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CHALLENGES IN HUMANITARIAN SUPPLY CHAINS MANAGEMENT: THE CASE OF POLAND

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Purpose: The aim of the research was to identify key challenges and best practices in managing humanitarian supply chains in Poland.
Design/methodology/approach: The research method was CATI (computer-assisted telephone interviewing). The research was conducted throughout Poland in 40 Crisis Management Centres at the provincial and district level.
Findings: Majority of respondents highlighted unpredictable demand as a prevalent issue, while weak supply chain visibility was also noted as a barrier to effective management. While technology is considered a positive influence on HSCH management, with 95% affirming its benefits, only 5% believe the current level of technology usage is adequate, indicating a need for greater technological investment. Furthermore, cooperation among HSCH actors appears satisfactory to most respondents, yet there are concerns about coordination and connectivity, as nearly one-third are uncertain about consistent communication between operational units and crisis management centres. The main findings from respondent recommendations emphasize the importance of collaboration, effective coordination and communication, involvement of skilled personnel, comprehensive planning, regular equipment updates, volunteer support and needs assessment.
Originality/value: The results of research can be addressed to those involved in public crisis management, both local authorities and public entities as well as blue light organisations and non-governmental organisations involved in humanitarian aid.
Keywords: humanitarian logistics, humanitarian supply chain, crisis situation, crisis management.
Category of the paper: research paper.

1. Introduction

Humanitarian supply chain (HSCH) management takes place in very complex and changing conditions. The parameters of a humanitarian supply chain are difficult to plan because the course of each emergency is individual, requires the involvement of multiple services, in each case different resources, to a different extent and quantity, and, moreover, these chains need to be adapted on an ongoing basis to emerging circumstances (Sienkiewicz-Małyjurek,

2014). Thus, the humanitarian supply chain is characterised by unpredictable demand, which is difficult to estimate based only on an analysis of the characteristics of the disaster, its type, size, location, and timing. Inventory is also difficult to plan for, and reliance must be placed on experience and probability analysis (Pokusa, Grzybowski, 2010).

Bag, Gupta, and Wood (2020) emphasize that the management of humanitarian supply chains is significantly challenged by the stochastic nature of demand. They further highlight that limited visibility within these supply chains, combined with prevailing uncertainty, exacerbates these difficulties (Bag et al., 2020). Visibility of a supply chain is the ability to track its individual components, subcomponents and final products from supplier through producer to consumer (Biel, 2021).

Uncertainty in the context of humanitarian supply chains, on the other hand, refers to the difficulties associated with anticipating and planning emergency response in dynamic and unpredictable conditions (natural disasters, armed conflicts or pandemics). Uncertainty is made up of changing factors such as the changing needs of the affected population, restrictions on access to crisis areas and logistical difficulties associated with damaged infrastructure (Shrivastav, Bag, 2023). Moreover, emerging information in humanitarian supply chains is uncertain, lacking much of the necessary data to plan and execute logistics operations (Agostinho, 2013). Information on required relief supplies, equipment, location and conditions at the scene plays a decisive role (Blecken, 2010).

Dubey, Luo, Gunasekaran, Akter, Hazen, and Douglas (2018) also highlight the issue of excess donations, which frequently fail to align with the actual needs of the affected population. With this kind of problem, information systems that help collect accurate information are important, and also support performance measurement and donation control. Thus, technology will positively impact the efficiency of the humanitarian supply chain by integrating operations and reducing uncertainty (Singh, Gupta, Gunasekaran, 2018).

Fiorini, Jabbour, de Sousa Jabbour and Ramsden (2021) state that managing the humanitarian supply chain is difficult because it involves critical timeframes that require the immediate mobilisation of all team members from different organisations and the need to coordinate multiple resources as quickly as possible. To this end, it is essential to ensure high-quality and reliable communication, especially during the response phase, when it has a real impact on saving lives and property, by effectively coordinating emergency services with other stakeholders (Carreras-Coch, Navarro, Sans, Zaballos, 2022). Communication between stakeholders ensures transparency and proactivity towards the emergency (Jabbour, Mendonça, De Camargo, Jabbour, Oliveira, 2019).

