activities. Furthermore. During the emergency response phase, the teams are dispersed on variant locations which result in many challenges for teams to meet face to face using KIMs. Hence, it is critical to use another way to integrate their flood knowledge such as social media. Social media comprises of several number of tools that facilitates an exchange of information online and allocating knowledge to another recipient to integrate with the mind as skills knowledge which introduces services and decision making in an appropriate time ([Yates and Paquette, 2011a](#_ENREF_372)).

Social media has proven to help coordinate, share and facilitate knowledge in flood disaster management operations. Flood responders can use social media during a disaster to disseminate critical information, to guide volunteers and to help reconnect families ([Perkins, 2010](#_ENREF_271)). Drawn from findings in the literature, this research mainly used SM as the platform that is able to manage, store, and share knowledge which can facilitate integrating the knowledge in the human brain and documents available to all employees of an organization. Accordingly, knowledge integration can be enhanced by using social media. [Pai (2012)](#_ENREF_262) Showed that the significant predictor of knowledge integration was utilization of technology. Thus, it can be hypothesized that:

***H4:*** *Social media usage will be positively related to the knowledge integration.*

### 4.3.4 Task-Technology Fit (TTF)

The Task-technology fit- defined can be viewed as an advancement of technology that allow a user in completing his or her tasks when combined appropriately, outcome utilization and performance ([Goodhue and Thompson, 1995](#_ENREF_114)). As stated by [El Said (2015)](#_ENREF_92), the higher task-technology fit increase it would result irrespective of the users’ likelihood of ensuring the utilization of the system, but likewise, the system performance becomes boosted on the user, as this directly impact on the need of the users tasks. According to the literature, in this study, Task- Technology fit refers to the assistance level of fit provided by social media in performing emergency response team’s tasks. In the TTF model, the utilization of the technology probably relied upon the fit among technology and the tasks it supported ([Lu and Yang, 2014](#_ENREF_209)). Several studies state the influential role for predicting TTF on technology usage, an important prediction is that TTF does not only help predicting performance but also predicts current and future utilization ([Kwai Fun Ip and Wagner, 2008](#_ENREF_190); [Lin and Huang, 2008](#_ENREF_206); [Zhou *et al.*, 2010](#_ENREF_383); [Aljukhadar *et al.*, 2014](#_ENREF_18); [Moreno Jr and Cavazotte, 2015](#_ENREF_227)). In addition, the relationships of TTF and the performance are also well documented in knowledge management research ([Kuo and Lee, 2011](#_ENREF_188); [El Said, 2015](#_ENREF_92); [Wu *et al.*, 2015b](#_ENREF_364); [Tam and Oliveira, 2016a](#_ENREF_321)). Task Technology Fit, which in return influences impact the performance ([El Said, 2015](#_ENREF_92)). Thus, the following hypothesis can be introduced:

***H3a:*** *Task-technology fit will be positively related to the Social media usage.*

***H3b:*** *Task-technology fit will be positively related to the emergency response team’s performance.*

### 4.3.5 Task Characteristics

There are several distinctions made by the knowledge management scholars among both the explicit and tacit knowledge. The codification is very easy in term of the explicit knowledge as well observable(Nonaka, 1994). On the other hand, the knowledge associated with the tacit tend to reside among the minds of people ([Davenport and Prusak, 1998](#_ENREF_71)) making it difficult in term of communication in a formal, systematic, or rather in a codified manner (Nonaka, 1994). Any action perpetrated by the user of a system to turn inputs into outputs is known as tasks([El Said, 2015](#_ENREF_92)). In this study characterized the task by two important requirements represent in task tacitness and task interdependence during emergency response. In line with [Kankanhalli *et al.* (2005)](#_ENREF_166) stated that, there are two most significant attributes of the task requirements which includes the task tacitness and task interdependence. Task tacitness (TTC) is the balance of tacit versus explicit knowledge required to effectively complete the task" ([Lin and Huang, 2008](#_ENREF_206)).Task interdependence (TID) comprises of the degree at which an individual tend to perceive they could possibly interact with and depend upon others to accomplish their work. People whose task and performance depend highly on others are likely to share information, knowledge, or materials ([Lin and Huang, 2008](#_ENREF_206)). A higher degree of task interdependence leads to more coordination and innovative information. TTF theory considers how technology may best be deployed to facilitate the achievement of tasks (Lin, 2014). [Wu and Chen (2017)](#_ENREF_362); [Hsiao (2018)](#_ENREF_138).TTF asserts that information technology should be a good fit with the tasks it supports in order to be utilized and to positively affect user performance.

In context of this study, social media platform has the ability to communicate members of teams, while they working in different places since the flood occurred, which results in many obstacles in communicating together and interchange knowledge that leading to lost interdependence. Meanwhile, [Panahi *et al.* (2016)](#_ENREF_266) stated social media platforms are particularly effective tools for facilitating tacit and informal knowledge sharing among individuals. Several studies have confirmed that is task characteristics is a significant influence on utilization technology ([Lin and Huang, 2008](#_ENREF_206); [Teo and Men, 2008](#_ENREF_326); [King'ori, 2013](#_ENREF_176)). As well as that many empirical studies have reported that is task characteristics have a significant impact on task-technology fit ([Goodhue and Thompson, 1995](#_ENREF_114); [Kwai Fun Ip and Wagner, 2008](#_ENREF_190); [Zhou *et al.*, 2010](#_ENREF_383); [El Said, 2015](#_ENREF_92)). Thus, it can be hypothesized that:

***H1b:*** *Task characteristics will be positively related to the task-technology fit.*

***H1a:*** *Task characteristics will be positively related to the social media usage.*

### 4.3.6 SM Characteristics

The characteristics technological dimensions comprises of relevance and compatibility ([Goodhue and Thompson, 1995](#_ENREF_114); [Zhou *et al.*, 2010](#_ENREF_383); [King'ori, 2013](#_ENREF_176)). In line with many studies, consistency with many tasks based on the degree of which a technology' functionalities is been perceived is term compatibility. It has been validated against several numbers of technologies. ([Nagy *et al.*, 2016](#_ENREF_232); [Sergio *et al.*, 2018](#_ENREF_304)). [Mccarthy *et al.* (2001)](#_ENREF_218) Unveiled that the concept of compatibility in terms of the usage of KM technology is a significant among both public and private sector organizations. Research has shown that several technologies are harmonious with the working styles, or internal needs, the more the confidence in term of utilizing well the technology shows the more the realization of the utilization ([Osang, 2015](#_ENREF_254)). [Teo and Men (2008)](#_ENREF_326) Expatiated further that having a given choices containing several relevant systems, one would have been inclined to select a system that provides the highest task characteristics.

Consistent with previous studies this study characterized the social media by relevance and compatibility and define them; relevance refers to social media ability for sharing knowledge and interacting in an easy and quick way, the questions that are probably used in the measuring process of relevance is echoed around the three main dimensions of useful information which are quickly and easily suitable for sharing. While compatibility refers to how the user finds the use of social media to be steady with the practice on the existing work based on disaster and emergency response, the questions for measuring compatibility reflected the four main dimensions of interaction, content sharing, accessibility and collaboration. Consequently, the characteristics of SM measured by relevance and compatibility and reflected in many dimensions such as sharing, connecting, accessibility, and collaborating, useful information quickly and easily, and coordinating that enable individuals to integrate flood knowledge within their organization.

In this term, a collective or knowledge integration resulting from knowing community members the knowledge in virtual communities are created by social media ([Cao *et al.*, 2015](#_ENREF_45)). Meanwhile, store, captured and sharing knowledge with another recipient to integrate with the mind as skills knowledge to introduce services and decision making at the appropriate time. [Cao *et al.* (2015)](#_ENREF_45) Elaborated further on the relationship exiting among the characteristics of social media and knowledge integration.

TTF theory is significant in introducing technology characteristics which fit with task requirement. The relationships of social media characteristics that influence the TTF are confirmed by Lu and Yang (2014). Thus, the following hypotheses are suggested:

***H2a:*** *Social media characteristics will be positively related to the social media usage.*

***H2b:*** *Social media characteristics will be positively related to the knowledge integration.*

***H2c:*** *Social media characteristics will be positively related to the task-technology fit.*

### 4.3.7 Moderators:

In addition to these 5 hypotheses, the moderating effects of “experience” on the strength of social media usage with knowledge integration relationships were included to be investigated. The users may eventually conclude that that the technology has a better (or worse) impact on performance than anticipated based on the actual experience of utilizing the technology and changing their expected consequences of utilization and thereby affecting future utilization. The person could as well learn from experience more efficient ways of ensuring better utilization of the technology, making sure the individual-technology fit is improved, and hence the overall ([Goodhue and Thompson, 1995](#_ENREF_114)). According to [Venkatesh *et al.* (2003)](#_ENREF_350); [Rapp *et al.* (2008)](#_ENREF_281) the relationship for utilization construct is be stronger by experience moderation. Therefore, the following hypothesis is suggested:

H6: Experience positively moderates the relationship between SM usage and knowledge integration where the relationship is stronger among the ones with higher experience.

Based on the above discussion, a total of six hypotheses are derived, and the research model is shown in Figure 4.1

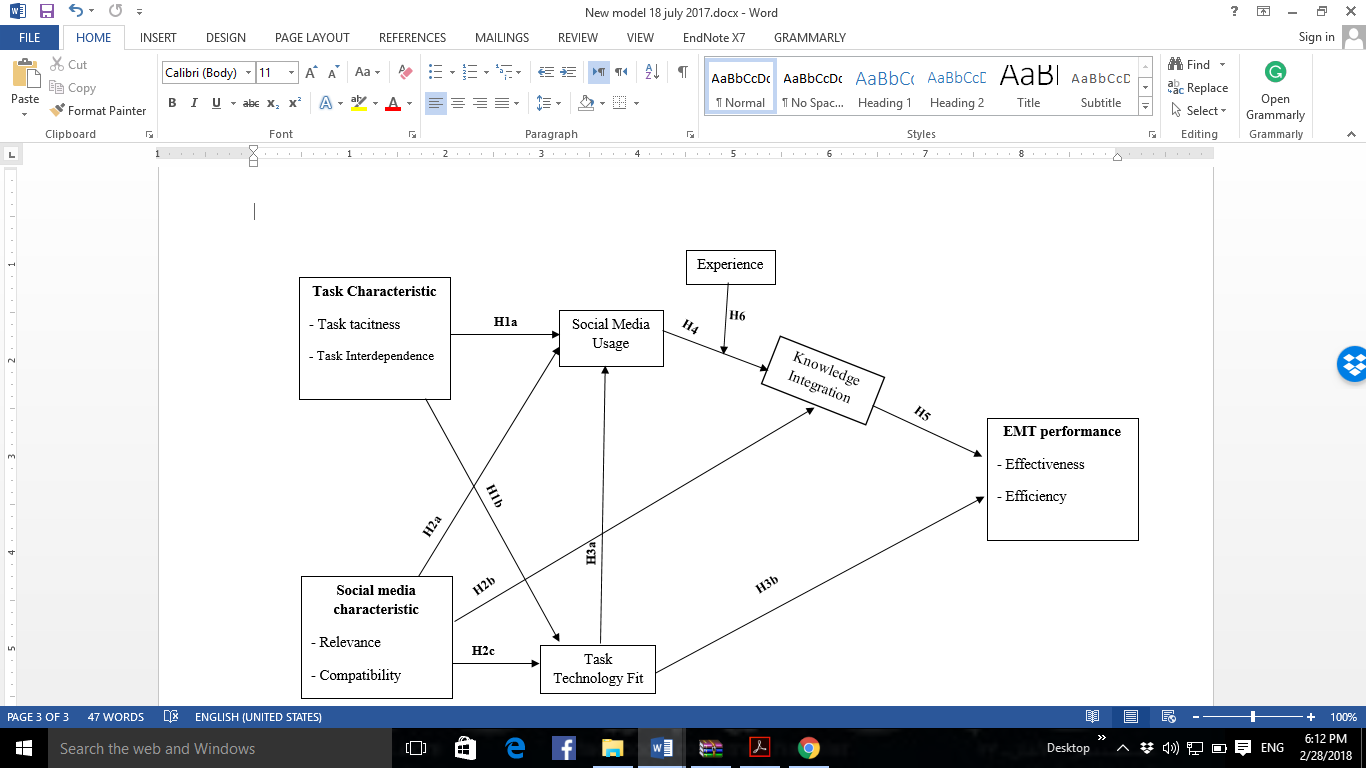


Figure 4.1: Proposed Model according to KBT and TTF Theory

## 4.4 Instrument Development and Validation

The main purpose of this study is to explore the influence of factors on the emergency response team’s performance. To achieve this goal the questionnaire is developed by identifying the constructs’ measures based on the model constructs. In addition, the criteria of reliability and validity measurement are applied.

### 4.4.1 Minimizing the Common Method Variance

During the data collection, the researcher was careful, so that the study does not deviate from actual context which is knowledge integration. This is important to ensure that respondents have a common understanding regarding the contextual knowledge of the study. Thus, this research aimed to minimize the Common Method Variance (CMV). A study suggested by [Chang *et al.* (2010)](#_ENREF_51), researchers should avoid CMV by constructing variables from information gathered from various resources and ensured questions are shuffle for reduction of bias occurrence towards the method they used.

Survey development process that utilized this method has been found to reduce bias relating to data collection in the research. It was believed that dedicated and committed use of the mentioned procedure would enhance the validation of the results. During questionnaire survey development for this study, the researcher tried to form simple and straightforward questions. Accordingly, precise words were selected to catch the most significant opinions (Williams, 2003). Further, unclear and lengthy questions may lead to an imprecise response. This also may cause respondents to leave the questionnaire.

Considering these constraints a logical and well-formatted questionnaire was designed. In this questionnaire, the questions do not strictly follow the order of constructs as required by the proposed research model. This approach yielded good and high-quality responses, which also reduced the CMV. Similar questions were grouped in the questionnaire and were listed based on random order, first, to make the questions easy to understand and to make it more convenient to fill. Secondly, this technique prevented respondent bias towards the questions. Thus the CMV is decreased.

### 4.4.2 Formulating Measurement Model

The concise conceptualization of the domain’s constructs is an essential step in the scale development. Specifically, Mackenzie et al. (2011) highlighted that there is a lack of good construct definition in many guidelines in the literature and this can have serious implications on a reliable measurement model development. All the constructs applied in this study already exist in the literature. An overview of the definitions of all constructs of this study is provided in Table 4.1 (section 4.2).

As the quality of dataset is important to the SEM, a valid and reliable measurement model is required. Mackenzie et al. (2011) Stated, “irrespective of the fact that it is crucial in validating the measures of constructs to structure knowledge in MIS that are cumulative and the behavioral sciences, the method of scale development and validation remains a challenging activity”. The relationship between constructs of the research model and its indicators are described through the model of measurement, also called an outer model (Hair et al., 2013).

The constructs of the research model can be computed using measurement indicators as single-item or multiple-item. The former one ensures superior rates of responses in that they can be easily and quickly answered (Fuchs and Diamantopoulos, 2009). In addition, single item measures have been used due to practical considerations to decrease the overall number of items in the questionnaire. It is worth noting that using them cause’s lack of degree of freedom and less available information to handle missing values (Hair et al., 2013). Accordingly to Hair Jr et al. (2016) state some research conditions that necessitate the use of single items, for example, when the population being surveyed is limited in size and nonresponse is a major concern.

