

THE RESILIENCE OF SOCIAL LOGISTICS SYSTEMS – INTRODUCTION

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Purpose: The article aims to formulate basic assumptions defining the resilience of complex systems falling within social logistics' scope of interest. The article emphasizes the importance of general systems theory for the contemporary understanding of management sciences, with particular emphasis on logistics. The authors of the article have also characterized, based on the current state of literature, the concept of social logistics as one of the three "clean" types of logistics, positioning it alongside military and economic logistics

Design/methodology/approach: The article presents an overview of approaches to the crystallizing issue of social logistics in literature. The analyzed object of research was referred to the general theory of systems and conclusions were drawn in the form of proposals to shape the social logistics system. In addition, the authors presented an original proposal for the composition of the social logistics system based on observation of the activities of social entities and in-depth analysis of Polish and foreign literature.

Findings: Then it was proposed to consolidate the term 'social logistics system resilience' and to conduct empirical research along with an outline of the research procedure. The proposed research procedure will be used and the results of research conducted in accordance with it – described in subsequent articles of the authors.

Social implications: In the article, it was concluded that the subject of the study is relatively broad, and the link between the topic of social logistics and supply chain resilience is a research gap that will be filled by series of articles, the starting link of which is this one. The analyzes contained in the article refer to a large extent to the problems of comfort in social life, with particular emphasis on human needs of a social nature.

Originality/value The originality of the article express in compiling the issues of social logistics with issues of systems' resilience. In the face of the constantly observed negative phenomena disrupting the functioning of social logistics systems, the topic of their resilience is of particular importance.

Keywords: logistic system, resilience, social logistics, social needs, vulnerability.

Category of the paper: Literature review.

1. Introduction

Over the past few years, the concept of social logistics has begun to crystallize, understood as one of three "pure" types of logistics. Social logistics began to be treated on an equal footing with economic and military logistics. This trend emerged from the perception of the difference in the key goal of the logistics implementers, as well as the different ways of reaching this goal. In this article, the authors presented a number of approaches to defining the term "social logistics" appearing in the literature. In addition, they presented an original proposal for the composition of the social logistics system based on observation of the activities of social entities and in-depth analysis of Polish and foreign literature. An important element of the article is an attempt to relate the concept of logistics system's resilience to the proposed social logistics system. A proposal of a research procedure aimed at determining the level of vulnerability and resilience of social logistics systems was also presented.

2. General system theory and social logistics

Reflections on the concept of the social logistics system proposed in this article should begin with the interpretation of the concept of a system well-established in management sciences and resulting from the general theory of systems. This theory is currently an interdisciplinary category and its sources should be traced to biological sciences. Already in the initial phase of the creation of general system theory, L. von Bertalanfy still formulated the current definition of the system assuming that it is "a set of elements in mutual relations" (von Bertalanfy, 1984). Over the years, system theory has undergone systematic development on the basis of cybernetics and engineers from various areas of engineering activity. Nowadays, system theory finds application in countless areas of functioning of both living organisms (which refers to its original sources) as well as technical devices or economic structures, but also societies, which requires seeking its application in the field of social logistics, positioned in the field of management sciences.

Logistic systems in management sciences

The leading representatives of the systemic trend in management sciences include K.E. Boulding, D. Katz, R.L. Kahn or R.L. Ackoff referring their works to general systems theory. The systemic approach in management sciences focuses and explains the existence of changes that can be observed in the functioning of various types of organizations. On the basis of systems theory, these organizations are treated as sets of elements deciding about their shape,

as well as sets of relations between these elements. Therefore, they are by definition a kind of systems.

Management itself, as the main subject of interest in management sciences, is treated as systemic activity, which is associated with the emergence of cybernetic management models assuming the existence of controlling and controlled elements (Rudolf, 2002). The management system behind Rudolf thus means a set of relationships between system controlling elements and controlled elements. According to Niedzielska, virtually any organization using a system approach can be decomposed into a number of subsystems (Niedzielska, 1998):

- management subsystem – its task is to analyze the environment and internal elements of the organization supplemented by making decisions aimed at achieving a number of goals set for the organization,
- information subsystem – is designed to enable the efficient and effective flow of information between the internal elements of the organization and its environment, which is an essential component of the functioning of the organization,
- executive subsystem – its task is to carry out tasks set for individual elements of the organization by the management subsystem.

