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# Digital Humanitarianism in a pandemic outbreak: An empirical study of antecedents and consequences<sup>\*</sup>

Anup Kumar<sup>1</sup>[0000-0002-1116-3230], Niraj K Vishwakarma<sup>3</sup>, and Parijat Upadhyay<sup>1</sup>□

<sup>1</sup> IMT Nagpur, India

<sup>2</sup> FMS BHU, India [niraj@bhu.ac.in](mailto:niraj@bhu.ac.in)

<sup>3</sup> IMT Nagpur, India

{[ankumar](mailto:ankumar@imtnag.ac.in),[pupadhyay](mailto:pupadhyay@imtnag.ac.in)}@imtnag.ac.in

**Abstract.** Based on the resource-based view and the thematic analysis of digital humanitarianism, information and Communication Technology (ICT) success, and the potential value of Crowd Sourcing (CS), this study proposes a Digital Humanitarianism Capability (DHC) model. The study extends the above research streams by examining the direct effects of DHC on Disaster Risk Reduction (DRR), as well as the mediating effects of process-oriented dynamic capabilities (PODC) on the relationship between DHC and DRR. To test our proposed research model, we used an online survey to collect data from 150 District Magistrates (DMs) of India who is handling the COVID-19 Pandemic Management. The findings confirm the value of the entanglement conceptualization of the hierarchical DHC model, which has both direct and indirect impacts on DRR. The results also confirm the strong mediating role of PODC in improving insights and enhancing DRR. Finally, implications for practice and research are discussed.

**Keywords:** Digital Humanitarianism · Disaster Risk Reduction · ICT.

## 1 Introduction

Digital Humanitarianism (DH) has been widely regarded as a breakthrough in technological development in academic and business communities. Despite the growing need for digital humanitarianism, there is still limited know-how about the leveraging of such technological concepts into disaster management. The information overflow that occurs in the wake of a disaster can paralyze humanitarian response efforts. Computers, mobile phones, social media, mainstream news, earth-based sensors, humanitarian drones, and orbiting satellites generate vast volumes of data during major disasters. Making sense of this flash flood of information, or Big Data is proving a perplexing challenge for traditional

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humanitarian organizations. Aid groups are more adept at dealing with information scarcity than overflow. To address this problem many organizations are turning to Digital Humanitarians for help. Digital Humanitarians are volunteers and professionals from all over the world and all walks of life. They share a desire to make a difference, and they do by rapidly mobilizing online in collaboration with international humanitarian organizations. In near real-time, they can process Big Data to support relief efforts worldwide. They craft and leverage ingenious crowdsourcing solutions with trail-blazing insights from artificial intelligence. “Digital Jedis” by sharing their remarkable, real-life stories, highlighting how their humanity coupled with innovative Big Data solutions has changed how humanitarians will respond to disasters. The paper is intended to answer the following questions:

1. How Digital Humanitarian Dynamic Capabilities ( DHDC) is measured and its consequences on humanitarian disaster management
2. Whether process-oriented dynamic capabilities play a mediator between DHDC and Disaster Risk Reduction

## 2 Review of literature

The 2013 Global Disaster Study refers to the enabling essence of mobile telephones and social media for disaster recovery using the term humanitarian technology. New media innovations are essential to catalyzing a transition in humanitarianism (M Madianou, 2018).

### 2.1 Digital Humanitarian during a pandemic

As per the world health organization report (WHO), there is an ongoing need for humanitarian aid for more than 130 million people due to natural disasters, outbreaks of diseases, and conflicts. Digital health is limited and still in its adolescence, but the sector is developing rapidly (Fernandez-Luque Imran, 2018). Almost every day, new digital studies and capabilities are announced. The standard and conduct of research in the humanitarian environment can be enhanced through the automation of the data custody chain, smart metadata, and other emerging technologies (Perakslis, 2018). How digitalization (big data) transforms the face of humanitarian response. Following the Haiti earthquake, a digital map of areas most affected by the earthquake was developed. Hundreds of automated volunteers have labeled crowd-sourced knowledge via social media, allowing U.S. emergency teams to find survivors (Dave, 2017; Meier, 2015). The study of vast volumes of information generated by various outlets, such as social media material, is increasingly important for humanitarian health crises. They are an important case in which artificial intelligence technologies (AI) are used to assist in the detection and processing of sensitive information. Successful AI systems case studies have been published during a humanitarian crisis (Fernandez-Luque Imran, 2018; Mirca Madianou, 2019). The technological difficulty is to process vast amounts of data in real-time. Data interoperability is

