
Supply Chain Digitization Using GS1 Standards – Research Results

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Karolina Kolinska¹, Roman Domański², Szymon Fojutowski³

Abstract:

Purpose: Assessment of the level of products and services offered by the GS1 Poland organization to its customers - companies-participants of the GS1 system. Assessment of the needs of companies - customers of the GS1 system in relation to the solution provider - the GS1 organization.

Design/Methodology/Approach: The research was a direct interview. It was conducted with an expert - representative of the company: owner/manager, manager/specialist. The survey covered 775 companies that are members of GS1 Poland.

Findings: Digitization of the supply chain is mainly related to the use of barcodes. The most useful digital tool is My GS1. The companies-participants of the system expect in the future from GS1 organizations first of all individual approach and increase of the number of educational actions.

Practical Implications: The obtained assessment constitutes a ranking of popularity of solutions in the offer of GS1 Poland organization. Understanding expectations of companies-participants of GS1 system will allow to improve existing products and services, as well as introduce new ones - expected by market.

Originality/Value: The presented results fill a gap in the form of a lack of published research on supply chain digitalization in the Polish logistics market.

Keywords: Supply chain, digitalization, standardization, Global System One / GS1 Poland.

JEL codes: L15, L63, L86.

Paper Type: Research paper.

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¹Poznan School of Logistics, Chair of Information Systems and Digital Technologies, Poznan, Poland, karolina.kolinska@wsl.com.pl

²Poznan University of Technology, Faculty of Engineering Management, Institute of Logistics, Poznan, Poland, roman.domanski@put.poznan.pl

³GS1 Poland, Poznan, Poland, szymon.fojutowski@gs1pl.org

1. Introduction

Nowadays, running a business is not possible without proper IT support. Digitalization of business is omnipresent. However, in order for it to be effective, also in this field it is necessary to operate on the basis of universally recognized canons.

Global System One (GS1) is an international system of business standards and solutions. GS1 Standards provide agreed-upon principles and guidelines that are uniformly applied by companies to improve supply chain operations across industries (Koliński and Domański, 2021).

This article presents GS1 Poland organization's experience on the domestic market in terms of digitalization of cooperation. It has a dual character, on one hand it assesses the level of products and services offered by GS1 Poland in the opinion of its customers, on the other hand it assesses the needs of companies - GS1 customers - in relation to the solution provider - GS1.

The article consists of the following sections: literature review (section 2), description of GS1 organization (section 3), survey results (methodology - section 4, results - section 5, summary - section 6), final conclusions (section 7).

2. Literature Review

A literature search conducted in April 2022 in the Scopus database of scholarly articles selected a total of 25,208 publications on the broad topic of digitization. Limiting the interest to the area of supply chain led to a narrowing of the resulting set to 321 publications. Limiting the focus to standardization led to a narrowing of the resulting set to 273 publications.

Only 3 publications concern Global System One (GS1) in Poland. First presents the analysis of the number of participants of GS1 system in regards to the change of number of companies in Poland and the level of the use of various code systems (Cierpiszewski *et al.*, 2019). Second presents the research which was conducted in three hospitals in the Wielkopolska Region (Poland) with the aim at verifying how implementation of the Automatic Data Capture (ADC) techniques and global GS1 standards in the field of management of medicinal products flow in hospitals can help improve patient response time, quality of healthcare services and hospital efficiency (Gawrońska-Błaszczyk, 2016). Third presents the first in Poland implementation of a solution that enables tracing returnable packaging using EPC\RFID technology in the context of sustainable development of enterprises – article discusses the role of modern solutions based on GS1 standards (Cyplik *et al.*, 2011).

Broadening the spectrum of interest in GS1 standards beyond Poland led to the selection of 36 publications, including 10 scientific articles (Gawronska-Błaszczyk, 2016 repeats).

Their authors take up the following thematic threads: implementation a transformational supply chain strategy, enabled by GS1 standards, to achieve traceability of all products, equipment and patient safety events across the health system (Snowdon and Wright, 2018), managing the distribution of medications to guarantee their offer in health care facilities and communal pharmacies all over the country – a unique-code products procedure for their distribution and merchandising under GS1 international standards (Lopes-Martínez *et al.*, 2018), embedding GS1 standards throughout the NHS in England in line with the DH's eProcurement Strategy – any service or product comply with the standards (Hodgson, 2016), "OntoPedigree" – a content ontology design pattern for the representation of linked pedigrees – events captured within the pedigrees are specified using EPCIS - a GS1 standard for the specification of traceability information within and across enterprises (Solanki and Brewster, 2016).