Following the recommendation of Diamantopoulos et al. (2012), the single-item indicators were used in this study to measure demography characteristics of respondents such as age, experience and gender. For the rest of constructs in the model, multiple-items with at least three observable indicators were used followed Gefen et al. (2011); Petrescu (2013). There are two forms of multiple-item measures are reflective and formative. Reflective measurement model represents a sample of all possible items that are present in the domain of a certain construct. In another term, designed construct reflects an individual domain, and whenever this domain changes, all its indicators will be changed. Consequently, there is a great degree of interchangeability among the items of the reflective construct. Arrow direction between construct and indicator variables represents that the construct causes the measurement (or covariation) of the indicator variables as reported by (F. Hair Jr et al., 2014). In contrast, the formative constructs are multi-dimensional and cannot be measured by reflective measures, and hence, there is no interchangeability among their items (Hair et al., 2013; F. Hair Jr et al., 2014). In terms of practical and conceptual meanings, reflective and formative constructs have different qualities and should be assessed differently (Hair Jr et al., 2016). Table 4.3 presents the guidelines for selecting measurement model extracted from Hair et al. (2013). In this study, these guidelines were followed to develop the measurement instrument and select the appropriate method to assess the measurement model. Based on this table reflective measures were used for all constructs.

Table ‎4.1: Guidelines for choosing measurement model (Hair et al., 2013)

|  |  |  |
| --- | --- | --- |
|  | **Criteria** | **Decision** |
| I | Causal priority among the indicator and the construct | (a) From the construct to the indicator: reflective  (b) From the indicators to the construct: formative |
| II | Is the construct a trait explaining indicators or just a combination of the indicators? | (a) If trait: reflective  (b) if combination: formative |
| III | Do causes or consequences of the construct are represented by indicators? | (a) If consequences: reflective  (b) If causes: formative |
| IV | Is it certain that if trait assessment changes, all the items will also change in a similar way (assuming coded equally)? | (a) If yes: reflective  (b) If no: formative |
| V | Are the items mutually interchangeable? | (a) If yes: reflective  (b) If no: formative |

After identifying the constructs’ definitions, the second step was to generate and judge a pool of items. The primary consideration in this step is generating the potential and relevant items, ensuring face and content validity, and determining the appropriate response format. According to Netemeyer et al. (2003), the practical ways to collect items for an intimal pool are drawn from the extant literature or generated by the scale authors.

Almost all the contemporary social science researchers use either the previous measurement items that were in existence in the literature that modify the existing ones (Ramirez et al., 2013). The same approach was followed in this study and measurement scales were adapted from previously validated sources

As shown in table 4.2 Previous studies related to factors influencing performance team’s in emergency response through using knowledge integration strategy, the effect of social media usage on knowledge integration, and the impact on the use of social media were reviewed to ensure that a comprehensive list of measures was included. Measurements of TTF along with scales were acquired using Subramaniam and Venkatraman (2001), Lin and Huang (2008), Pearce and Gregersen (1991), Gudi (2008), Goodhue and Thompson (1995) and King'ori (2013). With the questions related to TTF, constructs were generated for these studies. KBT components and scales were taken from Tiwana (2004) and Tiwana and Mclean (2005). Then they were adapted for the flood emergency response context. . Table 4.3 exhibits the original scales and their sources together with the refined ones based on the objectives of this study.

All constructs of this study model are reflective constructs and the respondents were asked to what extent they agree or disagree with each statement using a five-point Likert scale, where 1 represents strongly disagree, and 5 represents strongly agree. The final step of designing an appropriate questionnaire to measure the research model is testing its validity and reliability. Different tests were conducted for measuring the validation and reliability of fundamental and constructive constructs. These assessment techniques are discussed in the following section.

Table ‎0.1 Measurement items pool of each construct

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Construct** | **Criteria/**  **Measurement Model** | **Code** | **Original Item** | **Refined Item** | **Source** |
| Task characteristics | V (a)  Reflective | TTC1 | The information your project acquired was complex. | The flood knowledge within my organization is complex (difficult to understand). ★ | ([Subramaniam and Venkatraman, 2001](#_ENREF_314)) |
| TTC2 | The information your project acquired was difficult to document in manuals or reports comprehensively. | The flood knowledge within my organization is difficult to document in manuals or reports comprehensively. ★ |
| TTC3 | The information your project acquired was difficult to understand from written documents comprehensively. | The flood knowledge within my organization is difficult to understand from written documents comprehensively. ★ |
| TID1 | I frequently must coordinate my efforts with others. ♠ | | (Pearce and Gregersen, 1991) |
| TID2 | My closeness with others enables me to carry out my responsibility. ♠ | |
| TID3 | The nature of my work demand that I consult with others more frequently. ♠ | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | TID4 | The performance of my job has a significant impact on others ♠ | | | (Pearce and Gregersen, 1991) |
| TID5 | My own performance is dependent on receiving accurate information from others ♠ | | |
| SM characteristics | I (a), III (a),  V (a)  Reflective | REL1 | Social media tools provide me with useful information quickly and easily. ♠ | | |  |
| REL2 | Good social media tools are suitable for sharing knowledge. | Appropriate social media tools are useful for sharing knowledge in my organization. ★ | |  |
| REL3 | Good social media tools are suitable for interacting with customers. | Appropriate social media tools are useful for interacting with colleagues within my organization. ★ | |  |
| REL4 | The information on social media is reliable. ♠ | | |  |
|  |  | CMP1 | In our organization, social media tools provide collaboration. ♠ | | |  |
|  |  | CMP2 | In our organization, social media tools provide accessibility to from information others. ♠ | | |  |
|  |  | CMP3 | In our organization, social media tools provide content creation. ♠ | | |  |
|  |  | CMP4 | In our organization, social media tools provide content sharing with/form others. ♠ | | |  |
|  |  | CMP5 | In our organization, social media tools provide interaction. ♠ | | |  |
|  |  | CMP6 | In our organization, social media tools provide decision-making facilities. ♠ | | |  |
|  |  | CMP7 | Social media tools provide accessibility to network with people. ♠ | | |  |
| Task-technology fit | I (a), III (a),  V (a)  Reflective | TTF1 | The company’s computer environment has a large, positive impact on my effectiveness and productivity in my job. | | In my opinion, social media tools’ functions are suitable for helping me to achieve my organization’s emergency management objectives. ★ | Goodhue and Thompson (1995) |
|  |  |  | | | |  |
| **Table ‎4.3:** Measurement items pool of each construct (Continue) | | | | | | |
| **Construct** | **Criteria/**  **Measurement Model** | **Code** | **Original Item** | | **Refined Item** | **Source** |
| Task-technology fit | I (a), III (a),  V (a)  Reflective | TTF2 | In my job performance, the IS computer systems and services are more valuable as an important aid to me. | | In my opinion, social media tools’ functions are enough to help me to achieve my organization’s emergency management objectives. ★ | Goodhue and Thompson (1995) |
|  | TTF3 | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | In my opinion, social media tools are fit (suitable) for the emergency management requirements of my organization. ★ | Researcher |
| SM usage | I (a), III (a),V (a)  Reflective | SMU1 | I frequently use KMSs to search knowledge in my work. | | Social media tools are frequently used to search emergency management related knowledge in this organization. ★ | ([Lin and Huang, 2008](#_ENREF_206)) |
| SMU2 | I frequently use KMSs to contribute knowledge in my work | | Social media tools are frequently used to contribute knowledge in this organization. ★ |
| SMU3 | I regularly use KMSs to search knowledge in my work | | Social media tools are regularly used to search knowledge in this organization.★ |
| SMU4 | I regularly use KMSs to contribute knowledge in my work | | Social media tools are regularly used to contribute knowledge in this organization. ★ |
| **Table ‎4.3:** Measurement items pool of each construct (Continue) | | | | | | |
| **Construct** | **Criteria/**  **Measurement Model** | **Code** | **Original Item** | | **Refined Item** | **Source** |
| Knowledge integration | I (a),V (a) ,  IV (a)  Reflective | KI01 | At the project level, the team members tend to synthesize and integrate their individual expertise. | | Staff and volunteer of our organization synthesize and integrate their individual expertise at the emergency management level. ★ | [Tiwana (2004)](#_ENREF_330), [Tiwana and Mclean (2005b)](#_ENREF_332) |
|  |  | KI02 | We applied our expertise in innovative ways | | We applied our expertise in innovative ways to handle emergency related issues. ★ |  |
|  |  | KI03 | We carefully made decisions to maximize overall project outcomes | | We carefully made decisions to maximize overall emergency management outcomes. ★ |  |
|  |  | KI04 | We leveraged the customer’s knowledge in many functional areas | | We leveraged the staff and volunteer’s knowledge in many functional areas related to emergency management. ★ |  |
|  |  | KI05 | Many creative ideas came from combining our unique perspectives | | Many creative ideas related to emergency management came from combining our unique perspectives. ★ |  |
| **Construct** | **Criteria/**  **Measurement Model** | **Code** | **Original Item** | | **Refined Item** | **Source** |
| EMT performance | I (a),III (a) ,  IV (a)  Reflective | EFT1 | In this organization, the task in our organization was completed within the planned time schedule. ♠ | | | [Gudi (2008)](#_ENREF_120) |
|  |  | EFT2 | In this organization, the task was completed within the allocated budget. ♠ | | |  |
|  |  | EFT3 | In this organization, the task was completed within the planned number of person-hours. ♠ | | |  |
|  |  | EFT4 | In this organization, the task was completed with the efficient use of all available resources. ♠ | | |  |
|  |  | EFC1 | In this organization, the task was completed satisfactorily for all participants. ♠ | | |  |
|  |  | EFC2 | In this organization, all incident requirements were met when the task was completed. ♠ | | |  |
|  |  | EFC3 | In this organization, the task was completed successfully without negatively impacting other tasks. ♠ | | |  |
|  |  | EFC4 | The task was effectively completed despite any conflicting task requirements. ♠ | | |  |

Notes: ★ Items are refined to cover main knowledge integration issues including flood emergency management and the use of social media. ♠The item is used in its original form.

## 4.5 Survey Instrument Validation

After developing an initial measurement instrument, a series of quantitative and qualitative pre-tests have been conducted with the focus on the items’ refinement and exclusion of bad ones from the initial survey. Hence, the objectives of this phase are: i) to enhance the model quality by conducting content validity and face validity, and ii) to further refine the items and discard the ambiguous ones. As long as the measurement items related to EMT performance are standard, the items related to task characteristics, SM characteristics, task-technology fit, SM usage, knowledge integration, and demography characteristics were assessed against face validity and content validity.

### 4.5.1 Face validity

According to Ranjit (2009), there is a need for a logical link on each question or item on the research instrument with an objective where the face validity is used for the establishment of this link. In this research to perform face validity. The experts were the three researcher in the field of information systems in the higher semester with the solid background in different research methodologies and the knowledge of questionnaire development. In order to make sure that respondents have had no problems in understanding or answering the questions and have followed the instructions in the questionnaire, the researcher employed the guidelines proposed by Bell (2005) to conduct the face validity. In this regard, the panel of experts was asked to review the questionnaire to find out the some recommendations; the time needed to complete the questionnaire; instructions’ clarity; whether the questions were unclear and ambiguous; whether the questions were uneasy to answer by the respondents; whether in their opinion any major topic is missing; attractiveness and clarity of the questionnaire layout; further comments to improve the questionnaire.

The responses of the experts to the abovementioned questions provided us with an idea of reliability and suitability of the questions

### 4.5.2 Survey Content Validation

Content validity of the measures determines how well the indicators represent the entire domain of the context (Hair Jr et al., 2016). Establishing consistency between the measurement items and the extant literature provides content validation. This requires conducting interviews with reputable practitioners (Bock et al., 2005). Before empirical analysis, the opinion was taken from the participants regarding certain measures and constructs that were incorporated in the study. They showed hopeful conceptual proximity while comparing measures with constructs. Overall, this shows satisfactory content. For content validation purposes, it was recommended that respondent familiar with EM team’s performance should be taken for the survey.

In order to satisfy the first criterion of Mackenzie et al. (2011) content validity judgment, the items that were used to measure each construct were based on reviewing relevant literature and were previously validated in other research as mentioned in section 4.5 on (Table 4.3). In the next step, the designed questionnaire was evaluated by 5 experts two from information system academia they work in the field more than 5 a year include a Professor experienced in knowledge management and technology usage, an lecturer experienced in knowledge management and disaster management using TTF model , and 3 from the field area on the flood organizations comprise an IT administrator with expertise in managing technologies for flood emergency response purposes and two staff responsible from emergency response operations they have experience of work in, flood disaster from 5-13 which is the most common way of assessing content validity (Salkind and Rainwater, 2003).

Since the questionnaire was in English and the respondents of this survey were not native English speakers, the words and phrases used in the questionnaire should be understandable for them. In order to be sure about this issue, the translated questionnaire from English to the Arabic language by consultant English, attached in (Appendix x) and revised by the expert from the field. According to their comments researcher combine many questions having the same meaning, remove redundant questions, replaced some words with field terminology and improve the translation of questions. According to followed their recommendation the final questionnaires are comprised of 39 items measuring 6 latent variables. Table 3.3 below shows the experts’ profile.

Table 3.3: The Experts’ Profiles

|  |  |  |
| --- | --- | --- |
| University /organization | Department/ School | Area of Expertise |
| Future University in Egypt | Department of  information system | Information Systems analysis, design, Knowledge management system,  Technology Adoption, |
| Shaqra university in Saudi Arabia | Department of  information system | Knowledge management, Technology adoption, Is development. |
| Saudi Red Crescent | Department  Emergency management | Preparation phase, response phase, rehabilitation and recovery phase |
| Sudanese Red Crescent | Department of food  Emergency management | Donation, emergency management operations and emergency department |
| United nations educational scientific and cultural organization(UNESCO) | Department Emergency management response | Communications system, health, and emergency management department. |
| Al-Nahari Centre Translation- Saudi Arabia | Translation Department | More than 7 years’ Experience in translation from English to Arabic and reverse |

### 4.4.3 Pilot Testing

The simulation of the major survey implementation as the simulation of the pilot survey was carried out on a trivial amount of the target population. It was carried out to unveiled the limitations or weaknesses associated with the questions, the layout of the questionnaire as well as the process (Kasunic, 2005). In this section, the elimination of bogus and improvement of the of the instrument was based on the questionnaire that was designed and developed (see Appendix E). The aim of the pilot survey is to find out if the survey questionnaire needs to be refined. The crucial activities, including the distribution of the questionnaires, data collection and the analysis process were all involved in the process of developing and testing the appropriateness of the instrument and in evaluating the feasibility of the main study.

100 printed questionnaires were distributed among Non-government organizations (NGOs) from four selected flood emergency response organizations (Sudanese red crescent society, United nations educational scientific and cultural organization, Al Manar organization Sudan and El- sugya charity organization Sudan) located in Khartoum (Khartoum was the area where the researcher lived during the conduct of the study, Sudan), targeting staff and volunteers. After a period of approximately one month, 35 completed questionnaires were finally collected. It is worth noting that some of these responses were from the different organizations but work in the same field of flood emergency response. Details of Demographic Information profile of Respondents are illustrated in Table 4.4.

