INITIATIVES AND PRACTICES FOR GREENING LOGISTICS SERVICES ON THE POLISH MARKET – STATUS QUO AND DEVELOPMENT OPPORTUNITIES

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Abstract

The practice provides us with numerous examples of green initiatives and solutions being implemented by logistics service providers (LSP). They differ from one country to another and their complexity and sophistication depend to a large extent on the development and state of maturity of the logistics market in a particular country. The factors that may influence the adoption of such green solutions were examined in several studies and the problem was investigated from different perspectives (LSP, customers, forwarders). However, there is a lack of research and publications referring to the Polish logistics market within the "green" context. Greening the logistics services seems to be overlooked or neglected.

Therefore, the main purpose of this paper is twofold: 1) to elaborate the scope and types of green initiatives and best practices implemented by LSPs on the Polish market, 2) to examine the factors behind the (non-)implementation of green solutions by LSP acting in Poland. In order to achieve these goals, the authors scrutinized the Polish logistics market as well as conducted a survey among logistics providers and freight forwarders acting in Poland. The green initiatives and green practices identified were subsequently organized and classified according to a comprehensive taxonomy (e.g., initiatives resulting from regulatory instruments of environmental policy *vs.* voluntary initiatives; green activities offered on a daily basis *vs.* those performed only as a special request from a customer). Moreover, the authors also elaborated on the formal system of green certification (e.g., ISO 14001 or BREEAM).

Key words: green initiatives and practices, green logistics; green transport; Logistics Service Provider, logistics services market

1. INTRODUCTION

Environmental issues have emerged as a crucial area in development strategies of many transport, logistics and forwarding (TFL) companies. Introducing green solutions in their daily activities is perceived as a company's social responsibility and is seen in a positive light and welcomed by society. Green efforts may lead to a

reduction in external cost of transport and logistics activity and simultaneously be profitable for a company.

The issue of environmental impact of TFL activity should not be overlooked, because the TFL sector as a backbone of international trade and globalisation contributes noticeably to global pollution and air emissions. According to the European Environmental Agency, the EU transport sector is still responsible for 46% of total EU-28 emissions of NO_x and constitutes a rising source of GHG emissions that in 2015 exceeded 1990 levels by 21%. (EEA, 2016, pg. 18) Furthermore, it is also projected that along with rising volumes of transported cargoes, CO_2 emissions from global freight could increase by 160% if no reduction measures are taken. (ITF, 2017, pg. 13).

The rising importance of environmental issues in the TFL sector is even reflected in the well-known Logistics Performance Index (LPI) and its indicators introduced by the World Bank. In 2012, for the first time, the LPI started to refer to green issues in logistics and survey the demand for environmentally-friendly international logistics (The World Bank, 2016, pg. 35).

Generally, while analysing green practices, attention is given more to manufacturing companies than to TFL ones; however, studies within the area of green logistics are progressively increasing. The problem researched from different perspectives often concerns experiences of LSPs in particular countries, especially Asian ones (e.g., Lin & Ho, 2011, pgs. 67-83). However, we noticed a lack of research in this field with regard to a Polish context and there are clear grounds to elaborate this topic due to the rising importance of the Polish TFL market.

The Polish TFL market is relatively young when comparing to markets of Western European countries. It has continuously developed since the beginning of the 1990s alongside with the process of transformation of the Polish economy to the market rules and further accelerated in 2004 after joining the EU. Simultaneously, at a European level, this is also quite a big market. According to data provided by the acknowledged German Fraunhofer Institut, in 2015 the size of the Polish TFL market was estimated at EUR 53.4 billion, which ranks Poland as the 7th biggest in Europe. (Kille et al., 2015, pg. 29) Considering exclusively the road transport market, the rank of Poland is even higher. (Raczkowski et al., 2017, pgs. 14-16) Furthermore, taking into account the total volume of the modern, commercial warehouse spaces (more than 11.2 million m^2 and this is forecasted to double over the next ten years), the Polish market resources rank eighth in Europe (JLL, 2016, pg. 32). The central location of Poland in Europe, the even better condition of its transport infrastructure and location of Special Economic Zones in particular regions are, among others, factors influencing the development of the Polish TFL market and confirming its rising importance.

