Evaluating the growing importance of IT in the management of transport logistics and supply chain

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Abstract. The potential of "action research" as a method for conducting transport surveys is examined in this paper, with a focus on evaluating it critically in order to address important transport policy issues like mitigating the effects of climate change and the environment, addressing social exclusion related to transport, and addressing issues of intergenerational equity. This is not a particularly new method in the social sciences, but it is one that has, up until now, been largely ignored in the subject of transport studies. The study investigates whether and how action research has produced distinct results from other qualitative transport survey methodologies and provides some real-world examples of how it has been used to gather data about people's travel experiences and behaviours. It looks at the best settings for action research as well as the abilities and methods that researchers should learn to get beyond some of the major objections to the approach. After that, it assesses a few of the most important obstacles to using an action research strategy and suggests possible solutions. In conclusion, it addresses the main obstacles that researchers conducting action research may have when analysing, presenting, and disseminating their "data" and suggests possible solutions.

1 Introduction

The costs of these operas can account for up to 50% of the total logistical costs. Transportation was very well integrated into the production and trade processes. Therefore, transport is involved in many issues of logistics. At the same time there is a sufficiently

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independent transport sector of logistics. The tasks of Transport Logistics include, first of all, tasks with their own solution, enhancing the mutual agreement of the actions of direct participants in the transport process. The relevance of solving such tasks arises when transport work becomes a separate sphere.

Logistics is the economic system's means of managing the flow of goods, related information, money, and services from their point of origin to their point of consumption in order to maximise system objectives and resource utilization [1-10]. The 1950s saw the beginning of the logistics industry, but this does not imply that procedures inherent to the industry were not used to economic activity. They were applied haphazardly and lacked a management strategy. The evolution of logistics can be divided into several phases.

Stage 1 is distinguished by the segregation of autonomous and fragmented processes pertaining to acquisition, retention, and dissemination. In multiple sources, this phase of development is alternatively referred to as the "fragmentation period." Certain logistics operations play a critical role in cost reduction, particularly in the domains of transportation, warehouse management, and production. The prevailing notion of management was derived from the foundational concept of enterprise management.

The second phase is referred to as the "period of conception and development of logistics"; this is when the discipline's fundamental ideas are developed. Logistics underwent significant transformation due to several factors: the economic downturn, shifts in market conditions, gradual market saturation, the expansion of oligopolistic competition, and the proliferation of marketing philosophies and increased consumer focus and awareness of the significance of sales activity. Given the prevailing circumstances, it became imperative to explore novel approaches towards cost reduction. One such approach was the evolution of computer technologies, which enabled the comprehensive implementation of economic-mathematical methods, theories of stock management, optimal planning, public service, and mathematical statistics, in addition to other techniques for analysing operations and forecasting.

When the market was saturated with products and services and supply exceeded demand, marketing emerged as the central concept in the field of enterprise management.

Phases three and four. The phase of logistics activity integration within the organisation occurred between the late 1970s and the early 1980s, constituting the third stage. Furthermore, logistics has expanded beyond the confines of individual businesses and began to encompass the operations of entire nations and the globe since the 1990s.

While the precise duration of specific phases of logistics development is not universally agreed upon, it is feasible to differentiate between the following stages: fragmentation, partial integration, integration of functional areas of enterprise logistics, and full integration within the supply chain.

Logistics has been redefined as enterprise-wide flow management due to economic shifts; all logistics operations and functions are integrated to accomplish business objectives. The notion of logistics has emerged as the central concept in enterprise management since the 1980s [11-26].

2. Materials and methods

The development of logistics is intrinsically linked to its foundational principles. Two definitions of "concept" exist in logistics: 1) concept—a notion of management; 2) logistic technology—a standardised sequence of logistic procedures that embodies a particular logistic notion.

To begin with, logistic concepts function as:

- information;
- marketing;

- integration

In logistics, material and supplementary service, information, and financial flows are subjects of study and administration.

The literature presents multiple definitions of the concept of flow; however, numerous scientists agree that flow refers to a collection of entities that are perceived collectively, exist as a process during a specific time period, and are quantified in absolute units during that time period (Table 1).

