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ANALYSIS OF DIGITALISATION NEEDS IMPROVING THE SUPPLY CHAIN EFFICIENCY FOR NEW SILK ROAD TRANSPORT CORRIDOR

UDC / UDK: 658.7:004(438)
JEL classification / JEL klasifikacija: L81, O14, R41
DOI: 10.17818/EMIP/2022/2.7
Preliminary communication / Prethodno priopćenje
Received / Primljeno: September 27, 2022 / 27. rujna 2022.
Accepted for publishing / Prihvaćeno za tisak: October 24, 2022 / 24. listopada 2022.

Abstract

Based on a review of scientific literature, as well as a detailed analysis of business processes, it should be stated that the increase in the volume of sales on a global scale generates not only the need to analyse the development of business, but above all the need to conduct scientific research in the field of improving logistics processes and information flow in the supply chain. The relatively long time of delivery of ordered goods, the complexity of customs processes and logistic service make it necessary to apply innovative digitalization solutions in order to be able to monitor and react quickly to disruptions. These analyses are most noticeable in global supply chains, which is why the New Silk Road became the research area. In this paper, the authors focused on conducting a review of digitalisation solutions that improve the efficiency in supply chains. The review was conducted both in the research aspect, by verifying knowledge on the subject in the scientific literature available on the Web of Science and Scopus databases, but also in the practical aspect, by analysing needs and trends in the use of supply chain digitalisation in business practice. The research aspect was based on the application of the CANVAS model for the identification of business needs in the supply chain digitalisation aspect and on surveys for importance degree analysis for the

identified needs in business practice. The research carried out in this area is the result of cooperation between Lukasiewicz Research Network – Poznan Institute of Technology and Poznan School of Logistics. The research was conducted in 2021 and the first half of 2022 among Polish logistic companies.

Keywords: supply chain efficiency, supply chain digitalisation, CANVAS model

1. INTRODUCTION

The continuous growth of the e-commerce market, as well as the business environment affecting the relationship between logistics operators, carriers, shippers and consignees, has contributed to the emergence of the New Silk Road initiative. It envisages transporting goods by rail from China to Poland and then distributing them using road and air transport throughout Europe. Due to the rapid increase in the number of shipments from China to Europe (especially with goods purchased through e-commerce channels), problems arise with the mass handling of shipments from China and, consequently, the need to streamline logistics operations. Problems also arise in the handling of return flows, in the processes of handling returns and complaints of goods.

The lack of common identification of individual cargoes, parcels and small consignments throughout the supply chain carried out by all participants, as well as the lack of a common IT system and the exchange of electronic information and documents in the supply chain, cause many problems and information gaps in the planning and organisation of logistics operations, both in supply and distribution. The resulting delays in the delivery of goods, process constraints and shortages of operational resources are particularly evident during periods of rush buying and importing of goods from China and other Asian countries.

The dynamic growth of global e-commerce and the associated mass movement of goods, the increasing complexity of trade processes, countries' customs and tax processes and accompanying legislation and rationing, as well as complex intercontinental supply chains and transport and logistics processes have made import and export goods movement practices highly complex. A growing need motivated by the efficient implementation of mass trade is the uniform and standardised identification of goods, consignments and shipments and the possibility to automate it. It will increase the efficiency and reliability of deliveries and reduce the costs of handling processes.

For this reason, the main research goal for this work is to identify the needs and benefits of supply chain digitisation, with a view to improving delivery monitoring, shipment transparency and security, thereby increasing the competitiveness of the end-to-end supply chain.

2. RESEARCH METHODOLOGY

The methodology involves conducting both literature and business practice research in parallel. The research was carried out between 2021 and 2022, as part of the research work at the Łukasiewicz Research Network - Poznan Institute of Technology. Figure 1 shows the methodology of the research work carried out.

