An Empirical Investigation of Factors Affecting Humanitarian Logistics Operations: The Case of Palestine

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Abstract

This paper aims to investigate the factors affecting the operations and efficiency of Humanitarian Logistics (HL) through its three main phases of preparedness, response, and recovery in the developing country context of Palestine. A quantitative research methodology using a survey instrument was employed in this study through which data were collected from 108 HL offices in government, NGOs, and other private logistics institutions operating in Palestine. Data were analyzed for its empirical significance on SPSS V21.0 using Pearson Correlation coefficient test. The results show that the most influential factor on efficiency of preparedness phase was "planning for logistics operations", whereas the most influential factors on response and recovery phases were "logistics technical operations" and "logistics, governmental, organizational and infrastructure issues", respectively. Furthermore, there is a positive correlation between factors of preparedness phase and efficiency of both response and recovery phases, and between factors of response phase and efficiency of recovery phase. This study provides valuable insights for HL organizations, NGOs, and policymakers on factors required to enhance efficiency and overall performance of HL management in Palestine and other developing country context with similar political and economic challenges.

Keywords
Humanitarian logistics, Logistics management, Logistics efficiency factors, Disasters management, Palestine.

1. Introduction
When a disaster hits a community, an expected instant response of rescue and evacuation operations is rapidly initiated to help the affected victims (Alexander 2019). To achieve the required efficiency, all parties must efficiently manage HL in each phase of disaster management, as this constitutes one of the most dominant factors affecting HL success (Koseoglu & Yıldırımlı 2015). HL is defined as operations of rescue and evacuation of affected people, utilizing resources and knowledge to help vulnerable or affected people by a disaster (Paciarotti et al. 2021). In fact, building a robust HL system is the first step in the process of effectively responding for a disaster (Shafiq and Soratana 2019). Therefore, HL play an important role in the management of the response supply chain (Cozzolino 2012). This means that the success or failure of emergency operations can be determined by logistics efficient management since aid, relief efficiency, and speed all depend on logistics deployment efficiency (Agostinho 2013).

HL is a vast scale displacement operation of victims and their needs. This scale creates complex conditions with hard challenges (Agostinho 2013; Apte 2009; Daud et al. 2016). Complexity comes because of interaction between many factors, such as availability of roads and fuel, facilities for storage and transfer, people movement or evacuation,

movement of humanitarian stuff, NGOs capacity, logistics knowledge, supporting communication technologies, and adequate funding (Daud et al. 2016). However, developing countries usually suffer from high losses in lives and properties caused by disasters. Such high numbers of losses are due to the absence of adequate disaster risk measures at governmental and HL management programs (Oloruntoba and Banomyong 2018). This makes communities vulnerable and very sensitive to disasters (Oloruntoba and Banomyong 2018; Banomyong et al. 2019). In addition to, previous studies reported several deficiencies in the developing country's structures, especially in fields of economy, communication, technology, health, and transportation (Banomyong et al. 2019). These deficiencies create unprecedented challenges for HL operations in developing countries' context (Shafiq and Soratana 2019).

Palestine is a developing country that is facing exceptional and critical political, economic, and security challenges in the occupied territories for more than 74 years, leading to unprecedented levels of humanitarian vulnerability (Hawajri, 2016). Therefore, Palestine is classified among those countries with the most fragile HL with low vulnerability index scores (Heaslip et al. 2018). The major causes of humanitarian vulnerability in Palestine are the continuous Israeli occupation, limitation of resources, and weak transportation and technological infrastructure (USAID 2011). In fact, Hawajri (2016) pointed out that more studies are needed to better understand factors affecting HL in Palestine before solutions can be proposed. According to author, HL improvement is a priority to reduce risks of both natural and man-made disasters when they happen. Furthermore, report released by UNDAC (2018) revealed that lack of awareness of factors affecting disasters management and HL in Palestine is preventing effective improvement plans for humanitarian operations. Thus, there is a pressing need for exploring factors affecting HL management and effectiveness in Palestine.

Emanating from the above, the main aim of this paper is to investigate the factors affecting management and efficiency of HL in the developing country context of Palestine. Furthermore, the paper uses the lens of the three phases of HL of preparedness, response, and recovery (Kovács and Spens 2007; Pache 2014; Koseoglu and Yıldırımlı 2015), to provide evidence on specific stage of the HL that needs investment and attention of NGOs and policymakers. Findings of this study is significantly valuable as there is absence of studies that explore the factors affecting HL with the consideration of the three stages of HL in Palestine. Therefore, this paper is considered among the first studies to analyze stages of HL in the Palestinian case. The next section provides the literature review conducted on three phases of HL and factors affecting HL in developing countries. Next, research methodology is presented including data collection and analysis. Finally, results will be discussed, and conclusions will be provided.

