Inter-Agencies Knowledge Sharing Factors in Flood Management

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Abstract

Objectives: The objective of this paper is to uncover the inter-agencies knowledge sharing factors in flood management that support knowledge management activities among related agencies. **Methods/Statistical Analysis**: This paper engages content analysis technique based on three perspectives namely technological; organizational and managerial; and political and policies. Cohen's kappa inter-rater was engaged to validate data gathered from semi-structured interview sessions with 19 senior officers involved in Malaysian flood management. **Findings:** This paper discovers a total of twelve (including three new) influencing factors for inter-agencies knowledge sharing. **Application/Improvements:** The results highlight the influencing factors for inter-agencies knowledge sharing for flood management domain and provide further research direction.

Keywords: Content Analysis, Flood Management, Inter-Agencies, Knowledge Sharing, Qualitative Research

1. Introduction

Each year, Malaysia will be affected by the floods. The recent flood had caused damages estimated around RM200 million for Kelantan (the most affected state), with the total damages caused by the floods ravaging parts of peninsular Malaysia is expected to cost the federal and state governments over RM1 billion[1]. In Malaysia, the agency responsible for disaster management is the National Security Division (NSD) under the Prime Minister's Department. The NSD main task is to coordinate the activities related to the preparation for, prevention of, response to and handling of disasters, including floods under the establishment of NFDRPC. There are many public agencies involved in the Flood Management (FM) collaborative task. At certain stages it also involves the Non-Government Organizations (NGOs). This join forces task requires collaboration between the agencies especially in the disaster related management[2]. It involves collaborative decision making activities and requires high level of complexity involving different sources of knowledge distributed across time, space and people. Knowledge Sharing (KS) can occur at the interpersonal, intra-organization or inter-organization[3,4]. Many literatures on the inter-organization KS that involve public agencies indicated that KS in the inter-agencies is more complex compared to the interpersonal and intra-agencies due to the fact that each agency has its own belief, culture and working environment[5–8]. There are reports on the KS for inter-agencies but not much in the FM domain. This paper discusses on the findings gathered from the literatures on the influencing factors for inter-agencies KS. The findings then used to analyze data gathered from the interviews done at ten different public agencies and NGO offices involved in FM. It then will serve the objective of this paper which is to uncover the inter-agencies KS factors in FM that could support knowledge management activities among related agencies.

The following section will discuss on the theme previously found in the literature in the relation of inter-organization KS and FM in Malaysia. This is followed by the discussion on the methodology. Subsequently, the next section is the data analysis and results followed by the research discussion. At the end of the paper conclusion and future work are presented.

2. Theoretical Background

2.1 Inter-Organizations Knowledge Sharing

In general, KS is the act of making knowledge available to others within the organization[9]. Work in[10] argued that to be competitive and productive, KS is absolutely necessary and as such organizations with a dominant market culture should have a vibrant KS culture. It is important to investigate the KS factor for inter-organization as multi-agency partnerships have now become the norm rather than an exception in big development projects, both national and international[11]. In[12] suggested that trust, communication, information systems/technology, rewards and organization structure are positively related to KS in organizations. The fact that very little research has looked at KS in time-critical environments and FM is considered as critical[13].

This paper employs the technological, organizational and managerial; and political and policy perspective as its theoretical framework in identifying the factors of KS. These perspectives are adopted due to comprehensiveness of research literature done on inter-agencies KS factors. In their work, a thorough literature search on interpersonal, intra-organizational and inter-organizational KS from reputable and established Information Systems, Management, Public Administration and e-government journals was conducted.

2.2 Technological Perspective

The technological perspective concerns on how the use of IT is believed to help in KS activities. Researchers believe that KS activities can be considered as IT projects involving information systems construction, organizational structure change, and business process reengineering. In believe that the effectiveness and efficiency of inter-organizational collaboration through KS can be enhanced with the advancement of information technology. Apart from the technological perspectives many researchers agreed that technological challenge is less complex when compared with challenges in organizational and political aspects as more complicated issues involving organization and policy need to be solved before implementing the technologies[14–16].

2.3 Organizational and Managerial Perspective

Because of the complexity of the relationship between the organizations involved, inter-organizational KS

relationships rely heavily on trust building between them[16–22]. Hence, trust is built when there is an appropriate exercise of authority, the parties involved are cleared of their roles and responsibility, and there is respect for the autonomy given[23].