Also in implementation information technology based on global GS1 standards – evidence of reduced standards-based inter-organisation IT over time (Power and Gruner, 2015), food compliance in the value chain 4.0 – future-proof solutions based on the GS1 standards (Lehmann, 2015), using of GS1 standards throughout the NHS in England – the next steps to becoming compliant (Doyle, 2014), the Electronic Product Code Information Services (EPCIS) is an event-oriented GS1 standard that aims to enable tracking and tracing of products through the sharing of event-based datasets that encapsulate the Electronic Product Code (EPC) (Solanki and Brewster, 2014), completing global data synchronization (GDSN) supply chain framework was developed as a model for the industry to achieve Global Standard (GS1) standards (Chen and Prater, 2013). In summary, the publications listed focus their attention on business and healthcare.

3. Characteristics of GS1 Poland

Global System One (GS1) Poland is part of GS1, a global organisation developing the most widely used standards system in the world. GS1 standards enable organisations to identify, capture and exchange information efficiently. The uniform data standard creates a common GS1 language that forms the basis for systems and processes worldwide. In this way, GS1 helps organisations to operate more efficiently, securely and sustainably.

Consumers and trading partners expect more and better quality product data. Access to reliable data about the origin and composition of products and the path they have taken in the supply chain removes any friction between business partners.

GS1 drives the digital transformation of all industries by enabling companies to create a digital version of their products. It offers a range of services and tools to make standards adoption easier and more efficient for companies.

GS1 Poland is a part of GS1 International Organization which manages GS1 system on a global scale. GS1 Foundation Poland manages GS1 system in Poland. It is the only institution authorized to admit companies from Poland and the EU to GS1 system and to grant them the right to use GS1 codes. GS1 Foundation Poland develops national solutions and participates in the development of global standards and new applications. It conducts research and development work and offers advisory services, drawing on the experience of partners in 150 countries worldwide. In this way it increases the efficiency of companies and entire supply chains.

GS1 Poland cooperates with GS1 National Organizations on a global scale. Directions of activities of GS1 Poland Foundation are agreed with GS1 Poland Council, which includes among others representatives of retail chains, manufacturers or solution providers.

The organisation's vision is contained in the statement "GS1 Standards are the basis for digital transformation in the Polish market", its mission in the words "We believe in the power of standards to change the way we live and work. We develop and implement GS1 standards in Poland by listening to the needs of the domestic market". GS1 professes such values as: orientation towards the client, working with passion, creation of a modern organisation, support of sustainable development, integration of the business environment (GS1 Poland, 2022).

4. Methodology of the Study

The survey was conducted in 2021. The survey included 775 representatives of companies that are participants of Global System One (GS1) Poland. The structure of companies, in terms of number of employees, is as follows: micro/small enterprises (up to 49 employees) - 64%, medium-sized enterprises (from 50 to 249 employees) - 21%, large enterprises (over 250 employees) - 15%. Most companies represent the retail sector (60%), of which 44% are manufacturers, while 16% are retail chains and wholesalers.

The research took the form of a direct interview with an expert - a representative of the company. Respondents represented both the management, decision-making level - the position of owner or manager (55%), and the management, executive level - the position of manager or specialist (45%).

The survey consisted of 14 closed questions and 3 open questions. This article presents only a fragment of the results of "Analysis of the survey of awareness, recommendations, satisfaction of GS1 Poland". The aim of the survey was, on the