Logistics is undoubtedly in the broad spectrum of areas of interest in management sciences. According to one of the more popular definitions of logistics, saying that it is "a process of planning, implementing and controlling the efficient and economically efficient flow of raw materials, materials, finished products and appropriate information from the point of origin to the point of consumption to meet customer requirements", you can undoubtedly state that it falls within the scope of management sciences (Coyle, Bardi, Langrey Jr., 2002). It assumes the implementation of basic management functions, in the case of logistics - in the context of shaping flows. Not concentrating yet on the direction of the recently separated area of social logistics, the theoretical basis for including the system approach in logistics in the broad sense should be indicated. The application of the system approach in relation to logistics has resulted in the emergence of numerous definitions of the logistics system, among which selected are characterized in Table 1.

Table 1.
Chosen definitions of the term "logistics system"

Author	Definition
P. Blaik	A set of logistic elements whose connections are concretized through transformation processes. Between these elements, with specific properties, there are close, specific, also in an organizational sense, connections. This means that in practice the structure of the logistics system is constituted only by those logistics processes that are subordinated in a systemic way to the appropriate organizational solutions
E. Michlowicz	Intentionally organized and connected set of such elements (subsystems) as supply, production, transport, storage, recipient together with relations between them and between their properties, conditioning the flow of streams, funds and information
B. Fahimni R. Molaei M. Ebrahimi	A network of organizations, people, activities, information, and resources involved in the physical flow of products from supplier to customer

Source: own work based on: Blaik, 2010; Michlowicz, 2002; Fafimni, Molaei, Ebrahimi, 2011.

Each of the definitions cited in Table 1 emphasizes the existence of certain elements that make up the structure of the logistics system and the orientation on flows, both material and information. Analyzing the development of logistics over the years and trends in modern society (with particular emphasis on social needs), one can observe a gradual shift in the center of gravity of logistics interest from the definitely dominant physical flows towards a more balanced situation in which information flows are gaining in importance. Undoubtedly, more and more often value (whose delivery based on shaping flows is one of the main tasks of logistics) takes on an intangible form in the form of information, the availability of which should be ensured by properly organized logistics activities of various types of entities.

Social logistics as one of the pure types of logistics

Modern understanding of logistics assumes the existence of its military origin, which shows a tendency to focus attention on transport and storage processes, as well as to pay attention to minimizing total costs (Szołtysek, Sadowski, Kalisiak-Mędelska, 2016). After transferring rules used in the military sphere to broadly understood business, the concept of business or economic logistics was created. In this way, scientists began to talk about two "clean" types of logistics – military logistics and economic logistics. On the other hand, scientists' opinions on the legitimacy of separating individual types of logistics were strongly divided. However, there was no doubt about the adoption of improving material and information flows as the essence of logistics activities (Krzyżanowski, 1994). Rules governing the decision-making process on actions taken can be understood differently for different logistics' types. In connection with the adoption of the above thesis, the authors of this article support the opinion of scientists who consider it justified to separate the two types of logistics mentioned above. They also acknowledge that consideration should be given to the recognition of social logistics as another – the third "pure" type of logistics. Their opinion motivates the perception of difference in the main goals of entities operating in the area of a given type of logistics, and in particular the difference in the manner of achieving these goals.

Asian authors were one of the first scientists dealing with the topic of social logistics, and the trend of taking social actions began to be noticed also in the activities of entrepreneurs who would traditionally be positioned as part of economic logistics. In the studies of Asian creators, one can come across the scope of interest in social logistics, however, guided by the business perspective. According to Tanimoto, social logistics is "creating, maintaining, regulating and taxing the infrastructure within which enterprises operate, with particular emphasis on the conditions of: transport, communication, control, settlements with the public budget, crisis management (Szołtysek, 2016)". Tanimoto therefore emphasizes the close link between social logistics and economic logistics, which brings his position closer to the modern concept of public management, which assumes drawing on the achievements of economic logistics and the experience of enterprises to manage public units. However, similarly to the need to separate social logistics as a separate type of logistics, the opinions of scientists are

divided as to its It is sometimes even acknowledged that the excessive combination of social and economic logistics can become a braking force for the former. A different approach to the positioning of social logistics determines its place within global logistics. In his mind, social logistics is one of three layers (Szołtysek, 2016).