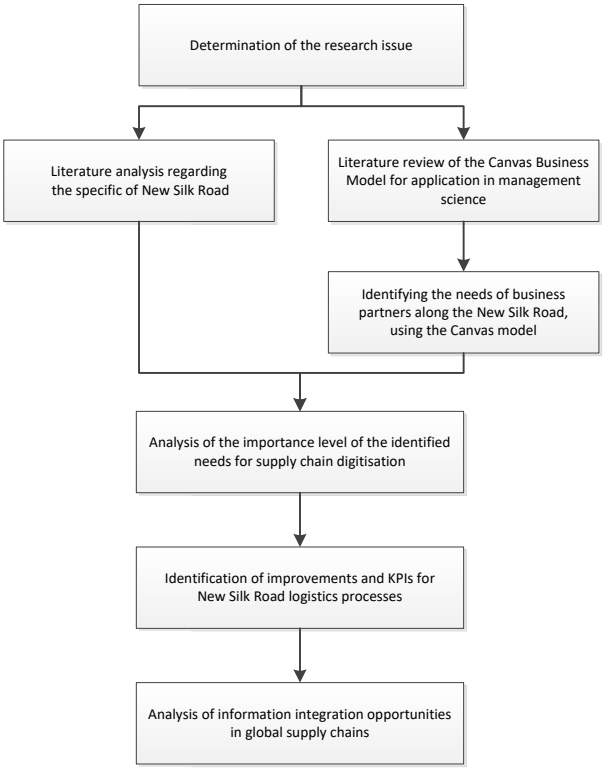

Figure 1 Research methodology

Source: own study

Two theoretical scopes have been identified in relation to the issues addressed:

- digitalisation of supply chains,
- specifics of using the Canvas Business Model in management science.
- In the presented paper, the authors used the following research methods:
- literature analysis, which aimed to assess the state for solving the research problem and to obtain scientific explanations related to the cognitive problem posed,

- business needs modelling using Canvas to represent and map business practice needs related to the identified normative problem,
- quantitative analyses to empirically verify the identified business needs in the digitisation of the supply chain along the New Silk Road. The survey was conducted in the first half of 2022 and aimed to identify the degree of importance for the developed digitalization needs in supply chains.

The theoretical research was supported by the identification of business practice needs, which was carried out as part of the PLANET research and development project. The structure of this paper follows the logic of the research work, in line with the prepared methodology.

3. DIGITISATION OF THE NEW SILK ROAD SUPPLY CHAIN

The vision of the New Silk Road (Lin, 2011; Ejdys, 2017; Wagener et al., 2020; Song, Fabinyi, 2022), which aimed to develop a transport infrastructure that could connect China, Central Asian countries, the Middle East, Europe and Africa into a single network, existed for a long time, but it was only in 2013 that steps were taken to put the concept into practice. The transport market between China and the EU had already been developed since 2008 through private initiatives, while in 2013 a decision was made to accelerate the development of transport infrastructure, and more extensive promotional activities were undertaken to develop the Belt and Road initiative.

The development of the initiative greatly accelerated with the acceptance of the project by the provincial government of China, which provided organizational and administrative support and mobilized huge financial resources in assistance. Thanks to the subsidies, rail freight prices have come close to those of sea freight.

Currently, the key role in rail connections between China and Europe (Sarwar, 2018; Bersenev et al., 2020) is played by the Trans-Siberian corridors (Northern Route), in particular the most extensive and exploited *New Eurasian Land Bridge* corridor (Tennenbaum, 2001). Less important, although with great potential, is the *China-Central Asia-West Asia* corridor, which together with additional variants (e.g. the Southern Route) form the Trans-Caspian corridors (Central Route).

The New Eurasian Land Bridge (Cieślik, 2020; Pomfret, 2021), also called the Eurasian Land Bridge or the Northern Route, is a link between the 2nd Pan-European Transport Corridor (Berlin-Minsk-Moscow-Nizhny Novgorod) and the 2nd Railway Cooperation Organization Corridor (Moscow-Astana-Lianyungang). It runs through China, Kazakhstan, Russia, Belarus, Poland and reaches Western Europe.

