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THE EFFECT OF INFORMATION TECHNOLOGY ON HUMANITARIAN SUPPLY CHAIN PERFORMANCE: THE MODERATING ROLE OF SATISFACTION

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Abstract

This paper will go on to examine the impact of IT on the performance of HSCs in Jordan and the potential to leverage IT to address issues with HSCs in relation to humanitarian priorities, operational requirements and improve overall performance of the humanitarian supply chain. These linkages are important in the context of current humanitarian action, increasingly dependent on efficient technologies. A total of 310 managers were selected and the data was collected from both online and paper questionnaires that were then analyzed using partial least squares structural equation modelling (PLS-SEM). The findings indicated that perceived ease of use (PEOU), perceived usefulness (PU) and satisfaction had significant and positive impact on the humanitarian supply chain performance standardized beta of 0.194, 0.411 and 0.221 respectively. Furthermore, satisfaction was found to be a positive moderating variable between the three constructs of PEOU, PU and performance. The results confirm the relevance of technology acceptance and user satisfaction as means to further humanitarian supply management. The discussion has shown that humanitarian organizations need to invest in user-friendly technologies and supportive systems to enhance efficiency and effectiveness. In theory, the study is based on the Technology Acceptance Model (TAM) to demonstrate the dual role of satisfaction as a direct predictor and as a moderator in the context of humanitarian supply chains.

Keywords: Information Technology, Perceived Ease of Use, Perceived Usefulness, Satisfaction, Humanitarian Supply Chain.

1. INTRODUCTION

In the dynamic environment of today, information technology has already brought tremendous changes in different aspects of our lives, including supply chains and the humanitarian sector (Rodríguez-Espíndola et al., 2020). Humanitarian supply chains benefit from a growing trust in electronic systems and technologies to facilitate the efficient and effective provision of aid (Atieh, 2025). Information technology has become increasingly important in the humanitarian context in improving the performance of humanitarian supply chains in a context where everything evolves and becomes more complex (Jeble et al., 2020; Ali et al., 2024). In this line, Liesa-Orús et al. (2023) highlight the importance of PEOU, which refers to the extent to which a system is perceived as

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easy to use. This concept represents users' perceptions regarding the ease of using information technology systems (Canavari et al., 2021). This factor is significant as a part of humanitarian supply chain conditions and is critical for both readiness to adopt and use digital technologies (Dubey et al., 2021). For instance, user-friendly processes not only ease the movement of logistics flows but also result in time savings for providing aid to beneficiaries (Liesa-Orús et al., 2023).

Moreover, one of the major factors that determine both whether digital technologies are taken into use and how widespread their adoption becomes in information technology is PU (Canavari et al., 2021), which reflects the degree to which a system enhances performance. The more it can offer value-added and meet the needs of humanitarian organizations, the greater the likelihood that it will be accepted and adopted by these organizations (Na et al., 2022). Besides, the moderating effect of satisfaction in the relationship between technology perceptions and supply chain performance needs to be explored (Rahi & Abd Ghani, 2021). Users are found satisfied with their experience and information they get, which helps to enable the implementation of technology systems effectively, leading to an overall effective supply chain for humanitarian aid (Rahi & Abd Ghani, 2021).

The focus of this paper is to evaluate how PEOU, PU, and satisfaction influence HSCP, and their relationship with HSCP, which in turn supports a detailed analysis of these relationships within a structured research model through well-coordinated data analysis (Iriani & Andjarwati, 2020).The outcome of this paper would support the identification of best practices and policies to improve the use of technology in relief and humanitarian aid (Kavota et al., 2020).

In information technology, vulnerabilities are a complex phenomenon and can impact multiple levels of humanitarian supply chain management (Ali et al., 2023). In this context, researchers are largely unable to investigate the barriers that threaten and challenge information technology use in humanitarian settings as a result of limited empirical research, therefore requiring comprehensive analysis to examine these vulnerabilities more effectively (Ali et al., 2023). Practically, organizations are challenged with implementing and maintaining innovative frameworks to enhance the execution of humanitarian supply chains productively and efficiently (Ahmed & MacCarthy, 2023). Non-profit organizations and humanitarian groups must quickly adapt to technological changes and develop capabilities to manage security risks and challenges presented by functional vulnerabilities (Roy et al., 2020). From a managerial perspective, vulnerabilities include challenges in policy implementation, risk management, data protection, and priority setting (Atieh, 2025). Management must develop strategies and actions to enhance governance, project management, education, and training to ensure that technologies are effective and securely implemented in the humanitarian supply chain setting (Abidi et al., 2020). These vulnerabilities emphasize the urgent need for collaboration and communication between scholarly researchers, professionals, and administrators to identify and address vulnerabilities thoroughly and sustainably, thereby improving the capacity of humanitarian supply chains to deliver aid and relief efficiently

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and effectively in the face of complex and evolving challenges in the modern world (Atieh, 2025).

The following research questions emerged from the above-mentioned research gaps:

RQ1: Do information technology factors have any correlation with humanitarian supply chain performance?

RQ2: Is the relationship between information technology and humanitarian supply chain performance moderated by satisfaction?

