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Business process management in order fulfillment growth in e-commerce

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Abstract. This study explores the role of business process management (BPM) strategies in enhancing order fulfillment efficiency for e-commerce businesses. Order fulfillment, a critical factor of customer satisfaction, often faces challenges such as order cancellation, delayed processing, missed delivery schedules, and damaged product received by the customer. BPM offers a framework for improving efficiency by redesigning workflows, enhancing communication, and optimizing supply chain processes. This research concludes that integrating BPM tools and strategies not only improves operational efficiency but also supports sustainable growth and customer satisfaction in e-commerce.
Keywords: business process management, e-commerce, order fulfillment, order cancellation, automation, redesign, defect

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Научная статья
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Управление бизнес-процессами в росте выполнения заказов в сфере электронной коммерции

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Аннотация. В данном исследовании рассматривается роль стратегий управления бизнес-процессами (BPM) в повышении эффективности выполнения заказов в электронной коммерции. Выполнение заказов, являющееся важным фактором удовлетворенности клиентов, часто сталкивается с такими проблемами, как отмена заказов, задержки в обработке, несоблюдение графиков доставки и получение поврежденных товаров клиентом. BPM предлагает основу для повышения

эффективности путем совершенствования рабочих процессов, улучшения коммуникации и оптимизации процессов цепочки поставок. Исследование приходит к выводу, что интеграция инструментов и стратегий BPM не только улучшает операционную эффективность, но и поддерживает устойчивый рост и удовлетворенность клиентов в сфере электронной коммерции.
Ключевые слова: управление бизнес-процессами, электронная коммерция, выполнение заказов, отмена заказов, автоматизация, переработка, дефект

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Introduction

With the changing customer behaviors in the new era and the emergence of technology from the 1980s, doing businesses through the Internet has become a new reality as a form of B2C, B2B, and even C2C. It is the benefit of electronic commerce that is changing traditional shopping channels into borderless markets. Some of these benefits like transformation of products or services to other countries that had never been before, serving different customer wishes and requirements, and facilitation of access to products [1], especially when it comes to protecting public and private life, for example, during COVID-19. Accordingly, e-commerce consists of all business processes between an organization and its external stakeholders in order to complete orders which were initiated via the World Wide Web [2]. As a result, this definition tells that for the fulfillment of an order formed by the customer, the efficiency of its business processes cannot be neglected during the procedures of supply chain. However, the related business processes have been still under pressure of bottlenecks and companies which are delivering products to their customers suffer from defects. According to MetaPack State of eCommerce Delivery Consumer Research Report which was conducted in 2016, 87 percent of customers in some of the developed countries were highly likely to shop again with an online merchant, following positive delivery experience [3].

Besides, 38 percent of them would never shop with an online merchant again, following a negative delivery experience. From a business process management standpoint, every defect which an organization runs into, leads to a customer satisfaction issue. Furthermore, organizations also suffer from financial losses associated with defects and in this situation; it is the customer choice not to repeat or purchase from the company [4]. The objective of this study is to provide guidance on how to enhance e-commerce with the help of business process management (BPM) concepts and methods. This article's question is how BPM strategies enhance order fulfillment efficiency and support sustainable growth in e-commerce businesses. In this article we will first discuss the importance of efficient order fulfillment from the perspective of BPM and then delve into the potential errors in those business processes.

Basic concepts of order fulfillment

Order fulfilment is any operation activities which are taken from the moment a company receives an order to the time the product or service is served to the customer [5]. According to Efraim Turban and others, these operation activities consist of all the back-office operations, which are invisible to the customer, such as packing, delivery, inventory management and accounting, as well as front-office operation like order taking and advertisement [1]. Obviously, the prime objective of order fulfillment is to deliver the right product to the right customer in a timely, cost effective and profitable manner [5]. This object differentiates from offline retailing since e-retailers are delivering smaller number of goods directly to individuals while simple retailers are focused on delivering high volumes of items to stores' shelves. This is why the Ozon company, a huge Russian e-retailer, in addition to deploying its logistics channels, has started pickup points as its customers order from anywhere, so they can pick up orders also from anywhere. In this business model, buyers do not have to wait for items delivered by courier at home with an extra cost, so they can pick them up from the pickup point which they have chosen near in the neighborhood before order placement and receive it on the way back to home from work, university, etc. for free. Figure 1 illustrates the basic operation model for order fulfillment in e-commerce.

