

Ing. Dušan Repik

PhD Student
University of Defence, Brno, Czech Republic
Faculty of Military Leadership
Department of Logistics
E-mail: dusan.repik@unob.cz
Orcid: <https://orcid.org/0000-0002-2629-9165>

Dr. Ing. Pavel Foltin, PhD

Assistant Professor
Brno University of Technology, Czech Republic
Institute of Forensic Engineering
Department of Risk Engineering
E-mail: foltin@vutbr.cz
Orcid: <https://orcid.org/0000-0001-8270-0390>

MEASURING THE PERFORMANCE OF HUMANITARIAN SUPPLY CHAINS: A SYSTEM OF INDICATORS

UDC / UDK: 061.23-022.326.5:658.86/.87

JEL classification / JEL klasifikacija: H41, L91, O22

DOI: 10.17818/EMIP/2025/14

Preliminary communication / Prethodno priopćenje

Received / Primljeno: October 28, 2024 / 28. listopada 2024.

Accepted / Prihvaćeno: January 21, 2025 / 21. siječnja 2025.

Abstract

Humanitarian supply chains are essential for timely and effective crisis response, yet measuring their performance remains challenging. This article identifies and analyzes factors influencing the performance of humanitarian supply chains, aiming to establish a comprehensive performance measurement system. Initially, it examines the current methods used to assess performance in these supply chains. Based on this analysis, a structured system of performance indicators is proposed, distinguishing between efficiency and effectiveness in processes and measuring outcomes to evaluate the results and impact of humanitarian efforts. The research concludes with a validated set of indicators designed to enhance efficiency and optimize logistics capabilities in humanitarian operations, providing practical value for application within humanitarian organizations.

Keywords: humanitarian supply chains, KPI, performance measurement, 3E model

1. INTRODUCTION

Over the past 50 years, climate change and extreme weather events have caused a significant increase in natural disasters, through its consequences, disproportionately impacting developing countries (UN DESA, 2024). Simultaneously, the number of armed conflicts has significantly increased since World War II (UN Press, 2023), with civilians accounting for up to 90 percent of war casualties (UN, 2022). The global pandemic that emerged in 2020 has had a continuing impact on the global economy and healthcare systems, triggering humanitarian crises in various regions. Additionally, the armed conflict in Ukraine that began in 2022 has exacerbated humanitarian crises worldwide due to its effects on global food, agricultural, and energy supply chains. About 184 million people—2.3 percent of the world's population—live outside of their country of nationality (WB, 2023). It is projected that by 2030, the number of people living in fragile and conflict-affected situations will rise to 46 percent of the global population (WB, 2021). Furthermore, the number of deaths resulting from both natural and man-made disasters is expected to increase fivefold over the next 50 years (Thomas and Kopczak, 2005).

The performance of humanitarian supply chains (HSC) is crucial for the success of relief operations (Repik and Foltin, 2022a). Unlike commercial supply chains, where performance is often measured in terms of cost efficiency and customer satisfaction, or CO² on societal sustainable development (Doófasi-Kovacs and Nagy, 2023), HSC prioritize the effectiveness and timeliness of aid delivery (Repik and Foltin, 2023). Thus, performance in this context is not merely a matter of operational efficiency but a critical factor in the overall impact of humanitarian interventions. Despite the critical importance of performance, there are significant challenges in accurately measuring it within HSC (Repik and Foltin, 2023). Recent studies emphasize the urgent need for a more robust approach to performance measurement that can quickly and still flexibly adapt to the dynamic conditions of humanitarian logistics and provide actionable insights for continuous improvement (Repik and Foltin, 2023).

While the importance of efficient HSC is widely acknowledged, there remains a substantial gap in the research regarding the development and implementation of comprehensive performance measurement systems tailored to the unique challenges of humanitarian operations. Most existing models are derived from commercial supply chains and fail to capture the specific needs of humanitarian logistics. Our distinctiveness stems from the empathy we express for the limited resources and capacities of humanitarian organizations combined with a changing and uncertain environment.

The primary objective of this research is to develop a tailored set of Key Performance Indicators (KPIs) that are applicable to HSCs, ensuring that these indicators are aligned with the unique requirements of the sector. The study addresses the research question: *How can performance indicators, commonly used in the business environment, be adapted and categorized for effective use in HSCs?*

The article focuses on the performance measurement of HSCs, which are essential in delivering aid during crises but face unique challenges compared to commercial supply chains. The paper outlines the existing gap in research regarding the development of performance metrics tailored to HSCs, given their dynamic, uncertain environments, and the non-profit nature of their operations. It proposes a comprehensive system of KPIs that adapts metrics from business models to align with the humanitarian sector's goals of economy, efficiency, and effectiveness. These KPIs aim to enhance operational efficiency, resource management, and aid impact while being practical and validated in humanitarian practice. The study underscores the importance of a balanced approach, using the 3E model, to ensure that aid is delivered promptly, cost-effectively, and with a meaningful impact on beneficiaries. The research has several limitations. First, the proposed KPIs are derived from commercial supply chains and may require further adaptation to address the full complexity of HSCs, which operate in volatile and unpredictable environments. Additionally, the empirical validation of these KPIs is limited to a select group of humanitarian organizations, potentially restricting the generalizability of the findings across different types of humanitarian crises and contexts. Moreover, data availability and quality in HSCs are often inconsistent due to disrupted communication networks and logistical challenges in crisis zones, which can hinder the effective implementation of the proposed performance measurement system. Lastly, the study does not fully explore the long-term impacts of using KPIs on humanitarian outcomes, leaving room for future research to assess the sustainability and effectiveness of this approach over extended periods.

2. LITERATURE REVIEW

2.1. Humanitarian Supply Chains

Analogous to the evolution in the business sector between 1980-1990, there is also a shift from logistics to supply chain management in the humanitarian sector. HSCs are vital infrastructures that ensure the timely delivery of aid and resources to populations affected by crises such as natural disasters, armed conflicts, pandemics etc. These supply chains differ significantly from commercial ones due to their emphasis on speed, flexibility, and the imperative to save lives rather than generate profit (Repík *et al.*, 2023). HSCs often operate under severe constraints, including limited access to affected areas, poor infrastructure, and the unpredictable nature of demand, which complicates the task of delivering aid effectively (Repík and Foltin, 2023). It must be acknowledged that in recent dynamic years these conditions have increasingly occurred in the commercial sector (Jambor and Nagy, 2022). However, actions in the humanitarian sector are often uncoordinated, spontaneous, unsolicited or unwanted (Tomasini and Wassenhove, 2009).

It is valid to adopt models and lessons from the business sector. However, there are specifics in the humanitarian context that can compromise the application of commercial sector approaches (see Table 1).