To respond quickly to hazards, governments have begun to implement early warning systems. In India, for instance, early warning systems are implemented to enable rescue teams to monitor the system's information while maintaining effective communication with one another. Communication must take place at regular intervals to have access to the most up-to-date information on the onset and progress of a disaster (eGyanKosh, 2007).

It is also important to inform at-risk communities immediately. The Federal Emergency Management Agency (FEMA) with the Federal Communications Commission (FCC) and various wireless service providers in the United States use the Integrated Public Alert and Warning System (IPAWS) to disseminate warning messages (Bennett Gayle, 2019). The Wireless Emergency Alerts (WEA) system allows geotargeted dissemination of messages to mobile phones in the area of imminent and direct threat (Federal Communications Commission, 2024). Such systems are also beginning to be launched in Poland. Early Warning Systems (EWS) enable the warning of residents about threats to life, health, and property or immediate evacuation, and enable cooperation with the police, municipal police, fire brigade, ambulance service and other security services (Walek, 2013).

The area at risk, the level of urbanisation or the scale of the damaged infrastructure also plays a significant role in the conduct of logistical operations (Sienkiewicz-Małyjurek, 2012). As Nowak (2008) adds, the factors determining the organisation of logistical security are problematic due to the following considerations:

- extreme conditions,
- blockade or isolation of affected areas,
- difficulties in reaching the injured (difficult terrain),
- rationing,
- the phenomenon of dichotomy.

Considering the identified challenges in managing HSCH, it is essential to identify key challenges and best practices in managing humanitarian supply chains in Poland.

This will be achieved by seeking answers to the following research questions:

1. What are the difficulties in managing HSCH in Poland?
2. What is the role of technology and information systems in supporting HSCH management in Poland?
3. What is the level of cooperation and coordination between the actors involved in providing assistance, as well as their communication with the emergency management centers?
4. What is the scope for investment and innovation in the area of humanitarian supply chains?
5. What are good practices and recommendations that can improve the effectiveness of HSCH in emergencies?

The answer to the above research questions is based on the 2024 CATI survey of the Crisis Management Centers in Poland.

2. Challenges facing humanitarian supply chains

Challenges in humanitarian supply chains include underdeveloped interorganisational networks, including intergovernmental cooperation (Silvia, McGuire, 2010) and associated coordination problems (Bag et al., 2020). The actors involved in relief operations are separate entities, functioning independently, which makes communication and coordination of activities very difficult. Dubey (2018) also points to limited coordination and ineffective cooperation between actors participating in HSCH activities. Sienkiewicz-Małyjurek (2012) also draws attention to the inconsistency of rescue procedures. Members of the National Fire Service, Volunteer Fire Service and ambulance service should have clearly defined responsibilities and procedures should be formalised and standardised, which could improve cooperation.

Waugh, Streib and William (2006) analyse the organisational structure of emergency management in the United States and the collaborative model of emergency response networks and highlight the importance of collaboration in emergency management. Kozuch and Sienkiewicz-Malyjurek (2015) also highlight the importance of interorganisational cooperation, pointing out the importance of cooperation between the state administration and executive units, the civic field and non-governmental organisations.

Leadership at local government levels is also a challenge in humanitarian supply chains. McGuire (2006) points out that the person in charge of emergency management in local government should have the right qualifications and aptitude and perceive threats as serious, not downplay them. Logistics operations in humanitarian operations are characterised by rapidity of response. When an emergency occurs, it is necessary to act automatically and decisions must be made quickly, even without much of the information needed. Van Wassenhove (2006) points out the lack of experienced logisticians, which hinders cooperation and coordination throughout the humanitarian supply chain.