The TAM is a fairly comprehensive framework analyzing the factors that influence the adoption of an IT product. It builds on the TAM by investigating the relationship between users' perceptions of ease of use and usefulness of the system to the performance outcomes of the organization within a humanitarian supply chain. In contrast, the study is centered on the post-adoption phase of technology, in which technologies have been adopted and perceptions by those who use them affect the efficient use of systems in day-to-day humanitarian operations. This paper leverages the TAM for humanitarian supply chains and employs the TAM to present a comprehensive view of the relation between PEOU, PU and satisfaction with supply chain performance, and it also uses it to provide a holistic understanding of how variables PEOU = perceived ease of use, PU = perceived usefulness, and SATI = satisfaction interact. PEOU refers to the thought that the use of a specific technology is free from effort; perceived usefulness is the belief that the use of this technology brings benefits to their performance or productivity (Davis, 1989). Both concepts are the cornerstone for comprehending the user's evaluation and goals for technology implementation (Liesa-Orús et al., 2023). Perceptions of ease of use and usefulness, for example, within the framework of TAM are believed to affect user behavior and thereby attitudes toward technology use. In other words, users' satisfaction with ease of use and realization of the benefits of the technology increases their intention to use it more often (Shahzad et al., 2023). Theoretically, the relationships between the concepts analysed in this study can be understood by using TAM. Consequently, it lays the groundwork for comprehending technology adoption in HSCs in Jordan.

PEOU and PU cannot be expected to have a positive impact on HSCP without effective system utilization. Instead, they affect the performance by optimizing system utilization, coordination, decision-making, and information exchange. In humanitarian contexts, if users find IT systems useful and easy to use, they are more likely to incorporate these systems into the work and operational processes, potentially improving the responsiveness, efficiency, and coordination.

Despite being perceptual constructs, PEOU, PU and satisfaction are assessed from managers who are directly involved in humanitarian supply chain operations. Their perceptions are relevant in that managerial users have an influence on the use and embedding of IT systems into organizational routines, as well as on their adoption. The study thus does not only rely on individual attitudes but also on the perceptions of individual managers as an assessment of the use of organizational technologies.

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1.1 Perceived ease of use

It is necessary to add that PEOU is an important dimension in the operation of humanitarian supply chains in final destinations under dynamic conditions like Jordan (Liesa-Orús et al., 2023). As technology systems play such a critical role in logistical coordination**,** relief management**,** and stakeholder participation**,** individual perceptions of technology usability have an important effect on operational outcomes within organizations. Given the ubiquity of multiple types of technology and platforms used by virtually all agencies engaged in humanitarianism, this underscores just how important it is to recognize and improve employees' perceptions of system usability (Dinh & O'Leary, 2025).

This could further lead to improvements in ease of use, simplifying operations, and reducing logistics time, leading to a shorter amount of time to address an emergency (Umar & Wilson, 2024). In addition, the adoption rate may also be enhanced due to their ease of use, leading to maximum utilization of resources with better coordination and decision making. More efficient information sharing and collaboration across actors can also be achieved (Ul Haq & Awan, 2020).

Nevertheless, concentrating on PEOU may contribute to enhancing both supply chain resilience and responsiveness at the same time (Na et al., 2022). Accessible technologies reduce time lost to errors, enabling a more dynamic response to fluctuating requirements (Netinant et al., 2025). This may also encourage greater user engagement with digital systems**.**

Overall, PEOU is related to Jordan's HSCP and flexibility. Focusing on increased usability for staff and stakeholders may create additional refinements that will support the service more effectively in communities needing assistance.

1.2 Perceived usefulness

In the case of humanitarian supply chains in Jordan, PU is an important factor. It represents a critical determinant of technology adoption and performance in humanitarian supply chains. Hence, in humanitarian operations (with limited resources and severe time constraints), the subjective utility value of a technology/system can have serious implications for its success within supply chain processes as well as performance fundamentals (Davis, 1989). In Jordan, different technology solutions are used by humanitarian organizations for stock tracking, shipment tracking, delivery arrangements, as well as communication with all stakeholders (Bader et al., 2023). Accordingly, enhancing the awareness or PU of staff and users regarding these technologies will be important for higher supply chain performance and maintaining timely responsiveness.

Improving the PU of humanitarian supply chains in Jordan can bring a number of benefits. First, it will increase the recognition of the technology among the participants and allow using a comprehensive technology (Rejeb et al., 2023). With it, the operational side can become simpler and more efficient, while lines of communication and cooperation among different arms of humanitarian organizations can converge more smoothly.

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PU can also enhance the decision-making and rationality in value chains (Ashrafi & Kabir, 2023). Staff who value the use of technology to provide them with accurate information in a timely fashion are more likely to use it to make critical decisions. This should result in better, more informed, and strategic decisions, which can optimize resources and thus the overall effect of humanitarian interventions. Moreover, paying close attention to the PU of technology within their programs can also enhance the resilience and flexibility of supply chains for Jordanian humanitarians (Ali et al., 2023). Technology with high perceived value enables organizations to react more accurately to changes in the situation and new crises that come up, thus allowing for agility and innovation in supply chain management practices (Atieh, 2025).

