

Article

Fulfilment as Logistics Support for E-Tailers: An Empirical Studies

Arkadiusz Kawa 

Institute of International Business and Economics, Poznan University of Economics and Business, 61875 Poznan, Poland; arkadiusz.kawa@ue.poznan.pl

Abstract: Undoubtedly, one of the key areas of e-commerce is logistics. It is not only about the delivery of shipments, but also a number of other processes related to customer service and warehousing. The e-commerce logistics is driven by such trends as development of logistic co-operation models, different delivery methods and cross-border e-commerce. Fulfilment is one of the logistic co-operation model examples. Still, only a small proportion of online retailers use their services. The paper aims to characterise fulfilment services and indicate the benefits which e-tailers achieve from applying fulfilment services as well as the reasons why other companies do not use them. It is also important to determine the impact of these services on the online sellers' performance. For the purposes of the research, 300 interviews were conducted with e-tailers. The studies show that only some part of the online shops use fulfilment services but those who use such service are satisfied and most often perceive saving time and increasing logistics service level as the greatest benefit. Moreover, such companies perform better. The firms which do not use the fulfilment services point out the willingness to keep everything under control as the main reason.

Keywords: e-commerce; fulfilment; logistics; firm performance



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1. Introduction

For some time now, there has been a trend of traditional sales channels being increasingly displaced by the electronic channel. The reason for this is the relatively low barriers to entry, which encourage more and more companies to sell products via the Internet. Customers can have access to information about companies and their products at any time [1]. They can easily find offers, compare them and read other users' opinions. They may also purchase new products which they did not previously use due to their unavailability in terms of location in distant places (e.g., goods from abroad), lack of time or a different lifestyle. Moreover, online shopping allows them to save money because they are closer to the manufacturers and bypass many intermediaries, such as wholesalers and distributors. Therefore, thanks to e-commerce, an additional value is created for the customers which is associated with a lower price of the product, convenience in the form of twenty-four hour access to e-stores and various methods of payment. The pandemic and its associated lockdown is also an additional stimulant.

The dynamic development of e-commerce does not mean that sales in brick-and-mortar shops or local markets will completely disappear in a few years. Quite the contrary, these two sales channels will complement each other, with offline outlets probably playing a supporting role compared to online sales (e.g., to try out a product, pick it up or return it). In both cases, efficient and integrated logistics is required.

Logistics in e-commerce is very important [2,3]; that is why managers are paying more and more attention to it. The delivery process to the end customer (the last mile) is not a direct challenge for most, as it is usually outsourced. The rest of the e-retailer's logistics processes such as warehousing, picking, packing and handling returns are more challenging. For this reason, some online retailers (e-tailers) choose to use logistics services provided by fulfilment operators.

The entities of e-commerce are quite a specific group of customers for logistics firms.

As a rule, these are small companies that offer a fairly wide range of products but in very small quantities. Their customers order single items, and their geographical location is very diverse [4]. For this reason, the fulfilment operators do not perform the distribution services themselves, but use the services of CEP (courier, express, package) operators and, to some extent, logistics companies (in particular with deliveries of goods on pallets). E-customers want to be offered a wide range of delivery services—from the more economical and slower postal service through more reliable courier services to the transitional forms that is the possibility to collect shipments from parcel lockers or PUDO (pick up drop off) points. Moreover, customers increasingly care about receiving information about the shipment in real time, and simplified and free returns of goods [5].

The subject of fulfilment is not very well recognised in the literature. This is mainly due to the fact that it is a relatively new issue, which has developed only with the growth of e-commerce [6]. Before, there was no demand for such services. There are very few publications in journals related to logistics and e-commerce, and those based on empirical studies are very scarce.

The issue of fulfilment is often discussed in the context of omnichannel [7]. Traditional retailers, who were previously only available for offline sales, are trying their hand at online sales as well. Managing the logistics of these two channels is not easy, which is why some companies choose to cooperate with a logistics company. Attention is also paid to integrating the different sales and distribution channels into one coherent system [8]. The literature also shows the impact of e-commerce on logistics service providers [9,10]. Fulfilment is also treated as “an important driver of customers’ behavioural intentions” [11]. The relationship between fulfilment services and customer satisfaction and loyalty is also examined [11–13].