2. Factors Affecting HL in Developing Countries

HL is concerned with delivering the relief material in emergency situations to save human lives, minimize loss, and provide relief operations (Overstreet et al., 2011; Thiruchelvam, et al. 2018; Rao 2017). Thus, HL is defined as the process of planning, investigating, and controlling the efficient flow and storage of goods and materials based on information for the purpose of reducing the suffering of victims (Overstreet et al. 2011; Abdulkarim et al. 2021). HL include activities such as procurement, storage, fleet management, materials handling, and transportation (Overstreet et al., 2011), evacuation of personnel, and management of resource, facilities, security, and communication (Khan et al., 2019). Successful HL operations mean fewer losses, more saving of lives, stopping or minimizing deterioration, and rapid recovery (Thiruchelva et al. 2018; Agostinho 2013; Cozzolino 2012; Shafiq and Soratana 2019; Apte, 2009; Paciarotti et al., 2021). Notably, HL is the core concept of relief operations. However, HL operations are costliest set of operations in the disaster management processes (Abdulkarim et al. 2021). Around 80% of relief expenses are payed for logistics, 65% of which are related to purchasing cost for different requirements such as materials and equipment, and the other 15% is related to transportation, handling, and storage cost (Apte 2009; Koseoglu & Yıldırımlı 2015; Paciarotti et al. 2021). All these expenses do not include the expenses of logistics preparedness operations (Apte 2009). Therefore, HL should be carefully planned at all stages to optimize resources allocations.

Developing countries are more affected by disasters than many other developed countries (Patel and Jay, 2019). There is clear increase in losses resulting from disasters in developing countries due to unplanned urbanization, insufficient investment in disaster management activities, and lack of information and knowledge at government levels on disaster mitigation strategies (Gavidia 2017; L'Hermitte 2015). As a result, humanitarian relief operations are handled with poor logistical support (Habermann and Hedel, 2018; Thiruchelvam, et al. 2018). These inefficiencies in HL activites in developing countries directly affect the delivery time of relief and accuracy of assessments of disaster impacts (Abdulkarim et al., 2021). The weak economies of developing countries and the inappropriate infrastructure of disaster

vulnerable areas pose another threat for humanitarian aid operations (Koseoglu & Yıldırımlı 2015). These infrastructure problems in developing counties are represented by weak capacities in airports and ports, risky storage areas, shortage in equipment, poor conditions of railroads and highways, limitations of tunnels and bridges, poor road signal systems among other issues impacting efficiency of HL in such countries (Jiang & Yuan 2019; Koseoglu & Yıldırımlı 2015). In addition, Oloruntoba and Banomyong (2018) added that challenges of HL in developing countries also include partnership challenges where local institutions in developing countries have limited connections with global institutions with vast experience in dealing with natural and man-made disasters. Moreover, Shafiq and Soratana (2019) categorized challenges of HL in developing countries into two categories. First, the pre-disaster challenges such as poor alert systems, multiple and inconsistent data sources, and the lack of community awareness. Second, the disaster response challenges such as weak coordination between involved parties which leads to unnecessary delays in relief operations (Shafiq & Soratana 2019; UNDAC 2018).

In the same vein, Çelik et al. (2012) assured that HL in developing countries is more complex than those in developed countries for several reasons. These include wars and political conflicts that are more seen in developing countries than in developed countries. According to report, HL, in such cases, have unprecedented challenge to access affected areas to help victims, which can only happen when an immense effort of coordination is made between conflicting parties. The report also explains that access to information in war and political unrest areas is another major factor limiting efficiency of HL. These factors are like those noticed in Palestine (Hawajri 2016).

3. Phases of HL and Hypotheses Development

According to Pache (2014) and Koseoglu and Yıldırımlı (2015), HL is divided into three main phases. These are presented and explained below:

- Preparedness phase (pre-disaster): which consists of many activities such as vulnerabilities assessment, emergency planning, building of coordination system, response mechanisms mobilization, establishing early warning systems, purchasing, storing relief materials, training, educating the community, and establishing logistics centers (Khan et al. 2019; Koseoglu & Yıldırımlı 2015).
- Response phase (when disaster happen): In this phase, the humanitarian relief and emergency services are deployed to affected areas. Responsivity is the most crucial issue in all operations in the response phase, as effective rapid response means saving lives, reducing damage, and limiting losses (Thiruchelvam et al. 2018; Koseoglu & Yıldırımlı 2015).
- Recovery Phase (Post-disaster): this phase includes activities that aim at rebuilding or maintaining the affected buildings and infrastructure (Koseoglu & Yıldırımlı 2015; Pache 2014). It also includes activities that aim at normalizing the lives of affected people (Khan et al. 2019; Koseoglu & Yıldırımlı 2015).

