NEW SOLUTIONS AND INNOVATIVE IDEAS IN LOGISTICS

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Abstract: The objective of the article is to discuss the present state of innovations in logistics together with the development trends. In the theoretical part, the authors present the fundamentals of logistics and innovations, also, the list of the most up-to-date innovations in logistics are being described. In the analytical part of the article, the authors focus on the main logistics companies, operating in Poland, with the more detailed description of their actions, with an emphasis on their innovative character. Also, the main barriers of being innovative are presented as well.

Keywords: Innovation, logistics companies, solutions, innovation's barriers

1. Introduction

The word "innovation" is derived from the Latin language "innovare", meaning the creation of something new, and this the reason why the basic definition of innovation, defines it as a process involving the conversion of existing opportunities into new ideas and putting them into practical use [1]. However, the most popular approach to innovation is the solution proposed by J. Schumpeter, in which innovation is understood as [2]:

- introducing into production new or improved products,
- introducing new or improved production method,
- creating new market,
- using new form of sell or purchasing of existing products,
- using new materials or semi-products,
- instroducing new processes organization [3].

There is a lot of innovation's definitions, however, most of them are interpreted in two ways [4]:

- In the broad sense, innovation is identified with the news, everything is perceived by humans as new, so we can assume that every new product, good or service appearing on the market is a kind of innovation, with the assumption that even improved products are novelties,
- In the narrow sense, it is assumed that not every "new" is an innovation, and only the product or service that has never been known before, can be regarded as an innovation. In this perspective, innovations are usually innovations of a technical nature and technology affecting the production process, bringing tangible benefits [5]

Very often, innovation is understood, depending on the strategy adopted by the company, eg. in the the concern automotive Volkswagen Group, innovations are defined that meet customer requirements by developing new solutions, that bring certain benefits. The result of such actions could be a new product or a new procedure [6].

The figure below shows the genesis of innovation of enterprises, which require from the company to fulfill at least two conditions: have the appropriate ability and motivation.

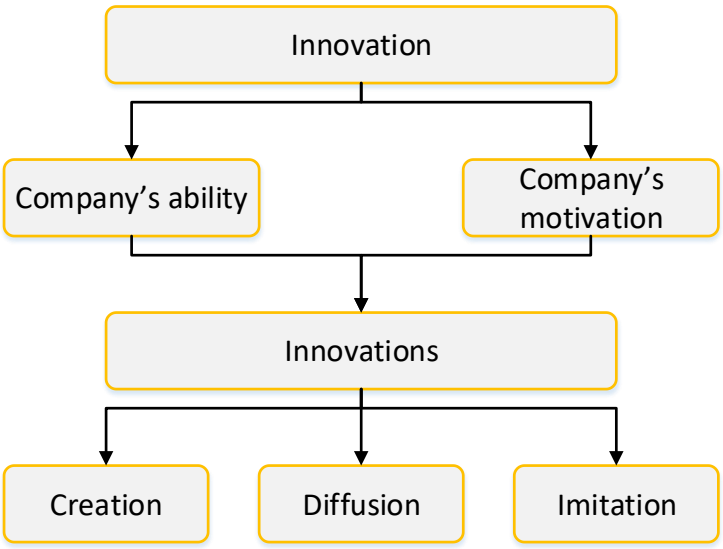

Fig. 1. Innovations' process in companies.

The ability of the company to create innovative solutions is conditioned by financial resources (usually a financial outlays on R&D) and human resources (people capable to create an innovation). However, in addition to having the ability to create innovative solutions, it is necessary to motivate the company to work on them. Motivation can be financial, when the company expects that the result of the introduction of innovations, will bring substantial financial benefits in the form of eg. higher revenues. In other cases, the motivation of the company can be satisfaction with the introduction of new solutions and obtaining recognition in the eyes of other enterprises [7].

Innovation is a common phenomenon in all spheres of the economy, both, large and small enterprises operating in any industry, can be innovative. Very often innovation is identified with new technological solutions, influencing for example tThe efficiency and speed production processes, but innovation can also have an organizational nature, its introduction could bring result such as increases the efficiency of the work performed by employees. [7]. However, this article focuses primarily on innovation in the logistics sector.