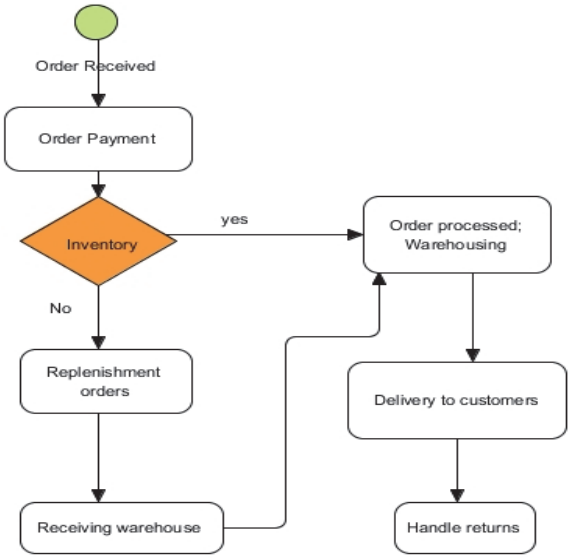

Figure 1. E-order fulfillment operation model [1]

The model includes the following steps:

1. Customer places an order with payment; some e-retailers collect payment for an item after the customer receives it.

2. Item availability is checked. If out of stock, the order is forwarded to a supplier or seller.

3. Target warehouse (fulfillment center) is selected; the order is transmitted to fulfillment center.

4. Order is picked and packed.

5. Fulfilled order is delivered to the customer.

6. Customer receives the item.

7. Returns are managed if needed.

Order fulfillment is considered as a key for the success of e-commerce. According to Peerless Research Group [6], order fulfillment has a lot of small, elaborated tasks and activates which are arranged in a complicated or delicate way and without an efficient management and delivery performance, the order cannot be completed or at least repeated by the customer. Van Landingham (2014) listed four main challenges that e-retailers are facing with:

– Order expectations: The much shorter delivery time, the smaller numbers of order cancellation.

– Order accuracy: delivering the right product to the right customer is vital for e-commerce; otherwise it loses its clients. However, in offline retailing, it is not a big deal.

– Multichannel order management: It is very difficult to manage various channels because most companies have their own systems which make it difficult to handle.

– Complex distribution: Packing and shipping for every order placed by customers while in offline orders there is no need for packaging every product. Furthermore, items are shipped in batch in shelves not to one by one customer.

The role of BPM in e-order fulfillment

Figure 2 illustrates the core processes of order fulfillment in online shopping.

Figure 2. Fulfillment structure for online shopping

From that standpoint, it could be stated that there is a relationship between order fulfillment and BPM due to the fact that the latter is working for the efficiency of operational activities and achieving a strong result. Since order fulfillment is about managing entire chains of events, activities and decision points, which add value to the retailer or any related organization as well as its customers, this concept is under BPM as its goal is the same. For example, in BPM we can see the order-to-cash process, which starts when a customer places an order to purchase a product or service and ends when the customer has made the corresponding payment after it has been delivered to him.

According to Turban and others [1], order fulfillment is a critical success factor for e-commerce. However, according to a study conducted by Peerless Research Group (2013), there is a mismatch between standard business processes and the special nature and requirement of e-commerce. The study pointed out that due to the fact that order fulfillment consists of many elaborate parts, which are very complicated to manage, the management and especially supply chain management are moving far behind. As a result, the first and most important measure which can be at risk of minimization is customer satisfaction. Based on a survey conducted by Kinnison and others [7], there are four main root causes for poor customer satisfaction in e-commerce: inaccurate orders, lengthy time of the order processes, missed delivery schedules, invisibility as the order moves across the fulfillment process. Turban and others [1] made a significant contribution to this field from the perspective of BPM and found a root cause for this issue, which is execution practices. They proposed that lack of information sharing and inadequate logistical infrastructure are key root causes. The first cause results in a lack of communication between the stakeholders (both human and system), from retailers upstream to suppliers and even to manufacturers, which leads to rising uncertainty in safety of stock and inventory. For the second cause, we can see some e-retailers use an external logistics service, which is expensive and unsafe instead of in-house functional department.

