



Organization Theory Review (OTR)

Volume No. 2, Issue No. 1, Spring 2018

ISSN(P): 2221-2876

Journal DOI: <https://doi.org/10.32350/OTR>

Issue DOI: <https://doi.org/10.32350/OTR/0201>

Homepage: <https://spa.umt.edu.pk/otr/home.aspx>

Journal QR Code:



Article: **The Integration of Knowledge Resources and Logistic Resilience for Effective Disaster Management**

Author(s): Muhammad Rizwan Junaid

Online Published: Spring 2018

Article DOI: <https://doi.org/10.32350/OTR.0201.02>

Article QR Code:



M Rizwan Junaid

To cite this article: Junaid, M. R. (2018). The integration of knowledge resources and logistic resilience for effective disaster management. *Organization Theory Review*, 2(1), 17–31.

[Crossref](#)



A publication of the
School of Professional Advancement
University of Management and Technology
Lahore, Pakistan.

The Integration of Knowledge Resources and Logistic Resilience for Effective Disaster Management

Muhammad Rizwan Junaid
Pakistan Institute of Management

Abstract

Rapid population growth, changing weather conditions and an increasing number of natural disasters have left human beings more vulnerable and exposed to nature's onslaught. Disaster Management Organizations (DMOs) need to be more resilient, responsive and effective to counter these natural hazards and should not leave any stone unturned in order to play their pivotal role in *rescue, relief and rehabilitation*. Organizational knowledge and logistics are two core factors considered most significant in transforming a DMO into a resilient organization that can shoulder its due responsibility in a plausible and desired manner. This paper is an initial attempt that discusses the integration of knowledge resources and logistics to accelerate the process of the said transformation.

Keywords: disaster, knowledge, logistics, supply chain, resilience.

Introduction

Disaster management has become a subject of tremendous significance around the globe and every country is striving to establish and maintain concrete, well documented and alert organizational setups that are efficiently *responsive* in case of any catastrophic event in order to reduce human and physical losses (Weichselgartner, [2006](#)). Natural disasters not only disrupt social and psychological states of a community but also create huge stress at environmental, organizational, operational and functional levels (Paton, [1990](#)); they displace millions of people, create shortage of commodities, cause huge economic losses and derail planned economic measures and GDP earnings. Earthquakes, drought, cyclone and floods are natural disasters that create large scale crises not just in a country but more often in a whole geographical region (Charvériat, [2000](#)). The gravity and magnitude of these disasters is fairly out of human control but the need of a documented, established and well-maintained mechanism to manage disasters is recognized.

Resilience can be defined in simplest possible words as 'the capability

to hold out pressure and widespread disaster'. With reference to an organization, the concept of resilience seems more collective and is defined as organizational resilience, which is the ability of an organization to anticipate, prepare for, and respond and adapt to incremental changes and sudden disruptions in order to survive and prosper. Gaonkar and Viswanathan (2007) define supply chain resilience as “the ability to maintain, resume, and restore operations after a disruption.” Knowledge integration is the process that synthesizes different knowledge models into a common model (Linn, 2006). It is not combining different kinds of knowledge from different sources; rather it is blending the understanding of a particular subject into other subjects to create a multi-dimensional outlook. Knowledge integration generates holistic resilience across an organization that enables it to perform its role in unanticipated and unplanned circumstances.

The prime aim of this research is to look into the manner in which knowledge and logistic resilience influence the effective disaster management ability of an organization. Disaster Management Organizations (DMOs) are meant to counter unanticipated, unexpected and sudden events that claim precious human lives and generate large scale economic, social, psychological and financial losses. These organizations are required to perform rapidly in a very limited span of time and come up to the expectations. Integration and interaction of multiple knowledge resources establish knowledge resilience; this knowledge resilience further regresses with supply chain (logistics) framework in a holistic mode that ensures logistic resilience. Knowledge and logistic resilience jointly influence the dynamic capabilities of a DMO.

2. Literature Review

The first section of literature review contains the definitions of related terms that would be supported further by analytical review in the second section.

2.1. Defining Disaster

One of the most difficult concepts in literature is to derive a concrete definition of disaster as there are many variations and intricacies involved in defining this word. International Strategy for Disaster Reduction (ISDR), a United Nation's agency defines disaster as “a serious disruption

of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources” (United Nations Office for Disaster Risk Reduction, [n.d.](#)).

The contemporary approaches toward disaster have taken a new turn and disaster is being defined within the perspective of low and high vulnerability and undertaken as the resultant factor of inadequately managed risk; these risks are amalgamation of vulnerability and hazard. Hazards are never considered disastrous in areas with low vulnerability as in the case of areas with high vulnerability (Quarantelli, [1998](#)).