Regardless of the way of positioning social logistics in relation to its other types, as the main premise for the necessity of its proper separation, scientists adopt a focus on satisfying the needs of beneficiaries of the shaped social logistics system. This satisfaction is the primary goal of social logistics, and this statement is at the core of most attempts to define this concept found in literature. These attempts did not always end with the full definition of the term, although they suggested key elements. Selected elements of the definition of social logistics are presented in Table 2.

Table 2.
Social logistics definitions' elements

Author	Definition's elements
G.V. Trujillo Ortiz	Social logistics is one of three layers of global logistics that links the strategic value of flows in the business sphere with the social system.
U. Dautzenberg	Social logistics is used to effectively and effectively confront society's needs in terms of material flows with possible ways of satisfying them.
I. Slavinska	Social logistics is oriented at providing all the different flows necessary to meet the needs of residents.
J. Szołtysek A. Sadowski M. Kalisiak-Mędelka	Social logistics is shaping material flows (and accompanying information) with a special social role in order to obtain specific space-time values, resulting from the needs of society and ensuring its proper functioning.

Source: own work based on: Trujillo Ortiz, 2009; Dautzenberg, 2008; Slavinska, 2006; Szołtysek, Sadowski, Kalisiak-Mędelka, 2016.

Table 2 shows that regardless of the way of thinking about social logistics, one should notice the special importance of society's needs for its existence. The definition coined by Szołtysek, Sadowski and Kalisiak-Medelska seems to properly define the essence of social logistics and will be the starting point for further considerations contained in this article. The authors of this definition also indicated 5 features related to the management process that distinguish individual pure types of logistics – the dominant premise for decisions, the priority of actions, the guiding principles, the subject and the main goal (Szołtysek, 2016). In terms of these features, one can easily see significant differences between types of logistics. In this case, the quality of society's life was defined as the priority of management actions. It will provide a starting point for considerations focused on determining social needs that are an incentive to shape the flows necessary to meet them. According to the definition taken from the PWN Encyclopedia, the quality of life is understood as "the degree of satisfying material and intangible needs – meeting standards or realizing biological, psychological, spiritual, social and political, cultural, economic and ecological units, families and collectivity; the concept used in social policy, psychology, medicine, economics and sociology" (PWN, 2019). In the context of social logistics, the above definition deserves the presence of social needs in a number of needs that are key to the quality of life, as well as the presence of a defined concept in economics.

This suggests the validity of the considerations contained in this article. Focusing on social needs, one should mention their definition and a number of social needs appearing in the literature on the subject.

The fact of the notion of needs in a wide spectrum of scientific disciplines or fields of life results in an ambiguous ambiguity in understanding it. This article focuses on understanding the concept of need in the context of economic sciences. The lack of a theory of needs in social sciences necessitated their definition in relation to psychological concepts. In literature, however, one can also see a departure from the psychological understanding of needs, towards functional and systemic concepts. The authors of this article adopt two definitions of systemic needs (Zbróg, 2011). The first of these states that "Need is something that, in relation to the biology of the individual, its social role, group culture, experience and current situational conditions in which it operates, creates in it not only a sense of satisfaction (or lack thereof) in a specific matters, but also (if the need is met) a sense of meaning in this satisfaction". Thus, it suggests the importance of social roles being on a par with biological conditions of human life. The second, however, assumes that "The need of a system is such a feature, because of which a condition of the undisturbed functioning of this system in its environment is a certain state of this environment [...]. The surrounding of a given system is the set of all non-system objects whose properties affect on the system and at the same time they change under the influence of this system. [...] Failure to meet the needs implies disruption of the system's functioning" (Zbróg, 2011). This definition, in turn, is a contribution to the attempt to create a model of the social logistics system described in the next chapter of this article.

