

## Information Technology Disaster Recovery Process Improvement: Emerging Protection Motivation Theory in IS/IT

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**Abstract:** Protection Motivation Theory (PMT) is one of the well-known theory in research sphere of health psychology. An analysis was conducted to discover the top ten journals in Scopus which is using PMT. The 7 out of 10 journals are related to health psychology, however, interestingly there were 2 IS/IT journals applied PMT theory in the research (Computer in Human Behavior and MIS Quarterly). IT and IS with PMT seems be part of the top ten ranking in Scopus. This is also supported by Scopus data that PMT was started to be applied in IS domain, since, year 2008 and total of 23 papers were published until 2016. This clearly indicates that PMT is one of the appealing theory and actively being used in IS research. Hence, in this study, researcher outlined the emerged of PMT in IS/IT domain and intended to investigate on critical success factors to improvised Disaster Recovery (DR) process in IT organization.

**Key words:** Information technology, disaster recovery, protection motivation theory, Scopus, domain, published

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### INTRODUCTION

As a process-oriented the Disaster Recovery (DR) should constantly improve the Disaster Recovery Plan (DRP) to ensure IT infrastructure assets can be restored from a disaster and some researchers stated as a knee-jerk and main focus is only on restoration of infrastructure assets (Elliott *et al.*, 2010; Herbane *et al.*, 2004). The DRP process defined a chain of policies which will facilitate the continuation or restoration of business critical applications or infrastructure at satisfactory service level during a disaster. DR activities require accurate information and preserve valuable knowledge in order to safeguard IT components. Lesson learned and best practices entries are changes in processes made throughout the organization that have led to improved processes (O' Leary, 1998, 1999, 2002; Alavi and Leidner, 2001).

In this study, the selected client is one of the many other IT Multi National Companies (MNC) in Malaysia. During the preliminary interview, researcher understood that the DR information in client's organization are being stored in various repositories. Scattered and inconsistent information will lead DR activities to failure due to unavailability of central repository. Mohanty *et al.* (2006) indicate that knowledge on disaster management approaches are materialize to be fragmented and emphasized an apparent gap in information harmonization which is true in the case of client organization. Innovative stakeholders will be extraordinary because they will be

able to learn from lessons and put into practice in the future disaster activities this is an additional role criteria for a stakeholder (Lin Moe *et al.*, 2007; Pathirage *et al.*, 2012, 2015).

In the client organization, lesson learned database or document to capture all lesson learned from each DR test appears to be absent. However, the information are being captured in post-test report separately after each DR test. Two pain points were observed during the preliminary interview with DR team, first is some of the lesson learned could not be remembered during post-test report write-up and second is the quick reference on all best practices are not obtainable from one centralized document or database. Hence, this study takes the opportunity to improvise the DR process by integrating motivation factors into DR activities which will benefit the IT organization.

**The aim of research:** This research adopts Protection Motivation Theory (PMT) from health psychology into Information Systems (IS) research by investigating on critical success factors to follow the improvised Disaster Recovery (DR) process.

### MATERIALS AND METHODS

**Protection Motivation Theory (PMT):** Mainstream IS theories will indeed play an important role for perceptive expectation to improve DR process for IT organizations on the other hand, the IS field may gain advantage by

Table 1: Maddux and Rogers (1983) protection motivation theory dimensions

Dimensions	Descriptions	Sources
Severity	Perceived severity during threatened event	Rogers (1975) Maddux and Rogers 1983
Vulnerability	Perceived probability of occurrence of a threatened event	Rogers (1975) Maddux and Rogers (1983)
Self-efficacy	Confidence in an individual ability to cope with threat and perform threat reducing behaviors	Bandura (2008) Rogers (1975) Maddux and Rogers (1983)
Response efficacy	Ability of the response to reduce the threat	Rogers (1975) Maddux and Rogers (1983)

studying theories from different fields too. PMT is a well-known expressive theories where by the intent of an individual to employ in protective activities will be observed (Anderson and Agarwal, 2010). Based on this PMT theory it will be realized in stipulations of the “intentions” of an individual to carry out a suggested preventive actions (Maddux and Rogers, 1983; Milne *et al.*, 2002).

With respect to DR in IT organization it is not out of the ordinary that the IT engineers with elevated IS security capacities together with skills able to value the necessitate to ensure organizational process is followed and such IT engineers might have the understanding of the risk to lose an important lesson learned information. Therefore, PMT model will help researcher to look into the motivating elements that persuade IT engineers to capture lesson learned during DR test activities.

Maddux and Rogers (1983) explained that the motivation of an individual to save from harm is improved through four elements severity, vulnerability, response efficacy and self-efficacy (Table 1).