PU is an important factor for measuring how effectively a humanitarian supply chain performs in terms of efficiency and effectiveness within Jordan's humanitarian supply chains. Raising the perceived value and utility of technology to participants and staff in the organization will bring new efficiencies (Ali et al., 2023). Consequently, the decision-making process will be enhanced and a more resilient and responsive logistics infrastructure can be built.

1.3 Satisfaction

Satisfaction is a key element in humanitarian supply chain in Jordan. It could be considered as a moderating variable between PEOU, PU and HSCP. Satisfaction is one of the evaluative constructs included in the post-adoption phase. In this paper, satisfaction is a general positive assessment by the user of the IT system used. Satisfied users are more likely to use the system, use it regularly, and translate PU and ease of use into operational benefits derived from the system. Thus, it is expected that satisfaction will not only positively influence performance but also enhance the impact of PEOU and PU on HSCP.

TAM supports this relationship. From this perspective, satisfaction might be regarded as a connection between the user's perceptions of system usability and perceived system effectiveness (Davis et al., 1989). This is in line with research findings that user-friendly systems tend to enhance the satisfaction of humanitarian staff, as demonstrated by Pramudito et al. (2023). This perspective would imply that systems that are easy to use and have high user satisfaction will be perceived as useful and supportive for goal attainment. This implies that the more a system is easy to use and the more users are satisfied with its performance, the more likely they are to perceive it as useful and supportive for achieving goals. Thus, satisfaction can contribute to acceptance and adoption of technology, and increase the PU of the technology, in humanitarian supply chains (Venkatesh & Davis, 2000). Knowing how PEU, satisfaction and PU are related allows for the development of interventions by stakeholders in humanitarian operations in Jordan to improve user satisfaction with technology (Tawafak et al., 2023). This can enhance the efficiency of processes like aid delivery, resource allocation, etc. Moreover, satisfaction is also expected to have a direct impact on the performance of humanitarian supply chains.

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1.4 Humanitarian supply chain

It is important to recognize that the supply chain plays a critical role in humanitarian operations. and is essential. Humanitarian supply chains are distinct from commercial supply chains as they are not based on profit targets, but rather are a series of interconnected organizations that coordinate the production, procurement, transport, storage, distribution, and implementation of relief items needed by people and communities during crises, disasters, and conflicts. It has the main purpose of humanitarian, not profit (Ren et al., 2020).

Such operations occur in an inherently uncertain and unstable environment. Humanitarian supply chains are complex systems that include various stakeholders such as the government, international actors, donors, NGOs, and local communities (Kovács & Falagara Sigala, 2021). These actors determine the needs, acquire supplies, store inventories, transport supplies, and distribute assistance to affected communities (Nyile, 2023). These supply chains are dynamic and unpredictable, and therefore, need to constantly adapt to humanitarian conditions that change over time (Kovács & Falagara Sigala, 2021).

Flexibility, adaptability and innovation are therefore important and necessary to assist actors in addressing constraint issues such as logistical limitations, damaged infrastructure, instability and regulation (Annamalah et al., 2025). Furthermore, humanitarian supply chains are humanistic, impartial and neutral. These rules translate to providing aid based on need rather than politics and economics (Cao et al., 2021). The humanitarian outlook plays a crucial role in shaping supply chain design and management practices, such as resource allocation, delivery approaches, and partnerships (Siawsh et al., 2021).

Moreover, technological and information developments over the last few decades have facilitated greater supply chain efficiency and better preparedness to respond quickly to crises for humanitarian actors (Fatorachian & Kazemi, 2021). Geographic information systems (GIS), remote sensing, mobile applications, and blockchain technologies have been utilized in logistics planning, distribution, supply chain coordination and real-time condition monitoring of delivery (Ding et al., 2021).

Overall, the humanitarian supply chain plays an important role in delivering humanitarian assistance to people affected by crises in a timely and effective manner. By facilitating the supply and distribution of essential resources, humanitarian supply chains help save lives, reduce suffering, and restore dignity to affected populations.

1.5 Hypothesis development

1.5.1 Perceived usefulness and humanitarian supply chain performance

In formulating a hypothesis concerning the relationship between PU and HSCP, one should review the existing literature, theory, and empirical evidence. Based on the review of literature and theoretical perspectives (Liesa-Orús et al., 2023), this hypothesis is informed by the framework of TAM, which states that individuals are more likely to accept

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and use IT if they view it as a useful tool for achieving better performance outcomes (Na et al., 2022). In the context of humanitarian supply chains, performance is defined as the speed and efficiency of aid delivery (Canavari et al., 2021).

In this context, perceived IT usefulness can be effective across multiple dimensions of performance (Bose et al., 2023). For example, the perception of information technologies' usefulness enables humanitarian organizations to quickly mobilize resources, use real-time data to plan optimal routes for aid delivery, maintain efficient communication and coordination among actors, and respond effectively to exogenous shocks.

Thus, one can expect a strong, positive relationship between perceived information technology usefulness and performance indicators such as responsiveness, resilience, reliability, cost efficiency, and the number of beneficiaries served (Davis, 1989; Rejeb & Rejeb, 2020; Zhai & Shi, 2020), hence the conclusion of the first hypothesis:

Hypothesis 1: Perceived usefulness has a positive impact on humanitarian supply chain performance.