Table 1 Differences between commercial and humanitarian supply chains

Criterion	Commercial supply chain	Humanitarian supply chain
Environment	Dynamic environment (Chopra and Meindl, 2013).	Chaotic and uncertain environment (Tomasini and Wassenhove, 2009).
Strategic objectives	Maximization of profit, value and high customer satisfaction (Chopra and Meindl, 2013).	Minimise loss of life and alleviate suffering (Tomasini and Wassenhove, 2009).
Information system	Generally making good use of advanced technology (Christopher and Peck, 2004).	Information is often unreliable, incomplete or non-existent (Christopher and Tatham, 2011).
Performance measurement system	Performance management is a common practice (Bititci <i>et al.</i> , 2012; Gopal and Thakkar, 2012).	Structured and standardized performance management is not common practice (Abidi, de Leeuw and Klumpp, 2014) and lags behind the commercial sector (Lu, Goh and De Souza, 2016).
Stakeholder configuration	A tightly coupled network of actors cooperating to ensure the efficient flow of materials and information throughout the supply chain (Christopher, 2005).	Stakeholder groups with no clear inter-linkages, predominance of NGOs and government actors (Kovács and Spens, 2007)
Supplier network configuration	Usually a well-structured and organisationally established supplier base (Chopra and Meindl, 2013).	Limited choice, sometimes even undesirable suppliers (Kovács and Spens, 2007).
Distribution network configuration	Well-defined methods for determining the number and location of distribution centres (Mangan, Lalwanis and Calatayud, 2021).	Challenging due to the nature of unknowns and the risk and urgency context (Gatignon, Van Wassenhove and Charles, 2010).
Delivery times	Determined by the supply chain based on prior agreement (Pettit and Beresford, 2009).	Delivery time requirements are very short and critical to save lives (Kovács and Spens, 2007).
Demand pattern	Relatively stable, predictable demand patterns (Beamon and Balcik, 2008). Demand emerges from fixed locations in predictable quantities.	Demand emerges from unpredictable events (time, place, type and size) (Pettit and Beresford, 2009). The demand for goods during these events is also unpredictable (Murray, 2005).
Inventory management	Well-defined methods for determining inventory levels based on lead time, demand, and target customer service levels (Simchi-Levi, Kaminsky and Simchi-Levi, 2000).	Inventory management is challenging due to variables in lead times and demand quantities and locations (Balcik, Bozkir and Kundakcioglu, 2016).
Staff structure	Designed to ensure efficient operations and optimise performance. Staffing evolves based on current trends (Kisperska-Moroń, 2010).	Largely volunteers (Repík and Foltin, 2022a).
End beneficiary	Consumer buying a product or service (Gros, 2016).	The victim of an emergency (Kovács and Spens, 2009).
Output	Products and services (Gros, 2016).	Transformed human life (Drucker, 1994).

Source: own, based on (Beamon and Balcik, 2008; Abidi, 2019)

Performance measurement systems are frequently recommended to facilitate the implementation of strategies and enhance organizational performance

(Davis and Albright, 2004). Since the late 1950s, these systems have been introduced in business, public, and military organizations, and more recently in the humanitarian sector, with the aim of improving productivity, accountability, and service delivery (Abidi, 2019). Performance metrics can significantly influence performance by initiating action, through improving decision-making and execution, and focusing attention on key areas, increasing objectivity, enhancing understanding, maintaining performance consistency over the long term, facilitating feedback, providing timely warnings to leadership, and helping organizations prepare for the future (Parmenter, 2015).

2. 2. Performance Measurement in Humanitarian Context

In modern management, performance measurement goes beyond mere quantification and accounting. Due to the limitations of traditional financial metrics, both academics and practitioners advocate for multidimensional performance indicators (typically both financial and non-financial) (Chan and Qi, 2003). There are numerous frameworks for performance measurement in both academic and practical contexts (Kennerley and Neely, 2002), such as the Results-Determinants Framework (Brignall *et al.*, 1991), the SCOR model (Supply Chain Council, 2010), the Strategic Measurement and Reporting Technique (Lynch and Cross, 1995), the BSC (Kaplan and Norton, 1992), and the Performance Prism (Neely, Adams and Crowe, 2001). Frameworks focused on transparency, such as The Red Cross Code of Conduct (IFRC, 1994), The Sphere Project (UNHCR, 2011), and The Core Humanitarian Standard (CHS Alliance, 2014) have also been developed, along with those that consider the impact of contextual and political barriers on the performance of HSC (Kovács and Tatham, 2009).

Identifying the right metrics and their quantity amidst vast amounts of available data (Parmenter, 2015) is another critical filter for success. Organizations often fail to distinguish critical success factors (Parmenter, 2015). Staff should monitor no more than a dozen indicators, only half of which should be critical (Monczka, 2009). Selecting a smaller number of meaningful indicators is thus crucial for improving performance (Parmenter, 2015). However, excessive aggregation can be a mistake, as it summarizes information to the point where it loses its significance (Monczka, 2009). To establish a meaningful performance measurement system, it is essential to focus on controllable events, ensure strong internal communication of the system and metrics, reduce bureaucratic burdens, and maintain a future-oriented approach (Parmenter, 2015).

3. METHODOLOGY

The research design follows a structured and systematic approach to answer the research question effectively. The study began with an extensive review of the existing literature on KPIs within business models (Van De Ven *et al.*, 2023)

building on findings from previous research on HSCs and their performance measurement capabilities (Repik and Foltin, 2023). This is complemented by practical insight from humanitarian logistics professionals.



Figure 1 Research workflow diagram

Source: Author

A systematic literature review conducted by (Van De Ven *et al.*, 2023) played a crucial role in this research. The review collated a comprehensive catalogue of KPIs used across various business models in academic literature. This catalogue served as the foundation for the selection process, wherein indicators suitable for humanitarian contexts were identified based on the needs of the sector.

The research incorporated primary data collected through semi-structured interviews with professionals in the humanitarian logistics. These interviews were designed to capture the priorities and challenges faced by those working directly in HSCs. The respondents for the study were carefully selected professionals with substantial experience in humanitarian or crisis logistics. All respondents ($N = 23$) had a minimum of three years (with 61% of respondents having 10 or more years) of experience in the sector, ensuring that their insights were grounded in practical knowledge and experience (see Figure 1).

Many respondents represented prominent NGOs such as IFRC, People in Need, and Médecins Sans Frontières, among others. Participants also included academic professionals from universities such as the Hanken (HUMLOG Institute), Kuehne Logistics University etc. Several respondents were part of integrated rescue systems, particularly from organizations like General Directorate of the Fire Rescue Corps of the Czech Republic. The business sector was represented by

professional consultant from Health Commodities Associates Limited and a respondent from the Ministry of Foreign Affairs of the Czech Republic also contributed to the study.

The positions held by respondents were diverse, ranging from senior roles such as Heads of Departments, and Directors to specialized roles like Humanitarian Logistics Professionals. This diversity ensured a broad range of perspectives on humanitarian logistics. The majority of respondents had over 10 years of experience, reflecting a deep understanding of the field. A significant portion of the participants fell into 6 to 10 years category, bringing considerable mid-career insights. The smallest segment had between 3 to 5 years of experience.

These interviews were conducted either through in-person meetings or via video calls. Prior to the interviews, 19 questions were prepared in advance. The questions included both open-ended questions and those with a fixed scale. During the interviews, respondents were asked to provide open-ended responses for qualitative analysis. In cases where fixed-scale questions were posed, respondents were prompted to answer directly within the scale. The data obtained from these semi-structured interviews were subsequently used to fill in a questionnaire. The quantitative responses derived from closed-ended questions were analyzed using descriptive statistical methods. This analysis allowed for a systematic comparison of respondents' perspectives and the identification of patterns or trends within the data. Importantly, the authors did not interpret the closed-ended responses beyond categorizing them according to the predefined scale, ensuring that the responses reflected the participants' own views.

The selection process involved a systematic analysis of the KPIs from the catalogue, focusing on their relevance and applicability to the humanitarian sector. This analysis was guided by the principles of the 3E model as key dimensions of performance in humanitarian operations. Each selected indicator was evaluated for its potential to contribute to these three areas:

- Economy: Indicators that focus on cost management and resource allocation were identified, ensuring that humanitarian organizations can maintain financial sustainability while maximizing the impact of their resources.
- Efficiency: Indicators that measure the effectiveness of operational processes, including logistics, resource utilization, and time management, were categorized under this dimension.
- Effectiveness: Indicators that assess the overall impact of humanitarian interventions, particularly in terms of beneficiary satisfaction and the achievement of organizational goals, were included in this category.

