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A REVIEW ON AGILE DECISION MAKING IN CRISIS MANAGEMENT

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ABSTRACT: *Agility in decision making has a potential to resolve crisis management; therefore a specific agile decision making technique should be implemented in crisis management. Crisis management requires the agility in decision making in order to resolve the crisis. The decision made has to be flexible enough so that the solution can be delivered on time. In having the decision, there are people that will contribute some suggestion, opinion, experience or knowledge. The virtual knowledge sharing is the vital part on delivering the agile decision making. This paper reviews such methods on agile decision making towards crisis management and the relation with virtual knowledge sharing.*

KEYWORDS: Agile decision making, virtual knowledge sharing, crisis management

1.0 INTRODUCTION

Crisis management is the process which an organization handles a situation that can cause harm to the organization, stakeholder or general public. Venette mentioned that crisis is a process of transformation where the old system can no longer be maintained [1,6-8]]. The main goal of crisis management is to be well prepared for crisis, ensure a rapid and adequate response to the crisis, maintaining clear lines of reporting and communication in the event of crisis and agreeing rules for crisis termination [2-5,9]. In this case, crisis management requires agile process of decision making. In the scenario of crisis, decision has to be made quickly and it is important to come up with the correct solution to resolve the arising matters.

With the trend today, IT infrastructure has made crisis management very handy and accessing knowledge for the crisis is much easier where many people can contribute information on the domain of interest. Somehow, we have been much relied on the virtual communities for supports in form of knowledge and experience. In this case, agile decision making (ADM) which based on virtual knowledge sharing (VKS) is very important in the context of crisis management, a context that is more flexible, sprint and reliable compared to the traditional way of handling crisis where it is mainly depend on documentation which is time consuming.

While there are many decision making theories and framework in existence such as rational decision making, collective decision making, collaborative decision making and normative decision theory, we adopt ADM as the theoretical approach for this study because ADM focuses on providing a means of understanding of how adjustment of implicit and tacit forms of knowledge, specifically making decisions during a crisis, are able to aid in providing operational continuity and subsequent critical infrastructure recovery based on the VKS. However, little has known regarding VKS in supporting crisis management.

Considering that the traditional forms of brick and mortar has been the common platform for the adoption of ADM in crisis management, the author aims to propose an alternative platform for the adoption of ADM in crisis management, namely the virtual knowledge sharing platform (VKS). It is argued that the fluidity of information regardless of its restrictions in time and space offers an efficient and effective environment to use ADM in crisis management. Hence, this paper presents the current practice of ADM in crisis management and the increased recognition on the use of VKS as an alternative platform for the use of ADM in crisis management. A discussion of how the concepts of ADM functions in VKS will be presented as well. Furthermore, future development and contributions to the field of crisis management will be discussed too.

2.0 LITERATURE REVIEW

Agile methodology proposes alternatives or substitution to traditional project management. It is commonly seen in a software development to predict the unpredictability. However, work related to agile and decision making is very limited. One of the related works was conducted by Nancy et al. that focuses particularly on IT infrastructure. They explained how it contributes to enterprise sensing and response agility and described the agility on agile IT infrastructure, human IT infrastructure and technical IT infrastructure [10-13]. However, this work does not show the contribution on the knowledge transfer to overcome a situation.

Another work that highlights knowledge transfer was documented in [14]. Knowledge transfer explained the process of participation on knowledge communities by using IT infrastructure. Unfortunately, the work did not describe the relation between ADM and IT infrastructure on the mechanism of virtual knowledge. Furthermore, IT infrastructure flexibility is defined by Duncan as the ability of the IS department to respond quickly and cost-effectively to system demands that evolves with changes in business practises or strategies [14]. This work explored various efforts to define or describe infrastructure flexibility in the literature. It identified the basic components of IT infrastructure and the previously proposed characteristics of flexibility. The discussion considered the concepts of IT resource management, including technological architecture, alignment of planning, and human resource skills, all of which have also been linked to definitions of infrastructure flexibility. It also explored how the concept of infrastructure

flexibility is viewed among IT executives. Nonetheless, this work is specifically on resource management on agility in IT infrastructure.

In comparison to the traditional methodologies, agile methodologies deal with unpredictability by relying on people and their creativity rather than on the process [15]. This work focused on the people aspect in agile software development. However, ,there was not much discussion on how people can contribute towards virtual knowledge and ADM. Agile methodologies favour a leadership and collaborative style of management where the project manager's role is that of a facilitator or coordinator [16]. The work presented here is related to organisational management. Ramete's research work focuses on a research project dealing with an agile mediation information support system in a specific transport crisis context [17]. Ramete further highlighted that the existence of several actors that have to work together in order to resolve or reduce a crisis situation. Moreover, the author proposes a method to provide an agile decision system for crisis management and described the use case to illustrate the research work. Somehow, this work did not synchronise the ADM with the crisis and explained how the information or knowledge is important to resolve the crisis.