Trans-Siberian corridors are the cheapest, fastest and safest freight routes on the China-EU-China route. They are characterized by favourable relations and the best hard (linear) and soft infrastructure, i.e. developed international

regulations, customs clearance and procedures. Their use is facilitated by the fact that Russia, Kazakhstan and Belarus belong to the common economic area (Eurasian Economic Union, EAEU).

The hard infrastructure (Beysenbaev, Dus, 2020; Fang et al, 2021) of the Trans-Siberian Corridors is a fully electrified, double-tracked railroad line with a length of about 10,000 kilometers (13.000 kilometers in the variant to Madrid). Up to 100 million tons of cargo are transported on it annually. In 2020, the average speed of trains on the line was 1.099 km/day. Delivery of cargo on the route from the Chinese border to the Polish border through the territory of Kazakhstan, Russia and Belarus averaged 4,96 days in 2020, while in 2019 this time was 5.14 days.

The use of Trans-Siberian connections is hampered by the depleting capacity of the corridor. It is caused, among others, by the lack of transshipment terminals and train stoppages at the terminal in Małaszewicze. Rebuilding of the transshipment terminal in Małaszewicze is crucial for the development of the entire corridor.

Despite the mentioned bottlenecks, the transport structure of the Trans-Siberian Corridor is its advantage, because in addition to the developed hard infrastructure, its advantages over other connections are evidenced by:

- only two customs borders (China-EAEU and EAEU-EU)
- low modality (only 2 changes of track gauge and no congestion in maritime transport)
- a single through fare
- well established transport patterns

Apart from the development of hard and soft infrastructure, digitalization of transport and logistics operations along the Silk Road Route enabling smooth information flow has been assumed an integral part of supply chain operations and a core element as well (Fahad Anwar et al., 2022).

The PLANET project aims at speeding up the process of development of global supply chains through the transition towards the Physical Internet paradigm, demonstrating how different technologies, business cases and standards come together in real-world applications, and are able to deliver added value to the users and have positive impacts in the environment. PI (Physical Internet) lays the foundations to realize the EGTN strategy towards Smart, Green and Integrated T&L Network.

The Integrated Green EU-Global T&L Network (EGTN) can be understood as an advanced European strategy that implies the development of a Smart, Green and Integrated Transport and Logistics Network of the future to efficiently interconnecting infrastructure (TEN-T, Rail-Freight Corridors) with geopolitical developments, as well as to optimize the use of current & emerging transport modes and technological solutions, while ensuring equitable inclusivity of all T&L participants, preserving the environment, and enhancing Citizens quality of life. The strategy definition, the support to strategy implementation, the strategy possible outcomes (digital & physical infrastructures, new operational

methods etc.) and the monitoring and maximization of strategy impact are functional components of the EGTN concept. It can be defined as a green, globally connected and smart network that will be aware of the global and EU geoeconomic developments and take advantage of technological advancements, timely responding to changes by adapting its development and operation. It will be an optimisation ready network in terms of logistics operations, able to better respond to the industry needs through the implementation of innovative technologies under the PI concept (Wolf et al., 2021). At the same time, it will be an open network in terms of information sharing by its stakeholders, supporting their decision making at every level (operational, strategic etc.) and including them to its governance scheme through a multi-level governance approach. Finally, its structure will ensure that the disadvantaged regions of EU will have the required level of connectivity.