Table 1. Descriptive statistics.

Variable	Year	Percentage	Condition	Min	Max
Development of AI	2022	39%	100%	69%	19.5%
Digital platform	2022	22%	100%	59%	29.2%
Data analysis	2022	26%	100%	44%	32.5%
Transportation	2022	51%	100%	65%	14.8%
Logistics	2023	47%	100%	74%	17.7%
Innovation LT	2023	20%	100%	68%	38.1%
Supply chain	2023	57%	100%	59%	19.7%
IT analysis	2023	37%	100%	54%	39.9%

*Note: Analysis of calculations with development prospects

Material flow consists of moving material resources, work-in-progress, and finished products utilised in logistics functions and operations.

Indicators of material flow comprise the following: product nomenclature, quantity, and assortment; size and quantity descriptions (including volume, area, and linear dimensions); weight and physical and chemical properties; packaging and transportation specifications; storage and handling conditions; value and value descriptions; and h.

Regarding the enterprise, service flow refers to the progression of services executed within the logistics system in order to satisfy the requirements of both internal and external customers.

A directed movement of financial resources pertaining to the flow of goods, services, and data constitutes financial flow.

Material or service flow is accompanied by information flow, which consists of verbal, written (including electronic), and other forms of communication.

The purpose of logistics systems is to oversee primary and secondary movements. A logistics system (LT) is an intricate, systematised framework comprised of interrelated components—links—that function as a unified process to oversee the movement of materials, services, and associated fluxes.

In the process of logistic activity, actions that lead to changes in flow indicators and are not allowed to be separated within the scope of management tasks are performed, and they are called logistic operations (LO). Three types of logistics systems are distinguished: a) direct communication systems; b) systems as an echelon; c) flexible connection systems (Fig. 1).

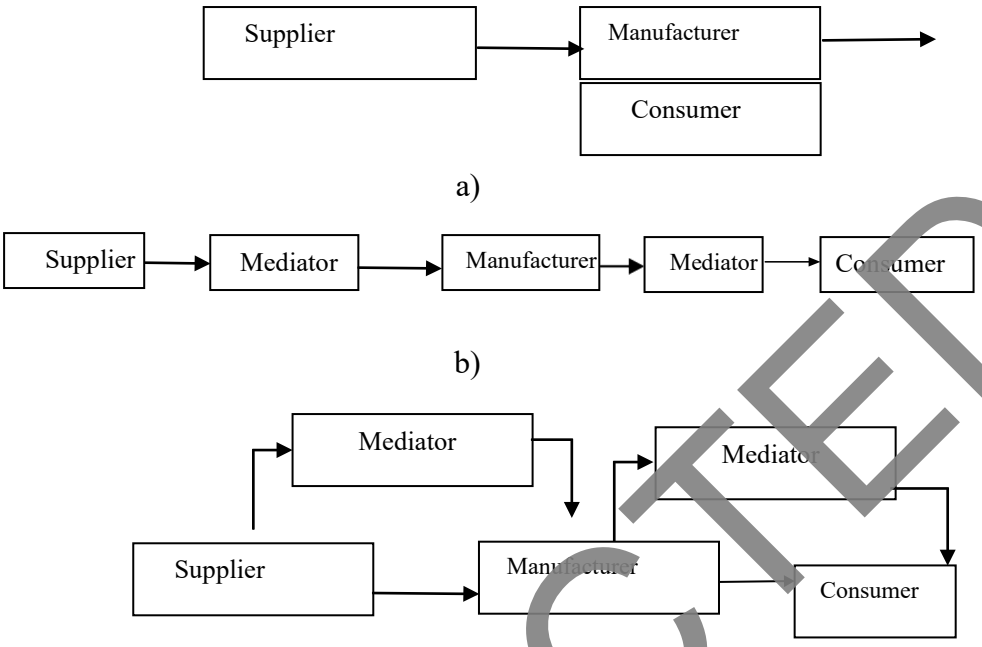

Fig. 1. Types of logistic systems.

2 Result and discussion

Due to economic shifts, logistics is now regarded as enterprise-wide flow management, involving the integration of logistics operations and functions to accomplish business objectives. The foundation of enterprise management has been predicated on logistics principles ever since the 1980s.