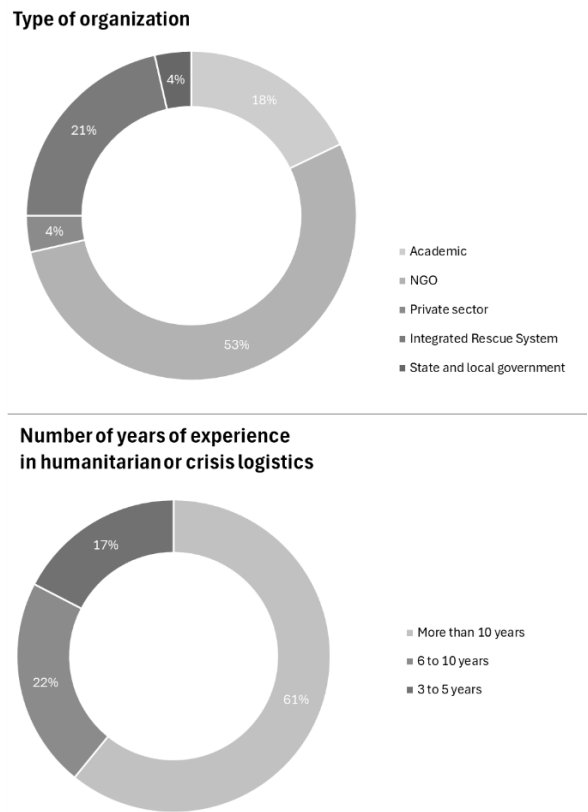


Figure 2 Basic information about respondents

Source: own

4. ANALYSIS

4.1. Analysis of performance measurement issues

Establishing performance indicators that are applicable in HSC management has been a longstanding challenge (Kyne *et al.*, 2007; Anjomshoe *et al.*, 2022). Research indicates that up to 55 percent of humanitarian organizations do not monitor any performance indicators, a quarter utilize some indicators, and only the remaining 20 percent measure performance consistently (Blecken, 2010). While there is an abundance of performance indicators available for commercial supply chains, many of these are rendered ineffective by the unique nature of the humanitarian sector (Beamon and Kotleba, 2006). Given the intangible nature of humanitarian services and the ambiguity surrounding what constitutes a successful

humanitarian outcome, it is even more challenging to translate humanitarian goals and principles into measurable performance indicators (Anjomshoe *et al.*, 2022).

In addition to the practical limitations, there are also constraints at a conceptual level. It is difficult to link the performance (Abidi, de Leeuw and Klumpp, 2014) or year-round efforts (Sawhill and Williamson, 2001) of a humanitarian organization directly to its objectives. Although humanitarian aid is primarily concerned with alleviating suffering, identifying and quantifying the relationship between HSC performance and the alleviation of suffering is a complex task (Abidi, de Leeuw and Klumpp, 2014). Moreover, humanitarian organizations often lack the resources and accurate data needed to consult with aid recipients about their perceptions of the assistance provided (Clarke and Parris, 2019; Cardoso *et al.*, 2023). This leads to a disconnect between the organization's self-perceived performance and the recipients' perception of the relevance and quality of the aid (Clarke and Parris, 2019). Furthermore, there is often an absence of a forward-looking focus in performance indicators, which are rarely designed to drive future improvements (Van der Laan, De Brito and Vergunst, 2009). Moreover, humanitarian organizations are not fully capable of controlling their HSC's performance (Kunz and Reiner, 2012).

Following a sudden disaster, the speed of response within the first 72 hours is crucial to saving as many lives as possible (Tomasini and Wassenhove, 2009). Preparation and planning are critical aspects, yet predicting the timing, location, and extent of humanitarian needs remains challenging. At the onset of a disaster, information is still limited (Tomasini and Wassenhove, 2009), even if the area had been well-monitored prior to the event – a rarity in less developed countries (Repik and Foltin, 2022b). From a logistical performance perspective, it is essential to understand specific impacts and needs, and to design and coordinate an effective response (Tomasini and Wassenhove, 2009). However, the accuracy and availability of data may be limited in environments where information and communication networks are disrupted (Van der Laan, De Brito and Vergunst, 2009). Additionally, uncertain and rapidly changing conditions rarely allow for the collection of comprehensive and reliable data (Kunz, 2019). This challenge is also evident in the development sector and in protracted conflict areas where security concerns hinder assessments and data collection (Anjomshoe *et al.*, 2022).

While in the commercial sector, the pressure for optimal performance stems from the demand side, in the humanitarian sector, it typically originates from the supply side (Tomasini and Wassenhove, 2009). Donor influence on performance is significant, as they may insist that their financial contributions be used directly for their purpose (Murray, 2005). Large organizations are known for their high bureaucratic burden, which can limit the speed of disaster response (Thorvaldsdottir, Patz and Eckhard, 2021). Moreover, highly publicized events are often subject to political and marketing pressures (Repik and Foltin, 2022b), which can strain bottlenecks within the supply chain and further burden already limited personnel capabilities. The issue of human resources extends beyond limited skills, abilities, or knowledge. Managing volunteers, who often constitute the workforce

of humanitarian organizations, is challenging (Repik and Foltin, 2022b). HSCs face uncertain availability and workload challenges, which are compounded by the absence of performance-based rewards or penalties (Repik and Foltin, 2022b). High turnover rates result in weak knowledge retention, creating additional challenges for performance measurement processes (Anjomshoae *et al.*, 2022). Especially in long-term operations, there is a risk of staff burnout or mental exhaustion (Repik and Foltin, 2022b).

At the core of the debate on aid effectiveness is the realization that humanitarian actions are often driven by short-term goals, which can potentially lead to unintended negative long-term societal impacts (Anjomshoae *et al.*, 2022). These negative impacts may manifest as market disruptions, aid dependency (Moyo, 2010), environmental damage, or even the prolongation of conflict (Anderson, 1999). For the reasons outlined above, it is imperative for the humanitarian sector to move beyond mere cost or time optimization.

Given these challenges, the application of the 3E model – Economy, Efficiency, and Effectiveness – presents a viable next step for enhancing HSCs. By focusing on these three pillars, humanitarian organizations can more systematically and effectively address the complexities of their operations, ensuring that resources are utilized efficiently, outcomes are achieved effectively, and costs are managed prudently. All this while maintaining the directness and simplicity of the model.

4.2. The 3E Model: Applicability to the Humanitarian Sector

The analysis of semi-structured interviews with professionals in the humanitarian logistics sector reveals a strong alignment between the core objectives of HSCs and the principles of the 3E model—Economy, Efficiency, and Effectiveness (see Figure 2). When respondents were asked to identify the most important goals for their HSCs, the responses consistently highlighted objectives such as cost-effectiveness, time efficiency, and the reach of aid, all of which are directly aligned with the 3E model.

These findings underscore the relevance and applicability of the 3E model in the humanitarian sector. By focusing on Economy, Efficiency, and Effectiveness, humanitarian organizations can better align their performance measurement systems with their operational goals, leading to improved outcomes in their missions. Therefore, integrating the 3E model into performance measurement frameworks represents a strategic approach to enhancing the effectiveness of humanitarian logistics and ensuring that aid is delivered in a timely, cost-effective, and impactful manner.

Select the 5 most important objectives for your HSC/logistics.