2. Innovation in logistics sector

What is characteristic for the logistics industry, is the fact that they use both innovations of a technological as well as organizational. Innovations in the logistics sector are present in almost all areas of its business - through the development of means of transport, by controlling and organizing the flow of raw materials, the development of structures of systems that are responsible for the implementation of logistics processes, taking into account the development of

business rules determine healthy competition and cooperation [19]. Very often innovations arising within the logistics sector are called "Best Practises", which over the time have become standards [8].

According to K. Gourdin, innovations implemented in the logistics sector should have the following characteristics [9]:

- Certainty – should appear between the cooperating parties, that any of them will meet the expectations reposed to him,
- Delivery time, which is an important factor in the choice of a logistics operator,
- Functionality of the operation,
- Communication, efficient monitoring of the flow of goods, materials or raw materials, efficient information management,
- Honesty, accurate presentation capabilities and performance of services under the concluded agreements.

Innovation's creation in the logistics sector is based on a close cooperation between the company and its customers (fig. 2).

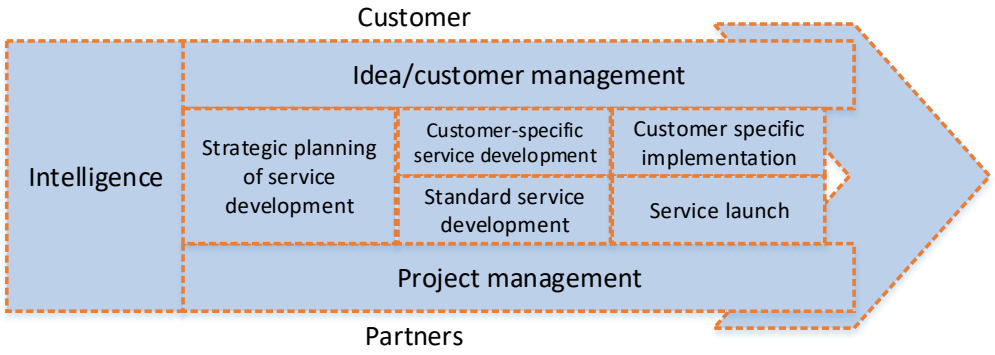

Fig. 2. Logistics innovation process model.

There is an idea at the beginning, which may be the result of the work of company's employees, as well as the result of the needs reported by its customers or the market in which it operates. In the next step, planned service module, in coordination with service portfolio. In innovation-oriented enterprise customers, action is taken to meet their needs, while in innovation directed to the company, the activities are focused on creating solutions specially dedicated to him. The final step is the launch of a new service or produce a new product, including close cooperation

with customers or run a solution, that is typically used in the enterprise. According to the presented model, even though the action for innovation in logistics companies are divided depending on the target audience, the next steps are making together and are interdependent to each other.

Innovations in the logistics industry, are unevenly distributed, very often innovations relate to ICT, enabling not only to track shipments, but also offering solutions to improve functions such as forecasting, warehousing, planning routes, placement of cargo on means of transport or logistical planning of entire networks. Also, the use of RFID technology and the use of mobile solutions [10]. With RFID technology it became possible to scan entire pallets and mobile devices contributed to faster and more efficiently, eg. between the driver and logistics operator. A systemic innovations are less frequently encountered, that innovation in individual products or activities, bonded into one piece.

For the most important innovations in logistics sector, shall be deemed: containers, Ford assembly line, Toyota Production System, systems such as ECR (Efficiency Customer Response), CPFR (Continious Planning Forecasting and Replenishment), EOQ (Economic Order Quantity), DRP (Distribution Resources Planning) or FedEX tracking systems [11].