However, there are studies that show that logistics outsourcing in e-commerce does not deliver the expected results. Cho, Ozment and Sink even indicate that “firms should avoid logistics outsourcing if performance is predicated on competitive advantage due to internally strong logistics capability and competencies” ([14], p. 336). However, it must be remembered that a very large proportion of e-commerce companies are new, inexperienced and thus lacking logistics competence, and could not develop quickly without the support of professional consultants.

The aim of this paper is to characterise fulfilment services and indicate the benefits which online retailers (e-tailers) achieve from applying fulfilment services as well as the reasons why other companies do not use them. It is also important to discuss what features and resources a company that provides logistics services to e-tailers should have and to determine the impact of these services on the online sellers’ performance. To our best knowledge, there are no studies investigated the dependence between using fulfilment services and firm performance. For the purposes of the research, 300 computer-assisted telephone interviews were conducted with e-tailers.

The structure of the paper is as follows. In Section 2, the logistic co-operation models in e-commerce are indicated. Section 3 presents the fulfilment service issue. In Section 4, the research methodology is given. Section 5 characterises the entities surveyed. Section 6 describes the results. Section 7 shows the relationships between use of fulfilment and firm performance. Section 8 concludes the paper and presents the limitations and future work.

2. Logistic Co-Operation Models in E-Commerce

In e-commerce, besides outsourcing deliveries of goods, services of warehousing and order processing are commissioned to external companies more and more often. Three basic models of co-operation may be distinguished: dropshipping, fulfilment and one-stop e-commerce [15]. Dropshipping involves shipment of goods directly from the warehouse of an external entity (the manufacturer or the distributor) to the client without the need to use the vendor’s warehouse. Dropshipping is quite popular among small firms. It is offered more and more often by distributors which want to sell their products over the

Internet, but do not have the time or competence to do it themselves. On the other hand, online sellers do not take the risk of freezing their assets in inventory, particularly when they increase the number of their product items [15–17].

In turn, the fulfilment service involves delegating part of the logistics processes to an external provider [18–20]. On behalf of the customer, operators receive deliveries at the warehouse, manage the stocks, do the stocktaking, process orders from customers, pack shipments, prepare sales documents (e.g., invoices, receipts) and shipping documents (e.g., a shipping list), deal with returned goods and co-operate with transport companies. Due to the fact that the main focus of this paper is fulfilment, it is described in details in the following sections.

One-stop e-commerce is an extension of fulfilment by additional services. This concept does not only imply support in the field of logistics (like fulfilment), but also end-customer service, marketing activities, provision of IT solutions as well as finance and accounting by one company. For example, a multilingual call center may be operated on behalf of the customer, where queries, complaints, etc. are handled.

3. Fulfilment Service

The fulfilment service consists in the organisation of logistics processes by a specialised external operator on behalf of the seller. Most often, they involve warehouse operations. The basic process is the receipt of goods ordered from suppliers by an online shop to the warehouse, where the goods are then stored. Other processes are triggered by customers who place an order online. On behalf of the online shop, operators complete orders, pack products, prepare documents and attach advertising materials. They cooperate with CEP operators and deal with the return of goods, too. With fulfilment services, web shop managers can focus on sales and marketing, and give the logistics over to an external professional. This is a more flexible solution, because a specialist fulfilment operator is able to adapt to the fluctuations of its customer's demand depending on the needs, e.g., by increasing or decreasing the warehouse space, or the number of employees. There is no need to invest in storage infrastructure and IT systems. Some fulfilment operators even take care of the repairs, refreshment and disposal of returned products.

The other components of fulfilment services are as follows: order fulfilment status management; inventory management, visibility, tracking and planning; postponement services; ticketing and labelling of products; printouts of commercial documents; dimensioning of products for www website presentation; kitting/bundling; re-packing; automatic integration of the IT system with courier systems; comprehensive services dedicated to returns from the clients; the quality controls of returns; recapturing of the value of returned goods.