The EGTN is foreseen composed by three interactive layers:

- The physical/infrastructural layer. It refers to how the EGTN will be structured in terms of physical corridors and nodes. The objective is to have a network that is better adapted to the new EU & Global geo-economic conditions, serve more efficiently future freight flows and facilitate better the development of disadvantaged regions in comparison to the current TEN-T structure.
- The technological layer, that represents the digital EGTN infrastructure and aims at leveraging emerging technologies capable to support the PI paradigm. The main objective of the EGTN technological layer is to ensure that the EGTN fulfils its 'innovation embedding' attribute in the sense that it takes full advantage of the potential of innovative logistics concepts and enabling technological innovations in its operation, ultimately aiming to become a network operating under a PI paradigm. Towards achieving this goal, a Cloud-based Open Platform is being developed to support the main aspects of the EGTN concept: the planning and the decision support (on governance level) for the development of EGTN infrastructure and the operationalisation of the EGTN.
- The governance layer, that consists of the ecosystem of stakeholders interacting and collaborating for developing and sharing T&L infrastructure and participating in the decision making of the EGTN. The EGTN governance goal is to ensure that the EGTN members in the PI network engage in collective and mutually supportive action, that conflict is addressed and that network resources are used efficiently and effectively.

Due to respond to these assumptions the following actions have been completed:

- Participants of the supply chains in Eurasian transport corridors as well as information flows have been identified.
- Analysis of the data and information transmission process and identification of communication standards in the New Silk Road rail transport.

- Analysis of the flow of transport documents in the New Silk Road rail transport (Europe-Asia).
- Analysis of information and communication conditions of customs procedures in the New Silk Road.

4. CANVAS MODEL IN SCIENTIFIC RESEARCH

Business Model Canvas is a 9-element scheme for designing a new or rebuilt business (Shimasaki, 2020). It consists of four main areas. The first is the value proposition. A key component of the business model that tells about what is offered to the target audience. To the right of the value proposition, there are 3 elements relating to the external sphere of the model (Amoussohoui et al, 2022). First of all, the audience segment for which we create a business model. Secondly, information channels through which we inform about our value proposition, and thirdly, customer relations, i.e. an element that describes how, through which sales strategy, a potential customer is to become a customer.

The right side of the diagram relates to: key actions that need to be taken to implement the business model, key resources that are necessary to implement the business model, and key partners with whom to cooperate during the implementation of the model (Wit, Pylak, 2020; Braun et al., 2021; Salsas et al, 2022).

The business model is based on two parts describing the sources of revenue and cost generation.

The starting point for creating a business model is to define the customer segment for which it is being created. The customer segment is a homogeneous group of customers. Market segmentation is the activity of dividing the market into relatively homogeneous groups of consumers which, due to their similar characteristics, reveal similar demand. The activity of separating market segments is performed in order to prepare a product or service in such a way that it meets the needs of customers and, consequently, allows to obtain a market advantage. In practice, we create a business model for a specific customer segment. If more than one segment is distinguished in the course of market analysis, then a separate business model should be created for each of them. To define market segments, ask yourself who are the most important customers for whom you create value. Defining customer segments is also a good time to determine whether the customer, user and payer are one or several entities or people.

The second key component of the business model is the aforementioned customer value defined as the so-called value proposition. It is created in two stages. In the first stage, for the created customer profile resulting from segmentation, his needs ("gains") and the problems he has to solve ("pains") are defined. As a result, we obtain a list of tasks in which we can help him ("jobs to be done").

Once you know your client's profile, you can propose a solution, i.e. our value proposition. At the beginning, we list all the sub-products and services that

the value proposition is to include, adding information on how they relate to the previously identified needs and problems of the client.

Creating value for the customer is primarily about generating benefits. We define the positive effects of how the designed solution will generate, among others, positive emotions, social benefits, saving time or increasing specific income. In addition to creating benefits, we also define the features of our solution, which are responses to the so-called "pains", i.e. customer problems. At this stage, we consider whether our solution reduces negative emotions, risks, the likelihood of unforeseen situations and costs.

Having a defined value proposition, we can define the competitive advantages of our product or service. We distinguish three main categories of advantages: functional, cost and importance in the value chain. The functional advantage means that the solution is distinguished by its functionality compared to other solutions available on the market. The cost advantage occurs when the solution is more cost-effective than those available on the market. Value in the value chain is an advantage when the solution is important in the value chain.