For this reason the environmental issues (environmental problems, general attitude to green practices and green practices/initiatives per se) regarding this particular market cannot be disregarded (neglected) as it has a wider resonance and influence to some extent the whole TFL sector and its pursuit to being eco-friendly.

Therefore, the purpose of the paper is twofold: 1) to elaborate the scope and types of green initiatives and best practices implemented by LSP on the Polish market,

2) to investigate the factors behind the (non-)implementation of green solutions by LSP acting in Poland.

This research is part of an ongoing project on the state of green transport and logistics in Poland. The first part of the project focuses only on one particular step in the transport/logistic process, namely the purchasing of TFL services and these results were published in Klopott and Miklińska (2016, pgs. 1-6).

2. METHODOLOGY

In order to accomplish the purpose of this paper, we decided to conduct three steps of research. First, with the aim of identifying what green initiatives and practices have been adopted by LSPs operating in Poland, we chose the method of content analysis. Krippendorff defined this method as, "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the context of their use" (Krippendorff, 2012, pg. 24). We selected for this analysis the 62 largest TFL companies (with respect to volume of revenues in 2015), which are included in the most recognized ranking of TFL companies operating in Poland, prepared by prof. H. Brdulak on a yearly basis (Brdulak, 2016, pg. E4-E5). They include both global, well-known logistics companies, and domestic ones, which offer services at national and international levels. All their websites, newsletters as well as companies' reports were explored in search of information about their green initiatives and practices.

The second step of the research we devoted to a survey among freight forwarders and logistics providers acting in Poland aiming at identifying factors underlying (non)implementation of green practices, LSPs' attitude to greening their services as well as green activities. We created a questionnaire using a form template provided by Google Forms and we also used this tool for distributing the questionnaire as well as for collecting answers. We sent the questionnaire to members of the Polish International Freight Forwarder Association (it was also included in their weekly newsletter) which embrace not only the biggest companies on the TFL market, but also the medium-sized and small ones. It allowed us to enrich this research as it was noticed by Lieb & Lieb (2010, pg. 524) that a majority of papers on green strategies of LSPs are mainly focused on large companies and the green attitude of medium-sized LPSs is generally not sufficiently researched (Oberhofer & Dieplinger, 2014, pg. 236).

Although the survey started in October 2016, we were still receiving new responses until the end of April 2017. The first part of the survey questions was dedicated to the phase of purchasing and offerings of green TFL services and the initial results were evaluated and published (Klopott & Miklińska, 2016, pgs. 4-6). The second part, on the other hand, was designed to examine green practices on the Polish TFL market as well as the factors behind their (non-)implementation.

In the third step, four of the targeted companies were interviewed in-depth in order to enrich the survey results, as the response rate was lower (29%) than we originally envisaged. These included the Polish branch of the global LSP, two medium-sized LSPs and one national freight forwarder company.

3. RELATED WORK ON THE FACTORS INFLUENCING THE ADOPTION OF GREEN SOLUTIONS

The issue of adoption of green practices by companies from the TFL sector may be analysed from different perspectives: LSP, customer, forwarding or transport company. The majority of studies investigates this problem from the perspective of an LSP operating on a particular market (e.g., Abdullah R. et al., 2016, pgs. 82-85), much less frequently from the perspective of a customer, particularly within the context of green purchasing and offerings (e.g., Martinsen & Björklund, 2012, pgs. 562-583). Environmental sustainability is frequently recognised as a priority in strategies adopted by many companies. However, Evangelista et al. (2014, pg. 65) draw attention to the fact that there is a difference in involvement of TFL companies in green initiatives which correlates with the range of their services as well as general attitude to environmental issues.