Inter-organizational trust can fall into three basic forms namely relational; calculative; and institutional[24] that is very much similar with the trust proposed In which had categorized trust as the following: 1. Calculus-based trust: The trust or needs to have the ability to assess the trustworthiness of the trustee; 2. Identity-based trust: Trustworthiness is based on long term established personal relationships with the trustee; and 3. Institution-based trust: Trustworthiness is produced on the institutional structures, organizational cultures, societal norms, and legal systems. For this content analysis, In categorization of trust will be used.

Another important factor in the organizational perspective is the leadership. Leadership is about providing vision, guidance, and resources, by the top management. This leadership will help to initiate and sustain the KS activities[25]. According to[26] leadership can be exercised through executive involvement, formal authority, and informal leadership. Due to the fact that different organizations possess different operation procedures, control mechanisms, and work flows, these can increase the complexity of KS. Thus, it creates some resistance to change from some individuals[27]. Hence, a strong and sound policy will help to reduce the resistance if it ever exists.

2.4 Political and Policy Perspective

It is utmost important for the policymakers to support the inter-organization's KS so that this will become a priority and people are aware of the implication of not having their information shared[28]. Legal and policy is important in the inter-organization KS because they help to facilitate the relationship, risk and trust related issues[29–31]. With a policy at hand, related parties will brush off any uncertainty during the KS as issues on privacy and confidentiality of the shared information are already taken care of[32]. It is also pointed that policy helps public to trust the government KS project.

2.5 Malaysia Flood Management

The NSD under the Prime Minister's Department is the agency that is responsible in handling all kind of

disasters. The NSD is bound by the NSC Directive No. 20 on "Policy and Mechanism on National Disaster and Relief Management". The Direction No. 20 was first issued on 11th May 1997 and revised on 30th March 2012. The NSC Directive No. 20 outlines the policy on disaster and relief management according to the level and complexity of disaster[33]. The NSD main task is to coordinate the activities related to the preparation for, prevention of, response to and handling of disasters under the establishment of NDMRC. In terms of floods, the NDMRC would take the form of the National Flood Disaster Relief and Preparedness Committee (NFDRPC). Among others, flood is considered as natural disaster that is under the Directive No. 20 to act upon. There are four temporal phases in disaster management cycle practiced in Malaysia FM namely preparedness (before disaster), response (during disaster), mitigation (after one disaster and before another strike) and recovery (post disaster).

Notably, of all the disasters in Malaysia, floods are most frequent and bring the greatest damage annually. Floods are therefore considered as the most severe type of disaster experienced in Malaysia[34]. According to NSC, the recent 2014 flood that hit Kelantan end of December 2014 is the worst flood in Malaysian flood history[35]. The BERNAMA news agency, in their early report has reported that the 2014 flood had affected nearly 200,000 people from six states of peninsula Malaysia[36]. This "tsunami-like disaster" has resulted into damages on properties, infrastructures, communication, and plantations[37].

In Malaysia, there are several agencies involved in the FM operations[38]. Among the agencies involve are the NSC, police, welfare department, health department, District Office, Police, NGOs, and Rescue Agencies such as the fire and rescue department. This inter-agencies collaboration is a must in ensuring their goals and objectives are achieved. Each of the disaster phase mentioned involves the management and coordination of a wide array of stakeholders: Government agencies, emergency response teams, community-based non-government organizations, and local residents[39]. Likewise, according to the NSC Directive 20, each agency can work together to carry out any items that have been set out. Collaborative partnerships is much needed to implement awareness programs and education related to disaster management, help in delivering aids in terms of logistics at the required time, channeling financial contributions and join forces in reducing the disaster's risk efforts[40]. However, with different working cultures, values and norms, together

with indifference in operation procedures and work flows, problems emerge when these multi agencies are required to work together. There is some hiccup in information flow of FM in Malaysia. The information flow from one agency to another is neither well-defined nor well-documented. They also added that the information sharing process, structure and mechanism are not transparent between agencies or from agencies to the public. Base on their analysis, this problem occurs due to the lack of communication across agencies which affect the information-sharing process.

Each of the agencies has its own roles and responsibilities, and the agencies must be able to share whatever FM data and information they own. Sharing information supports the decision-making process Therefore, it is very important for the government to improve several aspects of the FM system especially before and after the flood[41].

