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# CHALLENGES OF HUMANITARIAN LOGISTICS ON DISASTER MANAGEMENT: THE EXPERIENCE OF CORONA PANDEMIC IN TANZANIA

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## Abstract:
*Despite the government of Tanzania's multiple measures to combat the coronavirus epidemic, there is still a lot of misery and human death that is recorded from time to time. The goal of this research was to determine the role of coordination, transportation, and information and communication technology in the performance of humanitarian operations during the coronavirus pandemic and to give recommendations for how to improve it. The data was collected via a questionnaire from a sample of six referral hospitals in Dar es Salaam and the Coastal Region using quantitative methodologies and an explanatory research methodology. Using descriptive data analysis, the mean and standard deviation of the findings were computed, and the data was then summarized using frequency distribution tables before being analyzed using a multiple regression model. All independent factors demonstrated a significant positive relationship with humanitarian relief performance, including coordination, transportation, and information communication technology (p0.05). For better humanitarian relief operation performance, the study recommended that referral hospitals management ensure that there are adequate facilities for distribution of relief requirements, the required materials/ facilities arrive on time, and adequate ICT facilities for coordination of all stakeholders in the relief operation.*

## Keywords:
Coordination, Transportation, Information Communication Technology, Humanitarian Relief Performance

## 1. Introduction
Recently, the world has experienced various types of disasters causing widespread devastation and suffering among people. Some, like the 2004 Tsunami, Haiti's earthquake in 2010, Typhoon Haiyan in the Philippines in 2014, and the Japan earthquake in 2017, are natural disasters (Bai, 2018). Other man-made calamities include the 2020 Beirut explosion, the 2001 World Trade Center explosion, and others (Ab Malik et al., 2020; Pasman et al., 2020). The severity of the misery and destruction wrought by these disasters varied depending on the type. There are some that affect a small area of the planet and those that affect the entire world, such as the current coronavirus pandemic (Khan et al., 2020). Whatever the scale of the crisis, humanitarian logistics are critical, as disaster management relies heavily on numerous logistics activities, including transportation, coordination, information exchange, warehouse operations, inventory management, and so on (Ab Malik, et al., 2020).
Humanitarian logistics, according to (Ab Malik et al., 2020), is the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of goods and materials, as well as associated information, from point of origin to point of consumption in order to alleviate the suffering of vulnerable people. Additionally, they stated that it entails planning, procurement, transportation, warehousing, tracking and tracing, as well as customs and clearing, Therefore, humanitarian logistics is crucial in ensuring that the afflicted community obtains the necessary supplies at the appropriate time and location in order to reduce the disaster's impact. This can be accomplished by having sufficient planning and cooperation among all supply chain players (Saab et al., 2013). Effective humanitarian logistics is very crucial in combatting effects caused by all sorts of disasters including health related ones like Covid-19 pandemic due to its nature of spreading and ways of controlling it (Sanchez, 2020). The coronavirus pandemic is a global tragedy that has killed thousands of people and impacted global economic activity (Sanchez, 2020). The pandemic is especially hazardous since it is so easy to spread from person to person, even if infected people don't

show any symptoms (Bai et al., 2020). Its occurrence as other kind of disaster had not been predicted previously. It started in Wuhan, China, with a few cases, but after a few weeks, it had spread all across the world (Sin et al., 2020). Because of its impact on economic and social contexts, it raises concerns about the global efforts of all stakeholders to battle it, with humanitarian logistics serving as a steering wheel for the entire humanitarian relief process (Ab Malik et al., 2020)

As previously stated, humanitarian logistics plays a critical role in the design, implementation, and control of relief efforts. Once the humanitarian logistics have been properly planned and organized, the process of transporting medicine, commodities, and supplies from the point of origin to the crisis area in order to alleviate the suffering of the disaster's victims is monitored by the humanitarian logistics (Thomas, 2003). Wankmüller (2020) notes that uncoordinated leadership, inadequate communications, insufficient planning, resource constraints, and poor public relations are all characteristics of nearly all disaster operations, resulting in recorded inadequacies. As a result, collaboration among all stakeholders is critical if these issues are to be resolved (Sahay et al., 2015). Governments, humanitarian agencies, donors, non-governmental organizations, and commercial firms must collaborate to capture and manage disasters (Kovács & Spens, 2007; Nillson et al., 2010; Akhtar et al., 2012). Through effective coordination, all parties' roles and responsibilities are clarified, and a common understanding of how to conduct operations is achieved. Divergent perceptions among partners may exacerbate the disaster's magnitude rather than alleviate it (Panda, 2012).