One of the types of human needs of particular importance for this article and understanding the essence of social logistics are social needs. In order for selected needs to be considered social, they must meet a number of conditions (Lisowski, 1996):

- should occur universally, and their satisfaction should require the existence of appropriate institutions,
- dissatisfied may increase to the extent that justifies the use of institutional or systemic solutions,
- when certain social institutions (systems) are characterized by various types of dysfunctions, it is considered necessary to eliminate these dysfunctions.

The above three conditions differ in circumstances in which they occur. With regard to the first condition – social needs are better or worse met by already existing institutions, for the second – meeting the needs requires the establishment of appropriate institutions, while to the third - the needs are relatively difficult to determine. According to Lisowski's approach, it can be stated that social needs are all common needs, to which the existence and activity of appropriate institutions is required. Interestingly, however, it does not specify the nature of the needs considered to be social, as the only differentiator assuming their widespread occurrence.

3. The concept of social logistics system

The concept of the social logistics system proposed in this article assumes a high level of its abstractness. On the basis of systems theory, it can be stated that "an abstract system is defined by means of a set of system elements and a set of relations between elements of this system. Virtually every object can be considered as a system, regardless of whether the relations between its elements are the result of a deliberate intention of the designer or not. The selection of elements and the way relationships are defined determine the functions that the system performs" (Myszewski, 1998). This fragment of the article aims to create a model of an abstract social logistics system, containing a proposal of a set of its elements in the form of key tasks that it should fulfill. In addition, the proposed model contains references to the environment of the social logistics system and suggested flows that should occur within it and between it and its surroundings. Figure 1 provides an overview of the concept of the social logistics system, including elements of its environment.

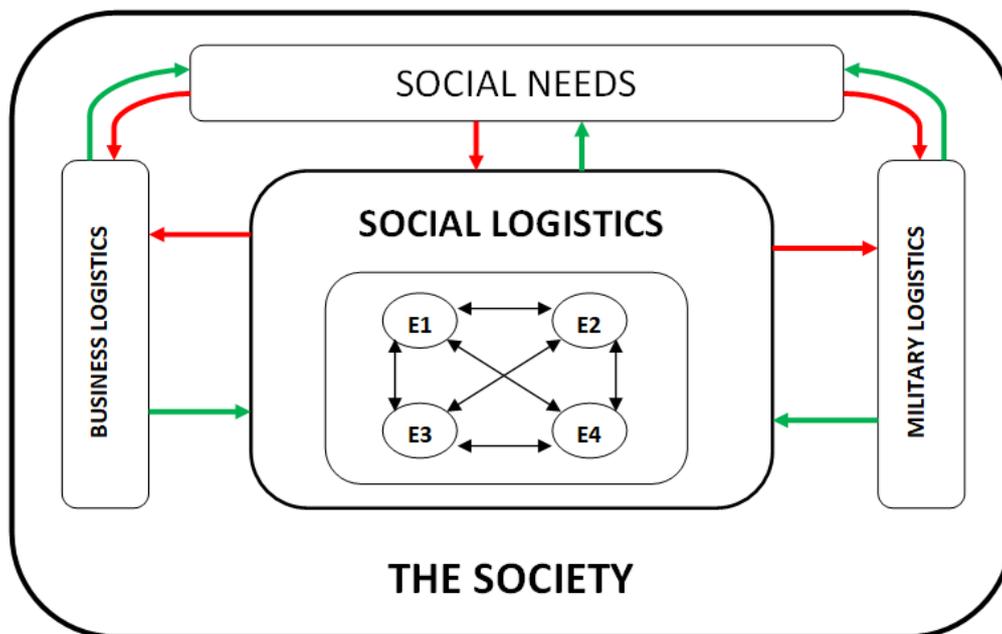


Figure 1. A general outline of the concept of the social logistics system and its environment.