On the right side of the business model, apart from the description of the segments and the definition of value, there are two elements that are, in a way, a link between them. The first is communication channels. Here we define how the defined value proposition will be communicated to the individual customer segments. When determining the method of providing information about the product to customers, it is worth noting that the communication channels will differ depending on the phase of the purchase process in which the customer is. There are 5 phases: (1) Building awareness, (2) Forming an opinion, (3) Purchasing, (4) Fulfilling the value proposition, (5) After-sale support.

The second link is customer relations. This is where the business model canvas defines the way of building relationships and formulates goals for building relationships. It can be attracting or retaining customers as well as increasing sales. When defining relations, one should ask oneself what kind of relations representatives of particular market segments expect from us and to what extent these activities are intentional.

On the bottom of the Canvas we can find financial aspects of the model. On the right hand side cost structure is presented. This part describes the most important expenditures divided into different categories such as fixed and flexible costs. On the left hand side of the model is place to present revenue streams. Defined segments of clients should be ready to pay for value proposition presented in the heart of the model and detailed sources of revenues should be defined in this part of the Canvas (Osterwalder, Pigneur, 2010).

5. ANALYSIS OF DIGITALISATION NEEDS IN NEW SILK ROAD SUPPLY CHAIN

As part of the work carried out in the PLANET project, one of the basic goals was to define business scenarios that will answer the question whether the solutions used in LL3 (Living Lab 3) will actually improve the efficiency of logistics processes of business partners Intermodal Operator and E-Commerce Logistic Operator.

For this purpose, a series of workshops was carried out in which both business scenarios and KPIs were developed that were business-related and interesting for business partners. In order for the developed business scenarios, and subsequently also the KPIs, to meet the real needs of the stakeholders, the logic presented in the diagram below was adopted.

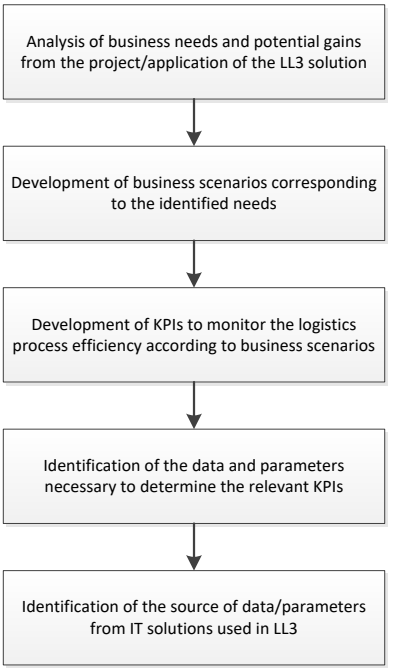

Figure 2 Logic for analysing and identifying the information needs of supply chain partners

Source: own study based on PLANET project

This logic allowed not only to embed the developed scenarios in business, but also to identify KPIs desired by the partners. The next step in our activities was to identify what data and parameters are necessary to determine the developed KPIs. The last, very important step was to identify which of the IT solutions used

in LL3 (IoT solution, EPCIS, EGTN) will be the source of generating particular data and parameters.

Business needs was structured as part of the work in the PLANET project in accordance with the CANVAS model. Jobs and Gains for E-Commerce Logistic Operator and Intermodal Operator are presented in the following sections:

Customer Profile (Jobs):

- Participation in global supply chain from China to Europe,
- Development and evolution of solutions based on supply chain digitization,
- Exploitation of information flow standardization,
- Logistics' processes optimization through IoT practical utilization,
- Better planning of logistics processes thanks to additional analytics options,
- Business communication improvement between supply chain partners.