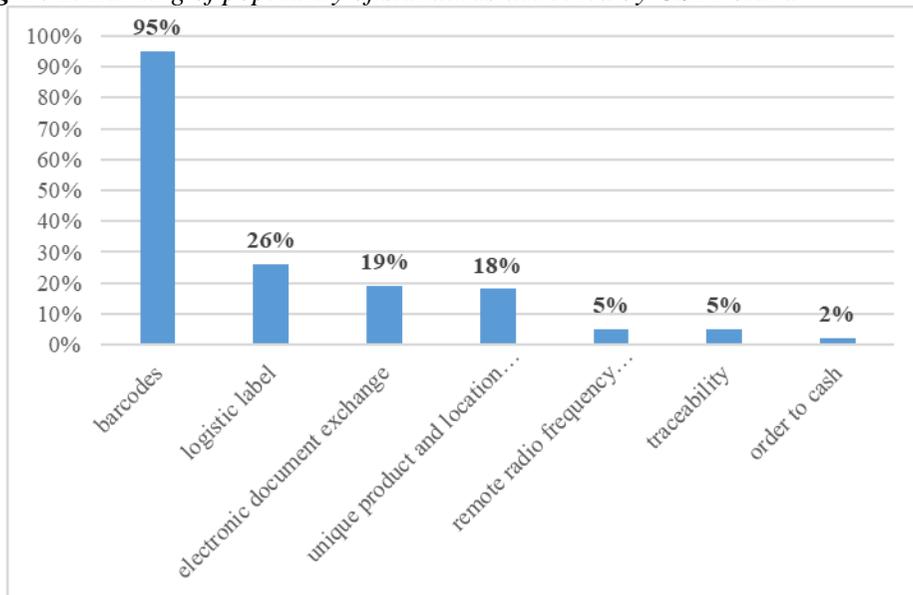
one hand, to assess the level of products and services offer (GS1 Poland organization), and, on the other hand, to assess the needs of companies (GS1 Poland clients), in terms of digitalization of mutual cooperation.

5. Survey Study

Among 775 representatives of companies who took part in the survey, 96% of them confirmed knowledge of GS1 Poland organization. The lack of familiarity with GS1 Poland may be surprising, since the survey was conducted among participants of that system. However, this peculiarity can be explained - incidental lack of knowledge (4%) was declared by persons at specialist position, just starting their career in logistics industry.

Figure 1 presents the recognition of GS1 Poland's offer (delivered standards) in the opinion of the GS1 System Participants (multiple choice option).

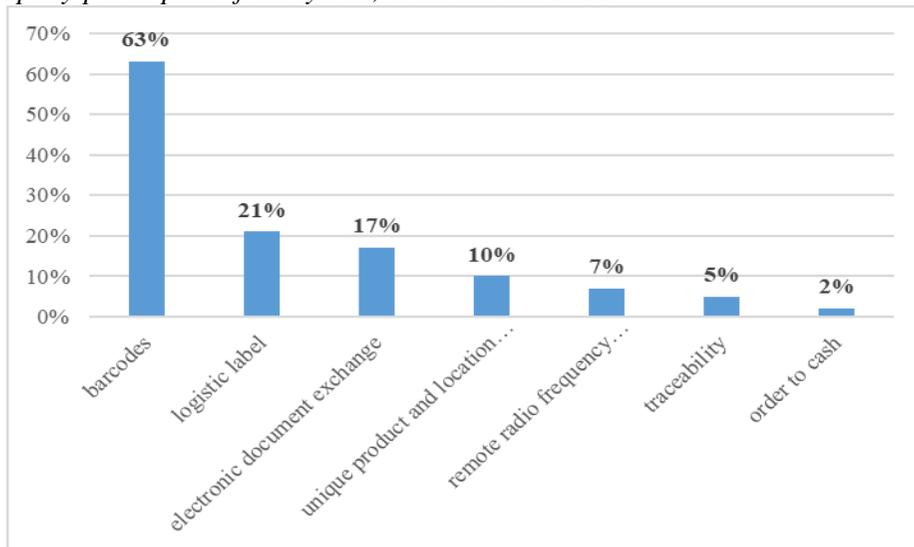
Figure 1. Ranking of popularity of standards delivered by GS1 Poland



Source: Own research (GS1 Poland, 2021).

Whereas Figure 2 presents the preferences of companies-participants of the GS1 system in terms of willingness to use in the nearest 2022 the offer of the GS1 organization (selected standards), which the company has not used so far (multiple choice option).