Working with customers, the fulfilment operator must be prepared for many contingencies that may arise at any stage of the service realisation [11]. For instance, the company should be able to serve customers from many industries that differ in their specifics, e.g., electronic products are often high market value commodities that require additional safety procedures for their logistic handling. The other challenge is extending the hours of taking orders from customers. Online shops require fulfilment service providers to accept orders at a later date and to process them within the same working day.

Nowadays, there are various fulfilment service providers on the market—from very complex ones operating globally, through CEP operators for whom this is an additional activity, to specialised local entities. Some service providers start this type of business on the basis of their own e-commerce experience and expand it to other entities.

Recently, fulfilment services have attracted particular interest from logistics service providers, whose managers have noticed that this is a growing part of the logistics services market. They are counting on a scale of orders adequate to their core business.

Online retailers also provide fulfilment services to their customers. The best example is Amazon and its Fulfillment by Amazon service, which has been offered for several years now. In addition to selling products on its platform, it offers logistics services to suppliers in the field of fulfilment of online orders. Sellers therefore do not have to deal

with the logistics of their customers. However, this is an expensive service and involves the presentation of products on the US company's website.

4. Research Methodology

4.1. Study Stages and Data Gathering

In order to achieve the objective, four-stage research using various techniques (desk research, direct interviews with experts, focus group interviews, quantitative research) was conducted. The empirical study was carried out in Łukasiewicz Research Network—Institute of Logistics and Warehousing for GS1. The subjects of the research were companies (represented by online retailers, fulfilment operators and experts) operating in Poland. The research subject was fulfilment services.

Based on available secondary sources, in-depth interviews with experts were carried out. The aim of this stage of the research was to better explore the fulfilment services market, in particular to find the relationships between e-commerce and the fulfilment services market, to diagnose the challenges and prospects for the development of the fulfilment services. The interviews with experts were also helpful in triangulating information obtained from additional sources, which increased the credibility of the results of the study conducted by the quantitative method.

The next step included focus group interviews with online shop managers who were current or potential customers of fulfilment operators. The aim of this stage of the study was to gain a deeper insight into the expectations and needs of online shops with respect to fulfilment services. This research served as a preliminary analysis of the problem and provided information necessary to properly organise the survey using the quantitative method, including in particular the design of the measurement tool (content, type, order of questions, etc.), which was the next phase of the research.

The information gathered at all the previous stages (desk research, interviews with experts, focus group interviews) was the basis for the preparation of the final part of the empirical research in the form of computer-assisted telephone interview (CATI). This technique is characterised by a relatively short time of reaching respondents and the possibility of ongoing monitoring of the research realisation and results.

The CATI survey was conducted in January and February 2020 in Poland by an external agency, which deals with carrying out CATI. The agency received a tool from the authors of the study, which it first tested and then implemented.

The question types to be used was: Likert scale questions, multiple choice questions, demographic questions and open-ended questions. The questionnaire will be verified during the pilot research.

4.2. Sampling Method

Due to the specific nature of the study (lack of complete and reliable data on the size of the general population of businesses—online sellers who have their own inventories of goods), a decision was made to use a simple random sampling scheme. The drawing of particular individuals selected for the interview was performed using special computer software—CATI Support.

The list of entities used for the draw was consistent with the REGON register kept by Statistics Poland and came from two commercial databases containing contact details of online sellers purchased by the research agency specially for this study. In total, after the removal of company data duplicates contained in both databases, the frame used for the draw consisted of approximately 8500 unique records.

An interview was attempted for each of the survey units drawn from the frame. In situations where the respondent agreed to be interviewed, two recruitment questions were asked at the beginning:

- Does your enterprise have its own stock of the products offered?
- Are you the owner or manager of the business?

The first question aimed at limiting the number of the entities surveyed to only those that directly sell their own goods and not the goods of another entity, e.g., via dropshipping. The second question was targeted at those with general knowledge of the business being surveyed.