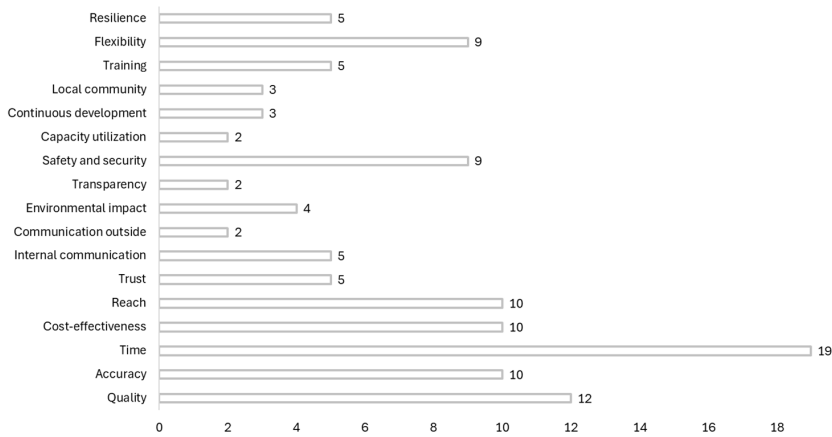


Figure 3 Results of the task of listing the most important targets for humanitarian logistics

Source: Author

In the context of humanitarian operations, economy refers to the prudent use of resources to minimize costs without compromising the quality of aid delivered. Traditional KPIs can be adapted to monitor and control expenses in humanitarian missions. Economy, for instance, was reflected in terms of cost-effectiveness (cited by 43% of respondents), indicating the importance of managing costs and ensuring judicious use of resources to maintain financial sustainability in humanitarian operations.

Efficiency was a dominant concern, with time (83% of respondents) being the most frequently mentioned goal, highlighting the critical need for timely delivery of aid in emergency situations. This focus on speed is crucial for optimizing logistics processes and reducing delays, ensuring that aid reaches beneficiaries when they need it most. Moreover, emphasis on quality (52% of respondents), flexibility (39% of respondents) and accuracy in deliveries (43% of respondents) demonstrate the importance of overall efficiency.

Effectiveness in the humanitarian sector is about achieving the intended impact of interventions. Effectiveness was underscored by the importance of reach (43% of respondents), aiming to maximize the number of beneficiaries served. Additionally, the goals related to trust (22% of respondents) and safety and security (39% of respondents) highlight the critical role of building and maintaining trust with beneficiaries, partners, and donors, and ensuring the safety of staff, volunteers, and resources.

However, it is essential to acknowledge certain limitations of the 3E model when applied to the humanitarian sector. While Economy, Efficiency, and Effectiveness provide a robust framework, they may not fully capture the

complexities of humanitarian operations, such as the need for adaptive decision-making in highly volatile environments or the prioritization of equity over efficiency in some contexts. Furthermore, the reliance on KPIs, while beneficial, can lead to an overemphasis on measurable outcomes, potentially neglecting qualitative factors like community engagement or long-term sustainability. Addressing these limitations requires a balanced approach that complements quantitative metrics with qualitative insights and contextual understanding.

5. RESULTS

The integration of the 3E model into the KPI framework for the HSC underscores the importance of a balanced approach to performance measurement. While some KPIs may need significant modification to fit the non-profit, impact-driven nature of humanitarian work, many of the core principles remain applicable. By focusing on 3E dimensions, HSCs can ensure that they are not only managing their resources well but also delivering high-quality aid that meets the needs of those they serve.

This chapter presents a comprehensive result of the study’s findings, highlighting indicators relevant to the research objective. The data is systematically organized and summarized in the included tables of indicators, which serves as a visual representation of the core outcomes (see Table 2, 3 and 4). Each indicator has been meticulously analyzed to assess the impact and significance of the variables under investigation. The results reveal a clear pattern, offering valuable insights into the effectiveness of the methodologies employed.

Table 2 Indicators falling under the area of Economy

Indicator	Reasoning for humanitarian supply chains	Calculation
Product or service price	Critical for budgeting and resource allocation. Humanitarian organizations must ensure that they procure goods and services at the most economical prices without sacrificing quality. Monitoring product or service pricing helps organizations manage costs effectively, ensuring that limited funds are used efficiently.	Price per Unit = Total Cost / Total Units Procured
Consumption of resources	Measures how efficiently an organization uses its available resources, such as materials, energy, and time. In humanitarian operations, minimizing resource consumption while maintaining effectiveness is crucial for reducing costs and ensuring sustainability.	Resource Consumption Rate = Total Resources Used / Total Output
Investors	Measures the growth in funds raised from investors over a specific period. In the humanitarian sector, securing increased funding is crucial for scaling operations, launching new initiatives, and sustaining long-term projects. Tracking the growth of funds raised helps organizations assess the effectiveness of their fundraising strategies and ensures they have the necessary resources to meet their goals.	Investor Fund Growth Rate = ((Total Funds Raised in Current Period - Total Funds Raised in Previous Period) / Total Funds Raised in Previous Period) * 100

Operating expenses (OPEX)	Include the day-to-day costs required to maintain operations, such as utilities, rent, and supplies. In the humanitarian sector, managing OPEX is crucial for maintaining financial sustainability. It helps organizations monitor and control their operational spending.	$\text{OPEX Ratio} = \frac{\text{Total Operating Expenses}}{\text{Total Revenue}}$
Capital expenses (CAPEX)	Refer to funds used by an organization to acquire or upgrade physical assets such as equipment, buildings, or technology. For HSCs, managing CAPEX efficiently ensures that long-term investments are made wisely and that resources are not overspent on capital assets.	$\text{CAPEX Ratio} = \frac{\text{Total Capital Expenses}}{\text{Total Assets}}$
Employee development or training costs	Measures the costs associated with developing and training employees. In the humanitarian sector, investing in employee development is essential for improving skills and knowledge. Monitoring these costs helps ensure that the organization is investing in its workforce efficiently.	$\text{Training Cost per Employee} = \frac{\text{Total Training Costs}}{\text{Total Number of Employees}}$
Personnel costs	Include salaries, wages, and benefits paid to employees. In the humanitarian sector, managing personnel costs is crucial for financial sustainability while ensuring that the organization retains qualified staff. Tracking helps monitor and control labour expenses.	$\text{Personnel Cost Ratio} = \frac{\text{Total Personnel Costs}}{\text{Total Revenue}}$
Sales and marketing expenses	Tracks the expenses related to promoting and selling products or services. For humanitarian organizations, these expenses may include campaigns to attract donors or raise awareness. Monitoring these costs helps ensure that the organization is maximizing its return on investment in marketing efforts.	$\text{Marketing Expense Ratio} = \frac{\text{Total Sales and Marketing Expenses}}{\text{Total Revenue}}$
Overhead or fixed costs	In the humanitarian sector, controlling overhead costs is crucial for maintaining financial stability.	$\text{Overhead Cost Ratio} = \frac{\text{Total Fixed Costs}}{\text{Total Revenue}}$
Variable costs	Managing variable costs ensures that the organization can scale its operations without overspending. Measuring helps track and optimize these costs.	$\text{Variable Cost Ratio} = \frac{\text{Total Variable Costs}}{\text{Total Output}}$
Total expenses	Encompass all costs incurred by the organization, including OPEX, CAPEX, personnel costs, and other expenditures. In the humanitarian sector, controlling total expenses is essential for ensuring that the organization operates within its budget and can sustain its operations over time.	$\text{Expense Ratio} = \frac{\text{Total Expenses}}{\text{Total Revenue}}$
Operating efficiency	Ensures that resources are used optimally, minimizing costs while maintaining service quality.	$\text{Operating Efficiency} = \frac{\text{Total Costs}}{\text{Total Revenues}}$
Delivery costs	Measure the total expenses associated with transporting goods or services to beneficiaries. In the humanitarian sector, managing delivery costs is crucial for ensuring that resources are allocated efficiently and that aid reaches those in need without excessive spending.	$\text{Delivery Cost per Unit} = \frac{\text{Total Delivery Costs}}{\text{Total Units Delivered}}$
Administration costs	Encompass the overhead expenses related to the management and operation of an organization, such as salaries of administrative staff, office supplies, and utilities. In the humanitarian sector, controlling administration costs is essential to maximize the funds available for direct aid.	$\text{Administration Cost Ratio} = \frac{\text{Total Administration Costs}}{\text{Total Operating Costs}}$
Return on investment (ROI)	In the humanitarian sector, where ROI may not always be measured in monetary terms, it is crucial for evaluating the effectiveness of investments in programs, technology, or infrastructure.	$\text{ROI} = \frac{\text{Net Benefit from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} * 100$
Cash flow (CF)	Represents the net amount of cash and cash-equivalents moving in and out of an organization. Positive cash flow is critical for ensuring that a humanitarian organization has sufficient liquidity to cover its operating expenses, fund programs, and invest in new initiatives.	$\text{Cash Flow} = \text{Cash Inflows} - \text{Cash Outflows}$