During HSCH operations, it is important that everyone knows who the coordinator is and understands that this person has the authority to make decisions in emergencies (U.S. Department of Labor Occupational Safely and Health Administration, 2001). The issue of coordination is one of the main challenges of managing humanitarian supply chains, not least because each disaster is different in terms of the actors involved, the needs of the victims and the extent of damage (Balcik, Beamon, Krejci, Muramatsu, Ramirez, 2010). Coordination is defined as the process of consistency between activities in the correct, efficient and consistent delivery of relief resources and essential medical, transport, and evacuation services (Nikkhoo, Bozorgi-Amiri, Heydari, 2018). Interorganisational coordination, on the other hand, is the synchronisation of system elements into a coherent, integrated whole, which is not understood in terms of its outcomes, but attempts to integrate and design the system's operation (Sienkiewicz-Małyjurek, Owczarek, 2021). This definition allows the complexity of crisis management networks to be addressed by including both the formalised

rules of cooperation between organisations and the informal relationships that exist within these networks (Sienkiewicz-Małyjurek, Owczarek, 2021).

Contracts are among the popular mechanisms in achieving coordination between members of the supply chain, some of which involve, for example, revenue sharing or volume discounts (Nikkhoo et al., 2018). Balcik et al. (2010) investigated the challenges of coordinating humanitarian supply chains and found that the complexity of crisis management networks, increasing donor demands, funding structures, competition for grants, volatility, as well as scarcity or surplus of assets are the primary factors of coordination challenges.

Noham and Tzur (2017) indicate that experience and knowledge condition decision-making agility. However, research by Safarpour, Fooladlou, Safi-Keykaleh, Mousavipour, Pirani, Sahebi, Ghodsi, Farahi-Ashtiani and Dehghani (2020) points to a problem with the lack of knowledge – of volunteers, decision-makers, governmental and non-governmental organisation staff. Researchers also point to a lack of public and organisational education, people are not aware of ways to help, they are not informed about what type of donation, to whom, when and how to donate (Safarpour et al., 2020). In addition, volunteers and staff are not well versed in how to identify the needs of the affected and in making and distributing donations (Safarpour et al., 2020).

Knowledge can be drawn from the experience of past emergencies. Many studies on specific disasters can be found in the literature. From such studies, it is possible to find out what are the most common mistakes or good practices in the context of humanitarian supply chain operations. Costa, Campos and Bandeira (2012) analysed, from a logistical perspective, large-scale natural disasters. It turns out that during the situations studied, there were numerous lapses and irregularities in humanitarian supply chain management.

In the first event described, which occurred in the Indian Ocean in 2004, 14 countries bordering the Indian Ocean were severely and extensively damaged as a result of the earthquake and tsunami. A feature of the relief efforts during this disaster was the excess of NGOs involved and the overwhelming number of donations made available. The poor quality of operations and the surplus donated as unnecessary goods resulted in an overloaded supply chain (Costa et al., 2012). Inadequate methods, programmes and tools and little commitment to process management and coordination. The consequences were blocked airports, overcrowded warehouses, and materials and equipment damaged in the sun and rain (Costa et al., 2012). In addition, insufficient staff keeping records of resources, poor logistics reports, losses, theft, and sale of donations were a problem (Costa et al., 2012). Inadequate planning contributed to poor resource utilisation, as well as a limited ability to deliver resources quickly. Lack of professionalism led to incomplete lists of affected people and needed goods, often resulting in haphazard distribution of donations (Costa et al., 2012).

The second case discussed concerns the 2005 earthquake in the region north of Pakistan and Indian Kashmir. This is one of the largest natural disasters in the world, affecting around 3.5 million people. Due to the difficult terrain (high altitude area), the high poverty level of the

population, the approaching winter, and the constant state of armed conflict in the region, the operation was very difficult (Costa et al., 2012). Despite the success, due to the onset of winter, some regions did not receive the three main groups of supplies (food and water, shelter and clothing; construction materials and tools) due to deficiencies in the application of distribution models. This shows the lack of adequate mechanisms to track and control resource flows from source to end user (aid recipient) (Costa et al., 2012).