Customer Profile (Gains):

- Cost optimization
- Operational times optimization
- Transparency and supply chain correctness
- Distribution time reduction
- Improvement of delivery status monitoring in transit to Client
- Possibility of monitoring of additional data, which cause in higher delivery service quality
- Safety increase of loadings / shipments
- Improvement of competitiveness of business partners on the market – higher quality of services, faster performance in terms of delivery times
- Reduction of operational errors caused by lack of detailed information about delivery
- Lower risk of shipment loss in international supply chain
- Increase of reloading operations' effectiveness

These needs and benefits were confronted and statistically verified in the form of a survey. The survey was conducted in the first half of 2022 and aimed to identify the degree of importance for the developed digitalization needs in supply chains. To analyse the degree of importance, a Likert scale was used supplemented by a 0 level (level 0 meant no importance and level 5 very high importance). The survey was conducted among 43 companies - partners in global supply chains: manufacturers, logistics operators, carriers or IT solution providers. The research methodology developed by the Author and presented in the publication (Domanski, Kolinski, 2020) confirms the representativeness of the research sample. Table 1 presents an analysis of the importance level for the identified jobs in global supply chains, using the New Silk Road as an example.

Table 1

Analysis of the importance level of the identified jobs for New Silk Road

Tasks to improve logistics processes in the supply chain (jobs)	Importance						Average value
	0	1	2	3	4	5	
Participation in global supply chain from China to Europe	4	6	5	8	10	10	3,023
Development and evolution of solutions based on supply chain digitization	2	1	5	7	12	16	3,721
Exploitation of information flow standardization	1	2	2	8	15	15	3,837
Logistics' processes optimization through IoT practical utilization	1	3	5	14	8	12	3,419
Better planning of logistics processes thanks to additional analytics options	0	2	5	7	11	18	3,884
Business communication improvement between supply chain partners	1	2	2	8	11	19	3,930

Source: own research

All the identified tasks for improving logistics processes in supply chains were considered to be important with at least a medium level of significance (average value minimum 3.0). The most relevant tasks concern the problem of digitisation of the supply chain, information flow standardisation and communication between business partners. These findings confirm the validity of the work on improving the information flow process in supply chains and monitoring the flow of goods.

The second major issue under analysis was an assessment of the importance of the potential benefits for supply chain digitalisation, as shown in the table 2.

Table 2

Analysis of the importance level of the identified gains for New Silk Road

Potential benefits of supply chain digitalisation (gains)	Importance						Average value
	0	1	2	3	4	5	
Cost optimization	0	3	1	2	8	29	4,372
Operational times optimization	0	2	2	1	15	23	4,279
Transparency and supply chain correctness	0	3	3	7	13	17	3,884
Distribution time reduction	0	3	2	12	14	12	3,698
Improvement of delivery status monitoring in transit to Client	0	1	5	4	17	16	3,977
Possibility of monitoring of additional data, which cause in higher delivery service quality	0	4	5	12	12	10	3,442
Safety increase of loadings / shipments	0	3	6	11	14	9	3,465
Improvement of competitiveness of business partners on the market – higher quality of services, faster performance in terms of delivery times	1	3	8	10	13	8	3,279
Reduction of operational errors caused by lack of detailed information about delivery	0	3	3	7	16	14	3,814
Lower risk of shipment loss in international supply chain	0	4	7	7	18	7	3,395
Increase of reloading operations' effectiveness	2	2	5	11	12	11	3,442

Source: own research

Similar to the first case, all identified benefits of supply chain digitalisation were also rated with a minimum medium level of significance (average value minimum 3.0). The two main benefits of the supply chain digitalisation, which are cost optimisation and operational time optimisation, are particularly to be noted.

In the next step of the research above mentioned jobs and gains were expressed according to defined scenarios by KPI and parameters. Intermodal Operator defined indicators and parameters presented on the Figure 3.