3. Methodology

Specifically we target agencies that involve in the response stage of the disaster management. It resulted into 19 semi-structured interviews conducted with the key personnel who are directly involved in the FM activities. They are senior officers from the NSC, welfare department, health department, rescue agencies (e.g., police, fire department), communication, local municipal and NGOs. Each of the interviews lasted between forty to ninety minutes. The interviews were all tape-recorded and transcribed. The respondents were first briefed on the research background. This is to ensure that they were well informed and will relate their answers to the inter-agencies whenever they were answering the questions. The questions asked, revolve on finding the factors for inter-agencies KS. Some example of the questions asked are "How knowledge is shared between department/agencies?" and "What motivates you and others to share knowledge?" During the interview, handwritten notes were taken along with voice-recording. These notes were also analyzed from which initial broad themes were identified.

Voice files were transcribed by the first author and main comments, while transcribing, were noted. After an initial round of interviews the data was analyzed and theory developed. The interviews questions were then amended to explore the new themes that emerged. Due to the need of anonymity of data, names of interviewees were also replaced by Respondent 1 (R1), Respondent 2 (R2) and so on based on the chronological order of interviews

conducted. Coding of the transcribed interview involved only those that most highly referring to codes such as management, technology and policy. The content of the transcribed interview is analyzed based on the three perspective discussed in the literature. By engaging the content analysis technique, identification of themes is devised. This is important due to the fact that we are dealing with qualitative data and it requires interpretation from the researchers. Furthermore this analysis views data holistically and develops clear relationships among perspectives and the themes. By using this method of data analysis, it will produce systematic, robust, rigorous and valid findings. The data interpretation was validated by an expert reviewer. In order to measure the inter-rater reliability, Cohen's kappa, an index with a value between 1 (perfect consensus between raters) and 0 (agreement is no better than chance) is employed. It is one of the more robust and relatively conservative measurement tools available and suits the content analysis method[42]. The score for the inter-rater reliability for this study is 0.89. The coder and expert reviewer then met to discuss elements that revealed any disagreements and decided on a mutually agreeable coding for each element. This exercise examined closely the linkages between the three perspectives and the twelve factors uncovered.

4. Analysis and Results

The discussion of the result is based on the three perspectives that had influence the inter-organizational KS. The content analysis helps to uncover twelve influencing factors. Three of the factors are from the technological perspectives, two from the political and policy perspective and the remaining seven factors are from the organizational and managerial perspective. Out of twelve factors, three of them are newly emerged. Table 1 shows the summary of the factors influencing KS for inter-agencies in FM domain.

Factors with the (+) sign indicate that they are influencing the KS positively. Factors with (-) sign indicate that they are the KS negatively. Factors with the * symbol indicate the newly emerged factors that were not in the list of factors identified by Yang and Maxwell. The number in the brackets represents the frequency of that particular factor reflected based on the interpretation of the excerpts.

4.1 Technological Perspective

IT capability and information security are the two factors that were identified based on the responds given. IT capability refers to IT capability at the inter-organizational level that emphasizes the technical ability to integrate shared information from heterogeneous information systems In the FM situation, knowledge among the different agencies are gathered and need to be disseminated for them to make better decision especially in the time of crisis or emergency. KS relies on the best technology. IT capability helps for fast and reliable data delivery. The respond from the fire department officer on this matter is put forward as an example of how IT capability is an influencing factor for KS:

"*Our department uses technology to ensure crucial information is delivered to the intended parties. We also got data from other agencies through this technology (GEN). Currently we do share information between agencies. For example, the current water level information provided by JPS. We can get the information from the official portal that can be accessed by others.*" (R15-8).

Technology such as ICT is very useful in making the KS a success. In this case it could help for fast communication and central repository that would flourish the KS as they know where the knowledge goes to and from where they could get the knowledge from. This is important for multiple agencies as they might be geographically scattered in physical. IT capability enables information from the ground to be able to travel fast to the upper management (the top management level i.e., the minister), this chain of information must be properly channeled and in order to make it able to do that, IT capability is required. Another respond related to this also pointed out the IT capability factor:

"*Information on what is happening will travel along the information chain up to the KP's level in 15-20 minutes using info blast (SMS digital of group of people of interest). The use of GEN - communication tools used in the operation- help in the fast and reliable information channel. This is really needed especially in crucial situation. For an example, it is important to know the current water level, and we can get the information from the official portal.*" (R2-13&14).