According to Apte (2009), challenges facing the three phases of HL are major contributors to lack of efficiency of HL. This was also confirmed by Özdamar et al. (2015) who explained that challenges to HL should be viewed at four different levels. These are: shortages of logistics experts, inappropriate assessment and planning techniques, limited collaboration and coordination between HL key players, and dependance on manual approached to manage supply chains and logistics. Özdamar et al. (2015) also added that to enhance successfulness of HL, it is vital that these challenges are mitigated to enhance performance of HL, especially in poorer geographical regions in the world. Consequently, Kovács and Spens (2007) attempted to examine classification of challenges facing HL efficiencies and robustness. In addition to already identified challenges impacting HL success, they found that government and NGOs organizational factors are also posing a pressing issue for HL performance. According to them, staff training and education, increasing donations, cooperations between stakeholders, and information management are all factors limiting efficiencies of HL at a global scale. Hellingrath & Widera (2011) also pointed out that enhancing HL performance can only happen when proper information technologies are used among players in all phases of preparedness, response, and recovery of HL.

Overstreet et al. (2011) found that there is a clear conflict in information about the use of funds for HL. Also, there are problems related to the compatibility and the capacity of IT systems that support HL. The author concluded that information management is necessary for entire activities of HL covering pre-disaster and post-disaster phases. Furthermore, infrastructure challenges, starting with the need for transportation planning in areas with damaged road, unrobust communication technologies, and weak transportation infrastructure databases were deemed by Overstreet et al. (2011) and L'Hermitte et al. (2015) as major contributors to limited HL coverage and efficiency in several previous disaster and relief operations. This view urged L'Hermitte et al. (2015) to recommend assessing

infrastructure capabilities and problems at every step in the process of planning for HL. This was also supported by the work of Jiang and Yuan (2019). Additionally, Shafiq and Soratana (2019) investigated how political and governmental factors, such as lack of humanitarian operations policies and coordination procedures, can impact HL operations. Authors found that governments policies and coordination between all departments supporting HL is not only required before disasters, but during and after disasters as well. These finding were also congruent with the work of Hellingrath and Widera (2011) who explained that organizational and governmental issues (politics and regulations) are among the main challenges facing HL performance and highlighted that governments should devise clear strategies to enhance HL planning and operations, based on participatory approach of all stakeholders.

Based on the previous discussions, it is obvious that efficiency of HL can only be enhanced when the entire HL lifecycle is well-managed (i.e., pre-disaster, during, and post-disaster phases). Therefore, in this study factors affecting HL efficiency during preparedness phase included HL planning, HL governmental, organizational and infrastructure, and HL technical operations factors. Also, factors affecting HL efficiency during disaster response phase included activation of emergency systems, government and infrastructure, and HL technical operations factors. Finally, factors affecting HL efficiency during the disaster recovery phase included HL planning, government and infrastructure, and HL technical operations factors. This conceptualization of factors based on previous studies led to the formulation of the following hypotheses summarized in Table 1 and further clarified in Figure 1.

Table 1. Research hypotheses

No.	**Hypotheses**
H1	Planning for HL in preparedness phase has a positive impact on Palestinian HL efficiency.
H2	Governmental, organizational and infrastructure factors in preparedness phase have a positive impact on Palestinian HL efficiency.
H3	Technical operations factors in preparedness phase have a positive impact on Palestinian HL efficiency.
H4	Efficiency of preparedness phase has a positive impact on efficiency of response phase of Palestinian HL.
H5	Emergency systems activation in response phase has a positive impact on Palestinian HL efficiency.
H6	Governmental, organizational and infrastructure factors in response phase have a positive impact on Palestinian HL efficiency.
H7	Technical operations factors in response phase have a positive impact on Palestinian HL efficiency
H8	Efficiency of response phase has a positive impact on efficiency of recovery phase of Palestinian HL.
H9	Planning factors in recovery phase have a positive impact on Palestinian HL efficiency.
H10	Governmental, organizational and infrastructure factors in recovery phase have a positive impact on Palestinian HL efficiency.
H11	Technical operations factors in recovery phase have a positive impact on Palestinian HL efficiency.
H12	The efficiency of preparedness phase has a positive impact on efficiency of recovery phase of Palestinian HL.