Source: Author

Table 3 Indicators falling under the area of Effectiveness

Indicator	Reasoning for humanitarian supply chains	Calculation
Satisfaction of customer needs	High satisfaction indicates that the aid provided meets the needs and expectations of the affected populations, ensuring the effectiveness of humanitarian efforts.	Customer Satisfaction Index (CSI) = (Total Positive Responses / Total Responses) * 100
Product or service quality	Essential in humanitarian logistics to ensure that the aid provided is reliable, safe, and meets the needs of the beneficiaries. Monitoring the number of complications, such as defects, failures, or errors, allows organizations to improve the quality of their services.	Complications Rate = (Total Complications / Total Products or Services Delivered) * 100
Customer acquisition rate	Can indicate the success of outreach efforts and the ability to expand services to more people in need. Decreasing numbers can have both positive and negative interpretations and need to be explored.	Customer Acquisition Rate = (Number of New Beneficiaries / Total Beneficiaries) * 100
Reach	Measures the extent to which humanitarian aid reaches the intended beneficiaries, directly reflecting the effectiveness of distribution strategies.	Beneficiary Reach = (Number of Beneficiaries Served / Target Population) * 100
Potential customers	Crucial for planning and resource allocation, as it helps organizations estimate the scope of their response efforts. By accurately assessing the number of people in need, HSCs can better prepare and prioritize their aid delivery to maximize impact.	Potential Customers = Number of Individuals Identified as Needing Assistance After Crisis
Media performance	Strong media performance is essential for raising awareness, attracting donations, and informing the public and stakeholders about ongoing efforts and needs.	Media Performance Index = (Number of Media Impressions / Number of Appearances)
Customer service performance	Reflects how effectively the organization addresses inquiries, complaints, and requests from beneficiaries. High performance in customer service ensures that beneficiaries' needs are met promptly, which is crucial for maintaining trust and satisfaction.	Customer Service Performance Index = (Number of Successfully Resolved Inquiries / Total Inquiries) * 100
Marketing and communication performance	Evaluates the effectiveness of an organization's outreach and communication efforts, particularly in raising awareness and engaging stakeholders. Strong performance is critical for attracting donations, informing the public, and mobilizing resources quickly in response to crises.	Communication Effectiveness Index = (Number of Successful Engagements / Total Communications) * 100
Security of internal processes	Refers to the safeguarding of critical operations and information within an organization. Ensuring the security of internal processes is essential to protect people, sensitive data, maintain operational integrity, and prevent disruptions.	Security Incident Rate = (Number of Security Breaches / Total Number of Processes) * 100
Internal training and education	Continuous training ensures that staff are equipped to handle the complexities of their roles, leading to more effective operations.	Training Hours per Employee = (Total Training Hours / Total Number of Employees)
Employee satisfaction	High employee satisfaction is essential in the humanitarian sector, as it can lead to higher productivity, lower turnover, and better service delivery.	Employee Satisfaction Index = (Sum of Satisfaction Scores / Total Number of Employees Surveyed) * 100
Staff turnover	High turnover can disrupt operations and lead to a loss of institutional knowledge, impacting the effectiveness of aid delivery.	Staff Turnover Rate = (Number of Employees Who Left / Average Number of Employees) * 100
Customer orders	Crucial for understanding demand patterns, planning resource allocation, and ensuring that the organization can meet the needs of those it serves. Analyzing the trend of orders over time also helps in assessing the effectiveness of outreach and service delivery strategies.	Number of Orders = Total Orders Received in a Given Time Period Order Growth Rate = ((Orders in Current Period - Orders in Previous Period) / Orders in Previous Period) * 100

Source: Author

Table 4 Indicators falling under the area of Efficiency

Indicator	Reasoning for humanitarian supply chains	Calculation
Product or service availability	Crucial in ensuring that necessary resources are always on hand when needed. High level of availability minimizes the risk of stockouts, ensuring that aid can be delivered promptly. Monitoring availability also helps organizations optimize inventory levels and reduce the risk of supply chain disruptions.	Product or service availability = (Total completed responses / Total requests received) * 100
Average order size or customer expenditure	Helps organizations optimize the size and value of aid packages, ensuring that they are efficiently utilizing resources while meeting the needs of beneficiaries.	Average Order Size = Total Value of Orders / Number of Orders Average Customer Expenditure = Total Expenditure by Beneficiaries / Number of Beneficiaries
Delivery accuracy	Ensures consistent delivery of aid, maintaining the trust of both donors and beneficiaries. It is crucial for smooth operations in unpredictable environments.	Delivery Accuracy Index = (Number of Successful Deliveries / Total Deliveries) * 100
On-time delivery	Critical in humanitarian operations as delays can have severe consequences.	On-time Delivery Rate = (Number of On-time Deliveries / Total Deliveries) * 100
Delivery time	Reducing delivery time is essential for ensuring that aid reaches those in need as quickly as possible.	Average Delivery Time = Total Time Taken for All Deliveries / Number of Deliveries
Logistics capacity	Sufficient logistics capacity is vital for responding to emergencies and ensuring that aid can be scaled up as needed.	Logistics Capacity Utilization = (Used Logistics Capacity / Total Available Capacity) * 100
Order confirmation cycle time	Reducing this cycle time is crucial for accelerating the delivery of aid and ensuring that orders are processed promptly.	Order Confirmation Cycle Time = Total Time Taken for All Confirmations / Number of Orders
Order fill rate	Reflects the organization's ability to meet the needs of beneficiaries efficiently, ensuring that all requested items are delivered as expected. A high order fill rate is indicative of a well-functioning supply chain.	Order Fill Rate = (Number of Orders Completely Fulfilled / Total Orders) * 100
Process throughput	Evaluates the efficiency of processes such as packaging, transportation, and distribution of goods. Higher process throughput indicates that the organization can handle more volume within a shorter time frame, which is critical during large-scale emergency responses.	Process Throughput = Total Output (e.g., Number of Packages Processed) / Total Time Period
Process duration or efficiency	A lower number of delays indicates a more streamlined and efficient operation, which is essential for timely aid delivery in emergency situations. Reducing process delays ensures that resources are deployed promptly, enhancing the overall efficiency of humanitarian responses.	Process Delay Rate = (Number of Delays in Processes / Total Processes) * 100
Process lead time	Minimizing lead time is crucial for delivering aid promptly, especially during emergencies.	Process Lead Time = Total Time Taken from Process Start to Completion
Inventory level	Maintaining the right inventory level is crucial to ensure that aid supplies are available when needed, without overstocking, which can lead to wastage and bottlenecks.	Inventory Level = Total Inventory Value or Quantity on Hand
Inventory turns or turnover	Indicates efficient management of supplies, reducing the risk of stockouts or excess inventory.	Inventory Turnover = Price of Delivered Products / Average Inventory Price
Workforce size	Maintaining an optimal workforce size is important to balance operational needs with budget constraints.	Workforce Size = Total Number of Full-time Equivalent (FTE) Employees
Partner network structure or density	In humanitarian logistics, a well-structured and dense partner network enhances the efficiency of operations by facilitating resource sharing, collaboration, and rapid response. It helps organizations evaluate the robustness of their partnerships and the potential for coordinated action.	Network Density = (Number of Actual Connections / Number of Possible Connections) * 100