Aside from the significance of excellent coordination in humanitarian aid, one of the most significant functions in the course of a humanitarian relief operation is transportation. There is a great deal of transportation of products and materials, including medical supplies and foodstuffs, from one location to another in disaster management (Shin et al., 2020). In this pandemic, for example, infected persons must be gathered from their homes and transported to specially equipped health centers. Not only that, but medical equipment and facilities, including as overall protection gear, ventilators, masks, and gloves, are in great demand and must be distributed from manufacturers to various medical facilities and health centers (Shin et al., 2020). Regrettably, the imposition of lockdown as one of the disease's containment strategies in some nations renders the entire supply chain impractical (Singh et al., 2020). Furthermore, the situation is exacerbated in many underdeveloped countries, where roads are inaccessible, particularly during rainy seasons, hampering the transportation of medicine and other essential services to remote areas. Small trucks and aircraft are needed in this situation for distribution in such remote places, whilst larger vehicles can only be employed in close proximity (Kovas and Spens, 2009). However, in many areas, a lack of or inappropriate addressing complicates an effective response to medical emergencies (Kovas and Spens, 2009).

Additionally, effective communication among all stakeholders is critical during humanitarian assistance operations. The use of information and communication technologies (ICT) can contribute to the effectiveness of the relief effort. The NDRF's use of Google Crisis Mapper, Person Finder, and Unmanned Aerial Vehicles (UAVs) to locate marooned persons in remote locations where roads had been washed away due to the 2013 floods in Uttrakhand exemplified the effectiveness of these approaches (Salay et al., 2016). In Nigeria, (Fonkam and Ukpe, 2013) noted the same thing, stating that using ICT for crisis management is extremely beneficial because information systems enable more flexible emergency response.

Unfortunately, reliable internet access continues to be a barrier in the vast majority of developing countries (Bali et al., 2016). The majority of municipalities do not have supported facilities, which include ICT infrastructure in addition to transportation-related assets, and this is particularly true in rural areas (Kaba, 2007; Osei-Akom, 2007). According to (Bealt, 2016), a lack of adequate information technology systems leads to insufficient information sharing, limited collaborative effort, and, as a result, redundancy of efforts in the workplace. Regrettably, one of the most critical challenges in combating the pandemic was a lack of co - ordination among East African countries (Saleh, 2020). According to (Dan and Aikande, 2020), the Tanzanian government used a different approach to pandemic control than the rest of East Africa. In Tanzania, for example, there were no curfews or restrictions on movement, and citizens were urged to pray to God for relief, undergo fumigation, and use traditional medicine.

Other East African neighbours, such as Kenya and Uganda, have imposed restrictions and lockdowns (African News, 2020; Devermont & Harris, 2020). On the transportation of materials from Tanzania to other East African countries, some Tanzanian drivers who wanted to cross borders to other East and Central African countries were tested positive and were supposed to be quarantined for 14 days, causing delays and late deliveries of materials to final customers (Nakkazi, 2020). In terms of information technology, most Tanzanian societies, particularly in rural

areas, are opposed to internet connectivity. This makes it difficult for them to communicate in a dependable and efficient manner (Mgema and Komba, 2020; Ngwacho, 2020). As a result, the goal of this article was to discover how coordination, transportation, and ICT affect humanitarian logistics in this COVID-19 pandemic, as well as to provide potential solutions that would lead to more successful humanitarian logistics in the future.