still an obstacle to the convergence of the internet and conventional data sources and is necessary for the exchange of data (Fernandez-Luque Imran, 2018).

## 2.2 UTAUT2 In Humanitarian operations management

Digital Humanitarians are volunteers, students, and professionals from all walks of life. In conjunction with foreign humanitarian organizations, they are mobilizing online. It makes sense to collect vast amounts of social posts, text messages, and photographs from satellites and UAVs to support humanitarian operations. They build and exploit innovative crowdsourcing approaches with relevant artificial intelligence insights (Meier, 2015). The information system develops a framework for handling the information while tracking and assessing humanitarian relief operations to enhance the performance of disaster relief operations. The concept of the Unified Theory of Acceptance and Use of Technology (UTAUT) is a method to research and understand better the factors that affect the acceptance and usage of the Information System by potential users (Dwiputranti et al., 2019). Mobile applications also offer ways to boost the efficiency of humanitarian logistics operations. People can regard mobile cash systems as one means of helping refugees. While refugees own cell telephones and have connections to numerous networks, they are people in need, and thousands are unable to live as a result of dangerous travel, harsh weather, medical conditions, and hunger (Abushaikha Schumann-Bölsche, 2016). Another way to provide emergency relief should find last-mile delivery drone applications in humanitarian logistics. Humanitarian organizations are getting increased attention from unmanned aerial vehicles (UAVs). They will help to solve problems of last-mile delivery, i.e., inaccessibility to the cut-off areas (Rabta et al., 2018).

## 3 Theory Development and Conceptual framework

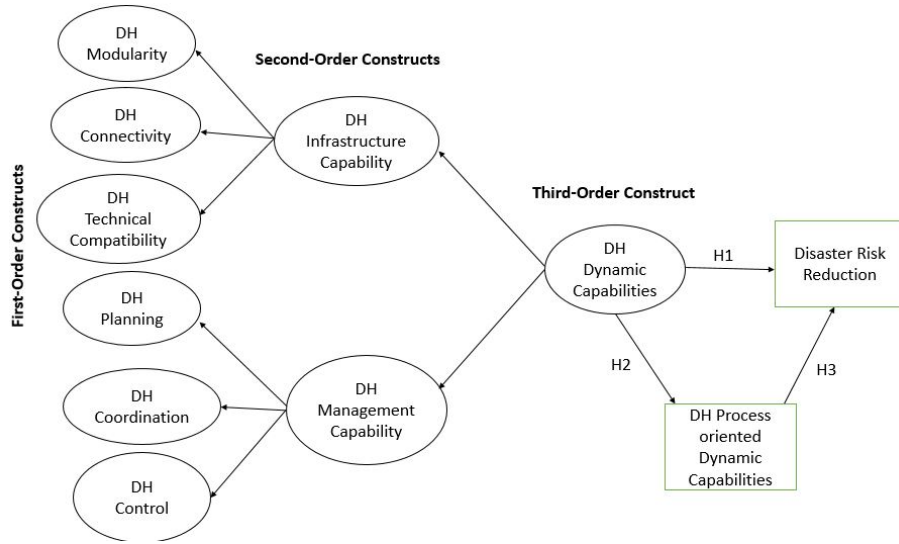
The Proposed theoretical model is presented in Figure 1.  
Fig. 1).

### 3.1 Constructs and Hypotheses development

Communicable diseases are a significant cause of death after natural or human-made disasters. Controlling an outbreak of an epidemic requires a rapid response. It is of utmost importance to establish and manage an emergency supply chain during the containment effort (Dasaklis et al., 2012).