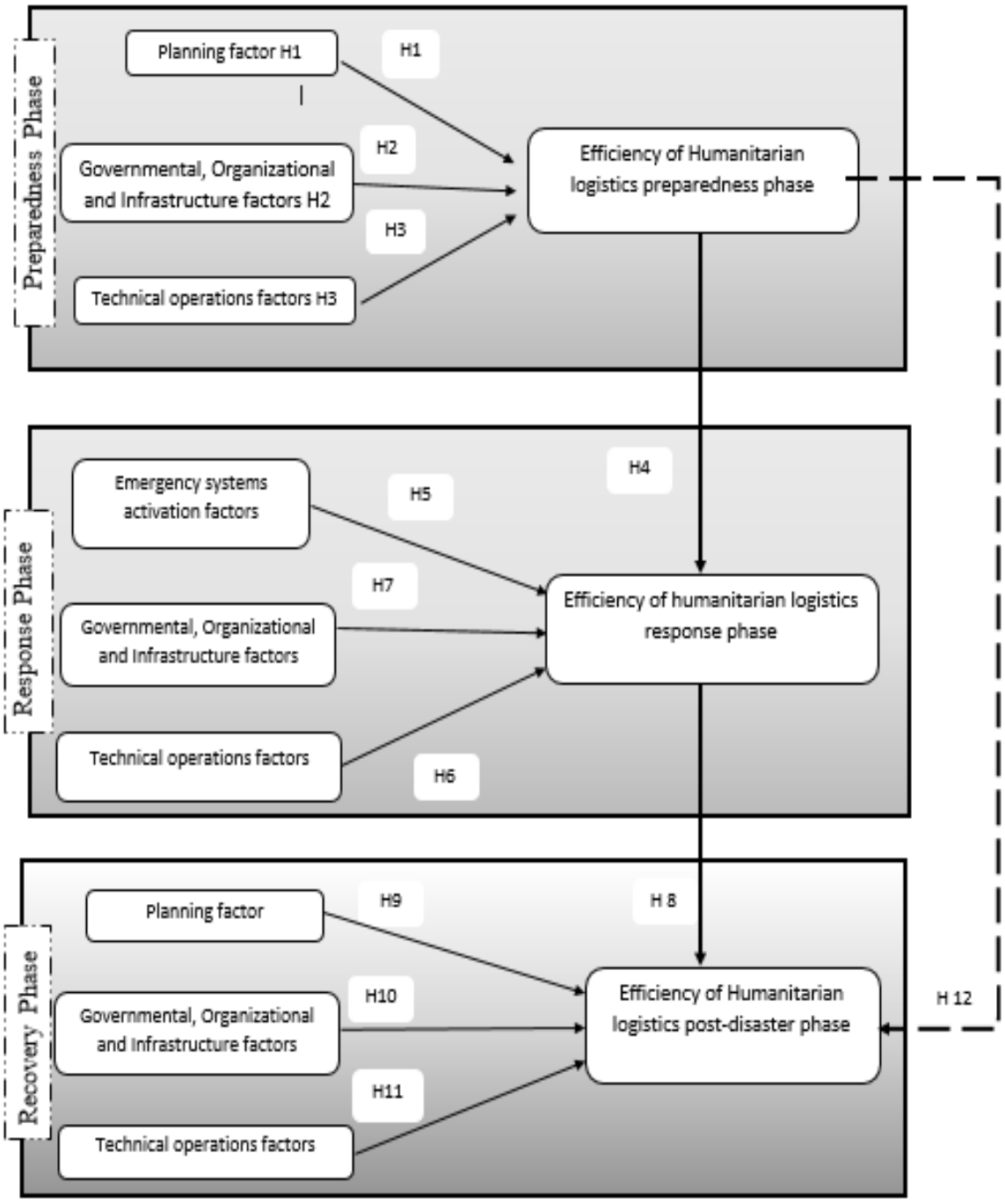

Figure 1. Research conceptual model

4. Research Methodology

A quantitative research methodology using a survey instrument was utilized in this study. The survey instrument was developed based on extensive literature reviews and findings of earlier studies found. The survey consisted of four

main sections. The first section contained 11 items and aimed at collecting demographic information of respondents. The second section included 33 items covering factors affecting preparedness phase of HL. The third section of the survey included 27 items assessing factors affecting response phase of HL. The final section covered 13 items assessing factors affecting recovery phase of HL. A five-point Likert Scale was used to assess factors included in this survey ranging from (1) strongly agree to (5) strongly disagree. To ensure validity and consistency of the research instrument, a pilot sample was tested with ten HL experts and professionals before its deployment. The pilot study indicated that items included in the instrument are clear and easy to understand.

The research population consists of the institutions providing HL services in Palestine including NGOs, GOs, and other private logistics institutions. The Palestinian Civil Defense and United Nations Office for the Coordination of Humanitarian Affairs OCHA were contacted to get a list of institutions or organization that legally works in field of disaster management and provide logistics service as part of their activities. Based on the data provided, the targeted population was 120 institutions. In this study, the entire available population was contacted, and an electronic copy of the survey was provided. A total of 108 surveys were filled and returned providing a represents rate of 67.5 %.