Arrows marked in green indicate flows of information on social needs. Depending on the type of social need reported, information is collected by implementers of economic, military or social logistics. It should be noted that there are situations in which individual entities exchange information about existing social needs, hence the information links between economic, military and social logistics. Arrows marked in red indicate flows (material and information) shaped to meet social needs. The symbols: "E1", "E2", "E3" and "E4" are a symbolic representation of a set of elements of the social logistics system, which will be specified later in the article. The concept described in this article is based on the definition adopted by the author of J. Szoltysek and P. Kołodziejczyk, according to which social logistics is "shaping

material flows (and accompanying information) with a special social role in order to obtain specific space-time values, resulting from the needs society and ensuring its proper functioning" (Kołodziejczyk, Szoltysek, 2009). The authors of the above definition also suggest positioning social logistics next to the other two pure types of logistics, which has an impact on the concept of an abstract system of social logistics. This suggestion and the quoted definition implies the adoption of basic elements of the social logistics system environment. The author of the article considers these elements: society with particular emphasis on its (social) needs, the general construct of economic logistics and the general construct of military logistics. Each system should be oriented on a specific goal, and in the case of the social logistics system it is to meet social needs, hence the set of social needs is the most important element of the environment of the proposed system.

Social needs as the most important element of the social logistics system environment

According to Lisowski's approach quoted earlier, it was stated that social needs are all common needs, to which the existence and activity of relevant institutions is required. These institutions will constitute a set of implementers of basic social logistics activities. However, before this collection is composed, it is necessary to specify the key social needs that appear in the reports of organizations dealing with their identification. For purposes of this article, reports published by the New England Healthcare Institution, University of Wisconsin County Rankings, The Town of Blackfalds and Center for Consumer Engagement in Health Innovation were analyzed. Table 3 presents key groups of social needs identified as part of research conducted by the above-mentioned institutions.

Table 3.

Key groups of social needs in the analyzed reports

Reporting institutions	Center for Consumer Engagement in Health Innovation	New England Healthcare Institution	The Town of Blackfalds
Groups of social needs	Education	Administrative needs	Addiction prevention
	Housing uncertainty	Housing uncertainty	Neighborhood security
	Employment	Access to socio-demographic information	Childcare
	Food safety	Food safety	Interpersonal violence
	Interpersonal violence	Interpersonal violence	Social programs
	Access to financial tools	Access to financial tools	Sanity
	Mobility	mobility	Housing uncertainty
	Family support and social assistance	Addiction prevention	Employment
	Access to childcare and education	Access to childcare and education	Interpersonal violence
	Earnings	Employment	Social exclusion
	Neighborhood security	Social isolation	
	Access to healthcare	Sanity	

Source: own work based on: The Town of Blackfalds, 2016; New England Healthcare Institution, 2016; Center for Consumer Engagement in Health Innovation; 2018.

The groups of social needs presented in Table 3 constitute an inexhaustible set of areas within which further identification of social needs should be carried out, which are precisely defined. Identification of specific social needs sought within the groups suggested in Table 3 will pose a future research challenge for the author of this article. In this article, for individual groups resulting from Table 3, a set of institutions responsible for meeting the needs of the proposed groups will be proposed. The elements marked in Figure 1 with the symbols E1, E2, E3 and E4 (the set can consist of more elements) will be subsystems of the proposed social logistics system, composed to meet selected social needs and consisting of social institutions responsible for meeting the needs reported by society.

Composition of elements of the social logistics system as a response to social needs

Table 4 indicates groups of social needs selected by the authors in a subjective manner resulting from the analysis of Table 3. For each of social needs' groups, information about the existence of support for the implementation of these needs by social, economic and military institutions has been assigned. In addition, an attempt was made to name individual subsystems of the social logistics system.

Table 4.

Proposed set of subsystems for the social logistics system

Social needs group	The support of social institutions	The support of business entities	The support of military organizations	Proposed social logistics subsystem
Access to education	+	+	-	Education subsystem
Access to housing	+	+	-	Housing subsystem
Freedom of employment	+	+	+	Employment subsystem
Food safety	+	+	+	Food access subsystem
Current administrative support (city services)	+	-	-	Administration subsystem
Access to socio-demographic information	+	-	-	
Limiting interpersonal violence	+	+	+	Social security subsystem
Access to financial tools	+	+	-	Finance subsystem
Mobility	+	+	+	Public transport subsystem
Access to social assistance	+	-	-	Social welfare subsystem
Access to childcare	+	+	-	
Prevention and overcoming social exclusion	+	+	-	
Addiction prevention	+	+	+	Health care subsystem
Access to healthcare	+	+	-	

Source: own work.