It is a common knowledge that when we are dealing with KS between various agencies, security and confidentiality of the information shared will be on the top list of priorities. Hence, it is critical to design a system that can handle access authorization and authentication for shared information. This also was raised by the respondents in the interview. The assurance of data shared would be discreetly disseminated is one of the influencing factors

Table 1. Inter-agencies knowledge sharing factors

Perspective	Factor (Frequency)	Description
Political and Policy	(+) Legislations and policies (17)	Legal and policy regulations can facilitate relationship building, risk reduction, and trust development in inter-organizational information sharing projects when specific guidance such as how to utilize information is proposed including the information security.
	(−) Information as power and authority (1)	This factor has negative influence to , the needs to show their skill and expertise in problem solving and handling matters at hand in the time of crisis make them want to do is to save lives, by whatever ways they could.
Technological	(+) IT capability (10)	IT capability that help the process of storing and disseminating knowledge across multiple agencies involved in FM.
	(+) Information security (3)	A system that can handle access authorization and authentication for shared information.
	*(+) Ubiquitous technology (2)	Technology that weaved into everyday life and enhancing the computer use by making many computers available throughout the physical environment, but effectively invisible to the user.
Organizational and Managerial	(+) Leadership (18)	Demonstrated by the act providing clear direction and goal setting, setting up formal authority in place, coordination and effective communication.
	(+) Negotiation & commitment development (16)	People are motivated to contribute to the collective good in organizations. By doing so, they maintain and assure their identities as coherent with their organizational identities.
	(+) Trust (8)	Trust revolves on personal relationships with the trustee (good rapport); and institution-based trust which includes clear procedures and roles and responsibilities of involved agencies.
	(+) Incentives and reward (5)	Compensation given to those who are willing to share their information and knowledge with other agencies.
	(−) Lack of experience (1)	Without much experience one would not fully embrace and understand the importance of KS. This factor has negative influence.
	*(+) Centralized repository (8)	A facility that helps common access, keeping and sharing of information that enable centralized accessibility. It could be manual and automated repository.
	*(+) Benevolence (4)	An act of intending or showing goodwill and kindness and care or consideration for other people's safety.

(+) indicates factor influencing positively
(−) indicates factor influencing negatively

for them to share their knowledge and IT could help to ensure safe data transfer. They would feel at ease to share their knowledge when they know that their knowledge is safely guarded. This aspect of technology is much needed in KS as shared by these two statements made by the respondents:

"*In order for us to share the knowledge, security and access level especially for sensitive information is needed.*" (R1-11).

"*There is no issue of leaking of information in knowledge sharing activities performed between agencies. Depending on how sensitive the data is, all necessary information must be shared. This is to help all parties to achieve their goals and objectives.*" (R10 -7).

The analysis also uncovered one new factor from this perspective, which is the ubiquitous technology. Current users are so used to the technology and gadgets. Smartphones, tablets, laptops are among the devices normally used when ubiquitous technology is discussed[43]. Ubiquitous technology is defined as the technology that weaved into the fabric of everyday life. It is the method of enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user[44]. This technology is equipped with sensors and actuators, thus allowing them to interact with the living environment. In addition to that, the availability of communication functions enables data exchange within environment and devices[45].

Thus, having ubiquitous technology helps the KS activities of FM domain especially when the agencies involved are away from their office and need to be at the location of the operation. Below are the examples of the respond associated with the ubiquitous technology:

"*Currently when there is a flood alert, we will be notified by the authority through our mobile phone. It is so easy because we can get it wherever we are at. It would be very helpful if we could use the same device for all purpose of communication and knowledge sharing.*" (R2-16).

"*The flood alert is (send) through our mobile phones. A special phone is provided to certain officers for ease of communication. ...*" (R15-10).

4.2 Political and Policy Perspective

This perspective covers the relationship, risk and trust related issues particularly one that involves uncertainty during the KS. This perspective also helps public to trust the government KS project through their policies. Two outstanding factors based on were identified from the interviews, being legislations and policies; and information as power and authority.

The legislations and policies factor covers the roles and responsibilities of the agencies involved in the FM activities (in all three level of disaster); the working procedures or work flow; and the information security and privacy aspect of the information. As mentioned in the technological perspective, the information security is also a factor for KS. However, that can only be implemented when a sound policy in place. The legislations and policies factor is very much needed for a solid foundation that will enforce the confidentiality and privacy of information. Working with multiple agencies would also require some certain working procedures. These agencies have different working cultures and values. They are also having their own operation and different control mechanisms. Thus, in order for these agencies to be able to work together, a standard working procedures need to be devised. The results from the interviews reveal that the legislations and policies is indeed a factor for KS as 17 of the respondents had mentioned about this factor. Below are some of the excerpts captured:

"*In order for us to share the knowledge, security and access level especially for sensitive information is needed. We channel the information through our network. The network is open for public, however with a strict access of information.*" (R1-14).