Table 3.4: Demographic Information profile of Respondents

|  |  |  |  |
| --- | --- | --- | --- |
| Measure | Category | Frequency (N-35) | Percentage  (100%) |
| Age | 20-30  31-40  41-50  51-60 | 3  15  11  6 | 8.6  42.9  31.4  17.1 |
| ***Total*** | ***35*** | ***100%*** |
| Gender | Male  Female | 22  13 | 62.5  37.5 |
| Level of Education | Bachelor  Higher diploma  Master  PhD | 20  6  6  3 | 57.1  17.2  17.2  8.5 |
| ***Total*** | ***35*** | ***100%*** |
| Name of organization | Sudanese red crescent society | 12 | 34.3 |
| United nations educational scientific and cultural organization | 9 | 25.7 |
| Al Manar organization Sudan | 6 | 17.1 |
| El sugya charity organization Sudan | 8 | 22.9 |
| ***Total*** | ***35*** | ***100%*** |
| Experience | 2-6 years | 6 | 17.1 |
| 7-11 years | 11 | 31.4 |
| 12-16 years | 9 | 25.7 |
| 17-21 years | 5 | 14.3 |
| >21 | 4 | 11.5 |
| ***Total*** | ***35*** | ***100%*** |
| Kind of social media | Facebook  Twitter  WhatsApp | 14  5  16 | 40  14.3  45.7 |
| ***Total*** | ***35*** | ***100%*** |

#### 4.5.3.1 Validity and Reliability Analysis

For the designed survey questionnaire validity to be tested, the PLS-SEM algorithms were applied using Smart PLS 2.0 software. Tables 4.5 and 4.6 exhibits the validity and reliability evaluation of the pilot study. As discussed in Chapter 3, the model used for measurement as put forward in this study is going to be validated for its indicator in term of internal consistency reliability, convergent validity and finally discriminant validity (shown in Table 3.4).

#### 4.5.3.1.1 Indicator Reliability

The measurement model of the indicator reliability was assessed against the criteria of its measurement items’ values of outer loadings. On the construct, the higher outer loadings are an indication that the associated indicators could possibly contain a higher in common. As a general rule, all outer loading values need to be higher than 0.70. Referring to (Hair et al., 2013), this research adopted the cut-off level at minimum of 0.4 and acceptable level of > 0.7 for item loading. The results of indicator reliability assessment are exhibited in Table 4.5.

Table ‎4.5 Indicator reliability assessment

|  |  |  |
| --- | --- | --- |
| Construct | Measurement item | Outer loading |
| Task characteristics | TTC1 | 0.860 |
| TTC2 | 0.586\*\* |
| TTC3 | 0.908 |
| TID1 | 0.905 |
| TID2 | 0.190\* |
| TID3 | 0.311\* |
| TID4 | 0.797 |
| TID5 | 0.879 |
| Social media characteristics | CMP1 | 0.862 |
| CMP2 | 0.806 |
| CMP3 | 0.864 |
| CMP4 | 0.811 |
| CMP5 | 0.825 |
| CMP6 | 0.780 |
| CMP7 | 0.630\*\* |
| REL1 | 0.933 |
| REL2 | 0.952 |
| REL3 | 0.907 |
| REL4 | 0.846 |
| Task-technology fit | TTF1 | 0.806 |
| TTF2 | 0.802 |
| TTF3 | 0.946 |
| Social media usage | SMU1 | 0.923 |
| SMU2 | 0.809 |
| SMU3 | 0.749 |
| SMU4 | 0.307\* |
| Knowledge integration | KI01 | 0.846 |
| KI02 | 0.785 |
| KI03 | 0.878 |
| KI04 | 0.851 |
| KI5 | 0.577\*\* |
| Emergency teams ’performance | EFC1 | 0.924 |
| EFC2 | 0.816 |
| EFC3 | 0.915 |
| EFC4 | 0.356\* |
| EFT1 | 0.604\*\* |
| EFT2 | 0.533\*\* |
| EFT3 | 0.857 |
| EFT4 | 0.856 |
| Notes:  \* delete the reflective indicator if item loading is less than 0.4;  \*\* if the value of item loading is more than 0.4 and less than 0.7, analyze the impact of item deletion on the values of AVE and composite reliability | | |

As exhibited in Table 4.5, the value of all external loadings of measurement items are exceeding threshold value (0.7), except 4 items (TID2, TID3 SMU4 and EFC4) with value less than the cut-off level of 0.4 and 5 items with the value of > 0.4 and < 0.7 which are TTC2 (0.586), CMP7 (0.630), KI5 (0.577), EFT1 (0.604) and EFT2 (0.533). TID2, TID3 SMU4 and EFC4 are deleted, while the impact of deletion of each of the other 5 items on the values of Average Variance Extracted (AVE) and composite reliability is analyzed. As recommended by (Hair et al., 2013), if the deletion of an items raises AVE values along with composite reliability indicator, deletion of the item is crucial. Hence, by running the PLS algorithm after deletion of each of these items, the results confirmed that deletion of all five items increased the values of AVE and composite reliability (see Appendix Y). Finally, by deleting the 9 indicator items with outer loading values less than 0.7, the remaining 30 items were well above the threshold criteria. Table 4.6 shows the results of indicator reliability assessment after deleting identified indicator items.

Table 4.6 Indicator reliability assessment after item deletion

|  |  |  |
| --- | --- | --- |
| **Construct** | **Measurement item** | **Outer loading** |
| Task characteristics | TTC1 | 0.916 |
| TTC3 | 0.929 |
| TID1 | 0.930 |
| TID4 | 0.805 |
| TID5 | 0.906 |
| Social media characteristics | CMP1 | 0.862 |
| CMP2 | 0.814 |
| CMP3 | 0.864 |
| CMP4 | 0.825 |
| CMP5 | 0.876 |
| CMP6 | 0.803 |
| REL1 | 0.933 |
| REL2 | 0.952 |
| REL3 | 0.907 |
| REL4 | 0.846 |
| Task-technology fit | TTF1 | 0.806 |
| TTF2 | 0.802 |
| TTF3 | 0.946 |
| Social media usage | SMU1 | 0.923 |
| SMU2 | 0.813 |
| SMU3 | 0.749 |
| Knowledge integration | KI1 | 0.851 |
| KI2 | 0.771 |
| KI3 | 0.897 |
| KI4 | 0.873 |
| Emergency response team’s performance | EFC1 | 0.911 |
| EFC2 | 0.866 |
| EFC3 | 0.940 |
| EFT3 | 0.921 |
| EFT4 | 0.892 |

#### 4.5.3.1.2 Internal Consistency (Construct Reliability)

As explained in Chapter 3 (Section 3.5.3.2), the internal consistency reliability of constructs is assessed against two criteria of Cronbach’s alpha and composite reliability . Table 4.7 Referring to, all constructs met the acceptable values for criteria of Cronbach’s alpha and which should be more than 0.7.

Table ‎4.7 Internal consistency reliability

|  |  |  |
| --- | --- | --- |
| **Construct** | **Cronbach's Alpha** | **Composite Reliability** |
| Emergency teams ‘performance | 0.884 | 0.916 |
| Knowledge integration | 0.871 | 0.911 |
| Social media characteristics | 0.924 | 0.936 |
| Social media usage | 0.776 | 0.868 |
| Task characteristics | 0.880 | 0.913 |
| Task-technology fit | 0.811 | 0.889 |

#### 4.5.3.1.3 Convergent Validity

For constructs, it is performed by assessing values of AVE for each construct. Considering the advice of (Hair et al., 2013), this research considered the value of 0.5 as the acceptable threshold value for AVE. As exhibited in Table 4.8, for all constructs AVE reached above the minimum (0.5), which means that there are no issues regarding the convergent validity of the proposed measurement model.

Table ‎4.8 Convergent validity assessment using Average variance Extracted

|  |  |
| --- | --- |
| **Construct** | **AVE** |
| Emergency teams ‘performance | 0.688 |
| Knowledge integration | 0.721 |
| Social media characteristics | 0.597 |
| Social media usage | 0.689 |
| Task characteristics | 0.678 |
| Task-technology fit | 0.729 |

#### 4.5.3.1.4 Discriminant Validity

As explained in Chapter 3 and suggested by (Hair et al., 2013), the discriminant validity of this study’s measurement model is performed by adopting Fornell-Larker criterion. Following Fornell-Larker criterion, the under-root (or square-root) of AVE is compared with Latent Variable Correlations (LVC). More specifically, this value (square-root of AVE) for each construct’ should be more than the highest correlation with any other construct. Fornell-Larker criterion assessment is shown in Table 4.9.

Table ‎4.9 Discriminant validity assessment using Fornell-Larker criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Construct** | **ERTP** | **KI** | **SMCH** | **SMU** | **TCH** | **TTF** |
| Emergency teams ‘performance | **0.8299** |  |  |  |  |  |
| Knowledge integration | 0.0761 | **0.8492** |  |  |  |  |
| Social media characteristics | 0.3968 | 0.0162 | **0.7727** |  |  |  |
| Social media usage | 0.0578 | 0.4602 | 0.1812 | **0.8305** |  |  |
| Task characteristics | 0.1716 | 0.5794 | 0.2316 | 0.6737 | **0.8235** |  |
| Task-technology fit | 0.1489 | 0.4 | 0.18 | 0.4915 | 0.5514 | **0.8541** |

As exhibited in Table 4.9, the AVE under-root value is higher than the correlations with other constructs. Hence, Fornell-Larker criterion provides evidence for the constructs’ discriminant validity.

## 4.6 Chapter Summary

This chapter begins with explaining the reasons for integrating KBT and TTF theories and describing of their substantial constructs and definition. Then following the developed research model and hypothesis of this study, an appropriate measurement model was developed in this chapter based on the literature and further refined of the model constructs. Using multiple approaches to assess the reliability and validity of the questionnaire discussed in Chapter 3, the proposed model of measurement was first assessed for its face validity by three researcher from the information system field. The content validity was then assessed from the experts’ point of view. Then, the validity and reliability of measurement model were tested by conducting a pilot study and analyzing the data using Smart PLS 2.0 by considering several criteria. The results obtained from the instrument validation process were used to improve the original instrument, including some improvements related to the terminology and scale level in using the instrument. The researcher believes that the validity and reliability of this study’s measurement model are sufficient.



# DATA ANALYSIS AND DISCUSSIONS

## **5.1 Introductio**n

The aim of this chapter is to assess the proposed model and present the findings of this study. The statistical software packages (Smart PLS 2.0 and IBM SPSS 24) are used to analyze the data according to the techniques suggested in chapter 3. The collected data are screened to determine and remove the missing and outliers data, and accordingly guarantee the reliability and validity of the data for testing. Then, the sample from whom the data were collected is described by presenting the characteristics of the demographic data such as frequency and percentage. After that, the measurement model assessment, including indicator reliability; construct reliability, convergent validity, item level discriminant validity and construct level discriminant validity is presented. Then, structural model is assessed, to examine the relationships and test the hypotheses. Then, the moderating effects of experience based on the proposed hypothesis are examined. Finally, results of hypotheses testing and moderating effects are discussed and compared with the previous related literature.

### 5.2 Data Screening

The actual study was initiated by online questionnaire hosted by SurveyMonkey was collected 33 responses and, then distributing 700 printed questionnaires to 12 NGOs work in flood disaster in Sudan and from the distributed questionnaires, 305 were returned. Therefore, on 338 responses the researcher screened data.

Data screening which in most of the time known as "data screaming" is defined as the process that ensures the data is clean and organized for carrying out further analyses ([Tabachnick *et al.*, 2001](#_ENREF_318)). According to [F. Hair Jr *et al.* (2014)](#_ENREF_95), data must be screened in order to ensure the data is reliable, valid and usable for testing. The main issues that need to be addressed when screening the data are missing data and outliers. The missing data occurs when the respondents could not answer one or more questions in the survey, which results in potential problems in the process of the analysis ([Tabachnick *et al.*, 2001](#_ENREF_318); [Saville *et al.*, 2011](#_ENREF_299)).

Furthermore, at the time of the data cleansing, there is an observation in the missing values in demographic information as a result, were handled through the removal from the dataset as suggested by [Hair Jr *et al.* (2016a)](#_ENREF_126). The issue is the dealing with the outliers to ensure that respondents paid attention to the questions and data was entered correctly. This type of outlier is called an unengaged respondent ([F. Hair Jr *et al.*, 2014](#_ENREF_95)) . The responses are reviewed to detect the illogical patterns. Accordingly, if a respondent replied to most items of each construct paradoxically, it is assumed that he or she did not read the items carefully. Additionally, if the respondents selected the same answer for all the items, it is assumed that he or she did not read or pay attention to the items. In addition, sometimes respondents enter for example '4, 4, 4.' for every single survey item. These respondents were obviously not engaged, and their responses are removed from the results. Other patterns indicative of unengaged respondents are; '1, 2, 3, 4, 5; 1, 2, ...' or '2, 2, 2, 2, 2; 5, 5, 5, 5; 1, 1, ...'. Accordingly, in this study 98 questionnaires have to be discarded due to missing data and unengaged respondent from. Because the final sample size in this study is 240, the researcher is not concerned about removed cases.

### 5.3 Demographic Information of the Respondents

The main survey was completed in December 2016 based on the developed questionnaire and the sample frame described in Chapter 4. The final number of respondents is 240 (after data has screened as discussed in section 5.2). These respondents were selected purposively based on their flood knowledge and how long they have been working in the flood emergency response organization (Experience). They should have at least 2 years’ experience. The results show that the age of the respondents ranges from 20 to 60 years. The majority of respondents (67%) were male, while 33% were female. In regarding to the education level 52% of respondents have Bachelor degree, while 7% of them have High diploma, 21% have Master, and 20% have Ph.D degree.

The number of respondents who are working in NGOs as the staff is 86 (36%), while the volunteers are 154 (64%). The study included 12 Non- government organizations in Sudan. A significant proportion (18%) of respondents were from Sudanese red crescent society, while 11% were from El Sugya charity organization Sudan, 9% were from each of Nawafil El khayrat organization and Jafra Foundation organization Sudan, 8% were from each of United Nations high commissioner for refugees, United nations educational scientific and cultural organization, Sudan social development organization, and united nations African mission in Darfur, 6% were from Arab organization for agricultural development. and finally, 5% were from Al Manar organization in Sudan, Al Rahma Islamic organization, and Sudanese Environment Conservation Society.

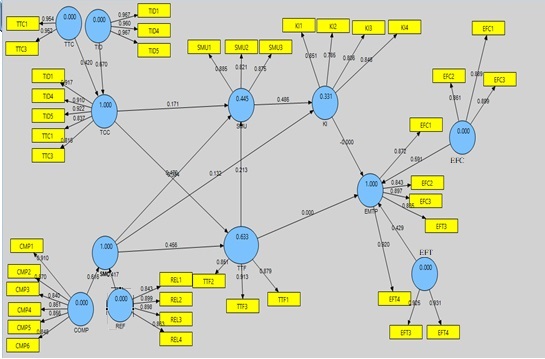
In addition, demographic data show that 52% of the respondents have been working in NGOs for 7-11 years and followed by 13% 12-16 years, 2-6 years and more than 21 years, meanwhile, the frequency of 17-21 years is less among the respondents with 10%. The majority of respondents (46%) use WhatsApp as one of the social media tools during their work on emergency response, followed by Facebook with 37%, while the rest of respondents (17%) used Twitter when the flood occurred. Table 5.1 illustrates the demographic details of the respondents.