Table 4 is designed to compose a non-exhaustive, sample set of subsystems of the social logistics system, which may be expanded (or limited) based on further research. This article is of a conceptual nature aimed at stimulating the discussion of academic circles also in the scope of subsystems of the proposed social logistics system. Another purpose of placing Table 4 is to justify the occurrence of individual flows indicated in Figure 1. The occurrence of various types of institutions in the process of implementing individual groups of social needs justifies the existence of flows between social, economic and military logistics constructs. Table 5, in turn, presents the multitude of financing sources for activities falling under individual subsystems of the social logistics system in the form of units of the Polish local government, bodies operating at the national level and private units focused on the provision of social logistics services.

Table 5.

Proposed set of sources of funding for the social logistics system's subsystems

Social logistics system subsystem	Sources of funding
Health care subsystem	<ul style="list-style-type: none"> - National Health Fund - State Budget – Ministry of Health - Local government – commune - Private institutions
Social welfare subsystem	<ul style="list-style-type: none"> - Local government – commune (Municipal Social Welfare Centers) - State budget (targeted subsidies) - Ministry of Finance, Ministry of Family, Labor and Social Policy
Education subsystem	<ul style="list-style-type: none"> - Education subsidy – Ministry of National Education - Local government – commune - State budget (targeted subsidies) – Ministry of Finance - Private education
Physical culture and recreation subsystem	<ul style="list-style-type: none"> - Own revenues of communes - Province self-government budget - State Budget (targeted subsidies) - Fund for the Development of Physical Culture, Sports Activities Fund for Students) - Sponsoring private enterprises - European Union funds
Social security subsystem	<ul style="list-style-type: none"> - State budget (police, fire brigade, army), - Municipal budget (city guard, Volunteer Fire Brigade)
Public transport subsystem	<ul style="list-style-type: none"> - State Budget (State Railways), - Municipal budget (public collective transport) - Inter-municipal associations (metropolitan transport), - Private companies providing transport services
Food access subsystem	<ul style="list-style-type: none"> - State Budget (State Sanitary Inspection, Veterinary Inspection), - Private institutions

Source: own work.

Table 5 aims to present the multitude of financing sources for individual subsystems of the social logistics system. Actually, in each of the discussed subsystems we deal with financing coming from central funds (state budget) and funds of local government units, additionally supported by the private sector. Summing up the concept of the social logistics system presented in this chapter, it should be pointed out that it was composed in relation to the goal of meeting social needs. Its environment is made up of society with particular emphasis on its needs and constructs of economic and military logistics, whose implementers actively participate in the implementation of some of the needs reported by society. The basic elements of proposed

system are subsystems aimed at satisfying specific social needs, whose collection remains open and will evolve in the course of further scientific research. In the area of scientific interests of this article's authors, the central place is occupied by the resilience of logistics systems, and this can undoubtedly be considered the proposed social logistics system. In connection with the above, the further part of the article concerns the definition of the way of understanding the concept of resilience of the social logistics system and the proposal of the future research procedure aimed at determining the level of vulnerability and resilience of selected social logistics systems.

4. Resilience in the context of the social logistics system

With the emergence of the need to look for solutions that reduce the increasing vulnerability of logistics systems, there has been a need to find answers to this phenomenon. Such an answer was considered the emergence of the term resilience, which was supposed to constitute an opposition to the vulnerability to damage and sensitivity to interference (Elleuch et al., 2016). The starting point for determining what exactly resilience is in relation to the social logistics system is therefore a set of definitions of the resilience of specific logistics systems, which are supply chains. An overview of these definitions is provided in Table 6.