"*There is an operating procedure put in place to ensure the respective agencies co-operate with each other.*" (R2-6).

"*When the committee with that certain job scope and responsibility was established, trust is no longer an issue in knowledge sharing. Any classified information will not be exposed. It will only use for internal discussion.*" (R3-8).

The above statements made by the agencies show that the agencies are able to share their knowledge by establishing the legislations and policies. These policies will guide them to perform their job better and with no worries of leaking any sensitive information as clear guidelines are in place. Setting the roles and responsibilities for each agencies involved is also needed. This is especially true when we are working with agencies that come from different working culture and background. In order for them to be able to deliver their best service, roles and responsibilities for each agency must be set forth on top of a standard working procedure that will make their working process smoother.

Another factor identified is the information as power and authority factor. It was reported that this factor influences KS negatively. However, based on the interviews, the respondents have positive views on this factor. They deemed that they exercise KS activities at their agencies to show their power and authority, instead of being afraid of losing one. This is reflected by the statements made by them:

"*It is good to share the knowledge with other departments as it will then benefit others. Knowledge sharing is not a threat for one's career advancement. It helps to build a skill set that later can be utilized by others. No one should be afraid of losing their niche by sharing their knowledge with others.*" (R6-4).

"*We work closely with the District Health Department and KKM in compiling and sharing the information needed for us to make plan and later on execute our plan if flood occurs.*" (R19-4).

Their willingness to share knowledge with others is moved by the idea of the needs to show their skill and expertise in problem solving and handling matters at hand in the time of crisis. For example, R6-4 is the comment from respondent that works with the fire department. It makes a lot of sense that the power and authority is a factor for them at the fire department, to share their knowledge because all they want to do is to save lives, by whatever ways they could. And as they put it, if they share their knowledge, others could get the benefits from it.

4.3 Organizational and Managerial Perspective

Most of the identified factors are from this perspective. The seven factors are leadership; negotiation and

commitment development; trust; centralized repository; benevolence; incentive and rewards; and lack of experience.

The leadership can be exercised in the form of executive involvement, formal authority and informal leadership. Leadership helps inter-agencies that come from diverse background, operation procedures, values and cultures to be able to work together in more coordinated way. Leadership can be used as force to promote cross-boundary coordination between agencies[46]. Coordination between these agencies is among the main concern addressed by many respondents. According to[47], the inter-agency coordination helps to maximize the purported strengths of shared regulatory space by preserving "functional" aspects of overlap and fragmentation, while minimizing its dysfunctions in terms of compromised efficiency, effectiveness, and accountability. Thus it is important for these agencies to be coordinated. The following remarks made by the respondents show how this factor has influenced their KS activities:

"When there is a join-operation, a committee will be set-up. The steering committee will coordinate the whole operation. The KSU (top management) will appoint the respective people as the committee members and they are given mandate to ensure the knowledge sharing is done." (R3-7).

"Somebody has to take care of the pool of information - as point of reference, so that everybody related to the operation knows who to contact and can take immediate action and act based on the information." (R12-5).

Based on the interviews coordination is identified as one of the elements that had contributed in the leadership factor. Well organized committee is appointed to execute the KS related activities. Coordination is also needed in order for the tasks to be full filled. Central repository for information sharing is needed and this also requires coordination as to who would gather, verify and disseminate the knowledge. Based on the excerpts, it is also learnt that schedule meetings and / or discussions are required as medium for KS. It shows that they have a centralized, scheduled and coordinated avenue in making the KS session possible. An appointed unit/person must be responsible for making sure all data are pooled and disseminated accordingly when needed. It has to be properly managed. All of the above descriptions points to coordination which lead to leadership as a factor for KS for inter-agencies in the FM domain. Good leadership would also facilitate participant interactions.

Effective communication among the participant agencies is really important in order for the smooth of operation. In[48] also opined that an effective leader or manager needs to be able to communicate well. This is especially true in the collaborative works that involving many parties, as communication is an important aspect for knowledge donation and collection in KS[49,50]. Other than coordination and effective communication, leadership could also be reflected by any directions given by the top management through formal authority. This is engaged through agreement building among participating agencies, creating an environment to develop appropriate and effective strategies, and helping key actors to be involved. The element of formal authority can clearly be seen from the following examples:

"Normally, there is no problem for them to share information or knowledge. As long as instruction was given (to them by their bosses) they will share with no question asked." (R3-1).