Moe, Gehbauer, Senitz and Mueller ([2007](#)) define a disaster as “a situation which overwhelms local capacity, necessitating a request to the national and international level for external assistance, or is recognized by a multilateral agency or by at least two sources, such as national, regional or international assistance groups and the media”. The overwhelming and un-anticipated nature of disaster makes it a disaster as it goes beyond the reach of human control.

All the above definitions have encompassed relevant dimensions of the term ‘disaster’; but it is evident that disaster, especially the outcome of any natural hazard, seems more dependent upon the level of vulnerability, ill planning, inefficient management and poor administration. It is more of a human generated phenomenon than a natural one as every natural hazard is not disastrous. Therefore, it can be concluded that disaster is the associated situation that occurs with any natural hazard. It is purely a relative term with reference to losses and damages incurred by a natural hazard as sharp variance can be witnessed in the adoption of this term.

2.2. Organizational Learning and Disaster Management

The current scenario is changing on fast track; global trends, technology trends and work trends have changed organizational learning environment (Farrukh & Waheed, [2015](#)). Social infrastructure has gained immense momentum and organizations are getting clear directions for their customers and other stakeholders. Experience, action based learning and problem based learning have generated a highly involved and engaged learning environment (Didominic, [2013](#)). Social networking, connection, collaboration and communication are integral to one another. Any learning environment needs to incorporate these features in organizational learning

and companies around the globe are focussing on these areas.

The linkage of organizational learning philosophy with performance and the notion of change is imperious as social phenomenology requires concrete integration between organizational learning and society. Organizations are becoming more and more social and their social face demands more and more from them. The integration of this relationship demands adaptability to counter rapid technological and environmental changes and today's organizations are regenerating themselves to eliminate the notion of resistance through increased efforts toward employee development through rigorous training (Kumar, [2012](#)).

However, scores of consultants and management scholars have debated the notion of *organizational learning* and *learning organization*. The ideal form of organization that gives way to individual and group learning and sets a continuous pace for holistic learning process is a *learning organization* (Easterby & Araujo, [1999](#)).

Today's organizations are more adaptive, lively, social and reconfigured as rapid changes in overall environment have transformed the entire working scenario. Employee empowerment has become very significant in the learning process. Rather than managing or controlling the learning process, it seems imperative to take every employee on board. It can further foster a culture of growth and development across the organization.

2.3. Integration of Knowledge Management and Disaster Management

Resource-based View (RBV) exemplifies that tangible and in-tangible resources available within a firm provide plausible grounds to gain competitive advantage (Penrose, [1959](#)). These resources further enable an organization to respond quickly in uncertain and critical conditions. The proponents of RBV manifested that external opportunities can easily be exploited by focusing upon existing resources rather than looking for new resources for every new opportunity (Peteraf, [1993](#)). These potential resources contain certain characteristics as they are valuable, rare, inimitable and non-replaceable (Barney, [1986](#); Mahoney & Pandian, [1992](#)). On the other hand, Knowledge-based View (KBV) of the firm undertakes knowledge as the most significant and important resource of the firm; knowledge itself is a complex social phenomenon (Nickerson,

[2004](#)) and knowledge-based resources are difficult to imitate and naturally complex (Alavi, [2001](#)). Even though, RBV considers the significance of knowledge-based resources in gaining competitive advantage but it takes knowledge as a generic resource rather than a resource with special characteristics (Grant, [1996](#)).

DMOs are meant to play a multi-dimensional role in order to effectively and efficiently manage disaster and disaster related emergencies. Since, DMOs perform against an unanticipated and sudden event hence *pro-activeness* seems to be the most prominent organizational ability. The multi-faceted nature of DMOs and the working environment in which they perform need an extensive utilization of knowledge-based resources. The prime objective of knowledge is to prepare an organization to stand against all odds and excel par limits in respective area (Hubka, [2012](#)).

The application of organizational knowledge at the right time and at the right place to serve the right purpose is the intrinsic strength of any and every organization (Hatch, [2012](#)). Knowledge management generates resilience among employees and they appear stronger in case of emergencies and untoward situations. It is closely related to the organizational culture that generates a learning environment in which individuals come up with their inner abilities and play pivotal roles in favor of the organization (Zaied, [2012](#)). Knowledge retention provides opportunities for an organization to store valuable knowledge in its repositories that can be used even after the departure of an employee; it further enhances the capability of an organization to be resilient on the basis of stored and available knowledge.