Table 6.
Definitions of logistics system's resilience

Author	Definition
Pettit, Fiksel, Croxton (2010)	The ability of complex industrial systems to survive, adapt and grow in the face of turbulent change
Gaonkar (2007)	Ability to maintain, resume and restore operations after a disruption
Datta (2007)	Not only the ability to resume operations after a disaster, but also a proactive, structured search for the ability of the supply chain to deal with unforeseen negative phenomena
Falasca (2008)	The ability of the supply chain to reduce the likelihood of interference and to reduce the effects of such interference, as well as to reduce the time it takes to regain normal performance
Ponomarov/Holcomb (2009)	The adaptability of the supply chain to prepare for unexpected events, respond to disruptions and maintain business continuity.
Barroso (2011)	Ability to respond to adverse effects caused by disruptions to maintain supply chain goals

Source: own work based on: Pettit, Fiksel, Croxton, 2010; Gaonkar, 2007; Datta, 2007; Falasca, 2008; Ponomarov, Holcomb, 2009; Barroso, 2011.

Definition of the resilience of the social logistics system

Definitions presented in Table 6, after appropriate transformation, may form the basis for determining the definition of social logistics system resilience. This transformation is based on the awareness of social logistics' basic goal, which is social needs' fulfillment, and the recognition of the existence of social institutions that are to meet these needs. It can therefore

be assumed that the definition of the resilience of the social logistics system may be the statement that *The resilience of the social logistics system is the ability of social institutions to continually meet social needs in the face of turbulent changes in the environment and to reduce the likelihood of social disturbances along with minimizing negative effects of their impact.* The above construct assumes the need to compose a set of potential social factors disrupting its functioning, as well as a set of factors affecting its vulnerability.

The concept of testing the resilience of the social logistics system

The proposed procedure for testing the resilience of social logistics systems will be based on the simplification of the procedure carried out as part of the doctoral dissertation of one of the authors of this article. The research procedure suggested in this article consists of three stages, and a brief description of its course is presented in Table 7.

Table 7.

Stages of the proposed procedure for testing the resilience of the social logistics system

Stage	Issue studied	Research methods
STAGE I Development of a set of disruptions in the social logistics system	Identification and classification of disturbances affecting the resilience of the social logistics system	-Analysis of the literature on the subject, -surveys
STAGE II Assessment of the degree of vulnerability of the social logistics system	Identification of the sensitivity category of the social logistics system	-Analysis of the literature on the subject
	Assessment of the degree of sensitivity of the social logistics system	-Surveys
STAGE III Assessment of the process of managing the social logistics system's resilience	Determining the ability of the social logistics system to strengthen immunity	-Analysis of the literature on the subject
	Evaluation of the supply chain resilience management process	-Surveys

Source: own work.

The second and third stages of the proposed procedure will be implemented through a modified SCRAM tool for assessing the sensitivity and resilience of supply chains. This tool, based on supply chains, has been based on two dimensions that are subject to modification:

Supply chain vulnerability points (modification: social logistics system vulnerability points) – "basic factors that make the supply chain susceptible to disruption" (Pettit, Fiksel, Croxton, 2010); based on expert research, the authors of the method specified seven sensitivity points, which are described in Table 8. For the purposes of the research procedure proposed in this article, the understanding of these vulnerability points was modified, taking into account social elements affecting the social logistics system.

Table 8.*Vulnerability points of the supply chain the social logistics system*

	Vulnerability point (supply chain)	Definition (supply chain)	Vulnerability point (social logistics system)	Definition (social logistics system)
V1	Environment changeability (turbulence)	Environment exposed to frequent changes of external factors beyond the control of the company	Changeability of social needs	The degree of exposure of the social logistics system to frequent changes in social needs
V2	Intentional threats	Intentional attacks designed to disrupt the operation or cause human, material and financial damage	Deliberate reduction of quality of life	Intentional attacks aimed at disrupting the quality of life of society
V3	External pressure	Existence of external tensions causing business barriers	Pressure of other types of logistics	Existence of tensions from economic and military logistics implementers
V4	Resource restrictions	Restrictions due to the lack of availability of resources for production and distribution	Resource restrictions	Limitations resulting from the lack of availability of resources necessary to meet social needs
V5	Process sensitivity	The importance of strictly controlling the conditions for the implementation of processes and materials used	Process sensitivity	The importance of strictly controlling the conditions for meeting social needs
V6	Dependence on partners	Degree of dependence on external partners	Dependence on partners	Degree of dependence on representatives of economic and military logistics
V7	Interference from suppliers/ customers	Susceptibility of suppliers and customers to external forces or interference	Interference from representatives of other types of logistics	Interference transmitted from representatives of economic and military logistics

Source: own work on basis of: Pettit, Fiksel, Croxton, 2010.