"Mesyuarat Tindakan Negeri is held twice a year as an avenue used for information gathering and disseminating. In the same meeting, members are also briefed on each roles and responsibilities. It (meeting) will coordinate the information given by each agency so that it will be shared among them." (R4-5).

In order for the organizations to work together, they need to know the goal of KS in managing the flood. When the goal is set, it is important for them to work in orderly manner. Working committee must be established to carry out the tasks and person in-charge must be appointed. This is also important for each organization to really understand of their roles and responsibilities. This is made possible when a procedure and guidelines are in place.

The next factor uncovered is the negotiation and commitment development. This factor emphasizes on the force of doing "greater good" in order to achieve the agencies' goals. According to[51] a person is motivated to contribute to the collective work effort of the organization he or she belongs to. He further explained that a person does that to discharge his/her moral obligations, or because through such contribution he/she can express and affirm a cherished identity. In a simpler word, a person is moved to share their knowledge because it is useful, because it feels right, or because it is "feels right". This also fits with the theory of social identity. Social identity is defined as part of the individual self-concept which derives from their knowledge of their membership of a social group (or groups) together with the value and

emotional significance attached with that membership[52]. Thus the higher level of identification, will give more effective KS. In the case of FM, the spirit of doing good deeds to save lives is so great. Their only goal is to save lives. They truly believe that their actions are needed and when they shared their knowledge, they are doing greater good for their organizations. Their strong social identification towards the organizations' goals is very high. They would do whatever it takes to do achieve that. This has made them share their knowledge almost willingly. This is known as group identification[53]. People who strongly identify with their team will share more knowledge for the benefit of the whole group. Some of the samples from the interviews are reflected below:

"*It is good to share the knowledge among departments as it will then benefit others. Knowledge sharing is not a threat for one's career advancement. It helps to build a skill set that later can be utilized by others…*" (R6-3).

"*The nature of work of the department promotes the knowledge sharing, especially in the rescue operation.*" (R2-2).

When discussing inter-agencies collaborative work, trust is always among important factor discussed. As discussed in the above literature, trust plays a major role in inter-organizational relationship. Based on the literature we identified that most of the trust reflected by the interviews are related with the identity-based trust and institution-based trust. Some of the respondents agree that having good relationship and emotional engagement with the other party would help build trust (R1-8 and R13-3). The other type of trust is gained through the institutional whereby in this case trust is built when there is responsible body appointed (the NSC) and clear instructions and sets of roles and responsibilities crafted (NSC Directive No. 20) to regulate the agencies collaboration work. The following samples support the above argumentation:

"*Even though there is a documented instruction for knowledge sharing, good rapport among respective officers is also important. Sometimes it is necessary to have a coffee break with them after a meeting. When they 'know' us it is easier to work with them.*"(R1-8).

"*Sometime the agencies responsible for the certain task did not trust us (NGO) in delivering certain tasks, if they have not worked together before. If that we have been working with them before and the agencies are satisfied with us then it will be easier for them to work together.*" (R13-3)

Many researchers deemed incentives and rewards as influencing factor for KS. The reward here is also referred to *the good deed is repaid by good deed* as in reciprocity[54]. Researchers believe that reciprocity help to build stable relationships and gain partners' commitment[55,56]. Reciprocity can supply essential circumstances to permit knowledge workers to work together freely and share their know-how and expertise in their ego-centered knowledge networks. Some of the comments from the respondents on the factor are presented:

"*It is a win-win situation (for knowledge sharing to take place). Every department is willing to share information among each other provided that it will benefit them mutually.*" (R16-2).

"*Our staffs are equipped with necessary skill and expertise, we will send them for trainings and when they get back, they must share this knowledge with others so that we could enhance our strength. We have some reward scheme for that.*" (R18-9).

All of the factors discussed above are factors that influence KS positively. There is also one factor that has negative influence on KS. Lack of experience would cause a relatively new and inexperience staff hesitates to share his/her knowledge. This is because of their little or no experience in information sharing led them to lack the understanding of benefits that can accrue from cross-boundary information sharing. Respond from respondent R18 is presented:

"*There are some misunderstanding by new recruits whereby they think in the SAR operation it depends on solo action (want to be hero). This kind of attitude will not help, and we do not encourage this because it will only jeopardize their life and the mission.*" (R18-11).

Apart from the five factors identified by, there are another two new influencing factors identified from the interviews. These two factors are centralized repository and benevolence.