1.5.2 Perceived ease of use and humanitarian supply chain performance

To develop a hypothesis regarding the relationship between PEOU and HSCP, this paper draws on existing literature, theories, and empirical evidence (Giri & Manohar, 2023).

Furthermore, based on prior theoretical and empirical evidence, it is hypothesized that the PEOU of information technology systems within the humanitarian supply chain is positively associated with performance. Based on TAM (Davis, 1989), which shows that users' acceptance of a certain technology depends on how user-friendly they perceive the technology to be, this study hypothesizes that PEOU will positively influence the performance of humanitarian activities.

System usability becomes especially critical for humanitarian missions because they involve dynamic logistics, making it essential to work efficiently and swiftly in any circumstances (Canavari et al., 2021). In turn, the ease of system usability will increase efficiency, promote communication between various parties involved, and enable quick and effective decision-making (Naveen et al., 2024). Consequently, positive perceptions of system usability in humanitarian organizations can positively affect their performance outcomes.

Thus, the second hypothesis is presented below:

Hypothesis 2: Perceived ease of use has a positive influence on humanitarian supply chain performance.

1.5.3 Moderating effect of satisfaction

Based on theories and studies, it can be presumed that there is a strong relationship between satisfaction with IT systems used in humanitarian supply chains and the general performance of these supply chains (Davis, 1989; Nyile, 2023). User satisfaction refers to the extent to which a technology fulfills the expectations of users, as Davis explains (Abualrejal et al., 2022). Humanitarian supply chains must be efficient and quick, and

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satisfaction is a key determinant of how effective the humanitarian functions of IT systems are. Satisfaction with IT systems and user satisfaction with meeting the user requirements have a connection that leads to an increase in operational efficiency, which in turn contributes to better decision-making for users who use IT solutions (Altalhi & Basiouni, 2023).

In examining the moderating role of satisfaction between the variables of PEOU, PU, and HSCP, Gopal et al. (2021) found that satisfaction acts as a moderator. Based on the above discussion, it is expected that satisfaction will reinforce the relationship between the PEOU, PU, and HSCPs (Alamri, 2020). Satisfaction is a person's evaluation of how well an information technology platform performs the desired outcomes.

In the theoretical supports of Azzahra & Kusumawati (2023), Davis (1989), satisfaction is expected to have a direct impact on HSCP and to moderate the effects of PEOU and PU.

Hypothesis 3: Satisfaction has a positive effect on humanitarian supply chain performance.

Hypothesis 4: Satisfaction has a positive moderating effect on the relationship between perceived usefulness and humanitarian supply chain performance.

Hypothesis 5: Satisfaction has a positive moderating effect on the relationship between perceived ease of use and humanitarian supply chain performance.

1.6 Conceptual Model

TAM provides a useful framework for conceptualizing the acceptance and use of information technology systems in a humanitarian supply chain environment. In TAM, PEOUand PU play key roles in shaping an individual’s attitude and behavioral intention to use IT systems in their work. PEOU refers to “ease of use" in terms of how easy or difficult it is to use a system. (Davis et al., 1989), while PU is the belief that using IT systems enhances job performance, productivity, and effectiveness (Davis et al., 1989; Garay-Rondero et al., 2020).

When it comes to humanitarian assistance and aid delivery, where promptness is essential to saving lives, TAM proposes that when a person finds that an information technology system is user-friendly and useful for performing his or her functions, the likelihood of adopting and using it successfully increases (Zhong et al., 2023). The higher level of use of IT systems will positively impact the effectiveness of operations in humanitarian logistics (Bag et al., 2021). In this manner, by creating a positive perception of ease of use and usefulness, organizations can encourage greater technology adoption and usage.

Satisfaction is conceptualized as both a direct predictor of HSCP and a moderating variable that influences the effects of PEOU and PU on performance.

Figure 1 shows the conceptual framework of the study, highlighting the relationships between PEOU, PU, satisfaction (as both a direct predictor and a moderating variable), and HSCP.