* 1. The Demographic Details of Respondents

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure** | **Category** | **Frequency**  **(N=240)** | **Percentage**  **(100%)** |
| Age | 20-30 years old | 28 | 12% |
| 31-40 years old | 133 | 55% |
| 41-50 years old | 62 | 26% |
| 51-60 years old | 17 | 7% |
| Total | 240 | 100% |
| Gender | Male | 161 | 67% |
| Female | 79 | 33% |
|  | Total | 240 | 100% |
| Level of Education | Bachelor | 125 | 52% |
| Higher diploma | 17 | 7% |
| Master | 51 | 21% |
| PhD | 47 | 20% |
| Total | 240 | 100% |
| Profession | Staff | 86 | 36% |
| Volunteer | 154 | 64% |
| Total | 240 | 100% |
| Name of organization | Sudanese Red Crescent Society | 43 | 18% |
| United Nations High Commissioner for Refugees | 20 | 8% |
| United Nations Educational Scientific And Cultural Organization | 18 | 8% |
| Sudan Social Development Organization | 19 | 8% |
| El Sugya Charity Organization Sudan | 26 | 11% |
| Jafra Foundation Organization Sudan | 22 | 9% |
| United Nations African Mission In Darfur | 20 | 8% |
| Nawafil El Khayrat Organization | 22 | 9% |
| Arab Organization for Agricultural Development | 15 | 6% |
| Al Manar Organization Sudan | 12 | 5% |
| Al Rahma Islamic Organization | 11 | 5% |
| Sudanese Environment Conservation Society | 12 | 5% |
| Total | 240 | 100% |
| Experience | 2-6 years | 31 | 13% |
| 7-11 years | 124 | 52% |
| 12-16 years | 32 | 13% |
|  | 17-21 years | 23 | 10% |
|  | >21 | 30 | 13% |
|  | Total | 240 | 100% |
| Social media | Facebook | 89 | 37% |
| Twitter | 40 | 17% |
| WhatsApp | 111 | 46% |
| Total | 240 | 100% |

### 4 .5 Measurement Model Assessment

In this phase of the research, as discussed in Chapter 4, the evaluation of the measurement model was carried out(section4.5.3.1). The reliability and validation of the measurement model is proven by evaluating the reliability of the indicator, internal consistency, convergent validity, and discriminant validity (item level and construct level). The extend at which a variable or a set of variables are consistent with what it intends to measure is carried out by the indicator reliability. Using the Composite Reliability and Cronbach’s Alpha, the construct reliability could be used to measure the internal consistency of constructs. The extent at which a measure tends to correlate in a positive manner with measures that are of alternative having similar construct is term as the convergent validity. The extend upon which a construct is truly distinct from other constructs through empirical standards is known as the discriminant validity. The measurement model is estimated using the PLS algorithm. The following subsections unveiled some of the findings associated with the results for each of the analysis used to evaluate the reliability and validity of the measurement model. Figure 5.1 illustrates the model used for the measurement. In the measurement model, all constructs are reflective based on this entire study construct items accordance to one or many criteria investigated on table 3.4



**Figure ‎0.1** Measurement Model

#### 5.4.1 Indicator Reliability

As discussed previously in Chapter 4, the indicators models representing the reliability measurement is measured by ensuring the items loading is examined. The satisfactory indicator reliability is achieved when each item loading is at least a value of 0.70 ([Hair Jr *et al.*, 2016a](#_ENREF_126)) . Table 5.2 illustrates the analysis results of the indicators’ loadings that the whole items have reached the acceptable value in the measurement model that ranges from 0.925 to 0.785, while signifying the level of satisfaction of the indicator reliability.

* 1. Indicator reliability assessment

|  |  |  |  |
| --- | --- | --- | --- |
| **Construct** | **Measurement** | **Measurement items** | **Outer loading** |
| ERT Performance | Efficiency | EFC1 | 0.869 |
| EFC2 | 0.861 |
| EFC3 | 0.889 |
| Effectiveness | EFT3 | 0.831 |
| EFT4 | 0.925 |
| Knowledge integration |  | KI1 | 0.851 |
| KI2 | 0.785 |
| KI3 | 0.805 |
| KI4 | 0.848 |
| Social media characteristics | Compatibility | CMP1 | 0.910 |
| CMP2 | 0.870 |
| CMP3 | 0.840 |
| CMP4 | 0.861 |
| CMP5 | 0.856 |
| CMP6 | 0.848 |
| Relevance | REL1 | 0.843 |
| REL2 | 0.899 |
| REL3 | 0.896 |
| REL4 | 0.863 |
| Social media usage |  | SMU1 | 0.865 |
| SMU2 | 0.821 |
| SMU3 | 0.875 |
| Task characteristics | Task interdependence | TID1 | 0.917 |
| TID4 | 0.910 |
| TID5 | 0.922 |
| Task tacitness | TTC1 | 0.837 |
| TTC3 | 0.815 |
| Task-technology fit |  | TTF1 | 0.879 |
| TTF2 | 0.851 |
| TTF3 | 0.813 |

The values of outer loadings exhibited in Table 5.1 shows that there is no issue due to all constructs exceeded the criteria threshold for the indicator reliability of the measurement model.

#### 5.4.2 Internal Consistency (Construct Reliability)

As explained in Chapter 4 (Section4.7.3.2.2), the internal consistency (reliability of constructs) is assessed against the criteria of composite reliability (PC) and Cronbach’s Alpha. Tables 5.3 shows that Cronbach’s Alpha for the constructs in the model as measured ranges from 0.826 to 0.954 and CR ranges from 0.893 to 0.947 and this is above the recommended value. Accordingly, the results illustrate that all constructs meet the satisfactory values for criteria of CR () and Cronbach’s Alpha which should be more than 0.7., and the items used to represent the constructs are reliable.

* 1. Internal consistency reliability

|  |  |  |
| --- | --- | --- |
| **Construct** | **Composite Reliability** (PC) | **Cronbach’s**  **Alpha (CA)** |
| ERT Performance | 0.947 | 0.930 |
| Knowledge integration | 0.893 | 0.841 |
| Social media characteristics | 0.960 | 0.954 |
| Social media usage | 0.896 | 0.826 |
| Task characteristics | 0.946 | 0.927 |
| Task-technology fit | 0.912 | 0.856 |

#### 5.4.3 Convergent Validity

The Average Variance Extracted (AVE) formed the basis for measuring and assessing the convergent validity. The establishment of the convergent validity is done when all constructs consist of AVE greater than 0.5. Table 5.4 shows that all constructs contain an AVE which ranges from 0.677 to 0.781, which exceeded the recommended threshold value of 0.5. Thus, the measurement model has no issues regarding its convergent validity. Other words, each construct possess measures correlates positively with alternative measures for the same construction.

* 1. Convergent validity assessment

|  |  |
| --- | --- |
| **Construct** | **AVE** |
| ERT Performance | 0.781 |
| Knowledge integration | 0.677 |
| Social media characteristics | 0.708 |
| Social media usage | 0.741 |
| Task characteristics | 0.777 |
| Task-technology fit | 0.777 |

#### 5.4.4 Discriminant validity

As discussed in Chapter 3 and following the recommendation of [Hair  *et al.* (2013)](#_ENREF_125), the discriminant validity concerning that of the measurement model is performed by two approaches.; cross-loadings and Fornell-Larker criteria. Cross loading assesses discriminant validity at the item level. By this criterion, the indicators’ loadings need to be higher in term of their respective construct when compared to other constructs. On the other hand, in the Fornell-Larker criterion, the square root of the AVE values is compared with the latent variable correlations. More specifically, each of the constructs AVE in terms of theirsquare root is required to be greater compared to its highest correlation compared to any other construct. Tables 5.5 and 5.6 exhibits the values of cross-loadings and Fornell-Larker criteria assessment, respectively.

As illustrated in table 5.5, the measures’ outer loading on each construct is much greater when compared to that of other constructs in term of loadings, which indicates that measurement model has discriminant validity at the item level.

* 1. Discriminant validity based on cross-loadings matrix

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factors | ERTP | KI | SMCH | SMU | TCH | TTF |
| EFC1 | 0.872 | 0.493 | 0.238 | 0.365 | 0.134 | 0.282 |
| EFC2 | 0.842 | 0.521 | 0.246 | 0.425 | 0.157 | 0.270 |
| EFC3 | 0.897 | 0.538 | 0.181 | 0.350 | 0.111 | 0.235 |
| EFT3 | 0.885 | 0.577 | 0.283 | 0.405 | 0.124 | 0.260 |
| EFT4 | 0.920 | 0.566 | 0.194 | 0.380 | 0.166 | 0.293 |
| KI1 | 0.495 | 0.850 | 0.414 | 0.481 | 0.292 | 0.388 |
| KI2 | 0.503 | 0.786 | 0.298 | 0.442 | 0.245 | 0.313 |
| KI3 | 0.467 | 0.807 | 0.324 | 0.477 | 0.271 | 0.337 |
| KI4 | 0.542 | 0.848 | 0.367 | 0.464 | 0.249 | 0.329 |
| CMP1 | 0.247 | 0.412 | 0.886 | 0.522 | 0.379 | 0.592 |
| CMP2 | 0.210 | 0.364 | 0.853 | 0.486 | 0.332 | 0.548 |
| CMP3 | 0.210 | 0.338 | 0.853 | 0.519 | 0.422 | 0.585 |
| CMP4 | 0.206 | 0.389 | 0.837 | 0.510 | 0.408 | 0.591 |
| CMP5 | 0.240 | 0.348 | 0.822 | 0.469 | 0.419 | 0.571 |
| CMP6 | 0.217 | 0.352 | 0.818 | 0.505 | 0.388 | 0.523 |
| REL1 | 0.173 | 0.327 | 0.803 | 0.472 | 0.362 | 0.529 |
| REL2 | 0.210 | 0.359 | 0.843 | 0.559 | 0.439 | 0.598 |
| REL3 | 0.247 | 0.365 | 0.850 | 0.540 | 0.433 | 0.588 |
| REL4 | 0.204 | 0.340 | 0.843 | 0.540 | 0.402 | 0.585 |
| SMU1 | 0.330 | 0.418 | 0.548 | 0.885 | 0.420 | 0.496 |
| SMU2 | 0.476 | 0.599 | 0.516 | 0.821 | 0.441 | 0.535 |
| SMU3 | 0.295 | 0.420 | 0.506 | 0.875 | 0.423 | 0.488 |
| TID1 | 0.090 | 0.270 | 0.433 | 0.442 | 0.917 | 0.612 |
| TID4 | 0.125 | 0.268 | 0.396 | 0.418 | 0.910 | 0.610 |
| TID5 | 0.106 | 0.249 | 0.424 | 0.411 | 0.922 | 0.603 |
| TTC1 | 0.188 | 0.325 | 0.414 | 0.465 | 0.837 | 0.600 |
| TTC3 | 0.185 | 0.306 | 0.422 | 0.467 | 0.815 | 0.603 |
| TTF1 | 0.299 | 0.347 | 0.588 | 0.481 | 0.579 | 0.877 |
| TTF2 | 0.245 | 0.399 | 0.612 | 0.567 | 0.633 | 0.853 |
| TTF3 | 0.261 | 0.348 | 0.593 | 0.510 | 0.600 | 0.913 |

* 1. Discriminant validity based on Fornell-Larker criterion

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ERTP | KI | SMCH | SMU | TCH | TTF |
| ERTP | 0.884 |  |  |  |  |  |
| KI | 0.610 | 0.823 |  |  |  |  |
| SMCH | 0.258 | 0.427 | 0.841 |  |  |  |
| SMU | 0.435 | 0.566 | 0.610 | 0.861 |  |  |
| TCH | 0.157 | 0.321 | 0.474 | 0.499 | 0.881 |  |
| TTF | 0.304 | 0.415 | 0.680 | 0.592 | 0.687 | 0.881 |

On the other hand, table -5.6, indicated that the square root of AVEs for every construct is greater when compared to the correlations of the construct with the other constructs while ensuring the satisfaction of the criterion of the construct level discriminant validity.

## 5.5 Structural Model Assessment

Following the assessment of the measurement model, the model (inner model) being structured is validated by estimating the paths between theconstructs. The structural model was an assessment by several criteria as suggested by [F. Hair Jr *et al.* (2014)](#_ENREF_95). Firstly, their need for the structural model to be checked to ensure collinearity issues by examining the value of VIF. Secondly, the significance of the structural model should be evaluated through the use of path coefficient (ß) and standard errors (t values) that could be possibly obtained as a result of bootstrapping. Thirdly, the level of R-squared (R2) for dependent variable needs to be assessed. Finally, there is a need also to make sure the dependent construct need to be measured based on the effect sizes (f2) of different constructs. In addition, this research estimates the moderating effects of experience that is being proposed in the theoretical research model. The moderating relationships were tested using the PLS-MGA technique. Techniques and criteria used to assess the structural model are explained in the following subsections. Table 5.7 summarizes the whole steps in term of assessing the structural mode as well as their tests and the criteria of acceptance based on [Hair Jr *et al.* (2016a)](#_ENREF_126) and [Chin (1998)](#_ENREF_56).

* 1. Criteria for structural model assessment

|  |  |  |  |
| --- | --- | --- | --- |
| **Step** | **Analysis** | **Test** | **Criteria** |
| 1 | Collinearity Issues | Tolerance | > 0.20 Acceptable |
| VIF | 5< Acceptable |
| 2 | Path  Relationships | Path coefficients | Ranges from -1 to +1  Less significant valuse are usually closer to zero. |
| p value | \* <0.10  \*\* <0.05  \*\*\* <0.01 |
| t value | >1.65 Significance level 10%  >1.96 Significance level 5%  >2.57 Significance level 1% |
| 3 | Coefficients of  Determination | R2 | 0.19 Weak  0.33 Medium  0.67 Substantial |
| 4 | f2 Effect Size | f2 | 0.02 Small  0.15 Medium  0.35 Large |
| 5 | Predictive  Relevance | Q2 | > 0 Having predictive  Relevance |
| q2 Effect Sizes | q2 | 0.02 Small  0. 15 Medium  0.35 Large |

#### 5.5.1 Collinearity Issue Assessment

In structural model, the path coefficients estimation is usually in accordance to the *OLS* regressions in term of individual endogenous latent variabl*e* in term of its predecessor constructs based on its correspondence. Accordingly, there is a tendency that the path coefficients might be biased whenever the estimation tends to involve some level of significant in term of collinearity which is among the predictor constructs. The statistical software package, IBM SPSS, is utilized to perform collinearity assessment. As presented in Table 5.8, the values of VIF of all constructs are less than 5. Hence, it can be concluded that there is no collinearity among the constructs included in the proposed model aiming to predict the ERT performance and consequently no need to eliminate any construct from the model.