A positive answer to both the recruitment questions resulted in the continuation of the interview. If a negative answer was given to either of the recruitment questions (not applicable if the telephone call was then redirected to the correct respondent), the interview was considered completed but ineffective (not included in the research sample).

In total, 300 correctly completed questionnaires were received. There were not any errors or incomplete information; that is why no surveys were rejected. All questionnaires were qualified for further analysis. With the assumptions described above, the survey can be considered representative. At the time of the study, the number of online shops was estimated at approximately 37,000. Presuming the reliability of this estimate with the sample size of 300, the range of an acceptable measurement error is $\pm 5.6\%$, the confidence level is 95%, and the size of the fraction is assumed at 50%.

5. Characteristics of the Entities Surveyed

Most of the examined e-tailers are micro and small enterprises. The average number of employees in the companies surveyed is 24. The most numerous are those employing up to 9 people (31%). Eight percent of the companies have at least 50 employees.

The diversity of Polish online shops is evidenced by the width of the offer. Another question in the interview concerned the number of assortment items on offer via the Internet. Among the companies surveyed, there were none that offered only up to 10 or more than 10,000 different goods. Most often, Polish online shops sell 501–1000 (35%) and 1001–5000 (31.3%) different products. This indicates a wide offer, which is connected with logistics challenges. The goods on offer must be in stock, otherwise they will be sent out late, which may negatively affect customer satisfaction. It is more difficult to carry out the picking process with a larger number of SKUs (stock keeping units).

The majority of the companies surveyed (59.3%) have a maximum of 500 orders placed online per month. A total of 33.7% get 501–2500 orders, and only 1.3% receive more than 5000 orders. This relatively small number of orders proves a still small scale of Polish e-commerce. If we compare these results with the previously presented number of assortment items, the conclusion is that small quantities of various goods are sold. This has a very significant impact on the logistics operations, as it requires preparation of diverse orders.

The companies surveyed represent 17 industries or product categories. Some of them offer products from several industries. Most shops sell clothing (21.7%), footwear (14%), consumer electronics (11.3%), furniture and household goods (11%) and hobbies (10.3%).

Among the respondents, only 14.7% sell via the Internet only (pure players). As many as 85.3% also sell in a stationary outlet (bricks and mortar). Thus, for the majority, Internet sales complement traditional sales. It should be remembered, however, that in Poland there are several tens of thousands of companies that have neither Internet shops nor stationary outlets, but offer their products via the Internet, mainly through marketplaces.

6. Results

Given that only some e-tailers outsource logistics activities, a filter question was first asked to determine whether or not the respondent's company used fulfilment services (storage, picking, packing, etc.) for the goods sold online.

Among the respondents, there are 30% of firms which use fulfilment services for goods sold on the Internet and 70% of companies which do not do so. This result is not surprising and indicates that fulfilment services are not very popular in Poland yet. By comparison, in the Netherlands these proportions are reversed. It still shows a great potential for Polish e-commerce in the field of logistics outsourcing.

Depending on the answer to this question, the respondents were asked a different set of questions. In the following part of the study, the replies were divided into those of the companies using fulfilment and those not using it.

In the case of the respondents whose companies use fulfilment, the question was asked whether they were satisfied with the fulfilment services for the goods sold on the Internet. A five-point scale (1 meant “I completely disagree” and 5 “I completely agree” with 3 as the “neutral” indication) has been adopted to capture the respondents’ evaluation. The average value is 4.19, which means that the online shops are satisfied with this service. Seventy-seven percent responded that they agree or completely agree with the statement that their company is satisfied with the fulfilment services for goods sold on the Internet. Interestingly, 0% disagree or completely disagree with this statement. This demonstrates a high level of the services provided by fulfilment operators.

In the next question, the respondents were asked to assess the benefits of using fulfilment services with a five-point scale. Respondents ranked all the identified benefits quite highly (above 4). According to the Internet retailers cooperating with fulfilment firms, the greatest benefit is saving time (4.22). 98% agree or completely agree with this statement. Another argument in favour of outsourcing in warehouse logistics is increased quality of logistics service (4.2), convenience (4.18) and greater opportunities for growth in new markets (4.18). What is interesting is that better cost control is only the 8th most important benefit. This means that the companies that decided to use the fulfilment service pay a lot of attention to the non-price factors. The worst scores are given to those that are benefits-related: process improvement together with the fulfilment operator (4.06) and greater customer satisfaction (4.10) (see Figure 1).