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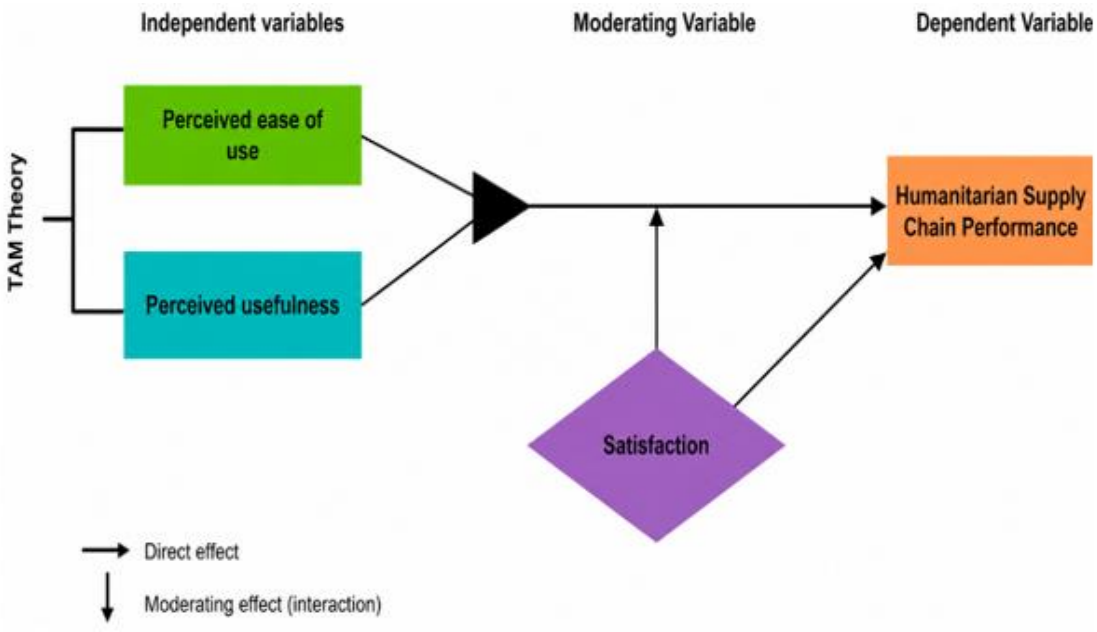

Figure 1: Framework of the study

2. METHODOLOGY

A quantitative approach was applied in this study to gain insight into how information technologies affect HSCP in Jordan. The sample was randomly selected from over 1,650 local relief organizations listed in the Jordanian Ministry of Social Development database (Record of Associations, 2018) to include 310 NGOs.

A Google Form questionnaire was created and sent to these organizations, according to a sample size guide (Krejcie & Morgan, 1970). A variety of statistical methods were then used to analyze the collected data.

Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for data analysis to examine the relationships between the study variables, including the independent variables such as ease of use and PU, and the moderating effect of satisfaction on the dependent variable, HSCP. This approach also aided in determining the factors influencing the adoption of technology and its subsequent performance effects in this regard.

PLS-SEM is effective when it comes to studying relationships among constructs, especially when multiple variables are involved. Such statistical approaches were effective in enabling the exploration of links among variables through data analysis. They improved understanding regarding how information technologies could improve performance for humanitarian supply chains in Jordan.

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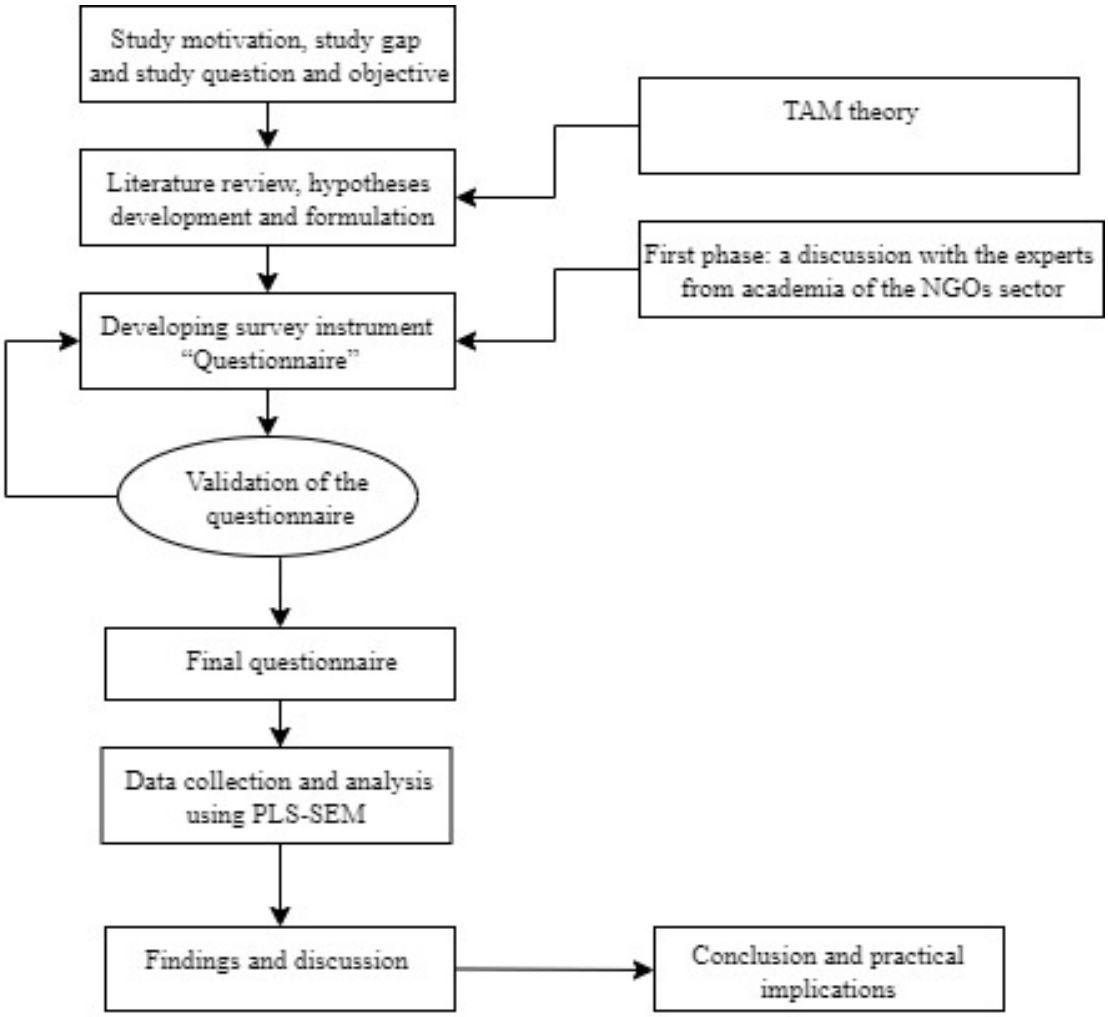