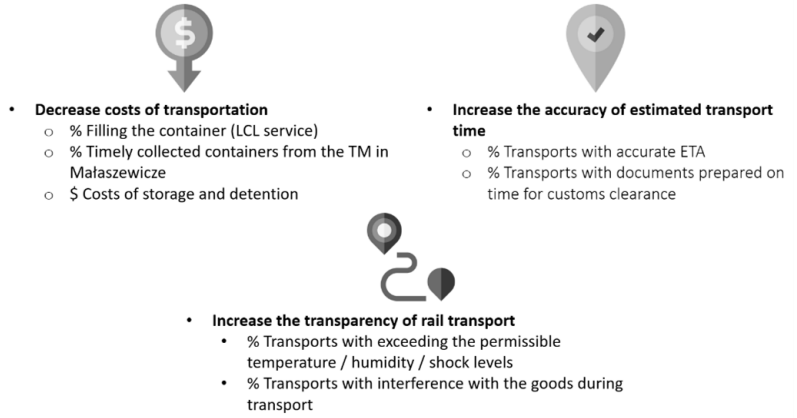

Figure 3 Indicators defined by Intermodal Operator

Source: PLANET project research

E-Commerce Logistic Operator defined indicators and parameters presented in table 3.

Table 3

Indicators and parameters defined by E-Commerce Logistic Operator

KPI	PARAMETERS
Container filling	- % loading container occupancy
Loading structure	- qty of single (scannable) loading units in containers - qty of partners involved - % shipments with delivery time guarantee required
Transport information accuracy	- % of transports notified for pickup accordingly - % of containers consistent with detailed notification
Logistics service effectiveness	- % of containers hold for information completing - Allowance time for container (customs service preparation) - Average daily loading units handled in distribution centre (project perspective)
Customs service effectiveness	- % of containers hold for additional customs data completing - Time from presenting the shipments for customs purposes until procedure finish - % of shipments hold for control / inspection
Shipments' safety	- % of containers consistent with detailed notification - qty of damage protocols (tansport unit)

Source: PLANET project research

6. CONCLUSION

The research conducted in PLANET went beyond strategic transport studies, and ICT for transport research, by rigorously modelling, analysing, demonstrating & assessing their interactions and dynamics thus, providing a more realistic view of the emerging T&L environment. The project employed, among others an EU-global rail corridor Living Lab for intercontinental connection and provided the experimentation environment for designing and exploiting PI-oriented Integrated Green EU-Global T&L Networks [EGTN]. EGTN is an open cloud infrastructure to enable digital communication amongst actors within the transport network, to access the various data available in the supply chain and outputted by the analytical model-based services.

This Living Lab 3 (LL3) was focused on streamlining logistic processes in flows from China to Europe by implementation of IoT technologies and GS1 EPCIS platform to facilitate transmission of data between partners involved in the logistics operations along the Silk Road Route using trains. Its main objectives included:

1. Increased visibility of goods thanks to IoT along the Silk Road, through the development of IoT solutions and sensors systems that help control resource parameters in real time and identify them while moving in the transport process, examining potential positive results in terms of broad implementation (tested on containerized flows – B2B use case).
2. Standardization of information flow, by creating a digital connection between actors in the transport network, enabling standardized data flow and access to information about cargoes coming from China to Poland in the whole supply chain in real time (implementation of the SSCC number and EPCIS on e-commerce flows – B2C use case).

The system architecture comprised of:

- The IoT platform that collected the data/parameters during the execution of logistics processes feeding the EPCIS repository, considering the standardized data-model.
- The EPCIS repository that ingested the data from IoT platform and fed the EGTN system. The EPCIS repository enabled a secure and ad-hoc data sharing with the stakeholders involved in the logistic transactions.
- The EGTN Platform that received data from EPCIS and exploited it to implement added value services toward greener and more optimized logistics networks.

EGTN provided architectures to connect the analytic models to other services in the platform, helping to establish the overall requirements for the technical architecture in which the predictive analytics components are effectively integrated with other components in the platform as services.