### 1.1. Statement of the Problem

The world is at a perilous crossroads, with COVID-19 spreading at an alarming rate on a daily basis. The loss of human life and economic damage caused by the pandemic have reached an alarming level on a global scale. Over 1.5 million people have died, over 64.5 million have been infected, and numerous manufacturing activities have been disrupted globally (WHO, 2020). Governments and other developing partners around the world have made numerous attempts to contain the pandemic due to its enormous impact. UN agencies, WHO regional offices, and non-governmental organizations (e.g., International Committee of the Red Cross, Médecins Sans Frontières) have been at the forefront of humanitarian assistance. They have assisted and continue to assist in a variety of countries, including providing staff training, developing case management and hospital readiness protocols, and supplying testing kits and PCR machines (Karamouzian & Madani, 2020). Governments worldwide have implemented a variety of preventative measures, including a complete lockdown (in which all events are suspended, schools are closed, non-essential shops are closed, non-essential movement is prohibited, and land borders are closed), the wearing of masks, and hand washing.

### 1.2. Main Objectives

To determine the factors affecting efficient humanitarians logistics toward combating COVID 19 pandemic in Tanzania.

#### 1.2.1. Specific Objectives

i. To determine the role of coordination among partners of humanitarian logistics towards combating the COVID-19 pandemic in Tanzania.
ii. To determine the influence of transportation on efficient humanitarian logistics toward combating the COVID-19 pandemic in Tanzania.
iii. To determine the role of information communication technology in efficient humanitarian logistics toward combating the COVID-19 pandemic in Tanzania

### 1.3. Significance of the Study

This research is significant as it will contribute important solutions to difficulties that result in inefficient humanitarian logistics in the fight against COVID 19. COVID-19's spread, as is well known, is a global overarching issue owing to its impact on human lives and overall economic ruin around the world (Sanchez, 2020).

## 2. Literature Review

### 2.1. Role of Coordination on Humanitarian Logistics

Coordination, according to (Malone and Crowstone, 1990), is the act of managing the interdependence of activities performed to accomplish a goal. This definit2.ion exemplifies the interdependence of disaster relief organizations and all responding organizations, all of which share the common goal of saving lives. Sanchez (2020) demonstrates that, while all stakeholders in disaster relief share a common goal, their backgrounds, experiences, and perspectives vary. To avoid confusion, contradiction, and duplication of effort, effective coordination is required, in which each stakeholder has well-defined, well-defined, and well-known roles from the perspective of the other stakeholders.

Additionally, effective coordination benefits logistics operations by allowing for the sharing of experiences and knowledge, which increases efficiency, reduces costs, improves quality, and increases the flexibility and speed of operations (Bealt et al., 2016). Coordination, according to (Gazley and Brudney, 2007) can result in a variety of benefits, including cost savings, improved service quality, organizational learning, access to new skills, risk diffusion, enhanced public accountability, the ability to buffer external uncertainties, and conflict avoidance.

Coordination can be classified as horizontal or vertical. Horizontal coordination entails relationships within an organization or community; vertical coordination entails relationships between two or more organizations that share responsibilities, resources, and performance data in order to serve relatively similar end customers (Kaynak & Tuer, 2014). However, in all forms of coordination, an effective communication system is critical. To avoid confusion, information should come from a single well-known source. Electronic coordination and communication systems are more efficient than manual coordination systems, which have a high rate of failure due to their slow response times when dealing with victims. Therefore, the coordination process should be aided by an integrated information system (Handayani and Mustikasari, 2018). The experience in Japan in 2010 demonstrates that the disaster management process failed due to insufficient coordination, which was exacerbated by a lack of political leadership, a delayed response by government and nongovernmental organizations to disaster relief, some military constraints, and an inefficient communication system (Panda, 2012).

The absence of adequate coordination among humanitarian aid partners is felt in many ways in the wake of the worldwide calamity caused by the coronavirus epidemic. For example, there is a global inconsistency in the use of proper drugs for disease therapy. While President Trump advocated the use of chloroquine for his population, European countries objected (Yazdany & Kim 2020), and in African countries, the use of traditional medicine is common (Temesgen et al., 2020), which was questioned by WHO because it had never been approved. Furthermore, the use of some protective equipment, like as masks, varies from country to country. While some countries (like as Singapore) advocated for the use of masks by all citizens, others advised that such masks be worn exclusively by sick people (Ohanube, 2020).