Figure 2: The research framework of the study

Table 1 demonstrates the demographic profile of the sample in terms of gender, age, experience, occupation, and education. In respect of gender, females accounted for 40%, while males accounted for 60%, which means that there is a moderate imbalance among participants.

Most respondents were in the 35 to 45 age group, as this group accounted for almost forty percent; other age groups were more evenly distributed. Over sixty percent were undergraduates, about twenty percent were postgraduates/professionals, and ten percent were high school graduates.

The demographic profile provides a basic understanding of the heterogeneity of the sample in terms of essential characteristics.

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Table 1: Respondents' Demography (n = 310)

Variable	Category	N	%
Gender	Male	186	60%
	Female	124	40%
Age	Less than 27	31	10%
	27–less than 35	62	20%
	35–less than 45	124	40%
	45 and above	93	30%
Years of Experience	Less than 10	86	28%
	10–less than 15	68	22%
	15–less than 20	70	23%
	20–less than 25	72	24%
	25 and above	9	3%
Job Title	Business Administration	167	54%
	Accounting	66	22%
	Social Sciences	62	19%
	Other	15	5%
Education	Diploma	33	11%
	Undergraduate	186	60%
	Postgraduate	91	29%

3. RESULTS AND DISCUSSION

3.1 Data Analysis

Data curation for this examination was performed by collecting paper and online questionnaires adapted from previous validated studies with related constructs. Other aspects such as PEOU, PU, and satisfaction have been widely examined in humanitarian supply chain and logistics contexts. With the PLS-SEM approach, this study aimed to test PEOU and PU and examine the moderating role of satisfaction HSCP (Giri & Manohar, 2023; Junejo et al., 2023) .A questionnaire was sent to 310 relief organization managers in Jordan to collect empirical data from which to test hypothesized relationships. The reliability of the data obtained was measured with the Cronbach's alpha, composite reliability, and factor loading (Yusoff et al., 2020).

Table 2 shows that each of the measurement models has a Cronbach's alpha of more than 0.70, composite reliability greater than 0.60, and factor loadings above 0.50, indicating that the reliability of the measurement models has been achieved.

Then the convergent and discriminant validity were assessed for overall validity. Convergent validity was confirmed as the Average Variance Extracted (AVE) values of every construct were above the 0.50 criterion as shown in Table 2. Next, the Fornell–Larcker criterion was used to analyze the discriminant validity. As shown in Table 3, the diagonal values of the square-rooted AVEs are larger than the inter-construct correlations for most constructs. Thus, the discriminant validity was only partially validated with the Fornell-Larcker criterion.

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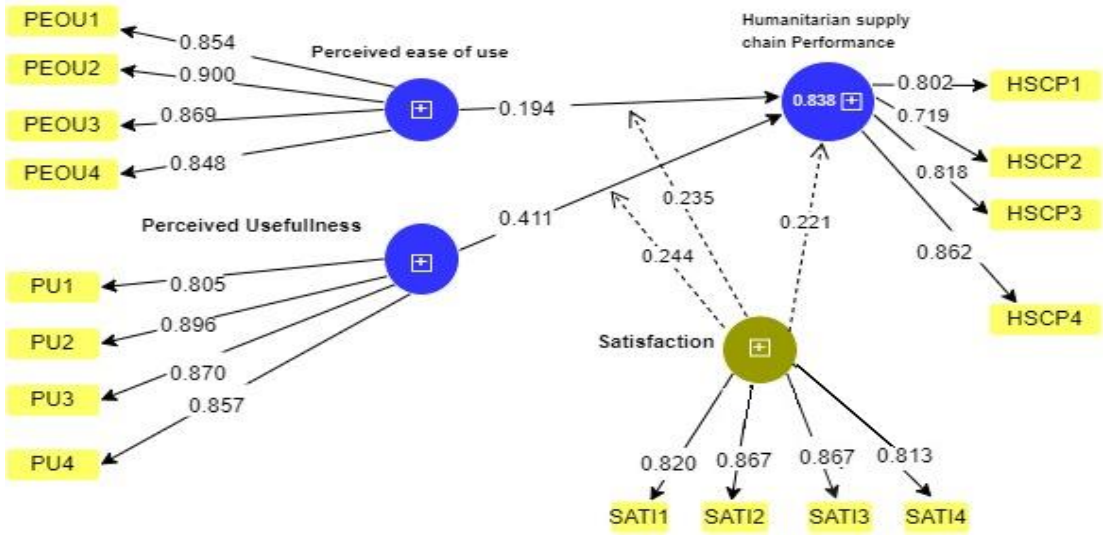