5.Data Analysis and Results

To analyze collected data, the SPSS V21.0 was used. As a first step, the Cronbach Alpha (CA) test was conducted to test the internal consistency of the survey. Based on the result, the reliability of all elements of the survey is above 91%, and the total reliability of the survey is above 97%, which is considered a high value. Results of CA test is shown in Table 2.

Table 2. Cronbach Alpha Test Results

Phase	Stage	No. of items	*Cronbach's Alpha*		
Disaster Preparedness Phase	Planning for logistics	18	0.906		
	Logistics governmental, organizational and Infrastructure issues	6	0.902		
	Logistics technical operations issues	9	0.856	0.944	
Disaster Response Phase	Activation of Emergency Systems	3	0.825		
	Logistics governmental, organizational and Infrastructure issues	9	0.857	0.945	0.973
	Logistics technical operations issues	14	0.929		
Post-disaster Phase	Planning for logistics	3	0.812		
	Logistics governmental, organizational and Infrastructure issues	5	0.860		
	Logistics technical operations issues	5	0.838	0.916	

To test the hypotheses formulated in this research, the Pearson correlation coefficient test was used. Table 3 shows the correlation coefficients between each component as an independent variable and the phase of HL as a dependent variable.

The results indicate that all tested hypotheses were accepted. In specific, the results shows that there is a correlation between the preparedness phase and its components, where each component is affecting efficiency of its phase ($P \leq 0.05$). The results show that, at preparedness phase, the most significant independent variable is "planning for logistics" factor followed by "logistics governmental, organizational and Infrastructure issues", whereas the least significant factor is the "logistics technical operations issues" factor. Similarly, at response phase ($P \leq 0.05$), the results show that "logistics technical operations issues" is the most significant independent factor followed by "logistics governmental, organizational, Infrastructure issues", and the least significant factor is the "activation of emergency systems". Finally, the results suggest that "logistics governmental, organizational and Infrastructure issues" is the most significant independent factor at the recovery phase ($P \leq 0.05$), and that the second most significant factor is

"planning for logistics factor", while the least significant factor is the "logistics technical operations issues". These results are further illustrated in Figure 2.

Table 3. Correlation Coefficients of the Components

Phases of HL	Factors of HL	Pearson's Coefficient	Sig.	Type of correlation
Preparedness Phase of HL	Planning for logistics	.93	0	Positive (H1)
	Logistics governmental, organizational and Infrastructure issues	.795	0	Positive (H2)
	Logistics technical operations issues	.782	0	Positive (H3)
Response Phase of HL	Activation of Emergency Systems	.645	0	Positive (H5)
	Logistics governmental, organizational and Infrastructure issues	.825	0	Positive (H6)
	Logistics technical operations issues	.936	0	Positive (H7)
Recovery Phase of HL	Planning for logistics	.756	0	Positive (9)
	Logistics governmental, organizational and Infrastructure issues	.904	0	Positive (10)
	Logistics technical operations issues	.749	0	Positive (11)