In addition, when the pandemic initially emerged in China, the United States expressed concern to WHO about how it handled the situation. As a result, it cut off all financial support to WHO, which had a significant impact on worldwide efforts to combat the illness (Fong & Devanand, 2020). Poor coordination, such as that which is currently being experienced around the world in dealing with the Corona virus, may result in the pandemic becoming resistant and thus persisting for a longer period of time, causing more deaths and severe economic destruction around the world (Kaynak & Tuer, 2020). As commented by (Thévenaz and Resodihardjo, 2010), a lack of coordination leads to duplication of efforts, inefficient and ineffective resource use, and relief operations that are delayed, slowed, or hindered.

**2.2 Role of Transportation on Humanitarian Logistics**

In humanitarian logistics, transportation is crucial. Because transportation accounts for a considerable percentage of supply chain expenses and plays a vital role in achieving customers' expectations (on-time delivery, short lead times), effective transportation increases the overall performance of humanitarian relief (Balcik et al., 2010). It assists in the transfer of necessary supplies, equipment, and facilities to the appropriate locations. There is a strong demand for transferring people, equipment, and supplies from one location to another during this coronavirus pandemic. It is in high demand to transport health facilities and drugs from a warehouse or manufacturer to hospitals (Sanchez, 2010). In addition, patients or dead bodies who have died at home must be collected and prepared for burial (Arellanam et al., 2020).

However, one of the most difficult challenges for many developing countries is the lack of adequate transportation facilities. Not only that, but the road conditions in most parts of the country, particularly during the rainy season are impassable (Kovács & Spens, 2009). According to Namagembe (2019), throughout most of southern Africa, assistance distribution is hampered by rough or gravel roads, as well as a lack of or inadequate bridges. Vehicle breakdowns and accidents are common due to the status of the road network, which includes several dirt roads (Kovács & Spens, 2009). This makes the transfer of medicine and other necessities to rural places extremely difficult. Because of this gap, controlling the pandemic will be extremely difficult, and the disease will be able to stay in our community for an extended amount of time. Also, poor infrastructure and bad house planning also stymie effective humanitarian aid. There is no adequate pass route between residences in most unsurvey locations. As commended by (Kovács and Spens , 2009) that many regions in Ghana have little or no street signs and names, complicating the response to fire and emergency situations. This necessitates the use of drones to deliver medications and other emergency services to residents of inaccessible locations (Shavaranim, 2017).

**2.3 Applications of Information and Communication Technologies**

ICT has become a primary asset for information coordination and exchange among stakeholders at all stages of the disaster management cycle (Raymond et al., 2015). ICT can take many forms, ranging from two-way radios and cell phones to humanitarian web forums and social media sites. These platform features are critical for rapid information transmission during disaster relief efforts (Bjerge et al., 2016). The use of information and communication technology (ICT) in the fight against the coronavirus pandemic is becoming increasingly critical. It cannot be overstated how critical it is to receive timely and accurate information. Different parties could coordinate the humanitarian mission more efficiently through the use of ICTs (Tatham et al., 2017). For instance, by utilizing a warehouse management system and radio frequency identification, such ICTs assist relief operators in determining demand, tracking order status, and planning an efficient distribution procedure (Smith, 2005). Other ICT applications, such as GPS and geographic information systems, are also beneficial during the evacuation. These applications are advantageous for locating patients, particularly those who are concealed or unavailable (Tohidi and Rustamov, 2020). Additionally, effective communication between decision-makers at various levels and operational response teams/personnel on the ground is critical to the success of the humanitarian operation (Lal, 2019).

However, the availability of information systems and skills are among the key constraints that hinder humanitarian relief in most areas of poor countries, as per experience. According to (Thomas and Kopczak, 2007), information systemic weaknesses are caused by a lack of available software that can handle humanitarian supply chain operations, unstable internet services, inadequate equipment, and a lack of qualified and competent ICT employees. Lack of proper IT systems, according to Bealt et al., (2016), leads to inadequate information exchange, restricted collaboration, and duplication of efforts among partners. Poor IT infrastructure can also function as a barrier between humanitarian groups and logistical service providers, as shortcomings in this area can result in costly blunders and inefficient time management (Bealt et al., 2016).