Figure 3: Items Loadings, Path Coefficient, and R^2 Values. Source: Results from SmartPLS software 4

Table 2: Factor Loading Analysis

Constructs	Items	Factor Loadings	Cronbach's Alpha	CR	AVE
Perceived Ease of Use	PEOU-1	0.854	0.891	0.894	0.753
	PEOU-2	0.900			
	PEOU-3	0.869			
	PEOU-4	0.848			
Perceived Usefulness	PU-1	0.805	0.880	0.882	0.736
	PU-2	0.896			
	PU-3	0.870			
	PU-4	0.857			
Satisfaction	SAT-1	0.820	0.863	0.866	0.709
	SAT-2	0.867			
	SAT-3	0.867			
	SAT-4	0.813			
HSCP	HSCP-1	0.802	0.818	0.843	0.643
	HSCP-2	0.719			
	HSCP-3	0.818			
	HSCP-4	0.862			

3.2 Structural Model

An examination of the structural model is carried out after establishing confidence in the measurement model's reliability and validity. To analyze the structural model, it is necessary to assess the extent to which the theoretical relationships are supported by the data. As a consequence of this evaluation, it is necessary to determine whether the hypotheses are supported.

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Table 3: Discriminant Validity (Fornell-Larcker's test)

Construct	HSCP	Perceived Ease of Use	Perceived Usefulness	Satisfaction
Humanitarian Supply Chain Performance	**0.872**			
Perceived Ease of Use	0.802	**0.868**		
Perceived Usefulness	0.811	0.809	**0.858**	
Satisfaction	0.908	0.887	0.866	**0.842**

According to Fornell-Larcker criterion, the interpretation is done on the basis of the comparison between the square root of the Average Variance Extracted (AVE) and inter-construct correlation. When the square root of the AVE is more than the highest correlation with other constructs as shown on the diagonal, the construct has an adequate discriminant validity .When inspecting " PEOU "'s square root AVE (0.868) it exceeds the maximum correlation value with “HSCP” (0.802). In most of the constructs, this pattern is exhibited, but here the correlation between Satisfaction and HSCP is larger than the square root of AVE for Satisfaction. Thus, partial support for discriminant validity was achieved using the Fornell–Larcker criterion.

Table 4: Discriminant validity (HTMT)

Construct	HSCP	PEOU	PU	SATI
HSCP				
PEOU	0.619			
PU	0.673	0.73		
SATI	0.625	0.592	0.523	

Note: PEOU= Perceived Ease of Use; HSCP=Humanitarian Supply Chain Performance; PU=Perceived Usefulness; SATI =Satisfaction.

The values of heterotrait–monotrait ratio (HTMT) for evaluating discriminant validity are reported in Table 4. The HTMT ratio indicates the level of similarity of constructs, and figures well below 1 suggest that the constructs are empirically dissimilar. According to Ringle et al. (2020), all the values of HTMT are lower than the recommended value of 0.85, which means that there are no problems with discriminant validity .Thus, results showed that the variables are different and each construct plays a unique role in the conceptual model .The variables are separate but related dimensions which could be explored without any theoretical overlap, as illustrated in the analysis. The results obtained from the HTMT indicate that there is no commonality in the constructs that can pose as a problem when testing the hypotheses.

3.3 Hypotheses Testing

To examine the path coefficients of the conceptual model (Purwanto, 2021) the PLS analysis method was used. The path coefficients obtained in the analysis using the software of SmartPLS are supposed to show the relationship between variables. The path coefficient ranges from -1 to +1, with the closer it is to either -1 or +1, the stronger the relationship between variables. Details of the path coefficients are given in Table 5.

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Table 5: Structural model estimates (Path coefficients)

Hypothesis	Relationship	Beta	STD Error	T value	P value	Decision
H1	PU ⟶ HSCP	0.411	0.050	7.806	0.000	Supported
H2	PEOU ⟶ HSCP	0.194	0.040	4.513	0.005	Supported
H3	SATI ⟶ HSCP	0.221	0.051	4.464	0.000	Supported
H4	SATI x PEOU ⟶ HSCP	0.235	0.043	5.951	0.000	Supported
H5	SATI x PU ⟶ HSCP	0.244	0.050	7.460	0.000	Supported

Note: PEOU = perceived ease of use; HSCP = humanitarian supply chain performance; PU = perceived usefulness; SATI = satisfaction.

The statistical analysis findings given in Table 5 show that the hypotheses are strongly supported. The findings demonstrate that H2 is supported (PEOU has a significant positive relationship with HSCP, $\beta = 0.194$, $p = 0.005$). Similarly, HSCP is significantly positively correlated with PU ($\beta = 0.411$, $p < 0.001$), which supports H1. Further, the direct impact of satisfaction on HSCP (SATI → HSCP) has a positive and statistically significant impact on ($\beta = 0.221$, $p < 0.001$), which means that satisfaction also has a direct positive impact on performance. Moreover, the interaction effects between satisfaction and PEOU (SATI × PEOU → HSCP) ($\beta = 0.235$, $p < 0.001$) and between satisfaction and PU (SATI × PU → HSCP) ($\beta = 0.244$, $p < 0.001$) are significant, which supports H4 and H5. The findings indicate that satisfaction is a positive factor that enhances the relationship between PEOU and HSCP and between PU and HSCP .In conclusion, the results offer important implications on the importance of usability, usefulness, and user satisfaction and the contribution it can make towards the efficiency of humanitarian supply chain efforts. Improving the efficiency, coordination, and responsiveness of humanitarian action relies on the use of technology and a positive user experience.