Source: own

6. CONCLUDING DISCUSSION

This study aimed to address the long-standing challenge of establishing effective performance measurement systems in HSCs. By integrating the 3E model into the performance measurement framework, the research contributes to a more systematic approach in aligning humanitarian logistics with operational goals. The findings underscore the importance of adopting a balanced and strategic approach to performance measurement that not only manages resources efficiently but also ensures the timely and impactful delivery of aid.

The analysis revealed significant gaps in the current performance measurement practices within the humanitarian sector. A considerable portion of humanitarian organizations either do not measure performance indicators or only do so inconsistently. This lack of systematic monitoring is compounded by the unique challenges of the humanitarian environment, where traditional commercial KPIs often fall short due to the intangible and complex nature of humanitarian outcomes. The study highlights the need for tailored indicators that can better capture the nuances of humanitarian efforts, particularly in terms of alleviating suffering and achieving long-term positive impacts.

By systematically selecting and categorizing indicators from the business environment and adapting them to the needs of HSCs, this research provides a clear answer to the research question. The study demonstrates that performance indicators from commercial settings can be effectively repurposed for humanitarian use when aligned with the 3E model. This categorization ensures that the performance indicators align with the strategic objectives of HSCs, allowing them to monitor and improve their operations across the three critical dimensions of performance. An important part of the results is the emphasis that the conditions of each emergency are different, as are the conditions of each HSC. For practical benefit, it is important to view this set of indicators as a database from which specific indicators can be selectively considered. For the reasons described above, HSCs should aim for as few sample indicators as possible.

One of the key insights from this research is the importance of the 3E model in bridging the gap between humanitarian objectives and measurable outcomes. The model's focus on Economy, Efficiency, and Effectiveness resonates with the core goals of HSCs, as evidenced by the semi-structured interviews with sector professionals. The alignment between the model and the respondents' priorities – such as cost-effectiveness, timely delivery, and the reach of aid – demonstrates the model's applicability in enhancing the operational performance of HSCs.

The study also brings to light the critical role of donor influence in shaping the performance of HSCs. Donor-driven pressures, particularly concerning the allocation and use of funds, often dictate the operational focus of humanitarian organizations. Donor influence on performance is significant, as they may insist that their financial contributions be used directly for their specific purposes, leaving little room for flexibility in addressing broader, long-term goals. This often leads to a skewed emphasis on short-term deliverables and narrowly defined objectives,

which may compromise the sustainability of interventions. Therefore, integrating the 3E model into HSC performance frameworks not only aids in resource optimization but also helps in navigating the complexities of donor expectations while maintaining a focus on long-term humanitarian objectives.

Despite the promising results of this research, several areas for future research remain. First, further studies should investigate the development of more specialized KPIs tailored to specific types of humanitarian operations, such as disaster relief versus protracted conflicts. This would help refine the application of the 3E model in different operational contexts and increase the accuracy of performance measurement.

Second, there is a need to explore the role of technology in improving data collection and analysis in HSCs, particularly in environments where information and communication networks are disrupted. Studies which explore the digitalisation needs for improving supply chain efficiency offer valuable insights into how technology can optimize the flow of goods in complicated logistical contexts (Nowak, Kirchner and Koliński, 2022). Research into how digital tools, such as blockchain, big data analytics, and AI, can be also integrated into the 3E model could lead to significant advancements in real-time performance monitoring.

Lastly, future research should also focus on the long-term societal impacts of humanitarian interventions, specifically how performance measurement frameworks can be expanded to assess not just short-term effectiveness, but also the long-term sustainability of aid efforts. This includes investigating the potential unintended consequences of humanitarian actions, such as market disruptions and aid dependency, and how performance measurement systems can account for these complex dynamics. A more comprehensive evaluation of these long-term effects would allow organizations to better navigate unintended consequences and improve the sustainability of their interventions.

However, it is crucial to recognize that the 3E model has certain limitations when applied in the humanitarian context. The focus on Economy, Efficiency, and Effectiveness may not fully address the unpredictability and complexities of humanitarian operations, where the prioritization of speed or cost-effectiveness could sometimes overshadow critical factors such as equity, community engagement, or the long-term sustainability of interventions. This could lead to a neglect of the qualitative aspects of humanitarian efforts, such as emotional and psychological support for beneficiaries. These risks and limitations must be considered when adapting the 3E model for humanitarian purposes, ensuring that the measurement systems remain flexible and context-sensitive.

The 3E model needs further refinement and validation to account for these complexities. Given the diverse and dynamic nature of humanitarian operations, the simplicity of a model that focuses on measurable indicators may not capture some of the more nuanced aspects of humanitarian work. Therefore, continued efforts are needed to fine-tune these frameworks to ensure their full applicability to the wide range of conditions humanitarian organisations face.

In conclusion, this research reinforces the necessity of evolving beyond traditional performance metrics to adopt a more holistic and tailored approach to performance measurement in HSCs. The 3E model presents a viable pathway for achieving this evolution, aligning humanitarian efforts with measurable outcomes that reflect both operational efficiency and humanitarian impact. By embedding this model into their performance frameworks, humanitarian organizations can better navigate the complexities of their operational environment, ensuring that their missions are not only fulfilled efficiently but also leave a lasting positive impact on the communities they serve. Further exploration into specialized KPIs, the role of technology, and the long-term impacts of aid will continue to enrich our understanding and improve the effectiveness of humanitarian logistics.

Author Contributions: Conceptualization, D.R. and P.F.; Methodology, D.R. and P.F.; Validation, D.R. and P.F.; Formal Analysis, P.F.; Investigation, D.R.; Resources, D.R.; Data Curation, D.R. and P.F.; Writing – Original Draft Preparation, D.R.; Writing – Review & Editing, P.F.; Visualization, D.R.; Supervision, P.F.; Project Administration, D.R.; Funding Acquisition, D.R.

Funding: This article is funded using resources from a specific research project at the University of Defence conducted under the title Using Performance Indicators for Planning and Managing Humanitarian Supply Chains and the tag SV22-FVL-K109-REP.

Conflict of interest: None.