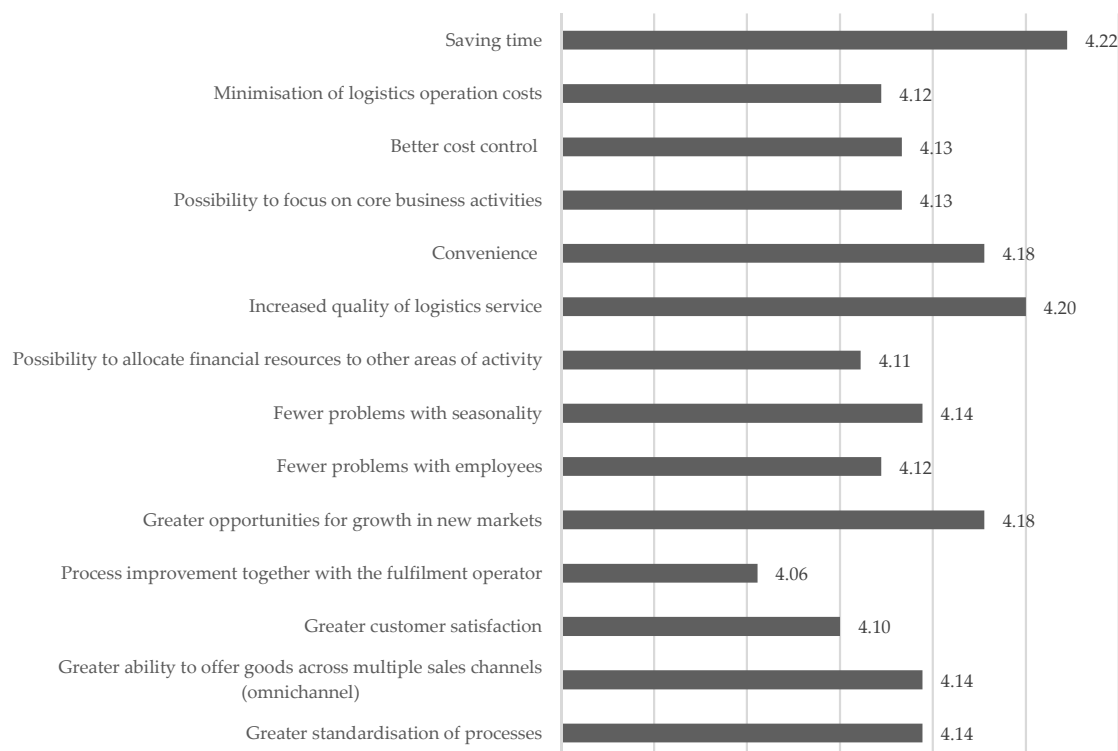


Figure 1. Benefits of using fulfilment services.

In the case of the respondents whose companies do not use fulfilment the question concerned the company’s intention to use fulfilment services for goods sold on the Internet within a certain period of time. The answers are promising, because 0.5% intend to do it in the next year, 11%—2 years, 15.2%—3 years (altogether 26.7%). As much as 41.9% do not intend to do that, and 31.4% do not know. There is quite a lot of potential in the group of

the undecided individuals. It probably requires appropriate education and awareness of the benefits of fulfilment outsourcing.

There are many reasons for not using the fulfilment services. The most important one is the willingness to have direct contact with the goods (4.22). 93.3% agree or completely agree with this argument. E-tailers think they are better able to perform logistics operations, can respond to customers' needs better and have more knowledge and experience than fulfilment operators (4.2). The statement with which online shops least agree is "our business is very difficult to predict" (3.96) (see Figure 2).