Whereas, according to D. Blanchard, in the year 2014, the most innovations in logistics brach, were [12]:

1. Printed in 3D technology simple fuel nozzle for jet engines, created by GE Aviation,
2. Enterprise-level visibility, which helped to determine what to purchase and what to manufacture, leading to reduction in stocks,
3. A new location-based inventory system, created by Silver Eagle Distributors, allowing management to know that products are on current pull,
4. Two pit-mounted hydraulic lifts, created by House of Blues, to keep workers from bending to lift materials from ground or truck level,
5. Gucci have created a three vertical lift modules, which proved approximately 1,800 feet of accessible storage place,
6. US Supply has centralized its service fleet operation in order to get a better visibility of driver performance and customer needs,
7. NYK Line has started to use a collaborative, cloud-based platform to get a better visibility and manage the movements of containers,

8. Urban Outfitter has adopted a campus concept for its distribution operation, it allows the retailer to flex labor back and forth between buildings,
9. The Center for Counterfeit Avoidance has created an assessment process based on international standards, with the goal of documenting how high-tech manufacturers are restricting hazardous substances from their products.

The above list of innovations is directed chiefly to companies operating in the US, but in Poland there are several companies operating in this sector, who are actively working on innovation. It is supported by the fact that in the latest report on the LPI (Logistics Performance Index), Poland in 2014 had 31st place in the world ranking (within seven years jumped 10 place, since in 2007 occupied place 40), leaving behind countries such as Czech Republic, Hungary, Slovenia, Romania and Slovakia [13].

3. **The examples of new solution and innovative ideas in polish logistics companies**

In the logistics sector, very often innovations concern the means of transportation or warehouses used to store inventory. In their case, over the past few years, the logistics industry has implemented several significant innovative solutions involving, among others, on:

1. Introduction of carousel rack, also called rotomatams - racks are suited to small areas, and the principle of their operation is based on the assumption, that it is worthwhile to use the full height of the storage area. Due to the fact, that access to high-altitude shelves would be quite difficult, the idea is to rack, in which shelves are rotated, allowing for easy access to goods stored on them. In addition, the rotary rack is movable in both directions, greatly reducing the access time to particular shelves. This rack can be used both in warehouses, industrial plants or in the archives. The biggest advantage of this type of shelving, is the optimization of the use of the space available in the store. Next to the carousel rack, in the warehoused are mounted Lean-Lifts racks. These racks have modular structures, that can operate independently, or in a fully integration with the IT system. It raises the warehouse, labor productivity and high speed of movement, which makes the merchandise is rapidly issued on the ramp [14],
2. The logistics sector also has presented a new concept of transport sets with a modular design, which enables them to adapt to specific rooms. This system also allows full profiling of hardware facilities, which causes that the client can get transport systems specifically tailored for their needs, so you can say that this kind of innovation is “a tailored” solution,

3. Also to use storage first forklift having a hybrid engine, was developed, which causes that during the braking the energy released earlier has been recovered. Forklift with electric engine have received a new types of batteries, and the same vehicles become more multipurpose and versatile, which makes that one forklift has the functionality of other storage facilities,
4. Another innovative solution are ecological Low Carbon packaging, which in 90% are made by recycled PET bottles, they have form of foam and use 20% less material than the other, conventional packaging, made of politereftelani acetate. This solution, shows that innovation in logistics are directed on ecology as well, like the earlier hybrid engines for forklifts,
5. In the information systems, used by the logistics industry, another innovative solution is the Vocollect voice system - a solution that is characterized by simplicity of implementation and use, its use increase the accuracy by 50% during the first 6-9 months of their application, the system enables obtaining accurate picking of 99.99% and increases the efficiency of those operations by 15-35% [15]
6. Pallet Mole platform is equipped with a battery and moves through a tunnel, formed by the racks and shelves. This platform also increases storage capacity and saving its surface,

It is also worth to mention the examples of innovative solutions developed by Amazon, which in New York, has launched a service to provide even individual products directly to the home, for example. cans of Coke or breakfast cereals. In the same time, Amazon, in cooperation with DHL and Audi, is currently testing the solution of deliveries of packages directly to the car, no matter where it is - after ordering the goods, a special application informs the courier where the car is now, the app also gives him temporary access to the trunk which, in a moment after delivery, automatically closes.