* 1. Collinearity assessment for the structural model

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **First set** | | **Second set** | | **Third set** | | **Fourth set** | |
| Construct | VIF | Construct | VIF | Construct | VIF | Construct | VIF |
| TCH | 1.290 | SMCH | 1.858 | SMU | 1.592 | KI | 1.208 |
| SMCH | 1.290 | TCH | 1.894 | SMCH | 1.592 | TTF | 1.208 |
|  |  | TTF | 2.728 |  |  |  |  |

#### Path Coefficient (ß)

Path coefficient focuses on verifying the path significance of the relations in a model that is structural ([Chin, 1998](#_ENREF_56)). In another term, the relationship between the latent variables in the model that is structural is term the path coefficients([Hair Jr *et al.*, 2016a](#_ENREF_126)). By adopting the Smart PLS algorithm in term of its output, relationships among variables that are of independent and dependent (β) were examined. Though, in Smart PLS, to examine the level of significant level relations, the t-statistics for the whole paths are generated based on Smart PLS bootstrapping function. T-value is a criterion, which helps to determine the significance level of β between dependent and independent constructs.

Path coefficients have standard values between -1 and +1; a value closer to +1 reflects a stronger relationship that is *positive* whose values are closer to -1, that reflect a relationship that is very stronger. In addition, the values for the p are computed using the T. DIST function in MS Excel 2010. To ensure a significnt coefficients, the bootstrapping procedure in Smart PLS are assessed by the t- values. Table 5.9 represents the results of the relationships and accordingly the hypotheses testing.

* 1. Hypotheses Testing Results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hypothesis** | **Path relations** | **β** | **t-value** | **p-value** | **Result** |
| H1a | TCH → SMU | 0.171 | 2.464 | 0.007\*\*\* | Supported |
| H1b | TCH → TTF | 0.470 | 6.541 | 0.000\*\*\* | Supported |
| H2a | SMCH → SMU | 0.383 | 5.793 | 0.000\*\*\* | Supported |
| H2b | SMCH → KI | 0.131 | 2.350 | 0.008\*\*\* | Supported |
| H2c | SMCH → TTF | 0.457 | 5.799 | 0.000\*\*\* | Supported |
| H3a | TTF → SMU | 0.214 | 2.421 | 0.006\*\*\* | Supported |
| H3b | TTF → ERTP | 0.061 | 0.886 | 0.188 | NS |
| H4 | SMU → KI | 0.486 | 6.618 | 0.000\*\*\* | Supported |
| H5 | KI → ERTP | 0.585 | 8.746 | 0.000\*\*\* | Supported |
| Notes:  \*\*\*p < 0. 01  NS: No support | | | | | |

H1a suggests that Task characteristics have a positive effect on social media usage. There is a positive impact demonstrated in this study’s model in term of significant of Task characteristics on social media usage (path coefficient =0.171, t-value=2.464, p<0.007), hence, H1a was accepted. Task characteristics have a positive influence on Task-Technology Fit with (path coefficient=0.470, t-value=6.541, and p<0.000). It is consistent with the proposed hypothesis H1b and supports that Task characteristics are positively related to Task-Technology Fit. Hypothesis H2a is also supported (Path coefficient = 0.383, t value= 5.793, P<0.000) which means that social media characteristic has a significant positive effect on social media usage. Hypothesis H2b is also supported by the values of (Path coefficient = 0.131, t value= 2.350, and P<0.008) indicating that social media characteristic has a significant positive effect on knowledge integration. H2c also is accepted (Path coefficient = 0.457, t value = 5.799, P<0.000). It is consistent with that social media characteristic has significant influence on task-technology fit.

H3a suggests that task-technology fit positively influence social media usage, and the results (Path coefficient = 0.214, t value= 2.421, P<0.006) support this hypothesis. In contrast, from the analysis, ERT performance is not influenced by task-technology fit (path coefficient=0.061, t-value=0.886, p >0.10). As a result, hypothesis H3b is not supported (rejected). Furthermore, H4 suggests that social media usage positively influence knowledge integration. From the analysis, it is shown that knowledge integration is positively influenced by social media usage (path coefficient=0.486, t-value=6.618, p<0.000) and thus this hypothesis is supported. Meanwhile, hypothesis H5 which proposes that knowledge integration is positively influenced emergency response teams’ performance is also significantly supported by the values of (path coefficient=0.585, t-value=8.746, and p<0.000). In conclusion, Table 5.9 presents that all proposed hypotheses are supported except H3b (the influenced by task-technology fit on emergency response teams ‘performance).

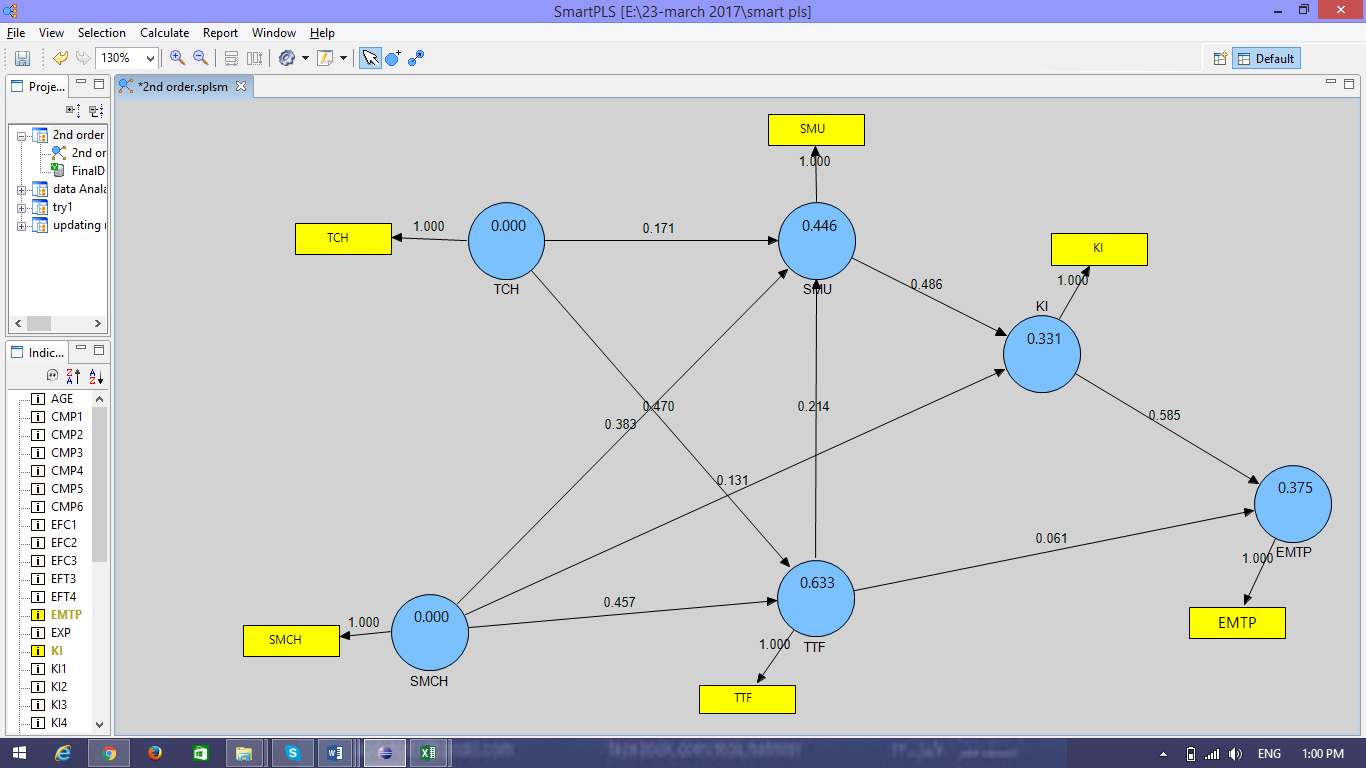
#### 5.5.3 Explained Variance (R2)

R2 indicates the number of the variance explained in term of the endogenous construct through its predictor constructs based on the structural model. This can as well be consider as the coefficient that basically represents the exogenous latent variables' which usually conjoin effects on endogenous latent variable ([Hair Jr *et al.*, 2016a](#_ENREF_126)). The range of the R2 values are from 0 to 1, where the higher values of the R2 represent a prediction that is much better through the PLS path model. For the R2 values, there are no rules of thumb; for example, considering the consumer behavior discipline, the values of the R2 of 0.2 are known to be higher in success driver studies (such as customer satisfaction or loyalty), much higher values are expected ([Hair Jr *et al.*, 2016a](#_ENREF_126)). Furthermore, according to [Chin (1998)](#_ENREF_56), R2 with 0.67, 0.33, and 0.19 are considered as substantial, moderate, and weak respectively.

In general, the higher value of R2 the more predictive power of the structural model. For example, R2=1 means that independent variable(s) is/are explaining all the variation of the dependent variable. In this research, Smart PLS algorithm function is applied to calculate the R2 for all dependent variables. The results show that the *R2* value of task-technology fit, social media usage, emergency response teams’ performance and knowledge integration are 0.633, 0.446, 0.375 and 0.331 respectively, which all are considered moderate. This means that the total predicted for Emergency response teams’ performance is 0.375 which indicates that 38% of teams’ performance for emergency response is explained by it is independent variables (TTF, KI), and social media characteristic and social media usage are able to explain 33% of the variance of knowledge integration (KI). Meanwhile, task-technology fit, social media characteristic and task characteristic explain 45% of the variance in social media usage. Finally, social media characteristic and task characteristic explain 63% of the variance in task-technology fit. Table 5.10 presents the R-square of dependent variables in the research model which all fall within the “moderate” explanatory power based on [Chin (1998)](#_ENREF_56) mentioned-above. As depicted in Figure 5.1, all the path coefficients were significant with different *p*-values except TTF ERTP. Figure 5.2 presents the structural model and values of the essential tests in steps 2 and 3.

* 1. Table 5.10 The R-square of dependent variables

|  |  |  |  |
| --- | --- | --- | --- |
| **Dependent Variable** | **Notation** | **R square** | **Level of explanatory power** |
| Emergency response teams’ performance | ERTP | 0.37.5 | Moderate |
| Knowledge Integration | KI | 0.33.1 | Moderate |
| Social Media Usage | SMU | 0.446 | Moderate |
| Task- Technology Fit | TTF | 0.633 | Moderate |



Note: ERTP= Emergency response teams’ performance, KI=Knowledge Integration, TTF= Task- Technology Fit, SMU=Social Media Usage, TTC=Task Characteristics, SMCH= Social Media Characteristics.

Figure 5.2 Structural Model Assessment

#### 5.5.4 Effect Size (f2)

Effect size is a criterion, which should be estimated in the process of evaluating the structural model to determine the impact that is most relevant based on an independent constructtowards its dependent construct using Cohen’ f2 ([Cohen, 1992](#_ENREF_63)) for interpretation the result. In addition to measuring the model’s predictive accuracy through the **R2** values of all dependent constructs, the ***f 2*** effect size for the independent constructs is assessed to measure the specification of impact in term of independent construct on the dependent construct by computing the change in the value of the R2 especially when this construct is basically omitted towards the model [Hair Jr *et al.* (2016a)](#_ENREF_126). The formula to calculate effect size is:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

R2 included and R2 excluded are the R2 values of the dependent construct when a selected independent construct is included or excluded from the model. The following guidelines are suggested by [Cohen (1992)](#_ENREF_63) for interpreting the effect size: 0.02, 0.15, and 0.35, represent small, medium, and large, effect size of an independent construct, respectively. In this research, through the estimation of the *R2* value, the change is computed by estimating the PLS path model twice, by considering the dependent construct at first instance (included) while at the second instances without the independent construct (excluded).Then, the f2 of the independent constructs is calculated using [Cohen (1992)](#_ENREF_63) formula.

Table 5.10 shows that the effect size of task characteristic and social media characteristic have large effect size on task-technology fit, however, social media usage and KI construct have a medium effect size. In addition, while the effect of task characteristic and social media characteristic is small on social media usage, social media characteristic does not have any effect on knowledge integration and task-technology fit does not show any significant effect size on emergency response.

**Table 5.1 :** Effect size (f2) results for the confirmed hypotheses

|  |  |  |
| --- | --- | --- |
| Relation paths | Effect Size(f2) | |
| f2 | Category |
| TCH → TTF | 0.47 | Large |
| SMCH → TTF | 0.43 | Large |
| TCH → SMU | 0.03 | Small |
| SMCH → SMU | 0.03 | Small |
| TTF → SMU | 0.49 | Large |
| SMU → KI | 0.23 | Medium |
| SMCH → KI | 0.01 | Not effect |
| TTF → ERTP | 0.00 | No effect |
| KI → ERTP | 0.30 | Medium |

#### 

### 5.6 Moderating Effects

Moderator is a quantitative or qualitative variables that has adverse effect on the strength or nature of the relationship among dependent and independent variables ([Henseler and Fassott, 2010](#_ENREF_132)). Using PLS path modeling, the hypothesized path model of direct effects should be assessed first, to know more about the strength of relationships, moderating effects analysis should be involved second([Henseler *et al.*, 2009](#_ENREF_133)) . Figure 6.3 shows the symbolic representation of moderator (Z) between dependent variable (Y) and independent variable (X).