Forming a logistics system that integrates all functional areas requires considerable time. Hence, in accordance with the definition, the progression of enterprise logistics system development consists of four consecutive phases (levels). Initially, the storage and transportation of completed products comprise logistics. The aforementioned functions operate in accordance with the principle of direct response to interruptions in the product distribution process and daily fluctuations in demand.

In the second phase, which encompasses customer service, order processing, warehousing, stock management of completed goods, and transportation, all logistics functions associated with the distribution of finished goods are integrated.

Delivery of raw materials and materials to the enterprise, sales forecasting, management of material reserves and unresolved production, procurement of raw materials and materials, and design of logistics systems are added to the results obtained in the previous stage during the third stage. The assessment of logistics operations within the organisation is conducted by comparing them to established quality benchmarks.

During the fourth stage, the integration of all functional areas of logistics occurs. Considering the legal frameworks of various nations, businesses achieve a level of operation that is global in scope; logistics now encompasses customs procedures, standardised documentation is implemented, and the reliance on third parties (logistics intermediaries) grows.

The progression of logistics continues to this day. The progression of integration processes in logistics has persisted since the early 1990s and has now transcended the

boundaries of individual businesses. Flow management is executed on a global, regional, and national scale; the Eurologistics process is one example. Furthermore, the fourth phase of logistics advancement is distinguished by the establishment of economic entities and institutional frameworks, with the implementation of a comprehensive array of logistics services serving as its central focus. These organisations are referred to as logistics service providers (3PL-providers), and they are entrusted with all logistics operations, the majority of which are non-production in character, or a portion thereof (Table 2).

Table 2. Matrix correlation and digitalization of transport logistics.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Development of AI	2022						
Digital platform	2022	2021					
Data analysis	2022	2021	2019				
Transportation	2022	2021	2019	2018			
Logistics	2023	2020	2019	2019	2022		
Innovation LT	2023	2020	2019	2020	2021	2022	
Supply chain	2023	2020	2020	2021	2021	2023	2023

*Note: Analysis of calculations growth over the years

The emergence of integration processes has given rise to an additional alternative for logistics outsourcing, namely 4PL-providers (Fourth Party Logistics Providers). They function as integrators of the entire logistics chain, offering a comprehensive and seamless solution for the organization's logistical operations through the utilisation of supplementary service providers' resources, capabilities, and technologies in addition to their own. By integrating strategic logistics chain management with prompt execution of strategic decision implementation and execution, a 4PL-provider serves as a hybrid entity that combines the responsibilities of a consulting firm and a 3PL-provider.

The development of logistics is intrinsically linked to its foundational principles. 2) In logistics, the term "concept" can refer to either a governing notion or a paradigm, or alternatively, a standardised sequence of logistic processes that embodies a particular logistic paradigm is referred to as "logistic technology."

DDT, or demand-oriented logistics, is one of the logistics concepts (technologies) that is extensively implemented in the distribution sector. A number of variations of this concept exist, such as QR, CR, and so forth.

In the integrated business structure of the past decade, the notion of integrated logistics was implemented to oversee the primary and secondary flows: design-purchase-production-distribution-sales-service. [16].

As a concept that has evolved continuously over time, TQM (Total Quality Management) establishes competitive quality in the absence of improvement limits.

This process can be represented in the form of the following scheme:

BT ↔ PT ↔ D ↔ L ↔ Q ↔ Log ↔ IP↔ M ↔ S

here:

BT- basic research;
PT - practical studies;
D - developments;
L - design;
Q - construction;
Log - logistics;
IP - industrial production;
M - marketing;

S - sale.

The logistics innovation process is a dynamic amalgamation of diverse forms of creative labour, organised and managed with logistics, and intended to produce innovations that serve a specific purpose. Therefore, in order to comprehend its dynamics, the following must be taken into account initially: work elements, motivation, resource provision, organisation and management, competition, and environmental conditions. Beyond the aforementioned set of objective factors, there exists an additional set of subjective factors that are also relevant: risk, policy, strategy, and so forth.