2.4 Performance of humanitarian operations

The performance of rescue efforts is a critical component of disaster management. Due to the diversity of stakeholders involved in the relief operation, each with their own unique history and experience, the relief operation's execution has become a point of contention (Dangi et al, 2012). As a result, those involved in the operation must have well-defined, achievable goals. Numerous metrics of relief operation performance have been recognized in studies (Beamon & Balcik, 2008; Bardhan and Dangi, 2016), such as relief service coverage, relief chain flexibility, cost, availability of relief services, relief service quality, relief service timeliness, and relief service equity.

## 3. Methodology

The study employed an explanatory research design with the goal of establishing a causal link between variables (Saunders et al, 2012). This strategy was used to investigate the relationship between independent and dependent variables. Six referral hospitals in Dar es Salaam and the Coastal Regions were included in the study. The target population consisted of 300 respondents who had participated directly in the Covid 19 relief operation. The sample size was determined using a simplified Yamane Formula of 1967, where n denotes the required sample size, N denotes the target population, and e denotes the level of confidence, which in this case is 5%. 175 respondents were chosen at random from 312 employees using a simple random sampling technique. However, only 152 respondents out of 175 returned completed questionnaires.

The questionnaire was self-administered and personally delivered to participants via the drop-off and pick-up method (DOPU). The questionnaire gathered biographical information about the study participants as well as information about the procurement performance. The questionnaire items were operationalized using 5-point Likert scales ranging from 1 to 5, with 1 indicating strong disagreement and 5 indicating strong agreement. The descriptive and inferential statistics used in this study were both descriptive and inferential. The data were presented descriptively using frequency distribution tables. Mean scores with their associated standard deviations were computed for each item and construct. Additionally, exploratory factor analysis (EFA) was used to ascertain whether previously identified items define a specific construct. At this stage, reliability and construct validity were determined. For each defined construct, factor scores were computed and prepared for use in multiple linear regression analysis. To ascertain the relationship between independent and dependent variables, multiple linear regression analysis was used. The study tested the multiple linear regression model's assumptions of linearity, homoscedasticity, the absence of multicollinearity, and residual normality. (2012) (Saunders et al., 2012).

The multiple linear regression model that was used is given as follows;
$Y = \alpha + ß1X1 + ß2X2 + ß3X3+ + Ɛ$. Where: Y = Procurement performance; $\alpha$ = Constant of Regression; ß = Beta Coefficients; X1 = coordination; X2 = transportation; X3 = Information Communication Technology; and Ɛ = Error of Regression.

## 4. Research Findings and Discussion

### 4.1. Demographic Characteristics of the Respondents

The demographic characteristics of the respondents are show in the Table 1;

**Table 1: Demographic Characteristics of the Respondents**

| Variable | Frequency (Percentage) | |
|---|---|---|
| **Sex** | | |
| Male | 94 | 61.8 |
| Female | 58 | 38.2 |
| **Age** | | |
| 18-25 years | 34 | 22.4 |
| 26-45 years | 81 | 53.3 |
| 46-60 years | 37 | 24.3 |
| **Level of education** | | |
| Certificate | 11 | 7.2 |
| Diploma | 38 | 25.0 |
| Bachelor | 70 | 46.1 |
| Master degree | 27 | 17.8 |
| Doctorate | 06 | 3.9 |
| **Work experience** | | |
| Less than 5 years | 24 | 15.8 |
| 6-10 years | 43 | 28.3 |
| 11-15 years | 42 | 27.6 |
| 16-20 year | 33 | 21.7 |
| Above 20 years | 10 | 6.6 |

#### 4.1.1 Gender of Respondents

The gender of the respondents was determined, and the results indicated that 94 (61.8%) of respondents were male and 58 (38.2%) were female. This indicates that the vast majority of respondents were men.

#### 4.1.2 Age of Respondents

According to their ages, the majority of 81 (53.3 percent) were between the ages of 26 and 45, while 34 (22.4 percent) were between the ages of 18 and 25, and 37 (24.4 percent) were between the ages of 46 and 60. This indicates that the vast majority of respondents (77.6 percent) were over the age of 25 and sufficiently mature to participate in the study and provide rational responses.

#### 4.1.3 Educational Attainment

The respondents' educational attainment was analyzed, and it was discovered that 11 (7.2 percent) held a certificate, 38 (25.0 percent) held a diploma, and 70 (46.1 percent) held a bachelor's degree. Twenty-seven (17.8%) respondents held a master's degree, while only six (3.9%) held a doctorate. This indicates that the majority of respondents (67.8 percent) were educated beyond a bachelor's degree.