Available knowledge resources (implicit and explicit), individual learning, self-motivated learning, organizational learning and knowledge management are the cores that breed organizational resilience. There is a sharp significant and positive relationship between knowledge management and organizational resilience as effective knowledge management enhances organizational resilience (Godwin & Umoh, [2013](#)). Especially, a DMO's core strength is its ability to be resilient to counter the unanticipated and unexpected event. In a holistic manner, a knowledge-based organization is supposed to be more reflexive, effective and responsive in sudden circumstances. Combining knowledge resources accelerates organizational resilience. It revolves around proactive

emergency management through early risk anticipation and the management's adaptation to new and future work practices such as distributed actors and new technology (Tveiten, Albrechtsen, Wærø & Wahl, [2012](#)).

Knowledge Management (KM) is precisely a holistic process of acquisition, management and application of disaster information and knowledge for better handling of disaster relief activities and operations (Zhang, [2002](#)). The focussed responsibility of KM is to ascertain the type of information needed to undertake relief operations and further disseminate this information among all those who are involved in disaster relief operations. The immediate effect of improving knowledge management efficiency is better, faster and effective decision making and enabling various group of workers to recycle and reuse different resources. Jennex ([2005](#)) described KM as the process of carefully relating knowledge from preceding decision-making experiences to existing and forthcoming decision making initiatives with the definite drive to improve the organization's overall effectiveness.

Knowledge integration is a comprehensive process of blending manifold models of knowledge into a joint model (Linn, [2006](#)). Integration of expert knowledge with indigenous and local knowledge is one of the best ways that can reduce the risk of disaster and improve disaster preparedness and management. Therefore, an effective and efficient knowledge exchange enables organizations to bring all performing actors closer to one another and build disaster resilient communities with a joint focus on emergency preparedness. It is worth noticing that Asian societies are therefore incredibly defenseless against disasters caused by natural hazards (earthquakes, tsunamis, cyclones, droughts, landslides, and floods) in amalgamation with environmental dilapidation including desertification, biodiversity damage, contamination, deforestation and soil corrosion, coupled with social aspects such as poverty and disparity. Political, economic conditions, social structures and social organizations also play a pivotal role in aggravating these conditions (Smith, [2009](#)).

The resilience of disaster facing societies can be increased by integrating old and new techniques and knowledge (Mercer, [2009](#)) Furthermore, it is being generally recognized that the integration of local knowledge with scientific knowledge can lead to better emergency preparedness and disaster mitigation strategies (Mercer, [2010](#)). The trio of

scientific evaluation, modern technology and local knowledge can give decision makers, policy makers and relevant societies a very impressive knowledge base needed to make disaster resistant policies, timely decisions and emergency preparedness procedures to address the environmental issues being faced by the society (Armitage, Berkes, Dale, Kocho & Patton, [2011](#)).

It has been clearly established that knowledge integration is core to disaster mitigation but in most of the cases, knowledge exchange, knowledge integration and knowledge assimilation are missing from the whole core of the scope of work of DMOs (Bolisani, [2008](#)). On the other hand, there is a need to maintain a smooth flow of knowledge well within all tiers of organization to ensure its timely usage to create efficiency.

2.4. Integrating Logistic Resilience and Disaster Management

Emerging disciplines of risk management and supply chain management have not yet incorporated *resilience* as a consolidate concept (Ponomarov, [2009](#)). Most of the time, the terms *supply chain* and *logistics* are used interchangeably. Supply chain resilience is defined as “the ability to proactively plan and design the supply chain network for anticipating unexpected disruptive (negative) events, respond adaptively to disruptions while maintaining control over structure and function and transcending to a post-event robust state of operations, if possible, more favorable than the one prior to the event, thus gaining competitive advantage” (Ponis, [2012](#)). Logistic strategy works well when it is incorporated within preliminary disaster management planning and a holistic planning model improves the responsiveness of a DMO (Perry, 2007).

Particular aspects of supply chain operations, such as inventory management and transportation, are core to ensure logistic resilience by considering manageable and significant portions of the whole chain of supplies; overall operations can be more cost and time effective, efficient and controlled. It is for sure that supply chain resilience cannot be obtained by accident but by concrete design. A resilient supply chain needs two crucial capacities, that is, the capacities for resistance and recovery. The first capacity defines a supply chain’s capability to defer an interruption and decrease the effect as soon as the interruption takes place. The second describes a supply chain’s ability to recuperate from an interruption (Trebilcock, [2015](#)).

Logistic resilience reduces the probability of risk for an organization and increases operational efficiency. In case of disasters such as earthquakes and hurricanes, the supply chain of an organization gets disrupted and leaves an organization vulnerable to discharge its obligations. Resilient supply chain mechanism recovers fast from these disruptions with full support from the flexible supply chain that addresses the day to day requirements within stipulated time. Companies which have fabricated their supply chains to answer momentous demand fluctuations have also assembled in the capability to react to supply deficiencies in order to be resilient.