Two components from table above will be put forward in this research, namely self-efficacy and response efficacy. Theses behavioral signifies the extent to which an individual is prepared to carry out actions such as capturing lesson learned during DR activities. First component is self-efficacy it is about IT engineer’s self-confidence in their capacity to carry out the suggested preventive actions (e.g., capturing lesson learned during DR activities). In 1995, these two researchers Compeau and Higgins, clearly explained about individuals who have elevated levels of self-efficacy concerning information systems is very determine to make use of the systems in their task compare to those individuals with diminutive self-efficacy. The same researchers also, noted that the self-efficacy has been made known to encompass an important force on individual capability to carry out behaviors. On the same context it was concluded that self-efficacy give emphasis to the individual’s ability to muddle through their daily

chore (Bandura, 2008; Rhee *et al.*, 2009). Second component is response efficacy it is a set of belief that suggested effective reaction or response (i.e., using lesson learned database for problem solving) will be effective in reducing the time, cost and error during DR activities. This component will assess IT engineer’s self-confidence in the response effectiveness in storing valuable lesson learned information from missing. An individual who has high probability in taking up an adaptive behavior is who has self-effectiveness knowledge to protect from risk with the suggested coping method (Rogers, 1975). Most of individuals will have fewer certainty in regards to efficacy measurement, however, some possibly will not enthusiastic to acknowledge it (Rippetoe and Rogers, 1987).

DR is a critical and major activities, nevertheless it does not usually draw the attention it warrant for the reason that the run and maintain production tasks are regarded as more important and urgent activities (Vance *et al.*, 2013). In addition that is the ordinary thinking process which is inherited by human that leads to believe the likelihood of a catastrophe beating is un-important as a result the pressing awareness and resources are committed apparently more burning problems. Hence, in the given state of affairs what motivates the IT engineers to jot down the lesson learned during DR test activities. The answer is attended by means of the threat and coping constructs suggested by Maddux and Rogers through the protection motivation theory. It is critical to examine the lesson learn critical success factors that influence DR process improvement through the guidance of the Protection Motivation Theory (PMT).

**Top ten journals in scopus applied protection motivation**

**theory:** This study adopts PMT from health psychology into IS research by investigating on critical success factors to follow the proposed DR process. PMT is one of the well-known theory in research sphere of health psychology. This can be further confirmed with the analysis of top ten journals which applied PMT in their research.

Figure 1 demonstrate the top ten journals, 7 out of 10 journals are related to health psychology. Interestingly the same graph speaks another fact on 2 IT and IS journals in which PMT was applied (Computer in Human Behavior and MIS Quarterly). IT and IS with PMT seems be part of the top ten ranking in Scopus.

Assuming IT organizations perceive valuable knowledge from lesson learned or best practice as the major threat (risk or concern) this theory propose that individuals decide whether they would conduct a recommended adaptive action (i.e., following the proposed DR process).

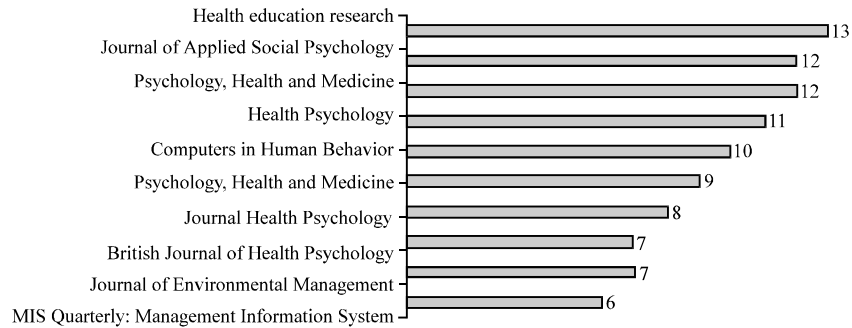


Fig. 1: Top ten Scopus Journals Applied PMT

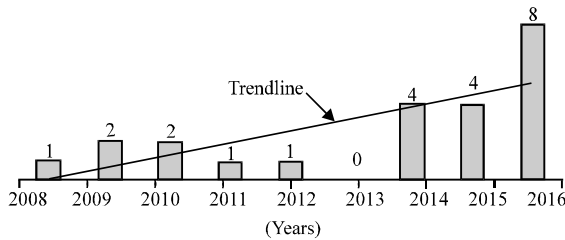


Fig. 2: PMT in IS Journals (2008-2016)

Coping cognitive appraisal from PMT refers to a cognitive process evaluating one’s capability to deal with and prevent the risk (Rogers, 1983).

This study posits that IT engineers will be more inclined to adopt the proposed DR process when they perceive valuable knowledge from lesson learned or best practice as a serious concern for upholding the quality of DR service.

## RESULTS AND DISCUSSION

**Research gap analysis:** As per the derived literature, this study takes an effort to fill the gap of motivation in the context of DR in IT organization sector. A query was run in Scopus database using Protection Motivation Theory (PMT) keyword to find related papers. Scopus database was selected to derive the journals data for the reason that it is peer-reviewed literature with a comprehensive overview of worldwide research publication. Total of 575 results were found with publication date from 1968-January 2017. The analysis was analyzed using Microsoft Excel spreadsheet software.