The addition of all factors can be categorised as follows: external and internal factors, primary and supplementary factors, subjective and objective factors, market and non-market factors, macroeconomic and microeconomic factors, and so forth, in accordance with the objectives of the analysis and the primary classification characteristics. Factors that impede the pace of innovation processes are also encompassed within the set of innovation activity factors. The term "innovation barriers" is used to describe them. The examination of five primary adverse elements.

- allows you to highlight:
- technical factors;
- classification factors;
- socially based factors;
- regulatory factors;
- economic factors.

Any innovative process is inevitably influenced by the entirety of the system's positive and negative factors. As an essential element in the formulation and execution of the innovation policy of the state, region, and organisation, the responsibility of management bodies at all levels is to evaluate the consequences of their actions and determine the optimal conditions for maximising gains and minimising risks.

Innovative logistics clusters include the following functions:

The following are examples of market entities that influence material flows:

- producers, consumers, and commercial intermediaries;
- transport companies involved in surface, water, and air transportation operations; forwarding companies engaged in road charter conferences;
- warehouse complexes, distribution centres, and terminals;
- small industrial zones, technological parks, and innovation centres;

Based on the above thoughts and considerations, the following conclusions can be reached:

- based on logistics concepts, it is considered promising to create a complex system covering transport, warehouse and forwarding services.

- modern, meeting international standards, highly modernized, and having a wide range of services

- establishing free economic zones, technological parks and small industrial zones, increasing the effectiveness of existing zones, establishing effective organization of cluster activities for rapid development of the service sector;

- Prioritising the matters of educating proficient experts in the respective domain and coordinating international collaboration to enhance their credentials, among other things. The significance attributed to competition within clusters also influences the dynamics of interpersonal connections among participants. Compared to clusters, relationships in logistics systems are more conservative. They are determined inflexibly by the functions carried out by the system's participants, namely the logistics chain connections. Certain cluster members constitute a "critical mass" for competition to occur. Such an arrangement does not exist within the logistics system. Innovation enhances the level of competition. Consequently, the

presence of innovative activity is increasingly expected within cluster structures. Additionally, innovation is necessary for sustainable development in logistics systems. However, should critical external pressure not exist, the logistics system will not adopt innovative measures. Furthermore, the logistics system could potentially fail if timely implementation of innovations is not achieved.

Two different methods can be used for the monitoring of vehicles: special equipment that determines the coordinates of cars (satellite system for determining the coordinates of cars); remote location of cars (use of navigation system using radar methods). Currently and in the future, the preferred method is the GPS and GLONASS system.

This system works as follows: the receiver receives signals from 3 or more satellites, measures the delay of the signals from each satellite, and automatically calculates its coordinates.

The processor compares this data with the electronic map included in the device's memory (enters it). The user (car) sees on his display the map and the point moved on it with the help of the GPS-receiver.

The system allows to control the movement of vehicles automatically through the dispatch center (DM).

The system includes equipment installed in the dispatch center (DM) and vehicles (TV).

Dim's software complex consists of independent software modules provided with a network interface, and works on the basis of the distribution of information processing. This ensures that the system can be adapted to the conditions, the reinforcement is simple, and it can be quickly adapted to the customer's requirements.

The system includes the following types of software modules:

- information exchange module through radio channels and cellular GSM/GPRS channels;
- DM module;
- system server module;
- with Microsoft SQL Server.

3 Conclusion

Primarily, their logistic integration serves as a unifying force among all stakeholders in the value creation process along the logistics chain, spanning from suppliers of raw materials to the ultimate consumers of finished goods. Simultaneously, its operation resolves issues pertaining to process optimisation and efficiency enhancement by capitalising on the synergy of the entire system, rather than that of an individual participant. Therefore, logistics presents a prospect for expanding the economy.