There are a number of factors which may influence the adoption of such green solutions and they have been investigated in several studies. Lin and Ho (2008, pgs. 17-26; 2011, pgs. 67-83) examined factors influencing the adoption of green practices in the Chinese logistics industry and indicates their three dimensions: technological, organizational (e.g., the quality of human resources and the accumulation of green-related knowledge) and the external environment in which a company conducts its business. Some authors claim that the trend of introducing green practices on a voluntary basis is increasing, because companies believe that it may have a positive influence on environment and sustainable development (Lai et al., 2010 pg. 7). Fürst and Oberhofer (2012, pg. 70) suggest that an increasing number of 3PLs perceive environmental sustainability as an opportunity to improve competitiveness and reap economic benefits. In the same vein, Zhu et al. (2008, pg. 261) point out that integrating environmental concerns into logistics activity translates into gaining and maintaining a competitive advantage. On the other hand, it is not always the case that implementation of green practices results in both: reducing the environmental impact and achieving profits and market share objectives (Zhu et al., 2007, pg. 1043). The other principal factors behind implementing green practices that are often referred to are customers' requirements and pressure from the supply chain (Zhang et al., 2008, pg. 1036), as well as governmental and international laws and regulations. Rising environmental awareness among the employees at all levels is another key driver for implementing green initiatives (Zhu et al. 2007, pg. 1043; Isaksson & Huge-Brodin 2013, pg. 217) what may translate into "greening" as part of a company's culture.

4. GREEN INITIATIVES AND PRACTICES - IDENTIFICATION AND ANALYSIS

Findings derived from the content analysis, survey questionnaire and interviews allow us to identify and subsequently classify and elaborate the environmental practices of investigated TFL companies.

Table 1 provides a general classification of identified green initiatives and practices that have been divided into seven basic categories (coded here from A to G).

It should be noted that there might be some overlap between the categories and that a particular practice/initiative may belong to more than one category. Throughout the rest of the article individual initiatives may be assigned multiple codes, including two codes belonging to the same category.

Table 1. Classification of identified green initiatives and practices

CODE	CATEGORY	DESCRIPTION
A1	Obligatory	Activities resulting from regulatory instruments of environmental policy.
A2	Voluntary	Activities which: are part of a company's culture; result from the green strategy of a company; may be introduced in anticipation of new environmental regulations.
B1	Linked to non-operational activities	Green solutions without direct correlation to the offered services and implemented regardless of customers' requirements.
B2	Linked to operational activities	Green solutions integrally related to the offered services, either adopted as internal standards, or offered to customers upon request.
C1	Requiring substantial financing	Activities and solutions which require considerable financial investment in assets or human capital.
C2	Not requiring substantial financing	Solutions which can be put into effect without incurring considerable expenses.
D1	Ad hoc and informal	Activities and solutions that are not intrinsic to the environmental management system or company strategy/culture, which can nonetheless contribute towards more systemic green initiatives when repeated over an extended period of time.
D2	Systematic	Activities that are not sporadic, but rather undertaken systematically according to a long-term plan and/or within a formalised environmental management system.
E1	Technical and technological	Activities that are related to the technical aspects of a system and require specific technological means in order to be carried out.

CODE	CATEGORY	DESCRIPTION
E2	Organizational	Activities which entail organisational and managerial changes, in the context of either the internal functioning of an enterprise, or its relationship with partners or contractors.
E3	Human-driven	Solutions which require hiring specialised staff, internal/external training, or raising the qualification level among staff members.
E4	Economic	Pro-ecological investments financed by a particular company in order to balance out the negative effects of operational activities, e.g., carbon offsetting.
F1	With direct outcomes	Activities resulting in direct, measurable and quantifiable outcomes, e.g., reduced fuel consumption.
F2	With indirect outcomes	Activities resulting in outcomes that are of a more qualitative nature, which are difficult to measure and which can manifest themselves only in a longer timeframe, e.g., increased customer preference thanks to an LSP's efforts to provide CO_2 neutral transport.
G1	SC-focused	Activities that span across the logistic chain and affect other supply chain actors.
G2	Company-focused	Activities that are focused only on the single company involved in the SC. The impact of its green initiatives is largely limited to the boundaries of the company.