Figure 2. Ranking of potential interest in GS1 Poland standards, not yet used by a company-participant of the system, in the nearest 2022

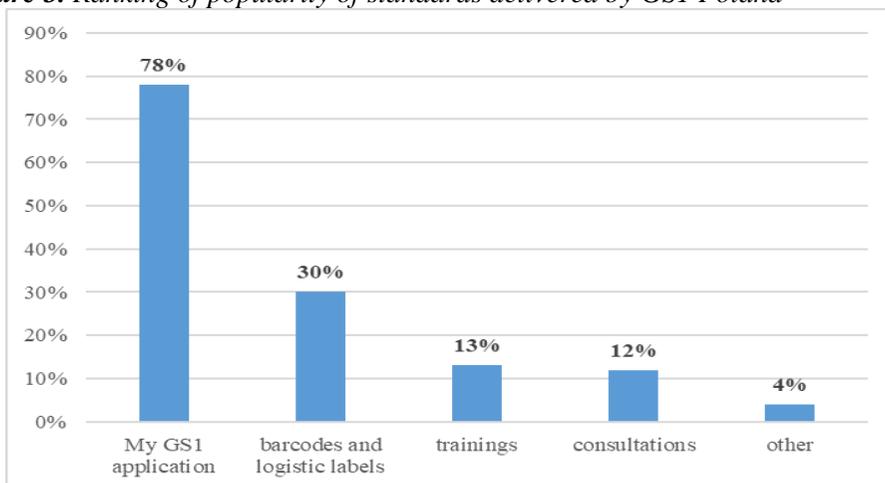


Source: Own research (GS1 Poland, 2021).

Participants of the system are active - 62% contacted GS1 Poland organization in 2021. Key forms of contact between companies and GS1 Poland are: e-mail (72%) and telephone (61%). Other forms of contact do not enjoy greater popularity - the share of responses does not exceed 5% for each of them.

Figure 3 presents the distribution of popularity of services provided by GS1 Poland among companies-participants of this system (multiple choice option).

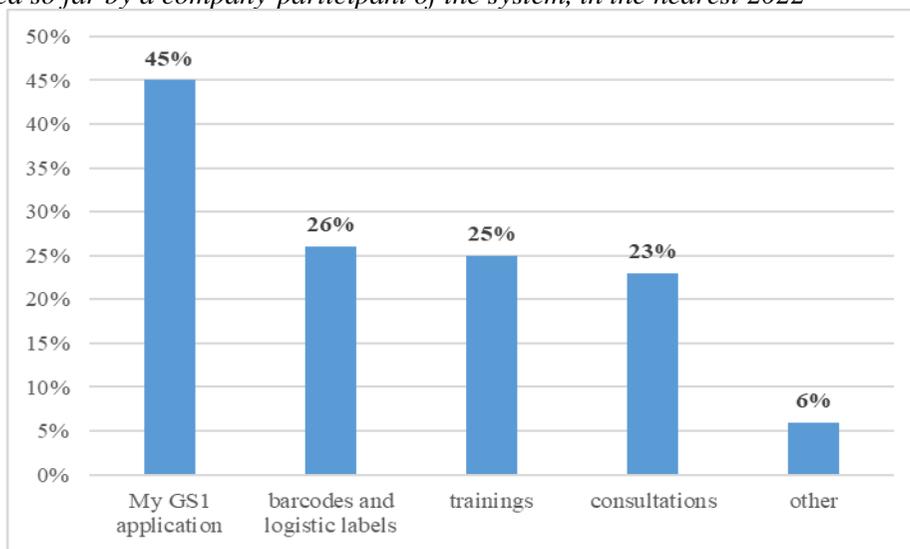
Figure 3. Ranking of popularity of standards delivered by GS1 Poland



Source: Own research (GS1 Poland, 2021).

Figure 4 presents preferences of companies-participants of GS1 system in terms of willingness to use GS1 organization services in the nearest 2022 (selected solutions), which the company has not used so far (multiple choice option).

Figure 4. Ranking of potential interest in GS1 Poland services, which have not been used so far by a company-participant of the system, in the nearest 2022



Source: Own research (GS1 Poland, 2021).

6. Summary of the Study

Among 775 representatives of companies that took part in the survey, 74% of companies stated that they see benefits from participation in GS1 Poland system. With solutions provided by GS1 Poland most companies are very satisfied (43%) or rather satisfied (44%). Percentage of companies dissatisfied is minority: 4% are rather dissatisfied, 2% are very dissatisfied. 7% of companies could not make such an assessment - no response.