REFERENCES

- Abidi, H. (2019). *Performance Management in Supply Chains: Applications to humanitarian and commercial supply chains* (PhD-Thesis, Vrije Universiteit Amsterdam). Available at: <https://research.vu.nl/ws/portalfiles/portal/78517330/complete+dissertation.pdf>
- Abidi, H., de Leeuw, S., & Klumpp, M. (2014). Humanitarian supply chain performance management: a systematic literature review. *Supply Chain Management: An International Journal*, 19 (5/6), 592-608. Available at: <https://doi.org/10.1108/SCM-09-2013-0349>
- Anderson, M. B. (1999). *Do no harm: how aid can support peace--or war*. Lynne Rienner Publishers, Boulder, Colo. <https://doi.org/10.1515/9781685854065>
- Anjomshoae, A. et al. (2022). A systematic review of humanitarian supply chains performance measurement literature from 2007 to 2021. *International Journal of Disaster Risk Reduction*, 72, 102852. Available at: <https://doi.org/10.1016/j.ijdr.2022.102852>
- Balcik, B., Bozkir, C. D. C., & Kundakcioglu, O. E. (2016). A literature review on inventory management in humanitarian supply chains. *Surveys in Operations Research and Management Science*, 21 (2), 101-116. Available at: <https://doi.org/10.1016/j.sorms.2016.10.002>
- Beamon, B., & Balcik, B. (2008). Performance measure in humanitarian relief chains. *International Journal of Public Sector Management*, 21, 4-25. Available at: <https://doi.org/10.1108/09513550810846087>
- Beamon, B. M., & Kotleba, S. A. (2006). Inventory management support systems for emergency humanitarian relief operations in South Sudan. *The International Journal of Logistics Management*, 17 (2), 187-212. Available at: <https://doi.org/10.1108/09574090610689952>

- Bititci, U. et al. (2012). Performance Measurement: Challenges for Tomorrow*: Performance Measurement. *International Journal of Management Reviews*, 14 (3), 305-327. Available at: <https://doi.org/10.1111/j.1468-2370.2011.00318.x>
- Blecken, A. (2010). Supply chain process modelling for humanitarian organizations. *International Journal of Physical Distribution & Logistics Management*, 40 (8/9), 675-692. Available at: <https://doi.org/10.1108/096000031011079328>
- Brignall, T. J. et al. (1991). Performance measurement in service businesses. *Management Accounting*, 69 (10), 34.
- Cardoso, B. et al. (2023). Performance evaluation in humanitarian operations based on the beneficiary perspective. *International Journal of Productivity and Performance Management*, 72 (1), 66-91. Available at: <https://doi.org/10.1108/IJPPM-06-2020-0295>
- Chan, F. T. S., & Qi, H. J. (2003). An innovative performance measurement method for supply chain management. *Supply Chain Management: An International Journal*, 8 (3), 209-223. Available at: <https://doi.org/10.1108/13598540310484618>
- Chopra, S., & Meindl, P. (2013). *Supply chain management: strategy, planning, and operation*. 5th ed. Pearson, Boston.
- Christopher, M. (2005). *Logistics and supply chain management: creating value-added networks*. 3rd ed. FT Prentice Hall, Harlow, England; New York.
- Christopher, M., & Peck, H. (2004). Building the Resilient Supply Chain. *The International Journal of Logistics Management*, 15 (2), 1-14. Available at: <https://doi.org/10.1108/09574090410700275>
- Christopher, M., & Tatham, P. (2011). *Humanitarian logistics: meeting the challenge of preparing for and responding to disasters*. 1st ed. Kogan Page, London ; Philadelphia, Pa.
- CHS Alliance (2014). Core Humanitarian STANDARD. CHS Alliance. Available at: <https://corehumanitarianstandard.org/the-standard/language-versions>
- Clarke, M., & Parris, B. W. (2019). Understanding disasters: managing and accommodating different worldviews in humanitarian response. *Journal of International Humanitarian Action*, 4 (1), 19. Available at: <https://doi.org/10.1186/s41018-019-0066-7>
- Davis, S., & Albright, T. (2004). An investigation of the effect of Balanced Scorecard implementation on financial performance. *Management Accounting Research*, 15 (2), 135-153. Available at: <https://doi.org/10.1016/j.mar.2003.11.001>
- Drucker, P. F. (1994). *Řízení neziskových organizací: praxe a principy*. 1. vyd. Management Press, Praha.
- Gatignon, A., Van Wassenhove, L. N., & Charles, A. (2010). The Yogyakarta earthquake: Humanitarian relief through IFRC's decentralized supply chain. *International Journal of Production Economics*, 126 (1), 102-110. Available at: <https://doi.org/10.1016/j.jipe.2010.01.003>
- Gopal, P. R. C., & Thakkar, J. (2012). A review on supply chain performance measures and metrics: 2000-2011. *International Journal of Productivity and Performance Management*, 61 (5), 518-547. Available at: <https://doi.org/10.1108/17410401211232957>
- Gros, I. (2016). *Velká kniha logistiky*. Vydání: první. Vysoká škola chemicko-technologická v Praze, Praha.
- IFRC (1994) *Code of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Relief*. Available at: <https://www.ifrc.org/document/code-conduct-international-red-cross-and-red-crescent-movement-and-ngos-disaster-relief>
- Jambor, Z., & Nagy, J. (2022). Resilience of food supply chains – a dynamic capability approach. *Ekonomika misao i praksa*, 31 (2), 473-486. Available at: <https://doi.org/10.17818/EMIP/2022/2.6>
- Kaplan, R., & Norton, D. (1992). The Balanced Scorecard: measures that drive performance. *Harvard business review*, 70 (1), 71-79.

- Kennerley, M., & Neely, A. (2002). A framework of the factors affecting the evolution of performance measurement systems. *International Journal of Operations & Production Management*, 22 (11), 1222-1245. Available at: <https://doi.org/10.1108/01443570210450293>
- Kisperska-Moroń, D. (2010). Evolution of competencies of logistics and supply chain managers. *Electronic Scientific Journal of Logistics*, 6 (3), 21-31. Available at: https://www.logforum.net/pdf/6_3_3_10.pdf
- Kovács, G., & Spens, K. (2009). Identifying challenges in humanitarian logistics. *International Journal of Physical Distribution & Logistics Management*, 39 (6), 506-528. Available at: <https://doi.org/10.1108/09600030910985848>
- Kovács, G., & Spens, K. M. (2007). Humanitarian logistics in disaster relief operations. *International Journal of Physical Distribution & Logistics Management*, 37 (2), 99-114. Available at: <https://doi.org/10.1108/09600030710734820>
- Kovács, G., & Tatham, P. (2009). Humanitarian logistics performance in the light of gender. *International Journal of Productivity and Performance Management*, 58 (2), 174-187. Available at: <https://doi.org/10.1108/17410400910928752>
- Kunz, N. (2019). An automated quantitative content analysis process for humanitarian logistics research. *Journal of Humanitarian Logistics and Supply Chain Management*, 9 (3), 475-491. Available at: <https://doi.org/10.1108/JHLSCM-06-2018-0051>
- Kunz, N., & Reiner, G. (2012). A meta-analysis of humanitarian logistics research. *Journal of Humanitarian Logistics and Supply Chain Management*, 2 (2), 116-147. Available at: <https://doi.org/10.1108/20426741211260723>
- Kyne, D. et al. (2007). Balanced Scorecard for Natural Disaster Management Projects. *Disaster Prevention and Management*, 16, 785-806. Available at: <https://doi.org/10.1108/09653560710837073>
- Lu, Q., Goh, M., & De Souza, R. (2016). A SCOR framework to measure logistics performance of humanitarian organizations. *Journal of Humanitarian Logistics and Supply Chain Management*, 6 (2), 222-239. Available at: <https://doi.org/10.1108/JHLSCM-09-2015-0038>
- Lynch, R. L., & Cross, K. F. (1995). *Measure up! yardsticks for continuous improvement*. 2nd ed. Blackwell Business, Cambridge, Mass.
- Mangan, J., Lalwanis, C., & Calatayud, A. (2021). *Global logistics and supply chain management*. Fourth edition. Wiley, Chichester, West Sussex, United Kingdom.
- Monczka, R. M. (ed.) (2009). *Purchasing and supply chain management*. 4th ed. South-Western, Mason, OH. Available at: <http://www.mim.ac.mw/books/Purchasing%20And%20Supply%20Chain%20Management%204th%20edition.pdf>
- Moyo, D. (2010). *Dead aid: why aid is not working and how there is a better way for Africa*. Farrar, Straus and Giroux, New York.
- Murray, S. (2005). *How to deliver on the promises*, *Financial Times*. Available at: <https://www.ft.com/content/79ae9810-6012-11d9-bd2f-00000e2511c8>
- Neely, A., Adams, C., & Crowe, P. (2001). The performance prism in practice. *Measuring Business Excellence*, 5 (2), 6-13. Available at: <https://doi.org/10.1108/13683040110385142>
- Nowak, P., Kirchner, M., & Koliński, A. (2022). Analysis of digitalisation needs improving the supply chain efficiency for new silk road transport corridor. *Ekonomika misao i praksa*, 31 (2), 487-503. Available at: <https://doi.org/10.17818/EMIP/2022/2.7>
- Parmenter, D. (2015). *Key performance indicators: developing, implementing, and using winning KPIs*. Third edition. Wiley, Hoboken. <https://doi.org/10.1002/9781119019855>
- Pettit, S., & Beresford, A. (2009). Critical success factors in the context of humanitarian aid supply chains. *International Journal of Physical Distribution & Logistics Management*, 39 (6), 450-468. Available at: <https://doi.org/10.1108/09600030910985811>