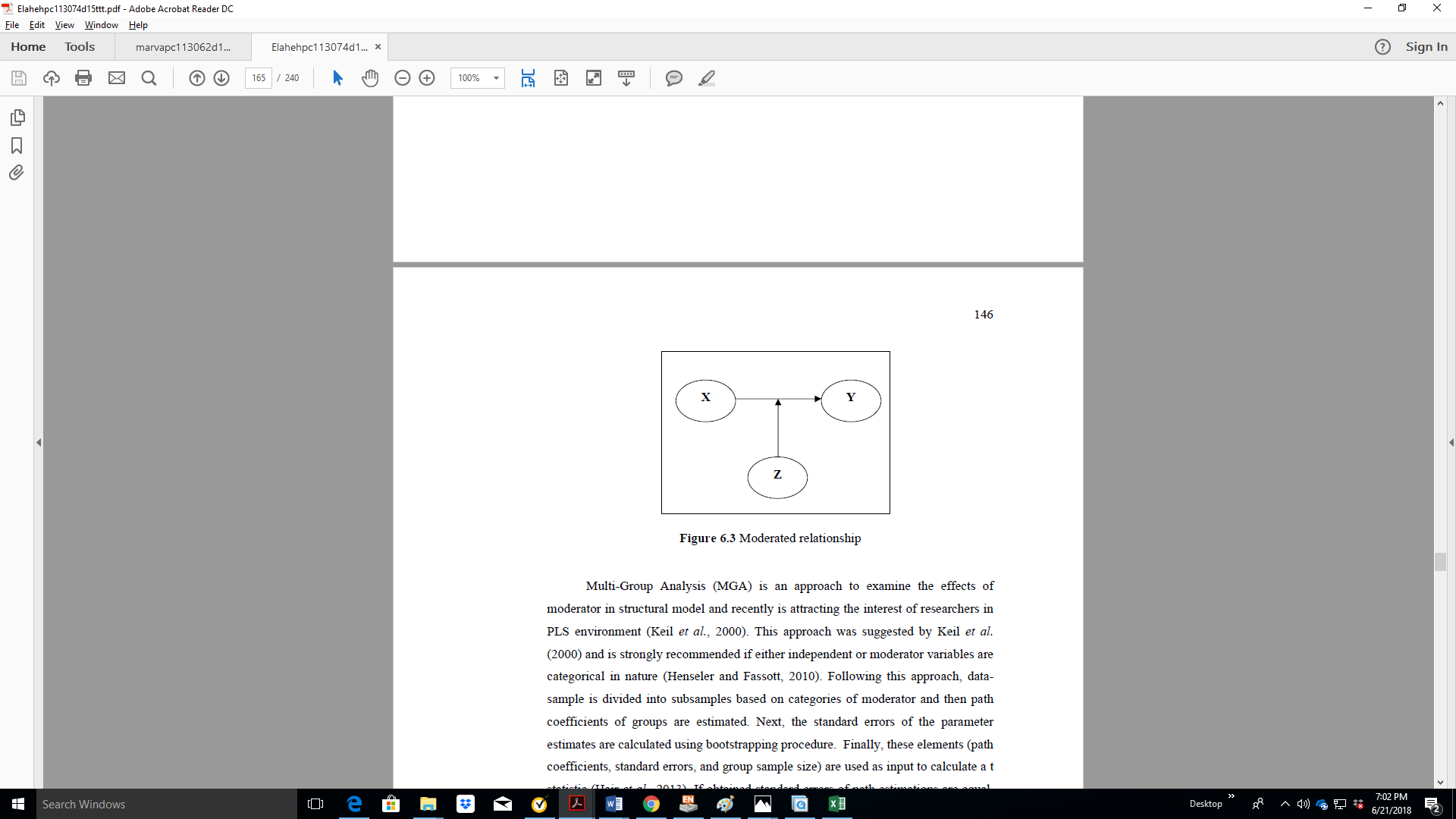


Figure 5.4 Moderated Relationship

Moderator can be either categorical moderating effects or continuous. When the moderator is a categorical variable, the moderating effect is categorical. On the other hand, in a continuous effects, there is moderation which occur especially when the moderating variable is metrically measured ([Hair Jr *et al.*, 2016a](#_ENREF_126)). In this research, the experience is considered as a categorical moderator. For the moderating effect to be accessed categorically, it is evidential that the analysis of the PLS-SEM multi-group (PLS-MGA) is used. Although, Smart PLS 2.0 supports the PIA, on the other hand, it become impossible to support the PLS-MGA which in turn required a manual process. The Smart PLS website provide an Excel spreadsheet to assist in the process of PLS-MGA analysis (<http://www.pls-sem.com/>).

Multi-Group Analysis (MGA) is an approach to examine the effects of moderator in the structural model. Recently, it is attracting the interest of researchers in PLS environment specifically in recent fields ([Keil *et al.*, 2000](#_ENREF_172); [F. Hair Jr *et al.*, 2014](#_ENREF_95)), finding out whether there is a significant difference between coefficients. Further, this approach is suggested by [Keil *et al.* (2000)](#_ENREF_172), and it is strongly recommended if either independent or moderator variables are categorical in nature ([Henseler and Fassott, 2010](#_ENREF_132)). In this approach, the data sample is divided into subsamples based on categories of the moderator, and then, the path coefficients of groups are estimated. Next, the standard errors of the parameter are calculated using bootstrapping procedure. Finally, these elements (path coefficients, standard errors, and group sample size) are used as input to calculate at statistic ([Hair Jr *et al.*, 2016a](#_ENREF_126)). If the obtained standard errors of path estimations are equal, the test statistic(t) is computed as follows ([Hair Jr *et al.*, 2016a](#_ENREF_126)).

|  |  |
| --- | --- |
|  |  |

Note: p (l) and p (2) formed the coefficients path associated with Group 1 and Group 2, while the se (p (1)) and se (p (2)) are the standard error of p (l) and p (2), respectively. n (1) and n (2), the number of observations in Group 1 and Group 2 .

If the standard errors are unequal, the differences between the path estimators of two groups are tested using t-tests ([Hair Jr *et al.*, 2016a](#_ENREF_126)) as follows:

|  |  |
| --- | --- |
|  |  |

#### 5.6.1 Result of PLS-MGA for Experience Moderation

Hypothesis H6 was proposed to test the effect of experience moderation. In the survey question, the moderating variable experience is group, hence, as put forward by [Hair Jr *et al.* (2016a)](#_ENREF_126), MGA technique is best suited to estimate the effects of experience moderation. Based on this research, PLS-MGA is employed to test the moderating effects of experience on the relationship of social media usage with the knowledge integration. MS Excel spreadsheet application developed by Hair et al. (2013) is used to calculate t values. To estimate moderating effect to experience, the sample is split into two groups: High experience group (>10 years) and low experience group (<= 10 years).

Therefore, based on the collected data, out of 240 respondents, 108 (45%) are considered as high experience group and 132 (55%) are considered as low experience group. As can be seen in Table 5.13, the coefficients and standard errors are considerably different between the two groups (0.413 for path coefficient). It is considered high variance. Furthermore, the t value is 4.569, which yields a p-value of 0.000, which is indicating that there is a significant variation across the two groups. The results (see Table 5.13) show that the effect of social media usage on knowledge integration is significantly higher (p < .01) for high experience group. This finding makes intuitive sense considering the nature of their business relationship compared with low experience, although of the number observations for high experience (108) is less than low experience (132). Consequently, it was concluded that experience is significant a moderator for social media with knowledge integration.

Table 5.12 PLS-MGA results for the moderating effect of experience

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Relationship path** | **High experience** | | **Low experience** | | **High experience**  **VS Low experience** | | |
|  | p(1) | se(p(1)) | p(2) | se(p(2)) | |p(1)–p(2)| | t value | p value |
| SMU KI | 0.756 | 0.0331 | 0.343 | 0.0845 | 0.413 | 4.569 | 0.000 |

### 5.7 Discussion on hypotheses testing

#### 5.7.1 The influence of Task Characteristics on SM Usage

Hypothesis H1a suggests that task characteristics have a positive effect on social media usage.Results (path coefficient =0.171, t-value=2.464, p<0.007) provided evidence to support this hypothesis. The theory of task-technology ﬁt unveiled that the utilization of technology mostly is governed based on technological features as a result of match and the task requirements (Goodhue & Thompson, 1995). Usually, this finding is consistent with similar studies in the literature ([Lin and Huang, 2008](#_ENREF_206); [Teo and Men, 2008](#_ENREF_326); [King'ori, 2013](#_ENREF_176)).

In a flood emergency response context, there are used both kinds of knowledge represented in sharing the documentation and guidance among the members that wrote down in the last detailed log of floods. Which include the most area suffered and where the areas suffered from low living that needs for the urgent response, besides the common roads removable away and lock, that known as knowledge explicitly. This doesn’t mean ignore the vital role for tacit knowledge possess in the mind of individuals’ teams have learned at one time or another that increased their experience and skills that helps other members to achieve their tasks via using SM. Consensus with [Panahi *et al.* (2016)](#_ENREF_266) states the most valuable source of knowledge, the tacit knowledge of volunteers and staff formed that most source of their “experiential know-how” relating to their experiences in term of emergency in most of the vital situations usually is all about “the reality of what works and the essence of making it work appropriately” apart from the explicit knowledge that base on “how things should work”. Social web platforms possess characteristics that show particularly effective tool in engineering tacit as well as knowledge that are informal that are shared among individuals ([Panahi *et al.*, 2012](#_ENREF_267)).

Moreover, [Grover and Froese (2016)](#_ENREF_119) stated social media platforms have the potential of capturing both the tacit and explicit knowledge that is generated during emergencies. Which leading staff and volunteer teams to regularly and frequently used social media to achieved team tasks. While the ER teams whose work comprise of tasks which are basically interdependent among others may seems motivated so as to use most technology that are of knowledge sharing than those who act alone (Jarvenpaa & Staples, 2000). The teams tasks during ER are interdependence on other, it can be saied distribute shelter depend on information gained from another task such as what are the worst areas that lost their homes and displaced peoples which need for urgent shelter, for quick delivering they need to know unaffected roads and otherwise. The tasks becomes more substantial in terms of task interdependence needs greater coordinating and sharing knowledge ([Kuthyola *et al.*, 2017](#_ENREF_189)). Consequently, of above-mentioned, there is the substantial need for teams work during emergency response flood disaster to use social media, which lead to easier communicate and coordinate their tasks that help for accurate decision making at the time on need. Thus, in this study, the task characteristics have positive related to utilization social media.

#### 5.7.2 The effect of Task and SM Characteristics on Task-technology Fit

The results showed that Task characteristics have a positive influence on Task-Technology Fit (H1b) with (path coefficient=0.470, t-value=6.541, and p<0.000). It is also hypothesized that social media characteristic has a significant influence on task-technology fit (H2c). The result also showed that this hypothesis is accepted (Path coefficient = 0.457, t value = 5.799, P<0.000). This confirms that the task-technology fit (TTF) is influenced significantly by Task characteristics and Technology characteristic(hypotheses 1b, and2c).

From the literature, TTF is studying the relationship for the task characteristics and technology characteristics. Which considered as one of the wells- Known theories in IS study. Based on this idea the performance will be high when the technical characteristics and task characteristics combine appropriately. In line with finding, [Goodhue (1995)](#_ENREF_112) in their art elaborate on the term technology to be a tool that is explore by individuals to achieve their tasks. Previous researches have shown that the effects of task and technology characteristics on task-technology fit have been discussed e.g., in [Zhou *et al.* (2010)](#_ENREF_383) as they pointed out that, the characteristics of the tasks and technology are used to discover the task-technology fit. Furthermore, there are several studies that have shown this result of the hypothesis task as well as that of the characteristics of the technology with significant and positive predict TTF ([Lin and Huang, 2008](#_ENREF_206); [Norzaidi *et al.*, 2009](#_ENREF_239); [El Said, 2015](#_ENREF_92)). In context of this study, there are two dimensions of the Task Characteristics which are Task tacitness and Task interdependence. Task tacitness which refer to the degree of balance of tacit versus explicit knowledge that required complete the task effectively. Task Interdependence which refers to the tendency of members’ teams to possibly interacting during an emergency flood to share knowledge or materials with others to accomplish their response activities.

#### 5.7.3 The influence of Technology (SM) characteristics on SM Usage

Hypothesis H2a is supported (Path coefficient = 0.383, t value= 5.793, P<0.000) which means that social media characteristic has a significant positive effect on social media usage. In this research, the result in the line with previous studies [Teo and Men (2008)](#_ENREF_326); [Rogers (2010)](#_ENREF_292); [Zolkepli and Kamarulzaman (2011)](#_ENREF_385) identified the important characteristics of social media as; compatible and relevance that enable utilization of social media. The previous studies about SM platform, relevance usually determined by characteristics such as interaction is identified by ([Yates and Paquette, 2011b](#_ENREF_373)), captured and sharing knowledge to another recipient and useful information quickly and easily. While compatible determine by characterized collaboration and provide accessibility ([King'ori, 2013](#_ENREF_176)). [Kwai Fun Ip and Wagner (2008)](#_ENREF_190) suggested that social media features might be equivalent in their communication, the information storing capabilities and accessed freely by other users. Furthermore, at the context of emergency response, the teams are existing in different places which using social media due to it provide all characteristic mentioned above that allow teams individuals to produce, organize, locate, and share content freely. In line with [Ahmed *et al.* (2018)](#_ENREF_9) state the application of social media are basically are consider as one of the most prominent platform used for the establishment of a real-time communication bridge that is adopted to sharing of knowledge in term of both the natural and manmade disasters([Ahmed *et al.*, 2018](#_ENREF_9)). The social media being an emerging technology form an integral part of technological advancement for flood disaster response. At the same time, within its platform, the social media’s participatory nature is best exemplified and are designated as the technological dimension help to complete the task and encourage utilization of search and contribute knowledge. Where people work collaboratively to create, compile, and update knowledge and use for search and contribute knowledge. From the above-mentioned studies, there has wide consensus as a result of this hypothesis which technology characteristic has a positive relationship with SM usage.

#### 5.7.4 The influence of Technology (SM) characteristics on KI

Hypothesis H2b is supported by the values of (Path coefficient = 0.131, t value= 2.350, and P<0.008) indicating that social media characteristic has an effect that is positively significant especially when considering the knowledge integration. Consistent with many studies such as [Cao *et al.* (2015)](#_ENREF_45), social media features support significantly knowledge integration in a positive relationship. Further, [Loebbecke and Myers (2017)](#_ENREF_208) argued that knowledge portals have characteristics that allows the integration of extensive mechanisms and knowledge that are dispersed in various facets as well as from sources that are diversein a successful relationship with knowledge integration. Furthermore, [Pai (2012)](#_ENREF_262) found a positive relationship between knowledge integration and e-business applications due it is functionality that supports the integrated knowledge .

KMSs as an example of IT integrate individuals that has a codified knowledge that are reusable while facilitating conversations which tend to create new knowledge. Hence, the KMS attributes are fashioned as a technological dimension that covers a broader area of business intelligence, collaboration, distributed learning, knowledge discovery, knowledge mapping, and opportunity generation in carrying out their tasks ([Lin and Huang, 2008](#_ENREF_206)).

[Loebbecke and Myers (2017)](#_ENREF_208) argued that one way to achieve KI is basically to introduce a knowledge portal (KP) as IT. Numerous processes can be erased with the emergence of new innovations in social media as well as that of the communication instruments that is involved in the widespread distribution of knowledge; it contain the attributes to potential stimulate the processes of KI as well as permits communication and collaboration process. Considering some of the most popular social networking sites like the WhatsApp and Telegram, they are now being used as tools for communication in term of the Kemaman District’s flood management team. The integrated knowledge as put forward by several actors has help in the development successfully (Zakaria, Ahmad, Noor, & Ahmad, 2016).

There are greater opportunities that are offered by the social media platforms in term of rapid knowledge flow among several individuals that are mostly working across most areas that are mostly diverse geographically and that can be provided via traditional tools that comprises of face-to face meeting ([Ahmed et al., 2018](#_ENREF_9)). [Luna and Pennock (2018)](#_ENREF_212) have also argued that social media facilitating the dissemination of information, provide and receive disaster information, and for increasing knowledge and exchanging advice, while providers also used for communication and coordination with colleagues. In this study the volunteers and staff benefit from the characteristic of social media for many issues represented on communication together to coordinated and integrate their task and knowledge about missing people, evacuation effected, block road, serious affected area and distribution supplies food and shelter, that encourage the teams of volunteer and staff to frequently and regularly used social media.

#### 5.7.5 The effect of Task-Technology Fit on SM usage

H3a suggests that task-technology fit positively influence social media usage, and the results (Path coefficient = 0.214, t value= 2.421, P<0.006) support this hypothesis. In light of this finding, it can be said that task-technology fit positive predictor for social media.

Basically, the term utilization formed the basis of measuring the behavior of employing an IS in completing task that are mostly diverse([Goodhue and Thompson, 1995](#_ENREF_114)). In this study, utilization of social media refers to the frequently use or regular use to search and contribute flood knowledge to teams and organization. In other word, SM usage is the behavior of employing technology in completing tasks. Task-technology fit on the other hand, is used to describe the degree at individuals are assisted by technology towards positioning his or her tasks ([Pai, 2012](#_ENREF_262)).