Kumar, Singh, Shahgholian (2022) describe issues and challenges in humanitarian supply chain management during the COVID-19 pandemic. The COVID-19 pandemic affected over 214 countries worldwide, disrupting the supply of essential commodities (Joshi, Sharma, Das, Muduli, Raut, Narkhede, Shee, Misra, 2022). COVID-19 is a pandemic with unique logistics management challenges (Durugbo, Almahamid, Budalamah, Al-Jayyousi, BendiMerad, 2022). Millions of lives were lost due to unpreparedness and ineffective strategies for managing humanitarian supply chains (Kumar et al., 2022). During the pandemic, many problems emerged such as (Kumar et al., 2022): lack of planning and preparation; prolonged shortages of essential relief supplies; insufficient number of laboratories; lack of visibility in the supply chain; inefficient distribution network; prolonged response time; dependence on a single supply for medical equipment and drugs; lack of adequate information; lack of knowledge of the protocol for treating viral illness.

This can be summarised by an analysis by Ozdemir, Erol, Ar, Peker, Iskender, Asgary, Medeni and Medeni (2020), which provides information on the constraints to humanitarian supply chains worldwide in the following areas: organisational barriers, interorganisational barriers, donation barriers and legal barriers. The author of this article extended the barriers identified by Ozdemir et al. (2020) to include distribution barriers (Table 1).

Table 1.
Organisations in the operation of humanitarian supply chains

Barriers	**Related operations**	**Research**
Organisational	Poor monitoring of operations	McEntire (2002), Balcik, Beamon (2008), Kovács, Spens (2009), Willner, Zafeiridis (2013), Petrudi, Tavana, Abdi (2020)
	Purchasing problems during the reconstruction phase	
	Poor use of technology	
	Lack of integrated systems for obtaining aid funds	
	Problems with accountability for organisational activities	
Interorganisational	Short delivery times and immediate response to emergencies	McEntire (2002), Stephenson, Schnitzer (2006), Balcik, Beamon (2008), Kovács, Spens (2009), Willner, Zafeiridis (2013), Agosthino (2013), Kabra, Ramesh (2015)
	Coordination problems in crisis management networks	
	Trust issues in the crisis management network	
	Problems with the dissemination of information by the media	
In the area of donations	Unethical behaviour (theft, corruption, embezzlement)	Willner, Zafeiridis (2013), Kabra, Ramesh (2015), Petrudi et al. (2020)
	Problems with donor responsibility for disposing of money	
	Greater donor demands for transparency in operations	

Cont. table 1.

Regulation and standardisation	Lack of regulation and support measures	Kovács, Spens (2009); Willner, Zafeiridis (2013), Agosthino (2013), Petrudi et al. (2020)
	Customs clearance problems	
	Differences in the operational procedures of the different organisations in the crisis management network	
	Difficulties in enforcing standards	
Distribution	Surplus or inadequate supply of aid resources causing bottlenecks	Chen (2021), Nodoust, Pishvaee, Seyedhosseini (2021), Agarwal, Kant, Shankar (2020), Cankaya, Ekici, Ozener (2019)
	Convergence of incoming aid	
	Destruction of resources and aid measures due to inadequate security	
	Theft of aid funds	
	Lack of necessary data to plan deliveries	
	Unfair allocation of supplies	

Source: adapted from: Ozdemir et al. (2020).

The role of the humanitarian supply chain is sometimes unrecognised in organisations involved in crisis management. Even when humanitarian supply chain management is implemented in these entities it is rarely integrated into the organisation's system of operations (Kamau, 2013). The implementation of logistical principles and proper management of the humanitarian supply chain will guarantee a more efficient flow of aid resources in the right quantities and in response to real needs. Figure 1 depicts a possible path forward, i.e. proposed solutions to the problems found in humanitarian supply chains.