### 3.2 DH Dynamic Capabilities

Disasters are increasing, and the assistance received by donors is becoming more and more unpredictable. Humanitarian organizations try effective and reliable solutions (Tomasini Van Wassenhove, 2009). Disaster management brings many



**Fig. 1.** Proposed Model

organizations together to share resources in crises. The collaboration of different organizations relies heavily on successful activities. The real conditions of the 2013 flood in Acapulco, Mexico, showed that anyone organization had been unable to cope (Rodríguez-Espíndola et al., 2018). The US economy and people have been severely affected by natural disasters. This is important that aid supplies are planned correctly and handled effectively before a disaster begins. Olanrewaju et al. (2020) provide multi-stage stochastic programming models for the suppliers in the planning stage of disaster response. It offers relief organizations with information into how the terms of the deal impact the decision to pick a service provider and how to reduce the overall expected contract expense. The models determine whether the chosen suppliers are fulfilling their contractual terms and how much relief the relief agency has bought from suppliers. This model is used to solve the problem for small-scale test cases and also to solve a real word problem (Olanrewaju et al., 2020).

### 3.3 Process-oriented Dynamic Capabilities

Logistics is essential for humanitarian relief and disaster response operations (Bastos et al., 2014). Disasters are marked by conflicting, unclear, or data shortages. Disasters like the Asian Tsunami, Hurricane Katrina, and earthquakes in Pakistan have shown the urgent need for powerful technical infrastructure (Tomaszewski et al., 2006). Rapid decisions need to be taken by the humanitarian aid staff. Information availability and consistency expectation are still not met in practice by humanitarian decision support systems (DSS). DSS supports a system for location recognition in the area of disaster relief supply chains to

tackle the network architecture. A real-life scenario can then be added to the solution strategy (Timperio et al., 2017). On the other hand, wide complexity reflecting pressures and constraints on the field and accelerated humanitarian logistical forecasting is three main challenges for an operational DSS in support of distribution planning (Rahman et al., 2017). Disasters lead to the collapse of the system of existing ICTs. The ICT failure stops the service from collecting information from disaster-affected areas in real-time last miles. This creates a complex, unpredictable, unstable, and restricting humanitarian relief situation (Nagendra et al., 2020).

### 3.4 Disaster Risk Reduction

Logistic activity may be described as a socio-technological mechanism by which a human social network organizes a set of technological activities. To understand the functioning of the whole system, all its components must be properly considered (Holguín-Veras et al., 2012). Logistics has gained significant attention from scholars and practitioners in the sense of humanitarian operations. In the next 50 years, the number of both natural and human disasters is expected to increase by five times (Nikbakhsh Zanjirani Farahani, 2011). Disaster recovery is complex and can greatly benefit from careful preparation (Wisetjindawat et al., 2014). Humanitarian relief agencies mobilize billions of dollars annually in support for victims of natural disasters, civil wars, and conflicts (Balcik et al., 2010; Tatham Houghton, 2011; Thomas, 2005). Logistics are central to their activities and their strategic tasks. Research shows that environmental factors, such as catastrophe unpredictability and the complexity of the financing, have contributed to high-swing logistics activities (Thomas, 2005). The 2003 worldwide epidemic of severe acute respiratory syndrome (SARS) has become a wake-up call for healthcare services. Pandemic planning has evolved over the past 15 years, with the introduction of a holistic disease risk management strategy (O'Sullivan Phillips, 2019; Runge et al., 2020). 2020 was the year of COVID-19 managing, World Bank group notes. It calls for the use of the system for controlling the risk of health-emergency disasters to supplement existing responses. It claims that the existing disaster management mechanisms and techniques will strengthen reactions to epidemics or global pandemics such as COVID-19 (Djalante et al., 2020). We, therefore, intended to posit : H1: DH Dynamic Capability has a positive impact on Process -Oriented Dynamic Capabilities H2: DH dynamic capability has a positive impact on Disaster Risk Reduction H3: Process-Oriented Dynamic Capabilities mediates the effect of DH Dynamic Capability on Disaster Risk Reduction