References

1. Ya. K. Karrieva, Effectiveness of international transport logistics system in the process of globalization. Monograph (TDIU. Economics, Tashkent 2013)
2. Y. K. Karrieva, Transport component of logistics systems in foreign trade operations. Iqtisodiyot va talim. Magazine
3. M. Tulakhodjaeva, M. Khodjaeva, *Features of digitalization and ensuring transparency of accounting and audit in Uzbekistan*, In Proceedings of the 5th International Conference on Future Networks & Distributed Systems, pp. 651-654 (2021) https://doi.org/10.1145/3508072.3508201
4. M. Khodjayeva, Z. Muqumov, Journal of Advanced Research in Dynamical and Control Systems **11(7)**, 978-981 (2019)

5. M. Khodjayeva, D. Karimova, International Journal of Advanced Science and Technology **29**, 1701 – 1704 (2020)
6. K. Liu, H. A. Mahmoud, L. Liu, et al., Resources Policy **89**, 104557 (2024)
7. M. Sadiq, C. Paramaiah, Z. Dong, et al., Resources Policy **88**, 104494 (2024)
8. N. Khajimuratov, M. Ismoilova, M. Sayfullayev, E3S Web of Conferences **402**, 08045 (2023)
9. A. S. Hasanov, A. U. Burkhanov, B. Usmonov, Energy, 130535 (2024)
10. P. Xu, T. S. Adebayo, K. A. Khan, et al., Journal of Cleaner Production, 140855 (2024)
11. S. Toshalieva, E3S Web of Conferences **449**, 03003 (2023) https://doi.org/10.1051/e3sconf/202344903003
12. A. Tukhtamurodov, Y. Sobirov, S. Toshalieva, et al., BIO Web of Conferences **82**, 06002 (2024) https://doi.org/10.1051/bioconf/20248206002
13. A. E. Xidirberdiyevich, S. E. Ilkhomovich, K. Azizbek, R. Dostonbek, Journal of Advanced Research in Dynamical and Control Systems **12**, 719-725 (2020)
14. D. Abdullah, K. Gartsiyanova, K. Mansur qizi, et al., Caspian Journal of Environmental Sciences **21(3)**, 647-656 (2023) DOI: 10.22124/cjes.2023.6942
15. K. S. Uralovich, T. U. Toshmamatovich, K. I. Kubayevich, et al., Caspian Journal of Environmental Sciences **21(4)**, 965-975 (2023) DOI: 10.22124/cjes.2023.7155
16. G. Chandramowleeswaran, L. H. Alzubaidi, A. S. Liz, et al., *Design of financing strategy model of financial management based on data mining technology*, In Proceedings of the 2023 Second International Conference On Smart Technologies For Smart Nation (SmartTechCon) , pp. 1179-1183 (2023) DOI: 10.1109/SmartTechCon57526.2023.10391603
17. D. Jabborova, D. Mamurova, K. K. Umurova, et al., E3S Web of Conferences **491**, 01002 (2024)
18. M. A. Jumagulovich, S. B. Tulkinovich, S. A. Medetbaevich, et al., International Journal of Religion **5(2)**, 493-501 (2024)
19. A. S. Hasanov, A. U. Burkhanov, B.Usmonov, et al., Energy, 130535 (2024)
20. D. Abdullah, K. Gartsiyanova, M. Qizi, Caspian Journal of Environmental Sciences **21(3)**, 647-656 (2023)
21. A. Usmanovich Burkhanov, M. Mansur qizi Eshmamatova, *The ways for improvement of investment strategy in the period of digital economy*, In Proceedings of the 5th International Conference on Future Networks & Distributed Systems, pp. 655-662 (2021)
22. Y. S. Petrenko, A. U. Burkhanov, L. A. Bukalerova, V. S. Ustenko, Global Journal of Flexible Systems Management, 1-17 (2023)
23. I. Mustapha, Y. Vaicondam, A. Jahanzeb, et al., International Journal of Interactive Mobile Technologies **17(22)** (2023)
24. D. Ziyadullaev, D. Mukhamedieva, U. Xoliyorov, et al., BIO Web of Conferences **67**, 01001 (2023)
25. N. Shanasirova, Journal of Advanced Research in Dynamical and Control Systems **12(2)**, 2783–2789 (2020) https://doi.org/10.5373/JARDCS/V12I2/S20201341
26. M. Ismailova, N. Alimukhamedova, Journal of Fusion: Practice and Applications **12 (2)**, 98-108 (2023) DOI: https://doi.org/10.54216/FPA.120208)