Meanwhile, Yates emphasised that knowledge management systems that will be useful in a disaster response must be flexible enough to handle unexpected situations yet robust enough to be reliable in degraded or complex environments [18]. Yates further mentioned that social media is emerging as an important technology for disaster response. Social media consists of tools that enable open online exchange of information through conversation and interaction. Unlike the traditional Internet and communication technologies, social media manage the content of the conversation or interaction as an information artefact in the online environment. Yates focused more on the role of social media which is much related to the virtual community and the information relayed are more on to the VKS. Although Yates has demonstrated the importance of social media, there is a need to see the category of social media and what platform can be used to overcome disaster management.

Apart from that, Quan Zhou claimed that decision making trial and evaluation laboratory (DEMATEL) is an effective method which collects group knowledge, analyses the inter-relationships among system factors and visualises this structure by cause-effect relationship diagram [19]. Quan Zhou proposed the fuzzy DEMATEL method to identify the critical success factors of emergency management. He further classified and analysed these critical success factors according to the structural relationship in order to improve the emergency management systematically. His work applies the critical success factor theory where the precise calculation and result need to be obtained in order to see the impact of the crisis or emergency. It identified the influencing factors in promoting the effectiveness and efficiency of emergency management. In order to have such factors, there is a need to have the contribution from the virtual communities which is not mentioned here. Factors contributed could be bias in terms of the background of the communities. Additionally, Van Veelen et al discussed that agile crisis response organisations can be seen as actor-agents communities, where artificial coordination strategies are applied to manage activities. They provided classification of artificial coordination strategies and specified them using Rasmussen's three level model for supervisory control, which are skill, rule and knowledge based [20]. It is interesting that the work recognises the role of agent or actor in contributing toward knowledge. Agent, in this context refers to the communities. On the other hand, this work does not seem to relate the ADM to the actors or agents.

In Faculty, the edge of organisations and agility are a potential mean to operationalise components that embed high reliable traits in the management and oversight of critical infrastructure systems [21]. The study was based on aviation infrastructure and agility theory was claimed to be a potential means of enhancing the way airport systems change modes of operations in a more efficient manner as a means of enhancing crisis management and decision making. This work has some similarities to the work of Van Veelen.

Diaz focused on the collaborative knowledge sharing where usability can be improved by supporting knowledge divergence occurrences. The approach recognises divergence occurrence as a natural source of new knowledge in knowledge sharing communities [22]. Andrienko described an ongoing research on developing methods for effective visualization support for situation analysis, decision making and communication in the course of disaster management [23]. Both works explained the importance of knowledge sharing communities and collaborative knowledge sharing can be visualised based on the information provided to a particular crisis. It is clear that there are needs to categorise the contribution and the source of knowledge because these practices are time consuming and do not reflect the ADM. The goals of the work are to reduce the information load of the analyst, decision maker or information recipient without omitting anything important and to ensure quick and accurate comprehension of the information.

All in all, most of the works discussed the importance of knowledge sharing and very limited works mentioned how knowledge could be capitalised in certain situation. Although they indicate the possible role of individual and steps to resolve crisis management, the relation between ADM in crisis management is not critical enough to portray how VKS could be part of the main contribution.

4.0 DISCUSSION

The selected work is summarised in Table 1 to analyse the practice of ADM in crisis management, Based on Table 1, the analysis focuses on the six aspects, namely the context, decision making style, technology used, position, methods used and application of virtual knowledge sharing. Based on the analysis with these work, it is found that ADM is adopted mainly

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Table 1: Adoptions And Features In Agile Decision Making

	ADOPTIONS AND FEATURES IN AGILE DECISION MAKING										
	CONTEXT		DECISION MAKING STYLE		TECHNOLOGY USED		POSITION		PROPOSED METHOD	VIRTUAL KNOWLEDGE	
AUTHORS	Organization	Non-Organizational	Virtual Data	Physical Data	IT Infrastructure	Non-IT Infrastructure	Hierarchical	Non-Hierarchical		Applied	Not Applied
Ramete et al. 2012		Public transport crisis	Use Case: Cartography process	Input	Use case diagram	No	No	Yes	Agile mediation information decision support system		√
Faculty, H,		Airlines crisis	Nil	Partially	Nil	Partially	Yes	No	Agile Theory, Distributive information, collective sensemaking, distributive power-base, dynamic task allocation, shared understanding of command intent		√
Aydin et al. 2004	IT department in Financial institute		Nil	Yes	No	Yes	Yes	No	Dynamic systems development method		√
Wang et al., 2007			Nil	Yes	Partially	Nil	Nil	Nil	Agile knowledge supply chain, emergency decision support system	√	
Horita et al., 2013	Yes		Partially	Nil	Yes	Nil	Yes	No	VGI & SDSS	√	
Andrienko & Andrienko, 2006	Yes	No	Partially	Partially	Yes	No	Nil	Nil	Geographical visualization		√
Yates & Paquette, 2011	Yes	No	Yes	Partially	Nil	Nil	Yes	No	Social media knowledge sharing	√	
Zhou et al. 2011	Yes	No	No	No	No	No	No	NO	Critical Success factors, fuzzy logic		√
Veelen & All, 2006	Yes	No	Nil	Nil	Partially	Nil	Yes	No	Actor-agents communities		√