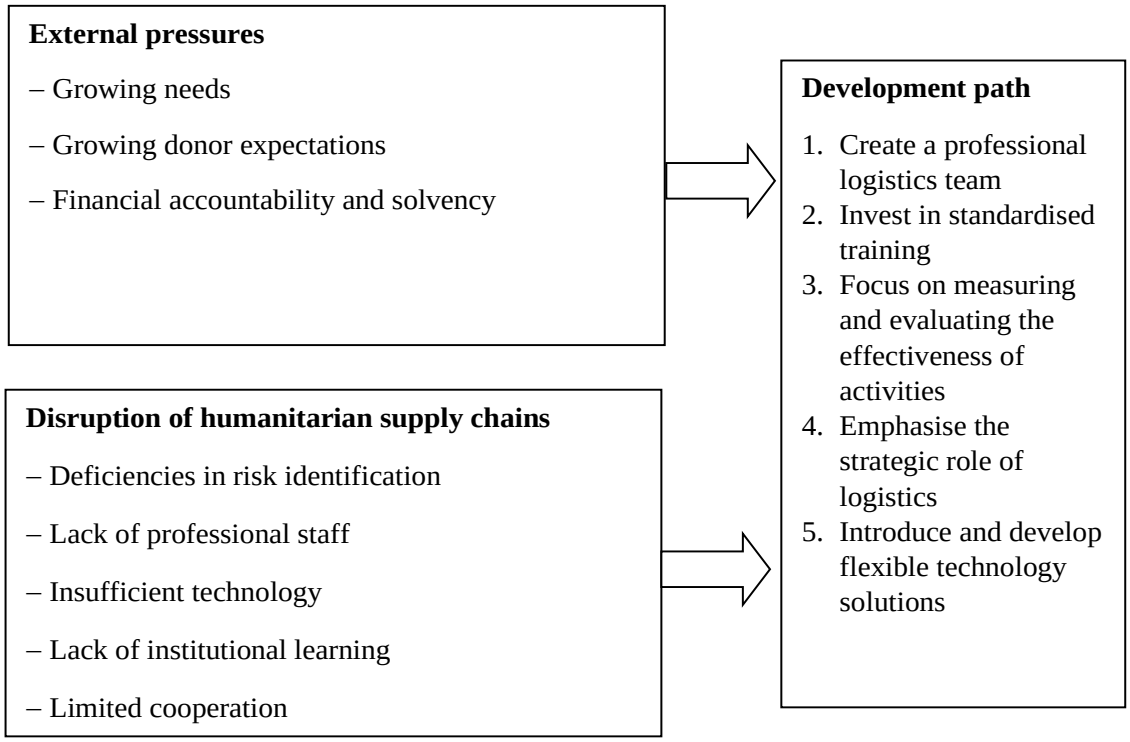

Figure 1. Possible development path

Source: adapted from: Thomas, Kopczak, 2005.

In addition to the proposals listed in Figure 1, at the Humanitarian Logistics 2009 Conference at the Georgia Institute of Technology, opportunities for improving humanitarian supply chain performance were developed. From the conference proceedings prepared by Stamm and Villarreal (2009), it appears that higher efficiency in humanitarian supply chains can be achieved through:

- indicators for evaluating performance, decision-making and operational improvement,
- cooperation between stakeholders (cooperation positively influences the outcome, but this is difficult to achieve),
- formalisation and standardisation of terminology, technology, and practices across the industry,
- logistics, which should occur in both immediate response and long-term development.

Proper and efficient handling of logistics operations is crucial (Negi, 2022). While none of the disaster situations can be prevented, their impact can be minimised through adequate preparation and proper response (Negi, 2022).

3. Methodology

The aim of this article is to identify key challenges and best practices in managing humanitarian supply chains in Poland. The research objective is detailed by the following research questions:

1. What are the difficulties in managing HSCH in Poland?
2. What is the role of technology and information systems in supporting HSCH management in Poland?
3. What is the level of cooperation and coordination between the actors involved in providing assistance, as well as their communication with the emergency management centers?
4. What is the scope for investment and innovation in the area of humanitarian supply chains?
5. What are good practices and recommendations that can improve the efficiency and effectiveness of HSCH in emergencies?

A telephone interview was used as the research method. The quality of data obtained by the telephone interview technique is as high as during a face-to-face interview; respondents are even more willing to share their opinions over the phone (Szreder, 2010, pp. 161-162). Often, a face-to-face interview is difficult or impossible, e.g. due to geographical distance or other specific conditions (Czakon, Glinka, 2021, p. 102).