#### 4.1.4. Work Experience

The study sought to ascertain the work experience of parastatal employees in order to determine the extent to which their responses could be relied upon when drawing conclusions. According to Figure 4.1, 24 (15.8 percent) of respondents had between one and five years of experience. Slightly more than a quarter of respondents, 44 (28.3 percent), had between 6 and 10 years of experience; 42 (27.6 percent) had between 11 and 15 years; 33 (21.7 percent) had between 16 and 20 years; and 10 (6.6 percent) had over 20 years.

### 4.2. Descriptive Analysis

#### 4.2.1. The role of coordination among partners of humanitarian logistics towards combating COVID 19 pandemic

The respondents were asked to rate their agreement with several statements in order to determine the extent to which coordination among humanitarian logistics partners aids in combating the COVID-19 pandemic. Table 2 summarizes the responses' averages and standard deviations;

**Table 2: The role of coordination among partners of humanitarian logistics towards combating COVID 19 pandemic**

| | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|
| There are adequate meetings to discuss the relief operation | 1.00 | 5.00 | 3.33 | .77 |
| All stakeholders participate in the decision making | 1.00 | 5.00 | 3.31 | .81 |
| All stakeholders are under the one control | 1.00 | 5.00 | 3.31 | .79 |
| The information on relief operation are disseminated to all stakeholders at the right time. | 1.00 | 5.00 | 3.32 | .80 |

The respondents concurred that sufficient meetings are held to discuss the relief operation (mean 3.33). This means that all parties involved in the relief effort met to discuss how to respond to the pandemic. Additionally, respondents agreed that all stakeholders should be involved in decision-making (mean 3.31). All respondents agreed that all stakeholders are controlled by a single entity (3.31). These findings corroborate those of (Panneer et al., 2021), who discovered that China and Singapore were able to contain the pandemic due to their use of large-scale coordination as an institutional and timely response, as well as their collaboration with government, industry, banks, and financial institutions, as well as their efforts to promote community resilience.

These findings, however, contradict (Panda , 2012)'s finding that there was no coordination among the relief operation's partners following the 2010 Japanese earthquake. The relief operation became more complicated as a result. Finally, respondents agreed that all information regarding relief operations should be made available to all stakeholders at the appropriate time (3.32). This finding is consistent with (Handayani and Mustikasari's, 2018) observation that effective information sharing facilitates relief operation coordination.

#### 4.2.2. The role of transportation on efficient humanitarian logistics towards combating COVID 19 pandemic

The respondents were asked to rate their agreement with several statements in order to determine the extent to which transportation as part of logistics operations aids in the fight against the COVID-19 pandemic. Table 3 summarizes the responses' averages and standard deviations.

**Table 3: The role of transportation on efficient humanitarian logistics towards combating COVID 19 pandemic**

| | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|
| There are adequate facilities for distribution of relief requirements. | 1.00 | 5.00 | 2.21 | 1.04 |
| The required materials/ facilities received at right time. | 1.00 | 5.00 | 2.25 | 1.07 |
| The road infrastructure facilitates the relief operation. | 1.00 | 5.00 | 3.90 | 1.05 |
| The adequate numbers of operators who facilitate the relief operation | 1.00 | 5.00 | 3.94 | 1.05 |

The respondents disagreed that there were adequate facilities for the distribution of relief requirements (2.22). Also, the respondents disagreed that the required facilities for relief operations like cylinders of oxygen gas, ventilators, masks, overalls, and sanitizers were not delivered at the right time. This implies that a lack of enough transportation/distribution equipment leads to a delay in the availability of the required materials. However, the respondents agreed that the road infrastructure facilitates the relief operation as it is, in most cases, passable. This finding is contrary to the finding of ( Kovas and Spens , 2009), who revealed that in most parts of developing countries like Ghana, the roads become impassible, especially during the rainy seasons. This may be due to the fact that the study was conducted in Dar es Salaam and the Coastal region, where, to some extent, the road infrastructure was in good condition. Lastly, the respondents agreed that there were adequate numbers of operators who could facilitate the relief operation. This implies that drivers and other cargo handling operators were sufficiently trained to undertake the required tasks.