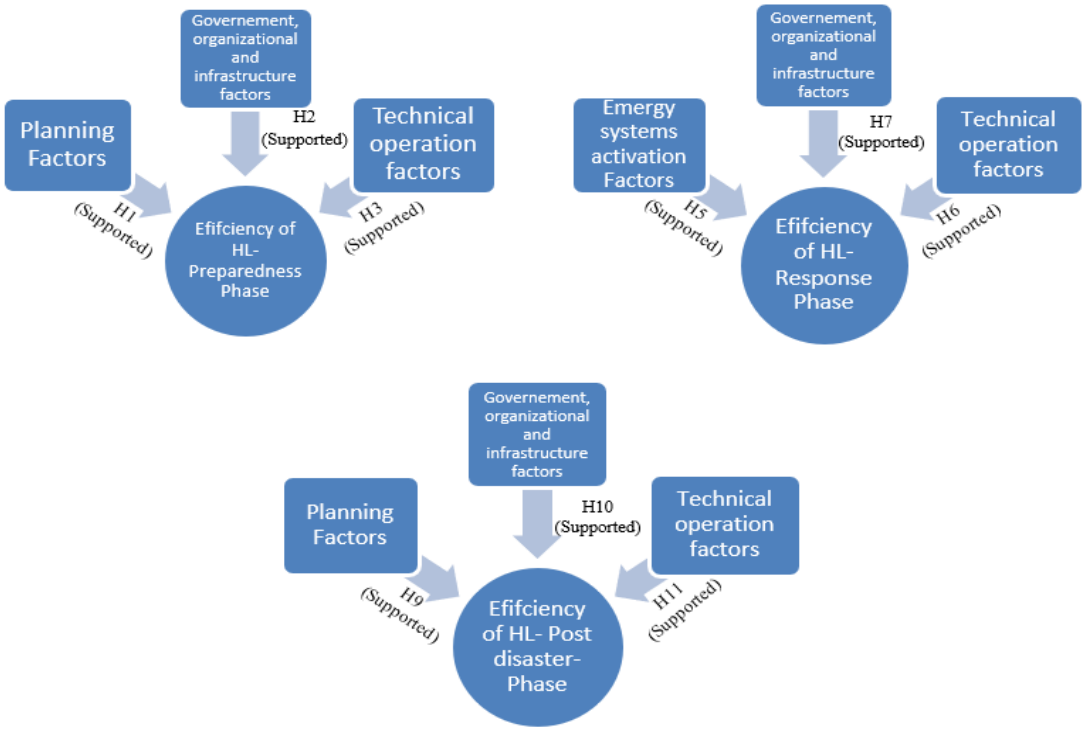

Figure 2. Hypotheses testing results of components on efficiency of HL phases

Furthermore, Pearson correlation coefficient was also used to test the potential impacts of preparedness phase on the efficiency of the other two phases of the HL (i.e., response and recovery phases), and the impact of response phase on the efficiency of recovery phase. Table 4 shows results of Pearson correlation testing and suggests that H4 (r= 0.763, P≤0.05), H8 (r=0.670, P≤0.05), and H12 (r=0.478, P≤0.05) are all supported. Therefore, all the formulated hypotheses in this study were supported. Figure 3 summarizes results of HL phases impacts on each other.

Table 4. The Correlation Coefficients between phases of HL

Phase of HL		Preparedness of HL		Response of HL		Recovery of HL	
		Pearson Correlation	Sig.	Pearson Correlation	Sig.	Pearson Correlation	Sig.
Preparedness of HL				.763**	0	.478**	0
Response of HL	Pearson Correlation	.763**	0			.670**	0
Recovery of HL	Pearson Correlation	.478**	0	.670**	0		

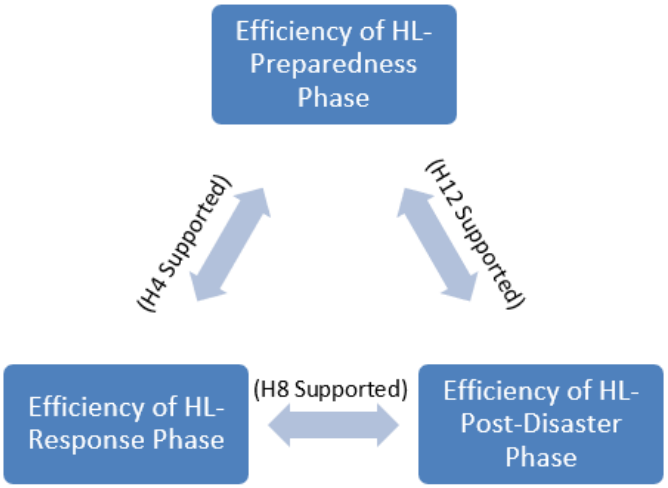

Figure 3. Hypotheses testing results of HL phases

5. Discussion

In this study, planning factors have been identified as having a positive impact on the HL performance (H1) and hence on the efficiency of logistics operations (β = 0.839, t =5.302, p =0.000). This result is consistent with previous studies such as Abdulkarim et al. (2021) and Koseoglu & Yıldırımlı (2015) who explained the negative impacts of lack of planning on the performance of HL operations, and they have also linked the factors of the planning process with the HL efficiency. Results have shown that planning for logistics is the main part of an efficient disaster management plan, and that every relief operation needs to be planned based on possible scenarios which depend on the type of disaster. Koseoglu & Yıldırımlı (2015) presented that logistics planning efficiency is affected by the political situation, funds and the donors' constraints, coordination, warehouse allocation, necessary information, etc., which completely existed and are valid in the case of Palestinian HL. However, and with respect to the mentioned scholarly papers, this result was expected. The lack of planning process in Palestinian HL can be proved, as poor HL planning processes lead to inefficient relief logistics operation performance in Palestine. Therefore, the results emphasized the importance

of good planning for Palestinian HL to improve its efficiency and performance. In addition, governmental, organizational and infrastructure factors have been identified as factors with positive impact on the HL performance (H2) if they are well-managed and maintained ($\beta = 0.556$, $t = 10.534$, $p = 0.000$). This result is consistent with previous studies such as Shafiq & Soratana (2019) and UNDAC, (2018) who discussed the negative impact of lack of governmental, organizational and infrastructure factors on the performance of logistics operations, and it was made clear in these two studies that governmental, organizational and infrastructure issues can boost HL efficiency if proper management practices are followed. Shafiq & Soratana (2019) said that humanitarian services (including logistics) were strongly linked to the political situation; and explain that the effective HL operations largely depend on governmental support, strong parties' coordination, good infrastructure, and well-organized systems.