The research was conducted throughout Poland in 40 Crisis Management Centres at provincial (7 CZK) and district (33 CZK) levels. The respondents were individuals holding senior positions in their organisations or delegated by their superiors as competent for the research. The Crisis Management Centre was chosen as the research unit because it is the organisational structure that is responsible for the coordination and management of activities related to the response to threats and crisis (gov.pl). It is the place where information on hazards and crisis is collected, decisions on preventive actions are taken, and the activities of the various public administration bodies, emergency services, the military and other entities involved in crisis management and HSCH management are coordinated. The aim of the Crisis Management Centre is to ensure a rapid and effective response to crisis to minimise damage and protect the life, health, and property of the population (gov.pl; Sienkiewicz-Małyjurek, Krynojewski, 2010, pp. 51-53).

The survey used a 5-point Likert scale, where 1 means 'strongly disagree' and 5 means 'strongly agree'. The Likert scale is used as one of the most commonly used psychometric tools in pedagogical and social research (Joshi, Kale, Chandel, Pal, 2015). The data obtained in the study were subjected to descriptive statistics. The measures used for analysis were the dominant, median, first quartile (Q1), third quartile (Q3) and mean. These measures allowed an objective assessment of the information obtained.

4. Results

Descriptive statistics formed the basis for the interpretation of the research results obtained. For each issue studied, statistical analysis was carried out individually. For clarity in describing the research, as well as throughout the text, the abbreviation HSCH - humanitarian supply chains - is used. The results obtained are presented in Tables 1-9. The first question concerned the problem of unpredictable demand in HSCHs.

Table 1.
The problem of unpredictable demand in humanitarian supply chains

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
1. Do you think managing humanitarian supply chains during emergencies and humanitarian aid is difficult due to unpredictable demand?										
0,00%	2,50%	25,00%	62,50%	10,00%	3	4	4	4	0,64	3,80

Source: own research.

The data in Table 1 shows that the majority of respondents confirm the problem of unpredictable demand at HSCH. There were 72.5% positive answers ('yes' and 'definitely yes'). A neutral position was maintained by 1/4 of the respondents, and 2.5% do not see such a problem.

Respondents then addressed the visibility of HSCH (Table 2).

Table 2.
Poor visibility of humanitarian supply chains

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
2. Do you think that poor visibility of humanitarian supply chains makes it difficult to manage them?										
0,00%	5,00%	15,00%	57,50%	22,50%	4	4	4	4	0,76	3,97

Source: own research.

Based on the data in Table 2, it can be concluded that respondents confirm the problem of poor visibility of HSCHs, which cause difficulties in their management. Such a problem is noted by 80% of respondents, 15% remained neutral and 5% believe that this factor does not cause difficulties.

Another issue examined was the impact of technology on HSCH management (Table 3).

Table 3.
Impact of technology on the management of HSCH

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
3. In your opinion, does the use of information systems and other technologies support the management of humanitarian supply chains?										
0,00%	0,00%	5,00%	62,50%	32,50%	4	4	5	4	0,55	4,27

Source: own research.

The data presented in Table 3 shows that almost all respondents (95%) confirm the positive impact of IT systems and modern technological solutions on HSCH management.

Another question asked about the level of use of IT systems and modern technological solutions in the surveyed organisations (Table 4).

Table 4.
Level of technology usage in HSCH management

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
4. Are the information systems and technological solutions currently used in your organisation in the field of humanitarian supply chains sufficient?										
20,00%	47,50%	27,50%	5,00%	0,00%	2	2,00	3	2	0.81	2,17

Source: own research.

The data in Table 4 shows that 67.50% of respondents believe that the current level of use of information systems and modern technological solutions is insufficient. Only 5% believe that the technologies used are at a sufficient level, and 27.5% of respondents maintained a neutral stance towards the issue under study.

The next issue examined was the level of cooperation between the actors involved in HSCH activities (Table 5).

Table 5.
Level of cooperation between actors participating in HSCH activities

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
5. In your opinion, do the organisations involved in humanitarian supply chains activities cooperate with each other to a sufficient extent?										
0,00%	7,50%	2,50%	57,50%	32,50%	4	4	5	4	0,80	4,15

Source: own research.