### 4.4. The role of Information Communication Technology on efficient humanitarian logistics toward combating COVID 19 pandemic

Respondents were asked to rate their level of agreement with several statements in order to determine the extent to which information communication technology aids in the fight against the COVID-19 pandemic. Table 4 shows the response averages and standard deviations.

**Table 4. The role of Information Communication Technology on efficient humanitarian logistics toward combating COVID 19 pandemic**

| | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|
| There are adequate ICT facilities for coordination of all stakeholders in the relief operation | 1.00 | 5.00 | 2.33 | .97 |
| There are ICT facilities for planning and distribution of the relief requirements. | 1.00 | 5.00 | 3.98 | 1.05 |
| There are ICT facilities for the effective sharing of information of all partners of relief operation. | 1.00 | 5.00 | 3.97 | .99 |
| There are ICT facilities for decision making on the relief operation | 1.00 | 5.00 | 3.88 | 1.07 |

The findings indicated that respondents disagreed that adequate ICT facilities exist to coordinate the efforts of all stakeholders involved in the relief operation (2.33). This means that some health workers may lack access to a computer connected to the internet, which facilitates stakeholder coordination, or may work in areas with unstable and unreachable internet facilities. This finding is consistent with that of Bealt et al. (2016), who discovered that many health facilities in the Dar es Salaam region have internet connectivity.

Furthermore, respondents agreed that information and communication technology (ICT) facilitates the planning and distribution of humanitarian assistance (3.98). Additionally, respondents agreed that information technology facilitates effective information exchange (3.97) and, finally, that information technology facilitates decision-making during relief efforts (3.88 ) This finding is consistent with ( Tatham et al., 2017), who discovered that utilizing ICTs increases the efficiency with which various stakeholders coordinate humanitarian operations.

### 4.5 The performance of the Humanitarian Logistics

The respondents were asked to rate their agreement with several statements in order to determine the extent to which humanitarian logistics performed in combating the COVID-19 pandemic. Table 5 summarizes the responses' averages and standard deviations.

**Table 5. The Performance of the Humanitarian Logistics**

| | Min | Max | Mean | Std. Dev. |
|---|---|---|---|---|
| The quality of services was of the required standard | 1 | 5 | 3.87 | 1.06 |

| | | | | |
|---|---|---|---|---|
| There was minimum complaints from the victims/ patients | 1 | 5 | 3.88 | 1.08 |
| The affected person received the relief / aid at right time. | 1 | 5 | 3.88 | 1.10 |
| The relief operations were conducted at minimum cost | 1 | 5 | 3.87 | 1.11 |

The respondent acknowledged that the quality of services offered by different centers in relation to the coronavirus met the required standard, according to the findings (3.87). Furthermore, the majority of respondents (3.88) felt that there were only a few complaints from victims or patients in need of assistance. Furthermore, the respondents agreed that the afflicted person received relief services at the appropriate time (3.88), and that the relief operations were carried out at a low cost (3.87). These findings are consistent with those of (Bardhan and Dangi, 2016) who found that the success of relief operations is largely dependent on excellent coordination, efficient logistics, and effective communication among all relief partners.

**4.5. Inferential Statistics**

**4.5.1 Reliability Test**

To determine the reliability of the study variables, they were subjected to a reliability test. According to Sekaran and Bougie, the reliability of measurement instruments in this investigation was determined using the Cronbach's alpha coefficient (2009). Cronbach's alpha of 0.7, the authors assert, indicates the instrument is reliable. The reliability scores for the variables included in this study are as follows: As shown in Table 6, coordination is.880, transportation is.850, information communication technology is.832, and humanitarian aid operation performance is.838. As a result, all instruments with variable parameters are trustworthy

**Table 6: Reliability Statistics**

| Variable | Cronbach's Alpha | No of Items |
|---|---|---|
| Coordination | 0.880 | 4 |
| Transportation | 0.850 | 4 |
| Information Communication Technology | 0.832 | 4 |
| Humanitarian operation performance | 0.838 | 4 |

**4.5.2 Multi-Collinearity Test Result**

Both tolerance and variance inflation factors were used to determine whether the independent variables were correlative. Table 7 summarizes the results of the multicollinearity test.