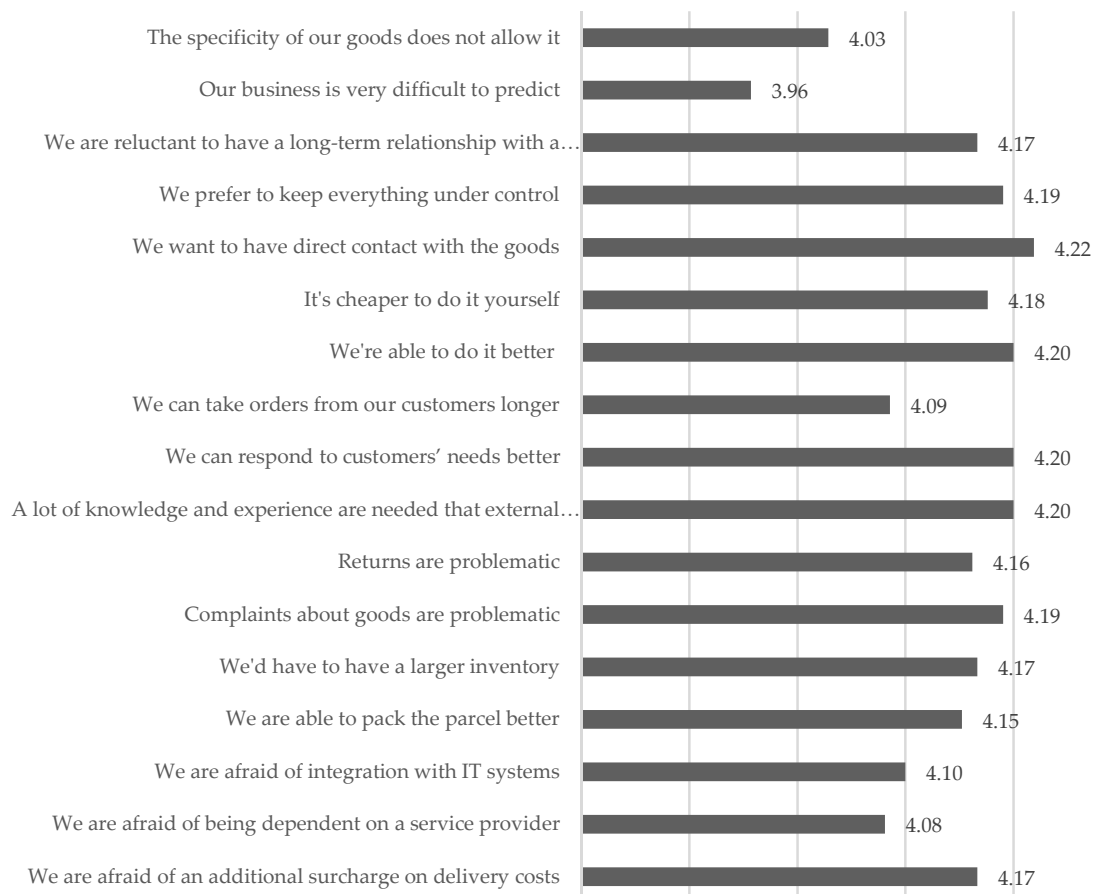


Figure 2. Reasons for non-use of fulfilment services for goods sold on the Internet.

Cooperation with a fulfilment operator is rather permanent, therefore one should carefully analyse their potential logistics partner. Due to quite a large number of fulfilment operators and the varying scope of their services, choosing the right one is not an easy task.

A company that provides fulfilment services to online sellers should have some specific features and resources. A clear and transparent price list, flexibility of available storage space and ability to handle sales peaks are ranked highest (4.2). 94% agree or completely agree with this feature. An equally important factor is a high rate of correct picking (4.19) and transparent and always up-to-date reporting (4.18). The least important criterion is knowledge of the industry in which the online seller operates (3.98) (see Figure 3).