Figure 2, further analysis was performed based on the 575 papers where PMT was applied. A search with key word “information systems” was done in the column “Source Title” to scrutiny PMT papers which have been published in IS journals. Analysis in Fig. 2 illustrates that PMT was started to be applied in IS domain, since, years 2008 and total of 23 papers were published between this 8 years. The graph showing gradual ncrease from

1 paper published in 2008-8 papers in 2016. This clearly indicates that PMT is one of the appealing theory and actively being used in IS research. Figure 3, in addition to above graph, another deep-dive analysis was done to distinguish in which IS journal those 23 papers have been published. MIS Quarterly is leading with total 6 papers, research were mainly focused on security perceptions, protective behaviors, privacy protection, information security and safe computing areas.

Similar to European Journal of Information Systems, all 4 papers were studied around information security and security policy areas. The third top journal is the Information Systems Frontiers with 3 papers which were studies mainly in healthcare information protection ground.

**Disaster research using protection motivation theory in IS journals:** Table 2, using “disaster” as the keyword a simple search was performed on the abstract column for all the total 575 papers. This is to analyzed how many research was done in the past using PMT in the context of disaster. Only 6 papers were identified using PMT constructs in their research in the context of disaster. However, 5 papers were explored in non-IT sector and only 1 paper was published in IT sector, this has been clearly illustrated in the last column in Table 2.

For the non-IT sector, the studies were mainly carried out on evacuation behavior during landslides, flood mitigation, precautionary behavior during earthquakes, avian influenza threat and natural disaster risk management. The IT sector study was looking into computer security behavior in Korean firms. The analysis evidently showing that there is a research gap of PMT in disaster domain in IT organizations. Therefore, PMT model will help researcher by discovering the motivation elements which can assist IT engineers to capture lesson learned during DR test activities.

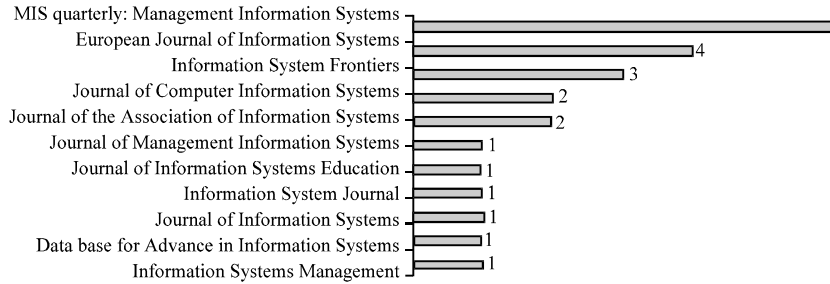


Fig. 3: IS Journal-23 Papers (2008-2016)

Table 2: PMT and disaster related papers in scopus (1968-January 2017)

Researchers	Title	Years	Source title	Source	IT or non-IT sector
R. Kakimoto T. Fujimi M. Yoshida H. Kim	Factors promoting and Impeding precautionary Evacuation behaviour	2016	International Journal of Urban Sciences	Scopus	Non-IT sector
J.K. Poussin W.J.W. Botzen J.C.J.H. Aerts and Policy	Factors of influence on flood damage mitigation behaviour by households	2014	Environmental Science	Scopus	Non-IT sector
T. Ozaki K. Nakayachi	Effects of descriptive norms and mutual relationships on precautionary behavior toward earthquakes	2014	Research in Social Psychology	Scopus	Non-IT sector
M.A. Bell T.R. Jordan J.A. Dake J.H. Price P. Rega S. Hollis	A national survey of emergency nurses and avian influenza threat	2014	Journal of Emergency Nursing	Scopus	Non-IT sector
C. Yoon H. Kim	The global standardization of regional disaster risk management	2014	Cambridge Review of International Affairs	Scopus	Non-IT sector
	Understanding computer security behavioral intention in the workplace: An empirical study of Korean firms	2013	Information Technology and People	Scopus	IT sector

**Information Technology (IT):** Organization’s vital objectives are to assure stakeholder’s requirements in addition to sustain the business for longer tenure. Understanding the nature of IT or IS failure and develop a good disaster recovery plan are the important tasks, though the actual challenges during a disaster is making a certainty that IT staffs be able to continuously be dynamic to restore the IT components. There have been numerous studies and researches that focus of PMT in non-IT sector, nevertheless similar conclusion perceived from other researchers. IS researchers focused on the DR for evacuation behavior, flood damage mitigation behavior, precautionary behavior toward earthquakes, emergency nurses and avian influenza threat and regional disaster risk management.

On the other hand only one research available on IT sector which the researcher studied on computer security behavioral. This evidently shows that research gap in PMT is significant, especially in the context of DR process in IT organizations. Hence, this study will reveal new research dimension in IT DR scope with the support of PMT elements. In order to, stay competitive,

organizations are moving towards innovative solutions, knowledge is now seen by business organizations as an asset that must be protected, preserved and evolved. Question is will motivation factors can play an essential role to protect valuable lesson learned during DR activities.

**CONCLUSION**

Nevertheless, study on the IT DR process will be relatively new with contribution respect to protection motivation context. This study tries to bridge that gap by investigating the protection motivation factors in lesson learned capturing mechanism to improvise IT DR process.

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