The data presented in Table 5 shows that 90% of respondents indicate a sufficient level of cooperation. However 7.5% repondents perceive a problem of poor cooperation between the units involved in HSCH activities.

This was followed by consideration of HSCH coordination issues (Table 6).

Table 6.
Coordination of HSCH activities

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
6. Do you think that coordination of activities in the management of humanitarian supply chains is implemented adequately?										
0,00%	10,00%	22,50%	57,50%	10,00%	3	4	4	4	0,79	3,67

Source: own research.

Based on the data in Table 6, it can be concluded that 67.50% of respondents have a good opinion of the coordination of activities. However, a neutral position was maintained by almost 1/4 of the respondents, and one in ten respondents agreed that the extent of coordination of activities was inadequate.

Another issue examined relates to the maintenance of communication between the executive units and the Crisis Management Centre during HSCH operations (Table 7).

Table 7.
Maintenance of communication between the executive units and the Crisis Management Centre during HSCH operations

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
7. Is communication between executive units and Crisis Management Centre maintained during the implementation of humanitarian supply chains activities?										
5,00%	5,00%	30,00%	57,50%	2,50%	3	4	4	4	0,84	3,47

Source: own research.

According to the information presented in Table 7, more than half of the respondents (60%) indicate that communication is maintained between the executive units and the Emergency Management Centre during HSCH operations. However, almost a third of respondents do not know if such liaison is maintained and one in ten respondents admit that liaison is not maintained.

Respondents then referred to the extent of investment and innovation in the HSCH area (Table 8).

Table 8.
Extent of investment and innovation in the HSCH area

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
8. Do you believe that the current level of investment and innovation in humanitarian supply chains is adequate?										
0,00%	35,00%	57,50%	7,50%	0,00%	2	3	3	3	0,59	2,75

Source: own research.

The data presented in Table 8 shows that more than one third of respondents (35%) believe that the extent of investment and innovation in the HSCH area is insufficient. In addition, 57.50% of respondents maintained a neutral attitude towards the issue under study, with only 7.5% of responses indicating sufficient levels of investment and innovation.

Another issue examined concerned rationality and economy in the use of financial resources in the context of HSCH management (Table 9).

Table 9.
Rational and economical usage of financial resources in the context of HSCH management

Multiple choice questions [%]					Position measures					
definitely not (1)	not (2)	Neutral/ undecided (3)	yes (4)	definitly yes (5)	Q1	Median	Q3	Mode	Standard deviation	Mean
9. In your opinion, are financial resources being used rationally and economically in the context of managing humanitarian supply chains?										
0,00%	2,50%	50,00%	47,50%	0,00%	3	3	4	3	0,55	3,45

Source: own research.

The data in Table 9 shows that 47.50% of respondents indicate that funds in the context of HSCH management are used judiciously and economically. However, half of the respondents indicated that they do not know whether funds in the context of HSCH management are used thoughtfully and efficiently, and 2.5% believe that funds are wasted. The dominant, or most frequent response, is 3, indicating that respondents do not know whether funds are used rationally and economically in the context of humanitarian supply chain management.

The last issue surveyed concerned good practice in the management of HSCH. Recommendations from respondents are below:

1. Cooperation with NGOs (11 responses).
2. Effective coordination of activities and communication (9 responses).
3. Involvement of appropriate and competent people (8 responses).
4. Extensive cooperation at county level and between counties (7 responses).
5. Detailed preparation of the crisis management plan and its regular updating (6 responses).
6. Regularly upgrade equipment and check stock (5 responses).
7. Selection of appropriate collection and distribution sites (4 responses).
8. Volunteer assistance in sorting and distributing donations (3 responses).
9. Needs analysis and avoiding the collection of unnecessary donations (3 responses).
10. Establishment of an action coordination team (2 responses).

The numbers in brackets exceed the total number of respondents, as participants provided multiple recommendations. Effective management of humanitarian supply chains in Poland is based on cooperation with NGOs, effective coordination and communication, and the involvement of competent people. Detailed preparation of emergency plans, their regular updating and good organisation of collections and distribution of aid, supported by volunteers and proper needs analysis, are crucial.