Source: own elaboration

The content analysis revealed that as many as 37% of the surveyed TFL companies do not provide information on their environmental performance; this is the more surprising that we refer to the biggest companies operating on Polish TFL market. Such information is rather sweeping and only a few companies have extensive and rich content on their websites devoted to green and sustainable issues. As far as the questionnaire results are concerned, 18.75% of respondents admitted that they are not involved in green issues at all and they did not point out any green practice. Table 2 presents a summary of the identified green initiatives/practices along with the corresponding percentages of surveyed TFL companies that indicated their support for the particular ones.

Table 2. Percentage of surveyed companies that have indicated their involvement in a particular green initiative/practice

INITIATIVE/PRACTICE	CONTENT ANALYSIS	QUESTIONNAIRE SURVEY
ISO 14001 environmental certificate	25.8%	35.7%
Other environmental certificates	3.22%	-
Vehicles/handling equipment technology	16.1%	6.25%
Alternative fuels	3.22%	6.25%
Energy management	9.6%	25%
Water management	4.8%	31.25 %
Environmental reporting	4.8%	-
Counting the carbon footprint	8%	-
Increasing environmental awareness	9.6%	-
Eco-driving	12.9%	6.25%
Intermodal transport	44%	18.75%
Optimization of route planning	11.3%	6.25%
Paperless office	8%	6.25%
Selective collection of waste	12.9 %	56.25%
Packaging	3.22%	-
Selection of subcontractors	4.8%	33%

Source: own elaboration

The elaboration of initiatives and practices starts with **environmental certification** (A2, C1/C2, D2, F2), as this practice was mentioned most frequently regardless of the research method used. The aim of fulfilling strong ISO certification requirements is to demonstrate a company's commitment to environmental protection and it is considered to have a positive influence on its public image. These motives are also mentioned as the most important in implementing ISO standards, in Swedish studies as well (Poksinska et al., 2003, pg. 560). However, it is worth noting that ISO 14001 per se does not proclaim that the company is environmentally-friendly.

From the interviewed companies, two possess ISO 14001 certification and admit that accreditation has no practical effect on their overall environmental performance. This opinion coincides with the results of some research studies (Freimann & Walther 2001). The most visible effect is an improvement in the communication process between those responsible for environmental issues within a company. The remaining companies are not willing to apply for ISO 14001 or EMAS certificates as they perceive the process as too onerous, costly and without any real influence on environmental performance. However, other research has shown that organizations adopting EMS (formally or not) more frequently implement green supply chain practices, regardless of how long the EMS has been in place (Darnall et al., 2008, pg. 39).

As far as other green certificates are concerned, according to the information provided by the Polish Green Building Council, four certification schemes relating to diverse building and infrastructure types are being used in Poland, namely LEED, BREEAM, DGNB and HQE (PLGBC, 2017, pg. 1). These types of certificates are not so widely used or recognized in the TFL sector as the ISO standards. According to the results of content analysis, only a few LSPs exploit green, certified warehouses; however, there are 25 green warehouses in Poland, out of which 18 are BREEAM, and 7 LEED certified (Colliers International, 2016, pg. 4).