Logistics is a critical element of emergency preparedness plans that assures the availability of required goods and services at the right place at the right time and in the right quantity. The core of logistic planning revolves around geological, geographical, sociological and physical characteristics of the affected area. Logistics remains the most crucial, imperative and complex element of disaster relief operations and flexibility and agility are core to this component (Kapucu & Lawther, 2007). A major chunk of disaster relief operations revolves around logistics; therefore, it should be lean, effective and efficient and on top of all through operative supply chain management. Since the dynamic disaster environment can produce an unexpected and unplanned need of logistics, that is why need for flexibility and creativity in logistics management are the two most desirable elements that seem indispensable in order to produce desired results and to deliver timely supplies to those in need.

2.5. Knowledge Management and Logistic Resilience in Disaster Management

Rapidly and continuously changing environment around the globe and the increasing frequency of natural disasters require logistic management to terminate its affiliation with the traditional supply models and to adopt a holistic supply chain mechanism in order to remain competitive and responsive. The role of knowledge and knowledge workers in logistic management is considerable and influential (Butcher, 2007). Knowledge workers subsidize to the adaptability, receptiveness, agility and resilience of supply chains at difficult and unexpected times such as natural disasters. The sharp and visible shift between the traditional and modern supply chain management is that the former was labor intensive while the

latter is information and knowledge intensive (Christopher, [2000](#)).

The role of knowledge in logistics management and handling has altogether taken a novel turn; now it is more of computerization, automation, communication, data base management, information sharing and knowledge integration among relevant personnel and departments involved. Therefore, a crucial task for logistics and supply chain establishments is obtaining the desired human capital needed to work with the mass of knowledge acquired to uphold the movement of merchandise and facilities in progressively intricate supply chain setup. Efficient logistics managers not only require technical expertise, relevant data, processed information and extensive qualification in disaster related management but they are required also to gain analytical skills, interpersonal communication skills, leadership, team building, contingency planning, project management skills etc. (Manuj, [2011](#)). The tremendous range of knowledge further demands the availability of multi-skilled professionals in senior decision making positions with regard to logistic management and acquiring maximum knowledge-based skills derives the possibilities to establish a knowledge-based framework that opens the opportunities for faster and comprehensive decisions (Akerkar, [2010](#)).

Knowledge integration and sharing across the whole network create competitive advantage and effective knowledge management around supply chain and logistic network provides the whole enterprise a sense of intelligence; because when network becomes more complex then knowledge sharing saves it from failing to perform proper function. The network of knowledge sharing must encompass explicit knowledge (procedures, processes, instructions and descriptions) and implicit knowledge (intuition and personal experiences) in order to create logistic resilience and agility up to the desired level. The procurement and analytical solutions “stages of excellence” assessment provides companies with a clear insight regarding the compatibility of their supply chain management cycle and their model of excellence contains knowledge/information management as one of the key steps in building an excellent supply chain management cycle (Kearny, [2016](#)).

3. Conclusion

The above discussion and extended contribution from practitioners, experts and management professionals have made it vitally clear that disaster management is a very complex, intricate and multi-faceted area that needs immense and holistic efforts from Disaster Management

Organizations (DMOs). Knowledge resources are core for the effective functioning of DMOs. It has been mandated that the whole process of knowledge management needs to be incorporated in all organizational functions and knowledge is not to be treated or undertaken as *a resource required on need basis*. Knowledge generation, codification, dissemination and integration provide a comprehensive framework that allows DMOs to act progressively in *pre-disaster, on-disaster and post-disaster* phases.

It is to be kept in mind that a linear linkage of available knowledge with different organizational functions facilitates the overall output desired in countering a disastrous situation. On the other hand, logistics play an equally important role in countering a disaster. What is required, where it is required and when it is required are the primary questions which need answers based on extensive research and widespread knowledge integration. The relationship between knowledge resources and logistics is fundamental and they complement each other.

The success story of a DMO revolves around a combination of available geological, geographical, sociological, psychological and indigeneous knowledge with efficient, adequate and accelerated logistic management. Failing to have a smooth and closely bonded relationship between knowledge and logistics diminishes the chances for disaster refugees to secure the desired help from DMOs and it adds further misery to their fate. In developing Asian countries, it has been observed on a number of occasions that the damaged link between knowledge resources and logistics has aggravated the prevailing situation and instead of providing immediate relief to the sufferers, DMOs have not only mistreated the affectees but have also added more grief to the already rotten conditions.

The prime need is to establish a workable framework with the help of which DMOs can manifest the role of knowledge and logistics and derive planned strategies to come up to the mark in all disaster related phases. The core dissimilarities do not allow us to have a universal and consolidated framework. Rather, what is required is to establish an operational framework keeping in view knowledge and logistics as core resources. This framework should not only address the disastrous situation but should also add value to the operative capacity and intellectual ability of a DMO.

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