5. Summary

In response to disasters, actors must quickly build complex supply chains to distribute the necessary and appropriate resources (Pokusa, Duczmal, 2009). In addition to the drive for timely and reliable service delivery, professionalisation is being pushed by increasing host government requirements to improve logistics and work to certain standards and regulations (Dube, Broekhuis, 2018). Such regulations can facilitate humanitarian supply chains by, for example, establishing clear lines of command in disaster response, reducing the flow of unwanted donations and regulating the activities of organisations that may cause disruption (Kunz, Gold, 2017). Interest in the topic of standardisation in humanitarian logistics is also evidenced by the launch in 2019 of the Development of Best Practice and Universal Standards for Humanitarian Transport and Logistics project, which aims to develop common principles and guidelines and promote good practice in logistics (Paciarotti, Piotrowicz, Fenton, 2021).

The stated aim of the article has been achieved. Based on literature research and own research, key challenges and good practices in managing humanitarian supply chains in Poland were identified. The own research indicates that respondents perceive unpredictable demand (almost 3/4 of respondents) and poor visibility (more than 3/4 of respondents) as challenges in HSC management. Furthermore, almost all surveyed HSCs confirm the positive impact of information systems and modern technological solutions on the management of HSCs. However, modern technologies are not sufficiently used by them.

Issues of cooperation and coordination were also rated positively by the majority of respondents. Almost all respondents (90%) indicated that the level of cooperation was sufficient, and 67.5% confirmed that the coordination of activities was appropriate. Although in the case of coordination of activities, one in ten respondents indicated that the coordination of activities was inadequate, and almost 1/4 of respondents maintained a neutral position on this issue. Crisis and the need for a collective response mobilise collaboration, whereby actors representing different organisations come together in a joint effort to address what they cannot solve alone (Guerrero, Bodin, Nohrstedt, Plummer, Baird, Summers, 2023, p. 2). To collaborate effectively, it is necessary to initiate contact with others, share information, resolve conflicts and seek agreement on work goals and procedures (Guerrero et al., 2023, p. 2). Which governmental and local government administrative structures are responsible for planning, coordinating and responding to crises is important for action. Clear lines of responsibility and coordination between different actors are crucial (Chodynski, 2021; Carreras-Coch et al., 2022; Sienkiewicz-Małyjurek, Owczarek, 2021).

Own research also shows that more than half of the respondents believe that liaison is maintained between the executive units and the crisis management centre. However, almost a third of respondents do not know whether such liaison is maintained and one in ten respondents admit that liaison is not maintained.

Own research found that more than one-third of respondents felt that the extent of investment and innovation in the HSCH area was insufficient, only 7.5% of respondents indicated a satisfactory level, and the majority abstained from expressing an opinion.

Issues of rationality and thriftiness in the management of HSCHs were also raised in own research. Respondents do not know whether financial resources are used rationally in the context of managing humanitarian supply chains, indicating a lack of control activities and a lack of thriftiness. The dominant response in this case is 3, i.e. a response of 'I have no opinion'. Such disregard for public funds, especially when people's lives and health depend on these funds, is unacceptable. For this question, a minority of respondents (47.50%) indicated that funds are used rationally. As Kmiecik (2015) and Marjanski (2015) argue, distribution in HSCH must respect the principles of norming and limiting, conditional rationing and in accordance with the principle of economy. According to the principles of new public management, ensuring the economy, efficiency, and effectiveness of public organisations becomes a priority (Kauf, 2015, p. 52).

The own research also addressed the topic of good practices in HSCH management. Respondents emphasised the role of cooperation between public institutions, NGOs and residents. In the context of cooperation with foundations and NGOs - these should have adequate logistical and staffing facilities, which allows for the smooth distribution of aid. In addition, regular collections, adequate communication with donors and monitoring of the situation at district and provincial level are important to ensure that aid is organised effectively and reaches those in need. Moreover, effective HSCH operations rely on collaborative efforts, prompt and efficient communication of information, and precise planning. Regular monitoring, needs analysis and updating of plans are also important.

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