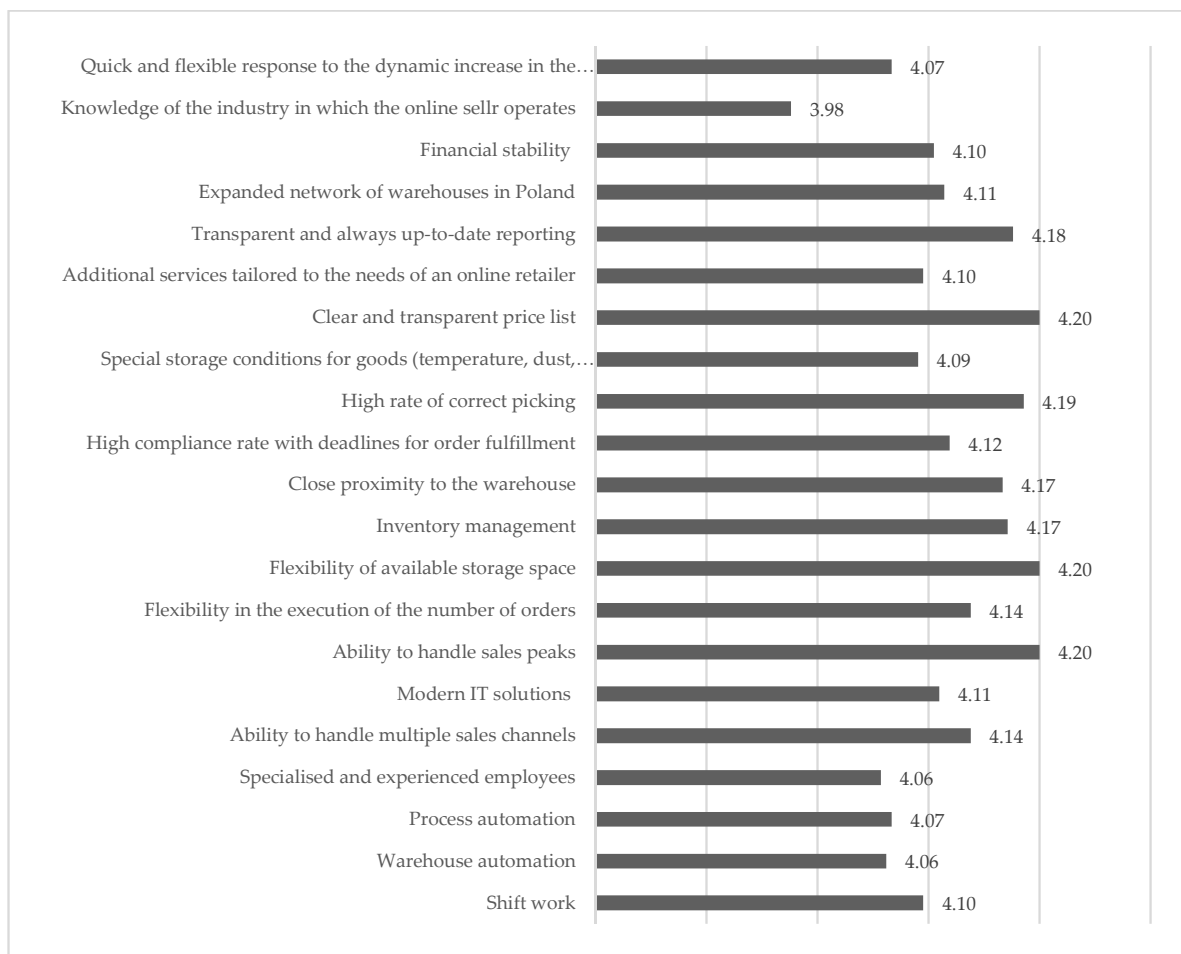


Figure 3. Features and resources of a company providing logistics services to online sellers.

7. Use of Fulfilment and Performance

Numerous studies show that companies with e-commerce competence perform better [14,21–23]. Therefore, in the questionnaire we also asked respondents about performance. Firm performance is very broadly defined and depends on many factors. Among the most commonly mentioned are sales volume, profit, market share, ROI and productivity [24,25]. We asked our respondents to compare their performance with that of their direct competitors. We adopted a five-point Likert-type scale to capture evaluation of, using a scale of 1–5, where 1 meant “much worse” and 5 meant “much better”.