There are various practices followed by TFL companies in the area of transport technology, especially with regard to **vehicles as well as cargo handling equipment**, for example, forklift trucks or cranes (A2; B1/B2; C1; D1/D2; E1; F1; G2). Companies invest in fleet renewal and gradually replace old trucks (Euro 3 emission standards) with those that meet EURO 5 and EURO 6 emission standards. Reducing the EURO 3 vehicles initiative also has its economic impact as the company pays the lower charges in MAUT and Via Toll system and consequently the prices for carriage can be more competitive. The other common measure is investing in tyres technology and some companies use only energy saver tyres, which, provided the proper maintenance, can run over 100,000 kilometres on their original tread. These tyres have less rolling resistance which translates directly to lower fuel consumption. Moreover, the technology of producing these tyres allows repeated regeneration and recycling. (CLECEAT n.d., pg. 8) Another measure that is gaining popularity is **alternative fuel** (A1/A2; B2; C1; D2; E1; F1). Companies invest in LNG-fuelled vehicles, hybrid-electric or electric vehicles and handling equipment, e.g., in warehouses or storage yards.

Energy management (A2; B1/B2; C1/C2; D2; E1; F1; G2) is another area where LSPs demonstrate their commitment to reducing emissions from their activity. The term "energy management" refers to a set of activities conducted within a company, which have a continuous character and aims at achieving the most efficient usage of energy in processes vital to its performance. Energy efficiency can be achieved, among others, through: monitoring of energy consumption, energy planning, selection of a relevant mix of supply sources or implementation of technical solutions enhancing energy efficiency.

Some surveyed companies inform publicly about their activities with regard to optimisation of energy consumption of offices and warehouses as well as handling equipment (e.g., electric forklifts). The common practice is the use of energy-saving lighting and lighting control systems for the interior hallways and rooms or installation of motion-sensing lighting in common areas. Changing energy-related behaviour of the staff also has a strong influence on energy consumption. Only one LSP informed about investments in alternative energy sources and had installed a photovoltaic plant within its vicinity which generates electricity used solely on the LSP's premises. All these activities in the area of energy management can amount to a significant reduction in companies' energy bills, so this is a win-win situation.

The most advanced approach to energy management is **carbon offsetting** (A2; C1; D2; E4; F2; G2). Even in the most advanced scheme of energy management the emissions cannot be completely eliminated. LSPs willing to achieve the "zero

footprint" should consider carbon offsetting. Applying such a sophisticated measure into a business strategy was only declared by one LSP.

In a similar fashion to energy management, we can refer to the practice of **reducing water consumption** (A2; B1/B2; C1/C2; D2; E1; F2; G2) which was also mentioned by respondents quite often. Companies pointed out measures used in order to achieve this goal, which include using tap aerators that may reduce about 50-60% of annual water usage as well as associated costs, installing motion sensors that activate flushing of the toilets or a vacuum system for flushing the toilets. A more advanced solution in the water management area is a water recovery system. i.e., collecting precipitation water from rain and snow and its subsequent usage in, for example, truck washers.

Environmental reporting (A1/A2; B1/B2; C2; D2; E2; F2; G2) is a practice that may be required by some countries or institutions. It is very often perceived as a bureaucratic burden, however may help in identifying sources/places where energy or other resources are wasted. Practice revealed that the monitoring and reporting may reduce the level of emissions even if other reduction measures have not been taken (for e.g., MRV regulation in maritime transport). Several companies decided to publish their environmental reports voluntarily in order to inform their customers and the public about their good eco-performance. It is suggested that the best idea is to introduce elements of environmental reporting on a voluntary basis and make it a promotional feature of the service (CLECEAT, n.d., pg. 9).

Since environmental issues, especially emission of GHG may be important to certain customers, LSPs enable the **counting the carbon footprint** (A1; B2; C1; D2; E1; F2; G1/G2) by means of dedicated CO_2 calculators which are available on their websites. In the basic version these calculators enable counting the CO_2 emission of a particular shipping route, but some are designed to calculate customers' carbon footprint for their whole supply chain including warehousing and distribution and allow identifying carbon reduction potentials in supply chains.