- Repík, D. et al. (2023). Present Trends, Emergencies and Their Impact on Supply Chain Security. *Vojenské rozhledy*, 32 (3), 063-081. Available at: <https://doi.org/10.3849/2336-2995.32.2023.03.063-081>
- Repík, D., & Foltin, P. (2022a). Applications of performance indicators for optimization of humanitarian chains. *Logforum*, 18 (4), 495-504. Available at: <https://doi.org/10.17270/I.LOG.2022.765>
- Repík, D., & Foltin, P. (2022b). Measuring The Performance of Humanitarian Supply Chains and Problems of Their Application In Practice. *39th IBIMA Conference Proceedings. 39th IBIMA International Conference*. IBIMA publishing, Granada.
- Repík, D., & Foltin, P. (2023). Analysis of problems of the performance management of humanitarian supply chain. *Proceedings of International Scientific Conference Business Logistics in Modern Management. 23rd International Scientific Conference on Business Logistics in Modern Management (BLMM)*, Ekonomski fakultet u Osijeku, Osijek. Available at: <https://www.webofscience.com/wos/woscc/full-record/WOS:001226680300012>
- Sawhill, J. C., & Williamson, D. (2001). Mission Impossible?: Measuring Success in Nonprofit Organizations. *Nonprofit Management and Leadership*, 11 (3), 371-386. Available at: <https://doi.org/10.1002/nml.11309>
- Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2000). *Designing and managing the supply chain: concepts, strategies, and case studies*. Irwin/McGraw-Hill (The Irwin/McGraw-Hill series Operations and decision sciences Operations Management), Boston.
- Supply Chain Council (2010). *SCOR Model*. Available at: <https://scor.ascm.org/processes/introduction>.
- Thomas, A. S., & Kopczak, L. (2005). From Logistics to Supply Chain Management: The Path Forward in the Humanitarian Sector. *Fritz Institute*, 15, 1-15.
- Thorvaldsdottir, S., Patz, R., & Eckhard, S. (2021). International bureaucracy and the United Nations system: introduction. *International Review of Administrative Sciences*, 87 (4), 695-700. Available at: <https://doi.org/10.1177/00208523211038730>
- Tomasini, R., & Wassenhove, L. V. (2009). *Humanitarian Logistics*. Palgrave Macmillan UK, London. Available at: <https://doi.org/10.1057/9780230233485>
- UN (2022). Ninety Per Cent of War-Time Casualties Are Civilians, Speakers Stress, Pressing Security Council to Fulfil Responsibility, Protect Innocent People in Conflicts. Available at: <https://press.un.org/en/2022/sc14904.doc.htm>
- UN DESA (2024). Sustainable Development Topics. Available at: <https://sdgs.un.org/topics>
- UN Press (2023). With Highest Number of Violent Conflicts Since Second World War, United Nations Must Rethink Efforts to Achieve, Sustain Peace, Speakers Tell Security Council. Available at: <https://press.un.org/en/2023/sc15184.doc.htm>
- UNHCR (2011). The Sphere Project: Humanitarian Charter and Minimum Standards in Humanitarian Response. 2011 Edition, UNHCR. Available at: <https://www.unhcr.org/media/31692>; <https://doi.org/10.3362/9781908176202>
- Van De Ven, M. et al. (2023). Key performance indicators for business models: a systematic review and catalog. *Information Systems and e-Business Management*, 21 (3), 753-794. Available at: <https://doi.org/10.1007/s10257-023-00650-2>
- Van der Laan, E. A., De Brito, M. P., & Vergunst, D. A. (2009). Performance measurement in humanitarian supply chains. *International Journal of Risk Assessment and Management*, 13 (1), 22-45. Available at: <https://doi.org/10.1504/IJRAM.2009.026388>
- WB (2021). Fragility, Conflict and Violence, World Bank. Available at: <https://www.worldbank.org/en/topic/fragilityconflictviolence>
- WB (2023). World Bank Open Data, World Bank Open Data. Available at: <https://data.worldbank.org>

Ing. Dušan Repik

Doktorand
Sveučilište obrane, Češka Republika
Fakultet vojnog vođenja
Katedra za logistiku
E-mail: dusan.repik@unob.cz
Orcid: <https://orcid.org/0000-0002-2629-9165>

Dr. sc. ing. Pavel Foltin

Docent
Tehnološko sveučilište u Brnu, Republika Češka
Institut za forenzičko inženjerstvo
Odjel za inženjering rizika
E-mail: foltin@vutbr.cz
Orcid: <https://orcid.org/0000-0001-8270-0390>

MJERENJE UČINKA HUMANITARNIH LANACA OPSKRBE: SUSTAV POKAZATELJA

Sažetak

Humanitarni lanci opskrbe ključni su za pravodoban i učinkovit odgovor na krizu, no mjerenje njihova učinka i dalje je izazov. Ovaj članak identificira i analizira čimbenike koji utječu na učinak humanitarnih lanaca opskrbe, s ciljem uspostavljanja sveobuhvatnog sustava mjerenja učinka. U početku se ispituju trenutne metode koje se koriste za procjenu uspješnosti u tim lancima opskrbe. Na temelju ove analize predlaže se strukturirani sustav pokazatelja uspješnosti, koji razlikuju učinkovitost u procesima te mjere ishode za procjenu rezultata i utjecaja humanitarnih napora. Zadnji dio istraživanja prikazuje validirani skup pokazatelja osmišljenih za poboljšanje učinkovitosti i optimizaciju logistike u humanitarnim aktivnostima, pružajući praktičnu vrijednost za primjenu unutar humanitarnih organizacija.

Ključne riječi: humanitarni lanci opskrbe, KPI, mjerenje učinka, 3E model.

JEL klasifikacija: H41, L91, O22.