The most frequently indicated benefits of cooperation with GS1 Poland are:

- the ability to offer coded products to customers,
- simplicity and transparency in assigning codes,
- a database of products and barcodes in one place,
- the labeling facilitates cooperation with contractors,
- automation of work and elimination of errors,
- entirely electronic activity,
- the possibility of consulting non-standard cases (industry standards),
- substantive support - courses, trainings, webinars,
- improvement of business activity effectiveness,
- improvement of communication,

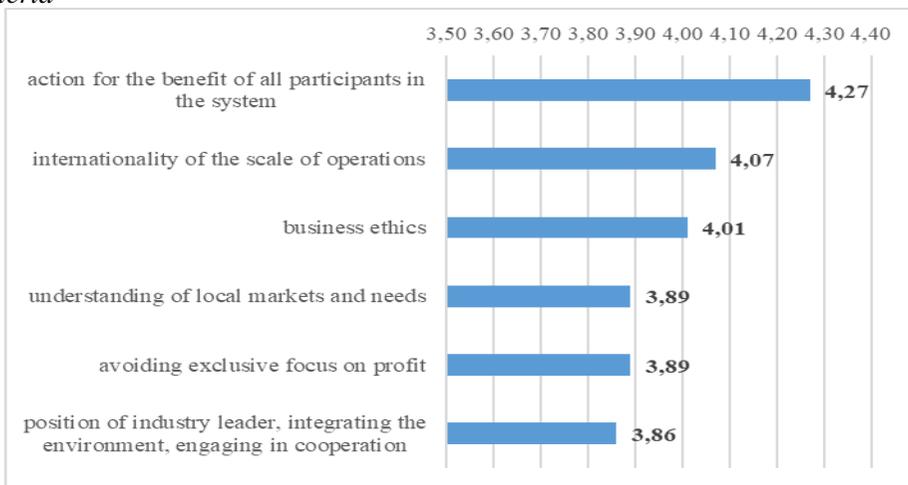
- standardization.

At the same time companies - participants of GS1 Poland system - indicated what this organization could do in the future to make cooperation more attractive for companies:

- reduced fee for participation in the system,
- possibility of obtaining certification by the company,
- individual approach to problems occurring in a given company,
- providing greater care for small and medium-sized companies, especially manufacturing ones,
- more and more frequent trainings and courses, preferably free of charge,
- more materials and manuals, preferably free of charge,
- a little quicker feedback.

Figure 5 is the quintessence of the survey results. Finally, companies on 5-point Likert scale (1 - lack of realization of a given value, 5 - realization of values in full) evaluated GS1 Poland organization activity in terms of selected criteria.

Figure 5. Final evaluation of GS1 Poland's performance according to selected criteria



Source: Own research (GS1 Poland, 2021).

7. Conclusions

The analysis of literature allows us to formulate a conclusion that the activity of GS1 Poland is mainly of business and practical character. It is proved by relatively small number of scientific publications in which it is mentioned by name. It should be noted, however, that a broader literature search selected definitely more publications about global standards, but without direct reference to the organization that manages

this system - GS1. Perhaps the image of GS1 Poland organization is different in alternative databases of scientific information (the literature review in this paper was limited to the Scopus database only).

The analysis of the survey results allows the following conclusions: supply chain digitalization is identified primarily with the use of barcodes (currently and in perspective - Figure 1 and 2), My GS1 is considered to be the most useful digital tool in cooperation (currently and in perspective - Figure 3 and 4), companies participating in GS1 system expect in future from GS1 organizations mainly individual approach and increase of educational actions, in activities of GS1 Poland global values are commonly recognized in business, which were evaluated on a five point scale from 3.86 to 4.27.

As part of the directions of further research it is planned to: confront the results of the current GS1 Poland survey with the results of other national GS1 organizations; analyze the current survey in-depth from the point of view of: type of industry of operation, size of enterprise, position of respondent; analyze changes in awareness of supply chain digitalization - comparative study 2021 vs 2017 (GS1 Poland has archival results of the previous edition of the survey).

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