A centralized information repository is required to support accessibility, adding, sharing and retrieving of information resources especially when collaboration between agencies that handle crisis[57]. When working with multi agencies, it is important to have a pool of expertise information of each agency involved. They need to have a central repository for them to look up on the expert directory especially in the time of needed and emergency. According to[58] a centralized or shared repository will help the explicit KS even better especially with the help of IT capability. This central repository does not only refer to digital form of repository. It is more towards a mechanism of keeping a centralized repository. That is why this factor

is grouped under the organizational and managerial perspective. There is a need for a centralized mechanism that could provide for centralized data keeping and access. It is important for organizations to provide effective and timely access to corporate knowledge at all levels so that efficiencies and competitive advantages are realized[59]. With help from leadership and legislation and policies, centralized repository could be the factor for KS. The followings are the excerpts from the interviews that reflect on the centralized repository:

"*One dedicated unit is needed to collect all information in one place so others can share and access the information immediately whenever needed.* " (R4-4).

"*It is very important to have uninterrupted and quick access of a common place where we keep all data, if there is delay or interruption on the knowledge delivery (sharing) this might cause problem in the SAR operation.*" (R15-6).

Benevolence is the love of others – a belief in the commitment to a greater good and dedication of one's professional life to that end[60]. In the public service and disaster management context, it is about care or consideration for other people's safety and caring about other people generally[61]. In[62] categorized benevolence as part of the dimension in trust besides integrity and ability. In this research however benevolence is described as an act of intending or showing goodwill and kindness and care or consideration for other people's safety. Benevolence is different from negotiation and commitment factor whereby negotiation and commitments are related with serving the agencies' aspiration which is bound to their operation procedures in managing the disaster. They do that to associate themselves with their agencies. Benevolence on the other hand is more on the individual drives on doing good deeds. This feeling is not associated with what their agencies' objectives are. The following excerpts indicated the benevolence factor:

"*Knowledge that I poses must be shared with others. Other people that work with me must also know what I know. This will help us to achieve our target and objectives.*"(R8-1).

"*In our line of duty, KS is critical so that everybody is equipped with the latest and correct knowledge when handling life threatening situation (i.e. accident, fire and flood). They know if they do not share knowledge some important thing might not be done and they do not want that to happen, because we are rescuer, it is in our blood to do good things towards others.*"(R16-2)

5. Discussion

The technological perspective according concerns on how the use of ICT helps in KS activities. This technological perspective is mainly focus on the ICT aspect of technology, we believe that this technological support is needed in KS activities that should covers the communication and information technology. The technology used should support the ease of, capturing, storing and disseminating the information from various agencies before the disaster and to be utilized later during the disaster. The interviews reveal that this is indeed a factor in FM domain. They believe that technology plays an important role in making sure the KS process to be exercised accordingly. This is supported by many statements made by the respondents. They mentioned about how satellite technology, social network and use of telecommunication technology is important to enable KS. Not to forget email and knowledge portal that are also used for sharing notes, teaching materials and when communicating with clients and co-workers. Apparently the ubiquitous technology is also a factor for KS.

On the other hand, the interviews shows that organizational and managerial perspective is mainly concerns on the coordination and formal set up of the operations with clear goals and directions that would encourage KS. The analysis also shows that leadership helps to initiate and sustain the KS activities. Strong support and direction form the top management of each agency has made the leadership an influencing factor for KS. The management has set the avenue for inter-agencies collaboration. This is done through meetings and establishment of working committees especially when dealing with in examples of many formal meetings and working committee setup by the NFDRPC as a result of NSC Directive No. 20. The meeting has specific meeting attendees which will be led by the NSC representative to coordinate the multi agencies involved. This reflects on both coordination and formal authority on the leadership factor. Coordination is about how activities can be coordinated and how actors can work together harmoniously[63]. Managing the shared resources (in this study the establish committee and assign person in-charge) managing producer/consumer relationship (those who produce knowledge and use the knowledge), managing simultaneity constraints (such as meeting scheduling) and managing tasks and sub tasks relationship are categorized as coordination process[64]. Goal decomposition, as an element in leadership is

also required to help the people involved in KS to further understand their objectives. When they know what their objectives are, automatically they are aware of what information that needed and what their level of secrecy. Procedures and guidelines also help them in achieving their goals.

Negotiation and commitment development involves strong social identification. Social identity is the perception of oneness with or belongingness to a group, involving direct or vicarious experience of its successes and failures[65]. Social identification leads to activities that are congruent with the identity, support for institutions that embody the identity, stereotypical perceptions of self and others, and outcomes that traditionally are associated with group formation, and it reinforces the antecedents of identification.