Table 6: R2 and R2 Adjusted

Variable	R^2	Adjusted R^2
HSCP	0.838	0.830

The R^2 value (0.838) of HSCP shows that the performance is explained by the independent variables in the model by about 83.8%. This high explanatory power implies that PEOU, PU and satisfaction are good predictors of the performance of humanitarian supply chains.

3.4 Discussion

Looking at the results overall, there is support for the necessity to improve the usability, usefulness, technology acceptance and user satisfaction in humanitarian supply chains in general. Results have been consistent with TAM developed by Davis (1989), which suggests that PU and PEOU are the key determinants of technology use and performance. Positive user experiences and embedding the technology can be powerful tools through which an organization can improve its operations and be more responsive and effective in a humanitarian context. The high scores of PEOU and PU suggest that technologies that are easy to use and perceived as useful will facilitate effective use of the technology and enhance coordination and decision making. Moreover, the present

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findings showed that the satisfaction variable influences the relationship between the technological variables and performance. In addition, the current results showed that satisfaction, as a moderator, strengthens the relationship between the technological factors and performance outcomes .These results are similar to other studies conducted earlier, such as the study by Azzahra and Kusumawati (2023), who found that user satisfaction and technology acceptance influence organizational performance; and other studies conducted by Na et al. (2022) which also obtained user satisfaction as one of the factors affecting organizational performance. Other research also has demonstrated that technology acceptance and user satisfaction are key factors that can enhance organizational performance.

These are significant factors in humanitarian operations, especially those that are time-sensitive and resource constrained, to deliver humanitarian assistance effectively and in time.

4. CONCLUSION

The findings of this paper indicate that PROU, PU, and satisfaction have a significant impact on the performance of the humanitarian supply chain. The relationships were all statistically significant and positive, meaning that higher levels of these factors have been shown to relate to higher levels of achievement of the performance outcomes and are in turn more effective for humanitarian operations. The findings revealed here call for user needs assessment and the choice of suitable technology to boost HSCP. This study's findings agreed with the results of other studies, as the relationships obtained in this study were supported by the literature. There might be some variations from other studies, however. For instance, Khan et al. (2022) and Petersson (2020) suggested direct effects, whereas the current study revealed that satisfaction acts as a moderating factor in the relationship between PEOU, PU, and HSCP. The differences could be attributed to methodological and/or conceptual differences across the studies, as well as sample differences.

Therefore, care needs to be taken in comparing the results of the present study with earlier studies. The similarity of the findings indicates that these relationships are fairly reliable and consistent; differences between the findings could be the subject of further research to deepen the understanding of the complexity of humanitarian supply chains and expand/prioritize existing theories. The study is an important contribution to the field of humanitarian supply chains, as it validates the relationship between the technology acceptance factors, satisfaction, and supply chain performance in an empirical manner. The results are consistent with TAM and extend its application to the humanitarian supply chain context by establishing a connection between perceptions of technology and outcomes related to performance. The research makes a valuable contribution to the humanitarian supply chain field because it is among the first empirical studies to confirm the link between the factors of technology acceptance, satisfaction, and supply chain performance. The results align with TAM and go beyond it by introducing a relationship between technology perceptions and outcomes related to performance in the

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humanitarian supply chain context. The study does not test the entire TAM sequence of the intention and actual use, but it is clear that important constructs of TAM are applicable to understanding the performance-related outcomes in humanitarian supply chains. The research findings have practical implications since the findings will be used in decision-making processes by managers and decision-makers within the NGOs, in the sense that they will use the results of the research to make decisions on the usability of technology, on the perceived benefits, and on the perceived satisfaction.

Research findings have practical implications, as managers and decision makers within NGOs can use the findings to make decisions regarding the usability of technology, perceived benefits, and perceived satisfaction to guide their decisions on the adoption and implementation of digital systems .Furthermore, the results highlight the importance of user-centered designs and ongoing learning for actors in humanitarian supply chains. Some theoretical and managerial implications are also provided in the study. It theoretically links the technology acceptance factors with the performance measures, thus extending previous research in the field of HSCP. On an operational level, it suggests that humanitarian organizations need to choose the right technologies but also have the capacity to help ensure user satisfaction and to use these systems effectively. Finally, the results reveal that satisfaction is a predictor and a moderator of the performance of humanitarian supply chains. This will provide much-needed analysis on drivers towards efficiency in humanitarian supply chains. Using the correct technology and satisfying the user will enable the humanitarian organizations to achieve better performance and deliver aid to the needy more effectively.

Author Contributions:

All authors contributed to the conception, design, analysis, and writing of this manuscript.

Conflict of Interest:

The authors declare no conflict of interest.

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