Additionally, coordination challenges such as unwillingness to share information, information flows, unreachable information, inconsistent data and information formats, media storage misalignment, unreliability, and insufficient communication systems all have an impact on the efficiency of HL operations. Likewise, technical operations factors have been identified as factors with positive impact on the performance of Palestinian HL (H3), and hence on the efficiency of logistics operations ($\beta = 0.722$, $t = 5.302$, $p = 0.000$). This result is consistent with previous studies such as Wilson et al. (2018) who emphasized that the governmental policies have a large influence on the HL operations. In addition, L'Hermitte et al. (2015) identified several strategic planning factors related to the technical aspects of HL which are considered as barriers, such as coordination plans, reliable communication networks, and the effective and integration relationships with suppliers.

The factors of humanitarian logistics in the preparedness phase have been identified as factors with positive impact on the HL performance during recovery phase (H4) and hence on the efficiency of logistics operations ($\beta = 0.526$, $t = 12.085$, $p = 0.000$). This result is consistent with the previous studies. Koseoglu & Yıldırımlı (2015) and Cozzolino (2012). These studied confirmed the fact that the preparedness stage is the most crucial and critical part of HL because a poor preparedness state could increase the potential complexity in the response phase. They explained that the aim of the preparedness phase is to be ready to respond to a disaster quickly and efficiently, this means that a poor response is the result of poor preparedness phase.

Furthermore, emergency systems activations factors in the recovery phase have been identified as having a positive impact on the HL performance (H5) and hence on its efficiency ($\beta = 0.438$, $t = 10.761$, $p = 0.000$). This result is consistent with the previous studies such as the UNDAC (2018) report, which identified leadership and management responsibilities as unique challenges, and this was created because of poor national legislation and unstable political situation. Apte (2009) pointed out that HL operation can be complex and hindered because of the interactions between various parties in a politicized environment and this creates a challenge facing activation of the emergency systems beside the challenge of emergency systems compatibility with type of disaster. FEMA (2019) indicated that unified leadership is an urgent requirement for large-scale disaster operations, and this needs a suitable political situation and clear regulations. Also, in this study governmental, organizational and infrastructure factors have been identified as factors of positive impact on the HL performance (H6) and hence on the efficiency of HL operations ($\beta = 0.846$, $t = 2.77$, $p = 0.000$).

This result is consistent with the previous studies such as Shafiq and Soratana (2019) who studied HL as a component of humanitarian supply chain. They concluded that HL faced many barriers like finding and donors constrains, donations kind, professional staff, tools and relief materials, distribution systems and methods. Jiang and Yuan (2019) detected many barriers facing HL such as shortage in resources especially funds, reallocating resources especially budget items, a significant part of useless offered donations which creates a major challenge for the disaster response logistics, damage or losses and needs assessment, communications systems, decision-making tools and structure, and distribution of rescue tools and relief materials systems and methods. The results also reported that technical operations factors in the response phase had a positive impact on the HL performance and efficiency (H7) ($\beta = 0.770$, $t = 8.031$, $p = 0.000$). This result agrees with the results of previous studies such as Overstreet et al. (2011) who mentioned that there are numerous technical challenges facing humanitarian logistics in the response phase. These challenges include closed roads, destroyed distribution centers, disabled communications and information, and critically needed items that need to be shipped thousands of miles, in addition to the need for accurate data to conduct demand analysis, warehouse and inventory locations and management system. In the same way, Thiruchelvam et al. (2018) emphasized that HL efficiency is directly affected by a relief supply chain which tends to be unstable, unpredictable, and unresponsive to the needs of disaster victims with lack or poor of coordination between the relief supply chain parties, and that hinders the effective supply of aid and relief operations. Furthermore, many other factors

were detected, which include large areas with huge operations facing logistics providers (Jiang & Yuan 2019), unavailability of suitable vehicles in terms of size and capacity (Koseoglu & Yıldırımlı 2015), and destroyed or looted facilities (Hawajri, 2016). All those factors were identified clearly in Palestinian HL case (Hawajri 2016; Heaslip et al. 2018).