Supply chain capabilities (modification: social logistics system capabilities) – defined as "attributes that enable the supply chain to anticipate and resist disruptions" (Pettit, Fiksel, Croxton, 2010). Based on expert research, the authors of the method specified the supply chain capabilities, which are described in Table 9. For the purposes of the research procedure proposed in this article, the understanding of these sensitivity points was modified, taking into account social elements affecting the social logistics system.

Table 9.*Capabilities strengthening supply chain resilience and capabilities of social logistics system*

	Capability (supply chain)	Definition (supply chain)	Capability (social logistics system)	Definition (social logistics system)
C1	Supply flexibility	Ability to quickly change supply sources	Institutional flexibility	Ability to use the resources of commercial and military institutions
C2	Flexibility in order processing	Ability to quickly change means of transport or other factors related to the implementation of orders	Flexibility to meet needs	Ability to quickly change physical factors related to meeting the needs

Cont. table 9.

C3	Availability of means of production	Availability of means to ensure a constant level of production	Availability of means of production	Availability of funds to ensure a continuous flow of goods in the context of meeting needs
C4	Efficiency	Ability to produce with a minimum level of resources required	Efficiency	Ability to meet needs with a minimum level of required resources
C5	Visibility (awareness)	Knowledge of operating assets and the environment	Visibility (awareness)	Knowledge of operating assets and the environment
C6	Adaptability	Ability to modify operations in response to threats and opportunities	Adaptability	Ability to modify operations in response to threats and opportunities
C7	Prediction	The ability to see potential future events or situations	Prediction	The ability to see potential future social needs
C8	Renewability	The ability to quickly recover from a disturbance	Renewability	The ability to quickly recover from a disturbance
C9	Dispersion	Wide distribution or decentralization of assets	Dispersion	Wide distribution or decentralization of assets
C10	Cooperation	Ability to work effectively with external parties for mutual benefits	Cooperation	Ability to work effectively with representatives of economic and military logistics for mutual benefits
C11	Organization	Organizational structures, policies, skills, organizational culture	Organization	Organizational structures, policies, skills, organizational culture

Source: own work on basis of: Pettit, Fiksel, Croxton, 2010.

The individual elements of the above two tables will be assessed on a five-point Likert scale (from 1 to 5) using a survey in which respondents will answer a series of questions as part of each of the supply chain's sensitivity or capacity points. The survey will first of all be addressed to representatives of high schools and universities located in the Upper Silesian-Zagłębie Metropolis, and their answers will be reflected in the assessment of individual elements of the sensitivity or capacity of the social logistics system. In the simplest variant of the proposed tool, the general point assessment of the sensitivity of the social logistics system will be the arithmetic average of the ratings of individual sensitivity points, while the general point assessment of the ability of the social logistics system (to predict and counteract interference) – the arithmetic average of assessments of individual capabilities. This approach is a significant simplification, and thus it is suggested to use an additional study to determine the weights (significance) of individual sensitivity points and the capacity of the system under consideration. The assessments obtained in this way can be subjected to extensive analysis.

5. Conclusion

The article presents an overview of approaches to the crystallizing issue of social logistics in literature. The analyzed object of research was referred to the general theory of systems and conclusions were drawn in the form of proposals to shape the social logistics system. Then it

was proposed to consolidate the term 'social logistics system resilience' and to conduct empirical research along with an outline of the research procedure. The proposed research procedure will be used and the results of research conducted in accordance with it – described in subsequent articles of the authors. After conducting literature research, the effect of which is this article, it was concluded that the subject of the study is relatively broad, and the link between the topic of social logistics and supply chain resilience is a research gap that will be filled by series of articles, the starting link of which is this one.

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