In the TTF model, the utilization of technology relied upon the fit among technology as well as the tasks it supported; in the use of social media, it is also mooted as true. TTF was predicted to be a significant precursor to social media usage. Several researchers have empirically tested the influence of TTF factor on technology utilization. [Ouyang *et al.* (2017)](#_ENREF_258) have already reported the positive relationship between task-technology fit (TTF) and utilization. [Lin and Huang (2008)](#_ENREF_206); [El Said (2015)](#_ENREF_92) has concluded that TTF substantially influences on knowledge management system used. Furthermore, the TTF influence significantly on utilization KPs ([Teo and Men, 2008](#_ENREF_326)). TTF was predicted to be a precursor to SM use, and there’s positive effect between task-technology fit and use ([Gribbins *et al.*, 2006](#_ENREF_117)). The relationship among the task-technology fit and system utilization co-exist as a result of the fact that, the better the fit, more the tendency for the users to liking the system and the results show TTF thus influence positively the information system utilization ([Osang, 2015](#_ENREF_254)).

In light of this context, The TTF rely on the matching of social media functionalities such as very adequate, useful, helpful, sufficient, and the task very easy with tasks needs. In context of emergency response, if social media applications provide functions that meet their needs, they will then use social media for share knowledge to help disaster victims through the disaster response efforts. Hence, in terms of the result of hypothesis. It consistent with the result of their above-studies shows that task-technology fit construct can influence positively towards social media usage.

#### 5.7.6 The effect of TTF on Emergency response Team’s task Performance

In contrast to the previous hypothesis, from the analysis, ERT performance is not influenced by task-technology fit (path coefficient=0.061, t-value=0.886, p >0.10). As a result, hypothesis H3b is not supported (rejected) and this indicated that TTF does not have any significant relationship with performance. The results reported in this research are inconsistent with those of prior researchers who showed the significant positive relationship between TTF and performance. This implies that according to previous studies such as (El Said, 2015; Lin & Huang, 2008; Norzaidi et al., 2009) whenever there is any kind of mismatches among task that is required to be completed and the technology available, the performance will be affected.

The internal consistency of multiple emergencies is defined as Profile deviation ([Wu *et al.*, 2014](#_ENREF_366)). According to Hoehle and Huff (2012) from the profile deviation perspective, fit is ‘the degree of adherence to an externally specified profile, evaluating fit as profile deviation is particularly useful for testing the effects of environment situations since multiple variables are involved. The word fit form a process that is dynamic. Even with the achievement of fitness, alignment, it is possible for any organizations to fail in term of their patterns of alignment when environmental changes are to be accommodated, based on the overemphasis on the fitness or not identifying perspectives that are of an alternative that should meet the need for the change (Chen et al., 2009). In this context, an ideal profile is assumed to exist, and deviation from this ideal profile implies a weakness in co-alignment, resulting in lower performance ([Chen and Huang, 2012](#_ENREF_54); [Hsiao *et al.*, 2017](#_ENREF_139)). According to [Wu *et al.* (2014)](#_ENREF_366) states because deviations in strategy from an environment-specific ideal profile should be negatively related to performance. This approach has been used primarily in the context of group support systems research where ideal capabilities can be derived based on such things as the communication needs associated with the task to be performed ([Furneaux, 2012](#_ENREF_103)). When you apply this perspective of fit as profile deviation in the context of this research in the flood disaster emergency response, and as known, this phase is common as change environment situations during the nature of the flood, furthermore, sometimes the teams that work together only when responding to an emergency incident, as well as the volunteer was work in different place and different situations, as result in volunteer has inadequate knowledge about the guidance and rules and strategy for organizations. Furthermore, numerous objectives that are to be attained in parallel for the purpose of success are said to contain; High psychological demands with several people considering working under time pressure as well as conditions that are most stressful. There is a need for a comprehensive understanding among the organizations' teams which needs a comprehensive understanding of diverse sectors considering its roles, responsibilities as well as authorities, this helps in ensuring that the tasks are scheduled appropriately while making sure a proper management of activities is attained. Usually, this form of understanding is essential especially in the minimization of services that are duplicated to facilitate communication (Mohammadfam et al., 2015). Entirely above conditions may be effected to change the organization's environment, strategy. Therefore, the task-technology fit construct has no significant influence on ERT performance.

#### 5.7.7 The impact of SM usage on Knowledge Integration

H4 suggests that social media usage positively influence knowledge integration. From the analysis, it is shown that knowledge integration is positively influenced by social media usage (path coefficient=0.486, t-value=6.618, p<0.000) and thus this hypothesis is supported.

Social media enabled the participants to socialize with each other by providing opportunities for dynamic conversations, discussions, questions and answers, commenting, instant communication, and open participation. For example, engaging in dynamic conversations and discussions is one of the most common ways of socialization on social media. Social media that encourage, support, and enable people to share their knowledge easily and effectively through different mechanisms ([Panahi *et al.*, 2012](#_ENREF_267)). As put forward by [Yates and Yates (2016)](#_ENREF_374), the social media is seen as an important technology that is used for communication in term of disaster response. As elaborated by the author, the social media can as well effectively play a very significant role towards the emergency knowledge management technology when and during an event of a disaster. Social media is increasingly being used to share knowledge during, disasters and emergencies ([Yates and Yates, 2016](#_ENREF_374)).

Through ICT such as social media, there is possibility for an individual to disseminate knowledge virtually at all times in mostly everywhere. Considering the emergency response of flood disaster, the social media tend to become the most significant tools that is used towards sharing of knowledge/information with the outside world in general ([Ishak et al., 2014](#_ENREF_153)). With the advent of social media tools such as blogs, online social networks, and wikis, several studies have argued that these new technologies provide new opportunities for facilitating tacit and experiential knowledge sharing among experts ([Panahi *et al.*, 2012](#_ENREF_267); [Cao *et al.*, 2015](#_ENREF_45); [Panahi *et al.*, 2016](#_ENREF_266)). [Patnayakuni *et al.* (2007)](#_ENREF_270) pointed out that IT as informal organizational integrative practices enhance the integration of specialized knowledge within and across subunits. Social media enable Watching and observing a practice of other people is regarded as a conventional and effective way to transfer tacit knowledge, particularly to transfer technical know-how and skills ([Panahi *et al.*, 2016](#_ENREF_266)). [Mehta and Mehta (2017)](#_ENREF_219) Identified communication environment as important antecedents to knowledge integration.

In context of emergency responders, usually provide a substantial decisions based on the emergency unfolds, that rely basically on the availability of what knowledge becomes available while ensuring a sense of several knowledge that belong to some sort of source ([Yates and Yates, 2016](#_ENREF_374)). A recent study statistically verifies that use of wiki can trigger a higher level of cognitive elaboration of team members when they process diversified information and knowledge shared within the team, which promotes knowledge integration at the team level and further improve a team’s collaboration quality ([He and Yang, 2015](#_ENREF_130)). Therefore, the finding of this study, is consensus with above-mentioned studies, using social media will be useful and substantial for knowledge integration to improve emergency response teams’ performance.

#### 5.7.8 The Influence of Knowledge integration on emergency response team’s performance

Meanwhile, hypothesis H5 which proposes that knowledge integration is positively influenced emergency response teams’ performance is also significantly supported by the values of (path coefficient=0.585, t-value=8.746, and p<0.000). Findings of this research indicates that the team performance in ERTP model is conceptualized as an output that is influenced directly by Knowledge integration. The study confirmed a positive effect of knowledge integration on team performance. Moreover, the present findings show that it is consistent with the results of previous studies which shows a positive link among knowledge integration and performance ([Tiwana, 2004](#_ENREF_330); [Mitchell, 2006](#_ENREF_223)) and recently examined and reported a positive link between knowledge integration and team performance ([Basaglia *et al.*, 2010](#_ENREF_29); [Gardner *et al.*, 2012](#_ENREF_108); [Mehta and Mehta, 2017](#_ENREF_219)). Similarly, the possibility to act in term of combining each other’s knowledge to achieving team goals would (i) provide the team members with the sense that portray their ability to work in a coordinated manner in order to solved the problems, and (ii) ensured that the team members competences are demonstrated ([Mehta and Mehta, 2017](#_ENREF_219)). Similarly, knowledge integration across knowledge boundaries improves performance ([Patnayakuni *et al.*, 2007](#_ENREF_270)). Knowledge integration in teams is promotive to team performance ([Robert Jr *et al.*, 2008](#_ENREF_289)). Collaboration integrating tacit knowledge and explicit knowledge positively influences performance ([Loebbecke and Myers, 2017](#_ENREF_208)).

At the first glance in floods disaster, there are emergency rooms in NGOs, urgently held meeting for the emergency team’s staff to discuss the information gained from the volunteer in affected areas, depending on it, r the instructions, rule, and directives are reviewed for the quick emergency response. Hence, they exchange their experience from the last lessons. Addition, they share their knowledge with teams that work in dispersed geographic areas to integrated their knowledge. Which lead to coordinate team’s effort and tasks to saving life, property and solve problems in accurate time with appropriate decision making, by using social media which help also in found missing victims and sharing large knowledge. Whereas, knowledge of one’s is built upon or combined with others idea is known as knowledge integration that generate insight that is new. Consensus with [Körner *et al.* (2016)](#_ENREF_180), which argued that team members in their part tend to assimilate some knowledge through communicating in a verbal form, the coordination of their expertise, skills as well as sharing of information about who thus become aware of the teams. While [Mehta and Mehta (2017)](#_ENREF_219) stated the importance of accurate and suitable time to make critical decisions effect to enhance team performance on emergency response. To respond rapidly by the team members, the availability of accurate and timely knowledge provides enablement for the teams members to respond rapidly to problems and facilitate tasks ([Takhtravanchi and Pathirage, 2015](#_ENREF_320)).

Investigation in to the by the present studies illustrated that the social interactions as well as the coordination mechanisms which basically involved in the integration of knowledge process tend to facilitate a common understanding of the members of the team’s objectives and how they can be achieved, resulting in more efficient performance ([Mehta and Mehta, 2017](#_ENREF_219)). In the light of the finding of this study, KI is good strategy to coordinate activities of teams which lead to enhance their performance.

### 5.8 Discussion on Moderating Effect Results

In this study, the experience variable has been proposed and tested. It was discovered to have an effect that is moderated on the constructs of the models**.**

#### 5.8.1 Experience

As can be seen from the results, the coefficients and standard errors are considerably different between the two groups (0.413 for path coefficient), which is considered high variance. Furthermore, the (t value is 4.569, which yields a p-value of 0.000,) is indicating that there is a significant difference across the two groups. Indicating to above result (see Table 5.13) consequently, it was concluded that experience is significant a moderator for social media use with knowledge integration. As can be seen in Table 5.13, the coefficients and standard errors are considerably different between the two groups (0.413 for path coefficient). It is considered high variance. Furthermore, the t value is 4.569, which yields a p-value of 0.000, which is indicating that there is a significant difference across the two groups.

[Abayomi and Ray (2014)](#_ENREF_1) unveiled that recurrent and much better experienced users of technology could better ensured the usage of the technology more effectively. Drivers Information Systems **(**DIS) is a web-based tool basically suggested that the users usually contain better experience with web orientated tools and thus effectively use the DIS as compared to the counterparts that does not contain such experience.

Internet experience positively affects the educational use of ICT ([Ouedraogo, 2017](#_ENREF_257)). Individuals experienced at using a (Mobile Banking) MB system could possibly contain a very significant increase in confidence to involve more and thus increases their usage significantly ([Tam and Oliveira, 2016b](#_ENREF_322)). [Lee and Kim (2009)](#_ENREF_198) provides empirical evidence confirming this relationship between experience and utilization is positive significance. In addition, meta-analysis study based on 121 articles suggests that user experience is a significant predictor of system usage ([Albashrawi et al., 2017](#_ENREF_16)). Validation of such effect has been carried out in a web-based system ([Venkatesh et al., 2008](#_ENREF_349)).

With rapid experience increased by MB, each person’s reinforce most of their habit in term of system usage, peoples who have long experience at using various MB services would tend to be positive about increasing their actual use ([Albashrawi *et al.*, 2017](#_ENREF_16)). Student confidence during clinical experiences strongly correlated with Knowledge integration([Cohen *et al.*, 2017](#_ENREF_61)). In another hand, among team members, to ensure the creation of an experience that is basically common based on facilitation of a team members to ensure that attainment of a common frames of reference and gain integrated efficiency. The improvement of returns that is based on the experience of integrating knowledge thus ensure the refinement of familiar technological knowledge that is most preferably to the exploration of new ones. In another development, the experience that is associated with the uses of integration of knowledge mechanisms could leads to an increased competence causes as a result of the exploitation of technological knowledge that are mostly familiar. Better competence with exploiting familiar technological knowledge tend to increase much experience when knowledge integration mechanisms is put in place ([Tsai et al., 2015](#_ENREF_338)).

[Tzabbar *et al.* (2013)](#_ENREF_341) stated that firms that are characterized with several experience accessing that tend to access sources that are external of information, usually extract benefits that are of more compared to that of firms which have less experience as well as firm which develop same experience; it could as well become more important to incorporate a wide range of knowledge that is discipline, that tend to increases the chances of success when transforming current knowledge into new knowledge.

### 5.9 Chapter Summary

This chapter addresses findings and discussions of the main study. Smart PLS 2.0 is used as data analysis tool, and results of data analysis and hypothesis testing are presented. This chapter starts with a description of demographic information of 240 respondents. Then, measurement model is assessed and demonstrated a satisfactory level of reliability and validity. In terms of indicator reliability all item loadings are acceptable, and in terms of construct reliability, all constructs demonstrated an acceptable values that is of composite reliability and Cronbach‘s Alpha. The model for the measurement likewise represents satisfactory convergent and discriminant validity (item level and construct level). Next, the validity of the structural model is assessed using an estimation of path coefficient (β), explained variance (R2) for the dependent variable, effect size (f2). The moderation effects of experience on proposed hypothesis are examined using PLS-MGA technique. Finally, results of hypothesis testing and moderating effects are discussed in detail.

# CONCLUSIONS AND FUTURE WORK

## 6.1 Introduction

This chapter summarizes the work presented in this thesis by explaining how the findings provided answers to the research questions and indicated the achievement of the related objectives. Moreover, the current chapter shows the implications, limitations and directions for future work thereof. Section 6.2 introduces a summary of the major findings of this research in terms of the outcomes for each objective. This is followed by an overview of the implications of this study, conclusions and research implications as presented in Section 6.3. Moreover, section 6.4 discusses the limitations of the study. Whereas, section 6.5 provides some recommendations for future studies, and finally, closing notes are stated in Section 6.6.