**Table 7: Multi-Collinearity Test Results**

| | Collinearity Statistics | |
|---|---|---|
| | Tolerance | VIF |
| Contract preparation | .641 | 1.559 |
| Competence of contract mgt. team | .377 | 2.653 |
| Allocated Budget | .358 | 2.790 |

The results above indicate that the variables are not collinear (tolerance factors of 0.641, 0.377, and 0.358, respectively). The variables have a VIF of less than 5, which is considered acceptable (1.559, 2.653, and 2.790, respectively). The strength of the relationship between the research variables was determined using Karl Pearson's coefficient of correlation. At a 95% confidence level, it was determined that all of the factors correlated positively (p 0.05).

**4.5.3. Kaiser-Meyer-Olkin (KMO) and Bartlett's Test**

Kaiser-Meyer-Olkin was used to determine sampling adequacy. Table 8 summarizes the findings.

**Table 8: KMO and Bartlett's Test**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .945 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 3338.627 |

Kaiser-Meyer-sampling Olkin's adequacy value was 0.945, which is greater than the threshold value of 0.5, and Bartlett's test of sphericity was statistically significant (p=.000), indicating that the variables under study are factorable.

**4.5.4 ANOVA F Test**

The ANOVA F test was used to determine whether the overall model fit met acceptable levels of statistical criteria. Table 9 contains the results.

**Table 9: Anova**

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
| | Regression | 165.566 | 3 | 55.189 | 180.537 | .000[b] |
| | Residual | 72.449 | 237 | .306 | | |
| | Total | 238.015 | 240 | | | |

According to Table 9, the overall model fit is satisfactory, as the p-value for the regression model F test is.000, which is less than the critical p-value (0.05) at a 95 percent confidence level. As a result, the model is highly significant in concluding that the three independent variables competence, independence, and management support all predict the performance of humanitarian relief.

**4.5.5. Model for Regression**

Table 10 summarizes the regression model's findings

**Table 10: Regression Model Summary**

| Model Summary[b] | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| | .834[a] | .696 | .692 | .55289 | 1.686 |

The adjusted R squared value was 69.6, indicating that coordination, transportation, and information communication technology could account for approximately 69.6 percent of the change in humanitarian relief performance. Other factors not included in the model could account for the remaining 30.4 percent variation in procurement performance.

**4.5.6 Regression Model Result**

Table 11 summarizes the regression model's output.

**Table 11: Regression Model Result**

| | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | T | Sig. |
| Constant | -1.011 | .217 | | -4.655 . | 000 |
| Coordination | .468 | .065 | .321 | 7.181 | .000 |

| | | | | | |
|---|---|---|---|---|---|
| Transportation | .398 | .093 | .251 | 4.293 | .000 |
| Information and communication Technology | .548 | .085 | .385 | 6.424 | .000 |

Coordination was found to have a coefficient of 0.468 (p-value = 0.00). This means that a unit increase in coordination results in a 46.8 percent increase in the performance of parastatal organizations providing humanitarian assistance. Additionally, transportation has a coefficient of 0.398 (0.00 p-value). This means that a unit increase in transportation efficiency results in a 39.8 percent increase in humanitarian relief performance. Additionally, the coefficient for information and communication technologies is 0.548 (0.00 p-value). This means that an increase in information and communication technology by 54.8 percent increases the effectiveness of humanitarian assistance. All three components had a positive effect on the performance of humanitarian relief (coordination, transportation, and information and communication technology). This can be summarized using the regression equation. Table 10 summarizes the regression model's output. Performance (Y) = -1.011+0. 468 X1+0.398 X2 + .548X3+e

## 5. Conclusion and Recommendations

### 5.1. Conclusion

According to the study findings, coordination, transportation, and information and communication technology have a positive effect on humanitarian relief performance. That is, as coordination, transportation, and information and communication technology improve, so will humanitarian relief performance, and vice versa.

### 5.2. Recommendations

According to the study's findings, it is recommended that organizations should ensure that there are adequate facilities for the distribution of relief requirements, the required materials/facilities are received at the right time, and there are adequate ICT facilities for coordination of all stakeholders in the relief operation for better humanitarian relief operation performance.

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