within a structured organisation and it is not a common decision making among non-structured organisation. Figure 1 emphasis the relation between VKS and ADM in resolving crisis.

Nowadays, the trend of relying on IT infrastructure has become the norm of the daily routine and can be called as the digital lifestyle. The infrastructures provide mass information, knowledge, experience and communication to enable decision or choice to be made. Furthermore, knowledge can be obtained even faster and decision can be made by this IT infrastructure. It is important to note that the platform of knowledge sharing relies very much on the IT infrastructure. With social media, Internet and all kind of application available, knowledge is now be retrieve and shared virtually with meeting face-to-face. However, as shown in Table 1, virtual data is not considered as a primary source of information and the use of IT infrastructure is not significant in the adoption of agile decision making in crisis management. Hence, due to the features of the VKS the usage of VKS as a platform can facilitate efficient, fast and effective decision making in crisis management.

Clearly, what most important before, during and after a crisis is the ability to make reliable decision. In crisis management, virtual knowledge will be contributed by the virtual communities. In the domain of interest, this community will contribute solutions and recommendations for the crisis issues. The authorities whom manage the crisis will have sufficient ideas to resolve the crisis. Virtual knowledge travel fast and flexible to adapt any changes of the decision to be made which is the ADM. Nevertheless, decision also can be made accordingly with the appropriate resources. Allocation of resources will be much easier because only the required resources will be placed at the crisis scene. This is all knowledge, knowledge that could assist in crisis management efficiently. Apart from that, decision making also need to be flexible and fast in crisis management. Slow and insufficient information or knowledge will demotivate in resolving crisis either in organisation or non-organisation. Therefore, the role of VKS is important in ADM during crisis management.

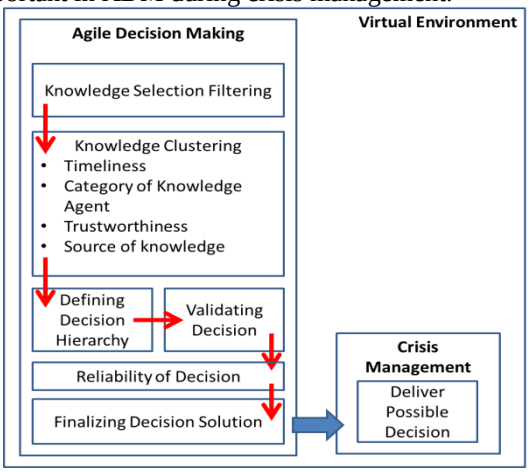

Figure 1: ADM in Crisis Management

5.0 CONCLUSION AND FUTURE WORK

It has become our daily routine relying on technology to obtain information, knowledge and thus making decision. Resolving crisis require reliable, flexible and fast decision making. ADM requires the IT platform to improve the knowledge sharing. However, the current practice of agile decision making in crisis management does not utilise the strengths of the virtual knowledge sharing platform. This paper provides justification for the use of VKS as a platform to perform agile decision making in crisis management. In this respect, there is a need to conduct a study to understand how the VKS could contribute towards crisis management and furthermore to allow ADM to take place. It is important to understand the benefits of ADM together with the technology in hand in order to improve crisis management through knowledge sharing and more importantly in VKS. In ADM, it is crucial to understand the category of agility to be made.

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a et al., 2013	Yes		Partially	Nil	Yes	Nil	Yes	No	VGI & SDSS	√
enko & Andrienko, 2006	Yes	No	Partially	Partially	Yes	No	Nil	Nil	Geographical visualization	
& Paquette, 2011	Yes	No	Yes	Partially	Nil	Nil	Yes	No	Social media knowledge sharing	√
et al. 2011	Yes	No	No	No	No	No	No	NO	Critical Success factors, fuzzy logic	
n & All, 2006	Yes	No	Nil	Nil	Partially	Nil	Yes	No	Actor-agents communities	