## 4 Research methodology and data collection

The questionnaire was designed based on UTAUT2 models, that were developed following an adaptation of the original TAM and TPB to this specific study. The questionnaire was tested using a pilot study before floating it online for pan

India respondents. The reliability and internal consistency of the instrument were evaluated by calculating the Cronbach alpha values for each theoretical variable. The construct validity of the model was evaluated using the inter-item correlation analysis. The overall Cronbach alpha was greater than 0.9, and the individual Cronbach alpha for each of the constructs was also greater than 0.9. Although the instrument was conceived from the previous literature, Confirmatory Factor Analysis (CFA) was used to test the adequate item loadings and sampling adequacy, the KMO test results show valid adequacy of the samples while few items were deleted due to cross loadings and poor loading.

#### 4.1 Data Collection

Data was collected from social media users across pan India in two stages from February 2020 to April 2020 during the COVID-19 lockdown period. A Snow-ball sampling technique was used. A structured questionnaire was developed using google forms, with a consent form appended to it and shared with the respondents through online mode. The link of the questionnaire was sent through emails, WhatsApp, and other social media to the contacts of the investigator. The participants were encouraged to share the survey with as many people as possible to widen the outreach and increase the sample size. The participants were asked to indicate their responses on the 5-point Likert scale. A total of 150 responses were received through the online survey, 120 were finally considered as they were found to be complete in all the aspects while 7 were found to be incomplete and discarded. The demographic details of the respondents show that there were 53.3 percent females and 46.69 percent male participants.

### 5 Measurement Model

CFA was used to test the fitness of the measurement model. The average factor loading was greater than 0.65 which shows a good model convergent, the average factor loadings were  $\lambda$ , AVE and AVE was  $\lambda^2$  the inter-correlation among the constructs. The CFA function was used to validate the measurement model using R studio LAVAAN Package (Barrett, 2007; Oberski, 2014; Rosseel et al., 2017). The model fit indices like SRMR, TLI, AGFI, GFI, NNFI, and CFI are adequately fit to the specified values.

#### 5.1 Structural Model

The path model represents the linear regressions of the hypothesis and its effect size and p values. The first regression equation represents the independent variable Disaster Risk Reduction regressed with the dependent variables DH Dynamic Capability, and Process-Oriented Dynamic. The second regression equation represents the dependent variable Process-Oriented Dynamic Capabilities regressed with DH Dynamic Capability. It has been seen from the regression that

DH Dynamic Capability and Process-Oriented Dynamic are significant predictors of Disaster Risk Reduction with an effect size of 0.528 and 0.36 respectively while Process-Oriented Dynamic Capabilities mediates the effect of DH Dynamic Capability on Disaster Risk Reduction.

## 5.2 Data Analysis and Results

H1 DH Dynamic Capability has a positive impact on Process -Oriented Dynamic Capabilities Proved H2 DH dynamic capability has a positive impact on Disaster Risk Reduction Proved H3 Process-Oriented Dynamic Capabilities mediates the effect of DH Dynamic Capability on Proved

## 6 Practical implications of the research

Digital humanitarianism is a new type of shared activism wherein anyone can participate and leverage the Capability of Big data Analytics. Digital Humanitarians are the volunteers from the society with the common goal of rapidly mobilizing online in collaboration with international humanitarian organizations. In virtually real-time, they make sense of vast volumes of social media, SMS and imagery captured from satellites and UAVs to support relief efforts worldwide. The ability to integrate the efforts of the connected volunteers to serve the people during disaster shall be a huge success to reduce the risk of disaster. The government of India has leveraged the use of NGO and civil society workers during the outbreak of COVID-19. The dynamic capability to leverage digital humanitarianism is therefore an important tool for the organizations during the disaster.

## 7 Limitations and further research

The research is based on the survey of the people who are directly or indirectly connected to the relief works during the COVID-19 Outbreak, which might be a potential bias for the research. In the future, the survey may include the other disaster environment.

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