### 6.2 Achievement of Research Objectives

The catastrophic consequences of floods and the need for urgent efficient response of the working teams are major concerns that are increasingly attracting research attention worldwide. In Sudan; the context of this research, the Non-government organizations play a vital role in the emergency response to flood disaster. As confirmed by previous studies, the NGOs face challenges such as communication and coordination between individuals or teams working in dispersed areas. Consequently, there is a need to understand and empirically assess the complex and dynamic nature of emergency response tasks, investigate the relationship of using social media for facilitating knowledge integration and the performance of flood emergency response teams through knowledge integration strategy. To address these concerns, this research employed a model that combined the knowledge-based theory of the firm as a theory of knowledge integration (KBT) with Task-Technology Fit (TTF) theory for emergency response task team’s performance through knowledge integration. The developed model provides guidelines for emergency response teams that may assist them to mitigate the challenges of the flood disaster in a country such as Sudan.

This thesis describes a journey that started with an interest in addressing the main question: “*How to enhance emergency response team’s performance through Knowledge Integration using social media platform?*” To provide adequate answer, however, three supportive questions were listed: 1) what are the factors that influence the emergency response team’s performance in Sudan? 2) What is the relationship between social media usage and knowledge integration in the context of emergency response? 3) How to develop and validate a model for emergency response team’s performance? Each of these questins corresponds to an objective to provide a comprehensive answer.The following sub-sections demonstrate how these objectives were achieved throughout the process of this research.

#### 6.2.1 First Objective: The Influential Factors of Emergency teams’ performance

The first objective of the current research as stated in chapter 1 section (1.5) is “to identify the factors that influence the emergency response team’s performance”. To achieve the first objective, this study consequently, an extensive literature review on knowledge integration, social media and performance in context of flood emergency response was conducted to identify the key factors that influence the emergency response task team’s performance. The finding of the review led to the identification of several factors related to improve performance by knowledge integration as well as, the critical role for using social media to integrate knowledge (Chapter 2, Section 2.8). these factors were selected included the emergency response team’s performance, Knowledge integration, Social media usage, Task-Technology Fit, task characteristic, and social media characteristic. Moreover, Experience was proposed as a moderating variable of the relation between social media usage and knowledge integration. As well as the review also included most commonly used relevant models and theories. Accordingly, the determined factors were examined by employing a framework which combined the Task-Technology Fit (TTF) theory and knowledge-based theory of the firm (KBT). These theories were adopted as the most suitable for the purpose of this study. As such, they provided a lens that shaped what this research looked at and the questions which were asked. Furthermore, a preliminary study was conducted to understand and confirm the constructs that affect the performance of team’s flood emergency response. Thus, an initial model of emergency response team’s performance in the context of Sudan was proposed (Figure 4.1 in Chapter 4, Section 4.2.1). Accordingly, this section provided answer to research question one and achievement of research objective one as stated in Ch1 (1.4, 1.5)

#### Second Objective: the relationship between social media and a knowledge integration

In line with the second objective; “To examine the relationship between social media usage and knowledge integration in the context of flood emergency response”. This objective was achieved based on three main activities; first, develop the hypothesis H4 that suggests; “Social media usage will be positively related to the knowledge integration. Second from the analysis, it is shown that knowledge integration is positively influenced by social media usage (path coefficient=0.486, t-value=6.618, p<0.000) and thus this hypothesis is supported. Third and finally compare the result analysis hypothesis with literature which get consensus with it, Since in the flood emergency response context, there’re many teams came from different NGOs with variant culture, experience and knowledge worked in dispersed places which lead to complexity communication and coordinated their tasks to get the appropriate decision making on time that need, and solve the problems. Based on difficulty on meeting face-to face to discuss the flood issue and share their experience, knowledge and the lessons learned from the last flood disasters that leads to use social media as platform. Social media refers to “the means of interactions between people in which they create, share, and exchange knowledge and ideas within virtual communities and networks” (Ahmed et al., 2018). The relation also confirmed through using the Effect size is a criterion that evaluated structural model to determine the impact of independent social media usage towards its dependent construct such as knowledge integration. Based on chapter 5 (Table 5.11) effect size of SMU → KI is (0.23) that show social media usage and KI construct have a medium category, referred to Cohen (1992) criteria for interpreting the effect size: 0.02, 0.15, and 0.35, represent small, medium, and large, effect size of an independent construct. The overall findings indicated that knowledge integration has a significant relationship with social media usage. These findings provided answer to research question two “What is the relationship between social media usage and knowledge integration in the context of flood emergency response?” and ensured the achievement of the second objective of this research.

#### Third Objective: Emergency response Team’s Performance Model

The final objective of this research is “To develop and validate a model for emergency response team’s performance through knowledge integration via social media”. In order to address this second research objective in this study, three main activities were conducted in order to develop a research model for guiding the emergency response team’s performance through knowledge integration via social media. First, from the factors identified from Research Objective 1, the researcher reviewed the performance, knowledge integration and performance theories and models utilized in previous studies within different contexts and approaches. which was undertaken in order to choose the best theoretical model that can be employed in this study. KBT based on Chapter 2 (Figure 2. 2) is the most applied theory in the knowledge management and related with KI, while TTF model widely was used in information system for variant outcomes performance or utilization knowledge.

Second, in order to ensure the strength of the research model, designed questionnaire for assessing teams ‘performance through knowledge integration via social media in a flood emergency response context, as detailed in Section 4.5, with refined items by validation the measurement items by conducted face validity and content validity. Then distributed the questionnaires for target population represented in volunteers and staff in Sudanese NGOS to for pilot studies. Finally, in third activities questionnaires were distributed to gathered data, then from screening data the valid is 240. The analysis was performed to examine the relationship identified factors based on the proposed research model hypotheses using analytics tool such as Smart PLS 2.0, SPSS 24 and excel sheets. In order to validate the structural model, the t-values, p-value, and path coefficient and effect size of each path were evaluated as reported in Chapter 5 (Tables 5. 9, 5.10 and 5.11).

Furthermore, this study assessed the moderation of experience on the relationship of social media usage with the knowledge integration PLS-MGA as statistical techniques details Chapter 5 (Table 5.12). As illustrated in Figure 5.2 the validated result was used as the empirical evidence to check the six hypotheses of this study. Based on the results that were discussed in Section 5.7, all the hypotheses were supported except H3b. The final model explained 38 percent of the variance in emergency response team’s performance, which means that the model provides an adequate predictive power of Emergency response team’s performance. Furthermore, the influence of knowledge integration on ERT performance was significant. As such, it explained the significant proportion (38%) of the variance in EMT performance.

SM usage and SMCH significantly influence KI. They were found to explain a significant proportion (33%) of the variance in KI. Influence of TTF, TCH and SMCH on SM usage were found to be significant. However, the relationship between TTF and EMTP was statistically not supported. While the Influence of SMCH on TTF was significant as well. It explained a significant proportion (63%) of the variance in TTF. Furthermore, Experience moderation effects on the proposed hypothesis were supported by social media usage with knowledge integration. The results of these procedures provided answer to research question 3 “How to develop and validate a model for emergency response team’s performance through knowledge integration via social media?” and ensured the achievement of the related objective. The overall outcomes as described in the above sections provided a comprehensive answer to the main question and the accomplishment of the objectives thereof.

**6.2.4** **Recommendation for emergency response tasks and decision-making**

* Based on the outcomes highlighted above and the extensive investigation of the context of the current research, there are some recommendations for decision maker that can contribute to enhancing the emergency response. These include the following:
* Improving the internet infrastructure to extend and strengthen its penetration to cover the different parts of the country. Particularly, the vulnerable areas to floods.
* Enhancing and providing adequate training for officials and other personnel involved in a flood emergency response on the activities exist during floods instance, the plans and directives and routine.
* Raising awareness of involved teams within the emergency response with the concept of KI as well as, the importance of using in ER activities to enhance communication and coordination of task teams during the floods.
* Increasing the awareness for using social media properly among the inhabitants of the most probability of flood exposure areas which help the member's teams to know much information to achieve their tasks appropriately and faster.
* Improving coordination and communication between the government institutions and NGOs involved in flood emergency response process.

### 6.3 Research Contribution and Implications

#### The findings of this study make several contributions to the current literature in the area of research. In general, it contributes to the body of IS research in knowledge integration as well as emergency response research. Moreover, the findings offer insights to practitioners and decision makers, namely, in Non-government organizations. These contributions can further be discussed in terms of two perspectives: theoretical and practical as detailed below.

#### 6.3.1 Theoretical Contribution

The key objective of this research was to develop and test the conceptual model for Emergency response team’s performance. The proposed research model integrated KBT theory of the firm and TTF. Furthermore, focusing on knowledge integration strategy bridges a gap in the prior research concerning the use of social media as a platform for knowledge integration in emergency response to enhance team’s performance. In addition to fill a gap that has been overlooked in previous studies in the aspect of using social media to integrate knowledge.

Knowledge integration is a key constructs of KBT theory of the firm. This research proposed that using knowledge integration as a strategy establishes well-planned coordination and systematic coordination with ever-growing collaboration to performance team’s activities. That in turn, can change the game and tackle the emergency response with effectiveness and larger impact for the community. Moreover, the critical role for social media that played to integrate team’s knowledge. Furthermore, a key contribution of this research is the formation of a theoretical research model which integrates two popular streams of research in IS which are technology utilization and Knowledge integration. While the validity of integrated model utilization has been confirmed for years, the proposed model in this research extended TTF model by combining all its constructs with knowledge integration which is a key construct of KBT theory of the firm. Moreover, the scant attention that has been given to the impact of "experience" as the moderator in previous research, has triggered the motivation to test the moderating effect of experience on the relationship between social media usage and knowledge integration. As such, the related contribution of this research is of considerable importance to theory and practice. Furthermore, in the context of this research in Sudanese NGOs, this study is among the pioneering empirical works that empirically investigates the influence of social media and knowledge integration to enhance of emergency response teams’ performance. To the best of the researcher's knowledge.

#### 6.3.2 Practical Contribution

This research contributes to practice by providing insights on the impact of social media usage for knowledge integration to enhance emergency teams’ performance. Moreover, the research sets some recommendations for action for policy and decision making. From a practical perspective, the results of this research can assist the Non-government organizations that are currently using or have been planning to use social media to utilize it more properly to integrate knowledge to enhance emergency response. However, emergency response is known as dynamically changing every time depending on the quantitative and qualitative nature of the respective disaster. As such, it is essential to focus on the most urgent and important factors. This study provides an understanding of the influential factors that affect Emergency response team’s performance. The findings can be used by managers of Non-governmental organizations to develop guidelines to enhance the teams’ performance which consequently affects the whole society during flood disaster.

This study was set in Non-governmental organization context in flood disaster in the country of Sudan with a sample of volunteer and staff. However, the proposed and validated model can be applied in other contexts with similar characteristics. Specifically, these results are expected to be the same at least with other Non-governmental organizations in a developing country. As discussed in chapter 2. Furthermore, this study found significant differences between the different experiences of employees and volunteers in using social media as integration mechanisms. It can be concluded that the model put forward in this study can be used by both government and Non – government organizations to improve team’s performance in the context of emergency response.

6.4 Limitations of the Study

Despite the achieved contributions, yet, this research is not without limitations. Worth noting that this work has invested in a huge body of sources in both Arabic and English. Admittedly, it has been restricted by some constraints, one of which has been the relative lack of uniformed statistics. Some sources compile numbers and present them in the form of a press release that states the relative breakdown of a few major categories, but stops well short of a detailed analysis or even a complete listing; they are not broken down by category. The lack of critical studies adds to the difficulties encountered in this research. However, this provided further significance to this research to shed some light on Sudan.

Generally, the limitations in this reasrch pertain to three issues. Firstly, the sampling method was non-probabilistic due to several reasons that were discussed in details in Chapter 3 (Section **3.1.2.3**). This affects the generalizability of this research. However, it is a common issue in IS research ([Gable, 1994](#_ENREF_104); [Dubé and Paré, 2003](#_ENREF_87); [Seddon and Scheepers, 2012](#_ENREF_302)) and is not a reason to give up serious claims about generality ([Lee and Baskerville, 2003](#_ENREF_196)). Secondly, the targeted population in this research included only volunteers and staff in NGOs in the State of Khartoum; the capital of Sudan. This was prompted for several reasons:

1. The primary sources of data in this research are available and easily accessed there. Moreover, other documentary data is also obtainable from different sources.

2. The headquarters of the targeted organizations are located in Khartoum. Therefore, it was appropriate and convenient for both the researcher and the respondents.

Finally, the scope of this study on the emergency response phase only limits the research by excluding other phases of emergency response and the teams involved thereof.

### 6.5 Recommendation for Future Works

1. This study of knowledge integration through social media to enhance emergency teams’ performance is by no means a comprehensive one. Another work remains to be done to refine its findings and build upon them. The thesis addressed the issue from the perspective and the objectives of NGOs. Moreover, the constructs that were employed are well documented in IS scholarship. Yet, more work is needed to determine their impact on the teams' performance, namely, in the emergency response phase. Also, this thesis linked these concepts, on the one hand, and knowledge integration and team performance on the other. More work is still needed to clarify that link further and determines its impact in different settings in other developing countries. In general, the new possible areas for further research can be summarized in the following points:
2. Implementation of the developed emergency response model is required on real case scenario to test its effectiveness on terms’ management and performance engaged in flood disaster.
3. .Investigating the proposed model in other countries can be a prolific topic of research. It can be tested and validated across various contexts, samples, and cases. Moreover, other factors that were not included in this model can be assessed. Additonally, other population and samples can be included, such as governmental organizations involved in emergency response.
4. Furthermore, the predictors of each dependent constructs of this research can be identified and analyzed in order to build a more comprehensive model of behavior based on different context.
5. TTF model is a still-evolving construct, and there are different versions of TTF-based models. In addition, it has been suggested that TTF can be extended with other related concepts to provide a more comprehensive explanation regarding the relationship among technology, task, task-technology, and the utilization of the technology. Beside can add another factor, for example, Goodhue (1995) suggested that utilization would be influenced by task-technology fit through the concepts of perceived usefulness.
6. As the design of the current study was a cross-sectional design, it recommends that investigation of the inter-relationship among the factors be performed by using a longitudinal study.
7. This research has thus served to highlight the growing need for research on how knowledge integration improvement the team’s performance in both efficiency and effectiveness via using social media.

### 6.7 Closing Note

In the developing country, Non-government organizations (NGOs) involved playing a vital role in the flood emergency response, which calls for the collaborative tasks. At certain stages, this joint force task requires collaboration between the NGOs teams, especially in the flood disaster-related management. Inadequate coordination and communication among those Multi-teams involved with the emergency response is an important matter. Weaknesses in communication inter-teams lead to objectionable outcomes. The most crucial flaw in such cases is the loss of essential knowledge for decision making which lead to lost lives. The empirical results of the current research suggested that social media utilization as an advancement of technology and emerging software innovation that brings a new wave of possibilities has a significant influence on knowledge integration, which in turn, has a positive significance on enhancing teams’ performance in the context of emergency response. Thus, utilizers of social media are advised to control their usage which provides good functions, while applying the knowledge integration strategy facilitates the appropriate decision making on time and solve problems in complex situations.

The research goal has been addressed through the design and development of a conceptual model that could decrease the problems associated with the flood disaster in Sudan. As a result, factors that influence the emergency response team’s performance were identified. The relationship between social media usage and knowledge integration based on the context of emergency response has been pointed out. While a model for the emergency response task team’s performance through knowledge integration was developed and validated. Some directions recommended for the future works have been highlighted for possible application and enhancement of the developed model.



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APPENDIX A



APPENDIX B