Based on the interviews done, the reciprocity concept is included in the incentive and rewards. As opined compensation is given to those who are willing to share their information and knowledge with other agencies and not just in monetary but return favor. In the FM agencies case is the exchange of knowledge that will smooth their operation and decision making process. The top management has incorporated some reward system into the appraisal system to encourage KS. This shows strong support and leadership from the management as well.

KS between the organizations must be supported by up-to-date technology but the technology used must be reliable and can be accessed by the users whenever they need them. Having said that, not all information can be shared, security of data must be considered. Workings with various organizations sometimes require them to look at others' website for information. This is time consuming thus a single point of access is required. In critical and emergency situation, push technology is really needed to notify the respective people. Alerts must be published to only the registered users. However, in the case of FM, we believe that the information security factor must not focus solely on the technological perspective. In the discussion we explain how information security is also an important element for the political and policies.

Working with people from different agencies requires trust. As mentioned earlier, trust is built when there is an appropriate exercise of authority, the parties involved are cleared of their roles and responsibility and respect of the autonomy given. In the FM case, good rapport is deemed to be the major influence in trust. Trust is gained through good relationships between the staff of different

organizations. More than often when the trust issues were brought up by the respondents, they will be referring to the good rapport the have with their brother agencies. In addition, having the policies and procedures in hand on how to handle the flood has also contributed in trust building. The NSC Directive No. 20 has helped in instilling trust among the agencies that had made them to share their knowledge willingly.

The findings of this paper also show that while the factors outlined by relevant, there are new factors that emerged being the ubiquitous technology, centralized repository and benevolence. The technology employed for the KS activities in FM must be ubiquitous. For an instance, an alarm system must be embedded into the information systems as to highlight and address urgent matter, the system must be mobile and uninterrupted as it should be accessible 24/7, along with the state of the art information system there should be a hardware that ubiquitous enough for the agencies to have so that they will feel at ease when using it (for example the smartphone). In the FM domain the centralized repository refers to a facility that helps common access, keeping and sharing of information that enable centralized accessibility. It could be manual or automated. Appointing a responsible unit or department as the head for working committee is an example of centralized repository. All related knowledge must be kept at one designated place which made accessible by others. An addition, technology is used to make the centralized repository automated. The second newly uncovered factor is benevolence. In the FM domain, benevolence helps in KS as they take pride in their intention of showing goodwill and kindness and care or consideration for other people's safety. Benevolence makes them to push their ego away and share their knowledge almost naturally.

6. Conclusion

This paper studies factor influencing KS, which can be categorized into three perspective namely organizational and managerial, technological, and political and policies. Twelve factors influencing the inter-agencies in FM domain were identified. Nine factors are similar with what were suggested by previous researchers as discussed in the literature namely legislations and policies; information as power and authority; IT capability; information security; leadership; negotiation and commitment development; trust; lack of experience; and incentives and reward. Three

new factors from the organizational and managerial, and technological perspective are discovered namely centralized repository, benevolence and ubiquitous technology. It also identified leadership as the most important factor for KS (based on the frequency), followed by legislation and policies; negotiation and commitment development; and trust. ICT is another influential factor as it supports for fast communication via ubiquitous technology.

As stated earlier, we only focused on the KS between agencies (inter-agencies) in the FM domain. We did not compare it with domains other than FM. Thus, the primary limitation of this study is the issue of external validity, whether we can generalize these results with other inter-agencies KS activities in Malaysia. Generalizing the findings of this study to other inter-agencies scenario requires careful consideration. In view of that limitation, it is acknowledged that different domain may have different KS factors that influence their KS activities. However, despite this limitation, the results of this study provide insightful implications for future work.

These factors are important to be identified because they help us to understand what make inter-agencies willing to share their knowledge. Their knowledge is crucial because it enables the team to act when disaster occurs. These are the factors should be considered for when FM agencies are collaborating at the pre-disaster, during and post disaster stage. At the pre-disaster stage these factors are relevant when conducting knowledge audit among agencies. These agencies are required to assess their knowledge asset, and they can do that effectively; via KS. Thus, the above KS factors play major roles for knowledge audit as these agencies could only successfully assess their knowledge asset they have, the knowledge needed from other agencies, and needed by other agencies through KS among inter-agencies. Hence, these factors will definitely better improve inter-agencies collaboration in FM. This finding helps the researcher to understand the factors for inter-agencies KS in the context of the FM. We believe that the factors identified could be related to our next investigation in inter-agencies knowledge audit management as the knowledge audit process is involving the KS among inter-agencies.

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