Human factors have a significant impact on environmental performance of the organisation. Some of the surveyed TFL companies take actions in the area of reducing the negative impact of transport and logistics on the environment by organizing seminars and trainings for their personnel, which aim at **increasing their environmental awareness** (A2; B1/B2; C1/C2; D1/D2; E3; F1/F2)**.** The modification of behaviour patterns of personnel or subcontractors that affect the consumption of the resources may enhance not only the environmental, but also the economic performance of the company. Colicchia et al. (2013, pg. 208) in their study also revealed that environmental training programmes for personnel at all levels is of critical importance in achieving companies' sustainability targets.

Within surveyed transport and logistics companies, the most well-known programme of modification of human behaviour are trainings for developing driving techniques - **eco-driving** (A2; B2; C1; D1/D2; E3; F1/F2; G1/G2). The company can also monitor and analyse driving eco-parameters of particular drivers as well as follow the trends in relation to the whole fleet. Eco-driving generates savings of fuel and associated costs and may also lead to lowering insurance premiums.

Green logistics and transport require **intermodal transport** (A2; B2; E1/E2; F2; G2). It is common knowledge that a modal shift from road to rail, inland waterways

transport or short sea shipping results in better SC performance in terms of GHG emissions. A small number of respondents admit that they attempt to convince their customers to organize transport using more environmentally-friendly modes of transport and carry their cargoes by intermodal transport. Understanding the interactions between intermodal transport activities and their impact on the environment is a key issue in promoting this eco-friendly transport system. Among the biggest LSPs operating on the Polish market (listed in the above mentioned ranking of Brdulak, 2016, pgs. E4-E5) about 44% perform their services utilizing intermodal transport. Considering the Polish TFL market, this means that rail transport prevails over other environmentally-friendly modes and inland waterway transport has no practical significance.

Another measure to improve the environmental as well as economic performance is **optimization of route planning and fleet utilization** (A2; B2; C1; E1/E2; F1/F2; G1/G2). In order to be profitable and eco-friendly, there should be no imbalance between outbound and inbound freights. Some of the TFL companies, in order to utilize the loading capacity effectively, use dedicated route planning and optimization software. IT-optimized fleet management systems are gaining popularity among LSPs as they improve utilisation of transport fleets and reflect in the reduction of costs.

The remaining green practices undertaken by LSPs include commonly known measures such as a document management system which gives the possibility to manage a **paperless office** (A2; B1/B2; D2; E2/E3; F1/F2; G2) or **selective collection of waste** (A1/A2; B1/B2; C2; D2; E2; F1) in the offices as well as in warehouses and other premises, sometimes in close cooperation with recycling companies. Additionally, the practice of **reusable and collective packaging** (A2; B2; C1; D2; E1/E2; F1; G1) is employed by LSPs as there are still possibilities of improvement in this area leading to economic and environmental benefits.

The last but not least practice of companies is the careful **selection of contractors** (A2; B2; E2; G1). As many as ⅓ of respondents do not consider the green criterion at all when choosing subcontractors, unless it is expressly required by a customer. The companies which do so (e.g., one of interviewed companies) cooperate only with other companies (contractors) which care about the environment in the same way (e.g., fleet service company has a close circuit of waste oil, which is disposed to respective stations) or enforce its high green standards on subcontractors willing to cooperate with them (e.g., subcontractors must only operate trucks that meet the emission standards EURO 5 or 6).

5. FACTORS BEHIND THE (NON-)IMPLEMENTATION OF GREEN SOLUTIONS BY LSP ACTING IN POLAND

There are different reasons underlying the implementation of green initiatives and practices as well as being reluctant to them among the LSPs operating in Poland.

The analysis of common practices revealed that especially favoured are those allowing the company to demonstrate its involvement in environmental protection and that are considered to have a positive influence on the public image (for e.g., ISO 14001). However the majority of LSPs' green practices have a direct influence on

their economic performance and this is the primary reason underlying their adoption, as there is a little environmental awareness without an economic interest.

The issue of obstacles behind the implementation of green solutions by LSPs is very complex. They may have different sources (e.g., may derive from customers, LSP as such or subcontractors) as well as diverse nature (e.g., arise from financial constraints, lack of environmental awareness or lack of necessary knowledge).