While the comparative approach to assessing indicators may be questionable in terms of its validity, it is an increasingly used approach in research. We adopted the well-accepted four-item efficiency scale from [24,25], in which the use of perceptual measures of firm performance is endorsed. It consists of market share, sales revenue, profit and profitability.

As indicated earlier, 30% of Polish e-tailers take advantage of fulfilment services. We had decided to check how the application of fulfilment services affects performance, and it turned out that companies using them achieve better results than those who perform logistics on their own. Market share, sales revenue, profit and profitability are all higher when fulfilment is used. However, these differences are not very large (see Table 1). We tested whether this relationship was statistically significant. We used the Pearson correlation coefficient in order to determine the relationship between the variables. Our study showed that the correlation between the use of fulfilment and performance was positive and statistically significant. The correlation was rather weak at only 0.14. This may have been due to the rather short history of fulfilment and the scant experience

of online shops. This research is certainly worth repeating in the future to see if this correlation increases.

Table 1. Comparison of company performance factors with those of direct competitors in the last financial year.

	Market Share	Sales Revenue	Profit	Profitability
Fulfilment service users	3.93	3.90	3.92	4.01
Own logistics	3.81	3.79	3.87	3.89
Difference	0.12	0.12	0.05	0.12

8. Conclusions

The development of e-commerce is very promising. In the following years, the turnover of the existing online shops will grow, and thanks to relatively low barriers to entry, new market players will be created. More and more often, projects are launched by international companies. Along with the development and establishment of online stores, there will be a need for logistics support. On the one hand, it creates great opportunities for new fulfilment services providers, and on the other hand, it increases the interest of other entities that will want to expand into this market.

The results achieved and the representativeness of the surveyed sample of enterprises lead to the formulation of managerial implications. There are many different companies offering fulfilment services—from international concerns, through logistics companies, to small specialised local entities. Many service providers offer fulfilment as an additional, insignificant service in their activity. Some start this type of activity on the basis of the experience of their own e-shop and extend it to other entities. Large logistics service providers offer fulfilment, counting on a scale of orders adequate to their core business, not being flexible enough to meet the needs of smaller e-shops.

The fulfilment market is still at a relatively young stage of development. The studies carried out for this project show that only 30% of the online shops use fulfilment services for goods sold on the Internet in Poland. Those who use the fulfilment service are satisfied and most often perceive saving time and increasing logistics service level as the greatest benefit. Another argument in favour of outsourcing in warehouse logistics is convenience and more possibilities to enter new markets. The remaining 70% which do not use the fulfilment services point out many reasons for that. The most important one is the willingness to keep everything under control. The online sellers believe that they can respond to customers' needs better and they want to have direct contact with the goods. For these reasons, the best solution for some online sellers is their own logistics. One should be aware of this and show customers that these barriers are easy to overcome thanks to the professional support of fulfilment service providers. It is very promising for fulfilment service providers that 27% of online shops intend to outsource their logistics for goods sold on the Internet within a maximum of three years.

Moreover, the fulfilment service is a relatively new area of activity of logistics service providers in Poland, and therefore it is constantly subjected to change. New concepts and trends keep appearing. A certain direction of development of fulfilment operators is expanding services for their customers, e.g., repairing or renewing returned products, financial and accounting services, contact centers, loyalty programs or coupons, and thus transition to the previously described strategy of one-stop e-commerce. An additional range of activity may also be adjusting the products offered to the preferences of specific customers in local markets; an example here is attaching instruction manuals or leaflets in a selected language.

Some limitations and future work can be identified in the studies presented. Our research shows that companies perform better when fulfilment is used. However, this relationship is not very strong, which probably results from too short a period of using these services. It would be beneficial to repeat the research in the future. Another limitation of the research is that it was conducted in one country only. In the future, the same study

could be conducted in other countries, too. The research using the quantitative method was conducted from the perspective of online shop managers. It would be advantageous to extend it to include the view of the fulfilment operators themselves.

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