The results also found that factors of HL in response phase have a positive impact on HL performance and efficiency of the recovery phase ($\beta = 0.733$, $t = 3.907$, $p = 0.000$). This result is consistent with the previous studies such as Benjamin, et al. (2017) who emphasized the idea that organized response phase is the best support for an efficient transition from emergency response phase to recovery phase and speeds up the recovery processes. In other words, response and recovery phases often merge. This was also agreed with Koseoglu & Yıldırımlı (2015), who said that the phases of disaster risk management are closely linked. Successful logistics operations in the response phase mean fewer losses, more saving of lives, stopping or minimizing deterioration, and then, starting rapid and speed recovery. In other words, if the response was inefficient then, the recovery will be delayed. As a result, the factors of response phase have a direct effect on the efficiency of the recovery phase. Moreover, based on the acceptance of previous hypotheses related to the response phase, it has become clear that negative impacts of HL factors in the response phase on the performance of logistics operations in the recovery phase. The negative impact of HL factors in the response phase on the efficiency of recovery logistics can be approved.

At the recovery phase of HL, results found that planning factors have a positive impact on the HL performance (H9) and hence on the efficiency of logistics operations ($\beta = 0.570$, $t = 11.841$, $p = 0.000$). This result is consistent with the previous studies such as Burkart, et al. (2016) who found that there are funding barriers facing HL activities in all phases of disaster management. L'Hermitte, et al. (2015) and Overstreet et al. (2011) both agreed that there are challenges facing the planning for the humanitarian logistics related to weakness in information management technologies. Gavidia (2017), Hawajri (2016), and Heaslip et al. (2018) strongly agreed that the political situation is one of the main factors in hindering the planning for the HL. However, and with respect to the mentioned scholarly papers, this result was expected. The negative impact of items or factors of planning process was notable in the Palestinian case, subsequently, poor HL planning processes led to poor efficiency of relief logistics operation performance. At a more subtle level, the results reported that governmental, organizational and infrastructure factors have a positive impact on the HL performance (H10) and hence on the efficiency of logistics operations ($\beta = 0.804$, $t = 5.279$, $p = 0.000$). Jiang and Yuan (2019) concluded that there are many barriers that negatively affect governmental and infrastructure issues that can impede the efficiency of HL, such as lack of funding, inadequate information technology systems, and ineffective coordination. Additionally, UNDAC (2018) identified some critical factors with negative affect on the efficiency of HL, such as the absence of identified government representatives as a legal reference point, and absence of effective central coordination abilities.

As mentioned before, Hawajri (2016) strongly agreed that the political situation is one of the main factors hindering the efficiency of HL. Likewise, technical operations factors in the recovery phase had a positive impact on the HL performance (H11) and hence on the efficiency of logistics operations ($\beta = 0.688$, $t = 5.364$, $p = 0.000$). This result came in line with previous studies such as Gavidia (2017) and Burkart, et al. (2016) who identified that lack of funding is a major factor for lack of technical capabilities of HL. Shafiq and Soratana (2019) studied the HL as a part of the humanitarian supply chain, and they found that the efficiency of technical aspects of HL operations is strongly linked to the efficiency of the supply chain. Additionally, Koseoglu & Yıldırımlı (2015) considered the lack of effective collaboration between parties as the most affecting factors to lack of technical dysfunction.

Finally, the analysis found that the efficiency of preparedness phase of HL is positively linked with efficiency of recovery phase of HL (H12) ($\beta = 0.567$, $t = 4664$, $p = 0.000$). This result is consistent with previous studies such as Benjamin, et al. (2017) who emphasized the fact that well prepared HL will play an active role in supporting an efficient recovery phase and will speed up the recovery processes. This was also agreed by Koseoglu & Yıldırımlı (2015) who argued that the phases of disaster risk management are closely linked and there is a direct impact of preparedness phase on recovery phase as seen in planning activities that should include some plans for recovery of logistics activities. They added that that preparedness phase includes activities such as planning for after the disaster, and, hence, this will support recovery logistics. Also, Cozzolino (2012) discussed the indirect effect of preparedness phase on recovery logistics. They concluded that poor planning and preparing for HL operations usually lead to poop recovery of logistics operations after a disaster.

6. Conclusions

In this study, an investigation of the factors affecting performance and efficiency of HL in the developing country context of Palestine was conducted. Three main phases of HL were included in this empirical investigation, namely: preparedness, response, and recovery phases. The results confirmed that "planning for logistics operations" was the most significant factors affecting efficiency of preparedness phase. Also, "logistics technical operations issues" was the most significant factor contributing to response phase efficiency. Whereas "infrastructure of logistics, governments and other organizations" had the greatest impact on efficiency of recovery phase of HL. This study is considered the first study to investigate factors affecting HL along the lifecycle of the logistics process, starting from preparedness, through response, and ending up with the recovery stage. The current study provides HL managers and policymakers with evidence on the need to invest more in planning for logistics operations as cornerstone factor for performance efficiency and success. Also, to better understand the factors identified in this study and how they impact HL operations, there is a need for more studies in other similar developing countries environments. Furthermore, conducting comparison studies on factors affecting HL operations and performance would be valuable to validate results of this study and to increase generalizability.

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