The results of the survey indicate that a lack of, or insufficient interest in, green services is the main barrier to the adoption of green solutions, as only 33.3% of customers express their requirements for green TFL services. The cost of the TFL service, time of delivery as well as quality of the service still constitute the most important criteria for customers. (Klopott & Miklińska, 2016, pg. 5).

Likewise, LSPs pointed to a lack of environmental awareness among their customers as the main barrier of developing green services. The general rule is that these are international companies with a stable market position, which are eco-aware and interested in green solutions.

The factors that hinder the development of green TFL services may also be attributable to LSPs' attitude and abilities. As many as 46.7% of LSPs admitted that the main hindrance is their lack of readiness (organisational, technical as well as financial) to fulfil the green requirement of their customers (Klopott & Miklińska, 2016, pg. 4). This negative attitude exceeds the simple relation LSP-customer and transfers into relations with subcontractors, as – what has been mentioned earlier – 33.3% of respondents do not consider the green criterion while choosing them.

Conducted interviews disclosed financial issues as an important reason behind such a domino effect; however, it is not a single problem. While green solutions are not obligatory, the lack of environmental awareness as well as relevant knowledge of possible solutions are strong impediments in the development of green practices in the market. We also noticed that many green activities are of an ad hoc or random nature are not an element of a company's green policy or strategy. It also happens that some companies adopt a particular green solution without being aware of their environmental importance and consequences, which is also an undesirable effect.

Financial matters, however, are not only a barrier, but in particular circumstances may appear as a factor encouraging the environmental-friendly activities. As research results indicated, it is particularly visible in the non-operational activity of the company (B1). Interviewed companies pointed to an unstable economic climate among other barriers underlying the involvement (or lack thereof) in green practices, as well as a lack of economic incentives encouraging to undertake green investments.

6. CONCLUSION

Based on the research findings we can conclude that the greening of the Polish TFL market is still at an early stage of its development. Identified and analysed diverse green initiatives and practices allowed us to distinguish their two main categories.

The first category includes practices which are sort of a challenge for LSPs as their implementation needs considerable financial investments in assets or utilizing sophisticated technical or technological solutions or require significant organizational

changes. These practices usually relate to the operational activity of a company and often result from precise requirements of LSPs' customers, usually those with a stable economic position.

The initiatives and practices that belonged to the second group are connected with the non-operational activity, do not require substantial financial investments but rather an appropriate "green" attitude and willingness to change behaviour for the sake of the environment. These types of initiatives usually bring cost savings visible in the short-term.

We note with regret that there a lot of companies on the Polish TFL market that overlook the problem of the TFL sector's negative influence on the environment and the issue of green solutions is neglected by them. We may conjecture that the reason for it lies in the financial capability and focusing mainly on everyday business in order to survive on the competitive and turbulent TFL market. However, a question arises, how long will these companies be able to compete on the contemporary global market having such a strategy and attitude to "green matters"? It seems that it will be difficult to avoid green requirements in the future (we can rather expect a rising demand for green solutions). We can claim that it is the "green attitude" translating into practice and supported by IT solutions that may become a factor of great influence on a company's competitive position in the near future.

There are a lot of determinants fostering further development of the Polish TFL market (improvements in the area of transport infrastructure in Poland as well as expansion of e-commerce, among others) and a subsequent increase in demand for TFL services as well as development of modern warehouse spaces. Alongside the projected development of this market, the scarcity of green practices may evolve into a serious problem soon. The one factor we should not omit in our deliberation is the rising environmental awareness among society and it will be the individual clients choosing the goods with a lower carbon footprint who will become a driver of the greening of the supply chains.

Identified and discussed barriers in implementation of green solutions (e.g., lack of awareness or willingness) must be overcome. Nowadays, the choice of "green" measures seems to be the only path to pursue.

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