The analytical solutions necessary for LL3 partners to increase supply chain efficiency along the New Silk Road have been identified:

- *Volume Flow forecasting* – enabling predicting the inflow and outflow quantities of cargo from a distribution center
- *Carbon Footprint Prediction* - forecasting the carbon footprint for transport routes/modes
- *ETA forecasting* - forecasting estimated time of arrival with comparison of different calculation models to determine the best accuracy

Measuring logistics processes on the New Silk Road is extremely complicated (Kompa, Witkowska, 2021). To assess the impact of implemented solutions on key operational areas and the business environment 7 KPIs has been identified and expected values set:

1. Reduced compliance costs (>10%)
2. Improved end-to-end visibility (>50%)
3. Improved customer experience (>15%)
4. Increased volumes (>8%)
5. Reduced operational costs (>10%)
6. Reduced disruptions of the Supply Chain (>15%)
7. Reduction in CO2 emissions (>20%)

To gain insight into the business processes of individual LL actors as well as physical and documentation flows, 17 B2B and 13 B2C processes were mapped as part of the pilot preparation phase. It will enable to identify processes where there is potential for improvement through implementation of new technological solutions as well as changes in the organizational area.

Moreover, the solutions implemented in the pilot affected the development of EGTN in particular aspects:

- *Geo-economics aware*: The implemented solutions improved monitoring of cargo in supply chain increasing the attractiveness of the New Silk Road and development need of the TEN-T network on a global scale.
- *Innovation*: Application of sensory network (IoT) for transport monitoring.
- *Impact*: Improvement of logistics processes both economically (ETA forecasting) and environmentally (carbon footprint).
- *Integrated*: An information-integrated supply chain enables the optimization of operational activities regarding unloading activities and potential consolidation of transported cargo.
- *Inclusive*: Enabling small businesses to develop PI networks through the use of GS1 standards.

Directions for further research in this area, is to carry out a physical pilot implementation to assess the logistics process efficiency in the intermodal supply chain, before and after the implementation of innovative solutions. The needs

identified in the framework presented in this paper have allowed the identification of key performance indicators that will provide the basis for further research.

Acknowledgments

This paper is the result of research carried out in the 'Progress towards Federated Logistics through the Integration of TEN-T into A Global Trade Network' - PLANET project.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No 860274.

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ANALIZA POTREBA ZA DIGITALIZACIJOM KOJOM BI SE POBOLJŠALA UČINKOVITOST OPSKRBNOG LANCA ZA PROMETNI KORIDOR NOVI PUT SVILE

Sažetak

Proučavanjem znanstvene literature, uz detaljnu analizu poslovnih procesa, utvrđeno je da povećanje ukupne prodaje na globalnoj razini stvara ne samo potrebu za analizom razvoja poslovanja, nego iznad svega potrebu za provođenjem znanstvenog istraživanja u području poboljšanja logističkih procesa i protoka informacija u opskrbnom lancu. Relativno dugo vrijeme potrebno za isporuku naručene robe, složenost carinskih procesa i logističkog servisa stvaraju potrebu za primjenom inovativnih digitaliziranih rješenja da bi se moglo pratiti i brzo reagirati na zastoje. Ove analize najuočljivije su u globalnim opskrbnim lancima, zbog čega je Novi put svile postao područje istraživanja. U ovome radu autori su se usredotočili na pregled digitalizacijskih rješenja kojima se poboljšava učinkovitost opskrbnih lanaca. Pregled je proveden u istraživačkom aspektu verificiranjem znanja o predmetu istraživanja u znanstvenoj literaturi dostupnoj na Web of Science i Scopus bazama podataka, ali također i praktičnom aspektu, analizom potreba i trendova u uporabi digitalizacije opskrbnih lanaca u poslovnoj praksi. Istraživački aspekt temeljio se na primjeni CANVAS modela za identifikaciju poslovnih potreba u polju digitalizacije opskrbnog lanca na istraživanjima analize stupnja značajnosti identificiranih potreba u poslovnoj praksi. Istraživanje koje je provedeno u ovome području rezultat je suradnje između Lukasiewicz Research Network – Poznan Institute of Technology i Poznan School of Logistics. Istraživanje je provedeno 2021. u prvoj polovini 2022. među poljskim logističkim tvrtkama.

Ključne riječi: učinkovitost opskrbnog lanca, digitalizacija opskrbnog lanca, CANVAS model.

JEL klasifikacija: L81, O14, R41.