The German company Zalando, has developed a system of bags Paket Butler - these are special bags placed at the door of the recipient's apartment, in which the package is being put, while no one is at home, the bag is protected against theft and opening with the help of mobile technology NFC. However, when it comes to innovative solutions, the Amazon is an undisputed leader - the company has raised the idea of delivering food packages using drones, which delivery time will not exceed 30 minutes. This solution is already being tested in Canada, and in Switzerland similar tests is leading Swiss post office, in cooperation with the Swiss Worldcargo and Matternet [16]. As we can see, both larger and smaller companies from the logistics sector are

constantly working on developing innovative solutions and implementing them into widespread use. However, innovations, very often face barriers with which companies must face and whose characteristics is presented later in this article.

4. Innovations' barriers in logistics companies

According to the Innovation Union Scoreboard ranking, Polish companies belong to the group of moderate innovators, are also characterized by unsustainable potential for innovation - this means that companies rely mainly on human resources and have little inclination to innovate and establish research and development cooperation, what makes their intellectual capital is not fully used. Polish companies also worse cope with the creation of intellectual property, but they are good in sales and export of innovative goods.

Polish companies wishing to increase their level of innovation, can use a range of solutions to support their activities in this area: Competitions National Science Centre, National Centre for Research and Development, PARP Programs, National Capital Fund, National Innovation Network and Knowledge Base innovative technologies , moreover they can take advantage of a tax credit for introducing new technologies and innovation to create a tax-free fund. However, apart from these solutions, Polish companies also face barriers inhibiting their innovation. Among these barriers can be distinguished as follows [17,18]:

1. Too large share of the so-called. non-repayable fund, eg. in the form of grants, despite the knowledge that the tax credits are more effective part of the loan tools to stimulate innovation,

2. Too large part of the fund is targeted at large companies rather than to the SME sector, there is a relationship here - the smaller the company, the harder it is to get funding,

3. Another barrier is called. conservatism of people deciding to award the grant, it causes that supported projects are mainly characterized by low innovation, while projects which meet all formal criteria receive a support,

4. As innovation barriers, pointed by the enterprises is also the mismatch level of education to market requirements, this makes graduates entering the market, have a high theoretical knowledge but often out of touch with modern reality, they have no practical experience and, most importantly, afraid to take pro-innovation activities .

5. Another barrier is the high cost of the equipment and laboratories intended for research and development, the costs of establishing the lab can be as high as several million zloty, which makes the smaller companies cannot afford such an expense,

6. The last, but perhaps the most important barrier to innovation, the company showed a lack of cooperation between research centers and companies. The reasons for the reluctance to establish such cooperation may include:

- The lack of encouragement from the government,
- Excessive requirements for the remuneration of the reward for cooperation,
- A small number of tenders satisfying the requirements of a specific company,
- Lack of information on the specific terms of cooperation and benefits,
- Insufficient knowledge of the realities of today's marketplace by research centers,
- A high degree of bureaucracy,
- The lack of willingness to cooperate on the part of research centers,
- The slow pace of cooperation,

Among logistics companies, it is this last barrier, was recognized as the main brake of innovative activities, while in second place was a barrier consist of difficulties in obtaining grants and funding for research and development.

These barriers mean that businesses, not just logistics, take independent action in the field of innovation, using possibly with ready-made solutions, developed by the major logistics companies (then we deal with diffusion or imitation), or try to awaken creativity among its own employees who as people with the experience, may be the biggest engine of innovation activities.

5. Conclusion

The effects of innovative actions bring positive results only - in times of crisis (which can also drive action) allow eg. for reducing its costs or increase the number of customers. In times of prosperity, influence on increasing the effectiveness of the company's activities for example. shortening delivery times, improving delivery accuracy and flow of information both inside and

outside the organization. Effects of innovation cause that company stand out in the market, improve its image and strengthen competitive advantage against other companies.

Currently, most logistics companies are looking for innovative solutions in the area of the ecology. In recent years, enterprises' awareness in the area of care and protection of the environment has increased. This resulted in, among others, the development of hybrid engines for forklifts or designing more efficient power batteries. Currently, innovation logistics companies focused on solutions for reducing emissions of pollutants into the atmosphere or noise reduction. It is also worth mentioning, that innovation created by the logistics sector also find application in other branches of the economy, which makes this industry can be a driving force for the entire economy.

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