Furthermore, a case study conducted by Ambrosio-Flores and others [8] analyzed a company under the sector of contribution material distribution and found that incomplete deliveries during six months accounted for around 25 percent of lost sales revenue in that firm. This research proposed a model called "Integrated Lean Warehousing – BPM model" which seeks to raise the number of order fulfillments as well as improve the indicators of each cause significantly. After a diagnosis was carried out using some different redesign methods of BPM, problems were identified, such as delays and poor flow of information, inefficient warehouse management, and low company coverage. Based on this report, it was found that the root causes of the problem were inefficient information flow and poor warehouse management, both of which at the percentage of 65.12 and 34.88, respectively. As a result of this model conducted in that company, the inventory record accuracy indicator improved from 79 to 95 percent. This research shows that through the application of Lean Warehousing and BPM tools, it is feasible to optimize the leading warehouse management indicators of the company. According to a report by Brynjolfsson et al. [9], businesses with BPM frameworks experienced a cut in operational costs by around 15%, due to the improvements in process efficiency and automation.

Case Study: Implementation of BPM in Ozon

Ozon, which is considered as the dominant e-retailer in Russia and some other CIS countries, launched in 1998 as an e-bookstore and then expanded its marketplace into various products, including fashion, household goods and electronics.

By 2024, its GMV was around 2.875 trillion rubles, rising by 64 percent in comparison with its previous year [10]. The basic operation model of Ozon is listed below:

1. Make-to-order (MTO): These products are only built after the order is placed by the customer. Printing books and making jewelry are examples of this operation model.

2. Make-to-stock (MTS): The products are built against a sales forecast and are stored as the available inventory, like clothes and electronic devises (most common in Ozon).

3. Digital copy (DC): If a product is a digital asset, copies are created and downloaded to customer storage devises.

The company has applied BPM to optimize its order fulfillment processes, enabling them to address operational challenges and have easy access to data. One of the most important benefits of BPM for Ozon is streamlining workflow works between process participants. Figures 3 and 4 illustrate the purchasing process without and with BPMS in Ozon. By installing a central database in all departments of that company, from warehouse to pickup centers, all the information on orders is stored, replacing the original paper streams and giving direct access to the process participants as well as bringing down the workforce. According to Teixeira and others [11], BPM enables organizations to integrate real-time data into their operations, allowing for more accurate demand forecasting and dynamic inventory control. Real-time data integration also enables Ozon to reroute shipments, and keeps customers informed on the status of orders. BPM not only improves internal processes but also facilitates external relationships with third parties (suppliers and sellers) and even customer, boosting competitiveness in a fast-paced digital marketplace [12].

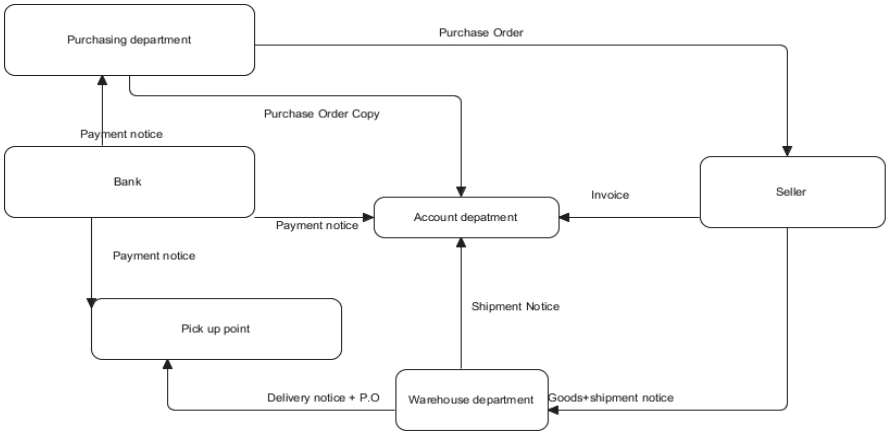

Figure 3. Purchasing process in Ozon without BPMS
Source: Figure created by the authors with Visual Paradigm software

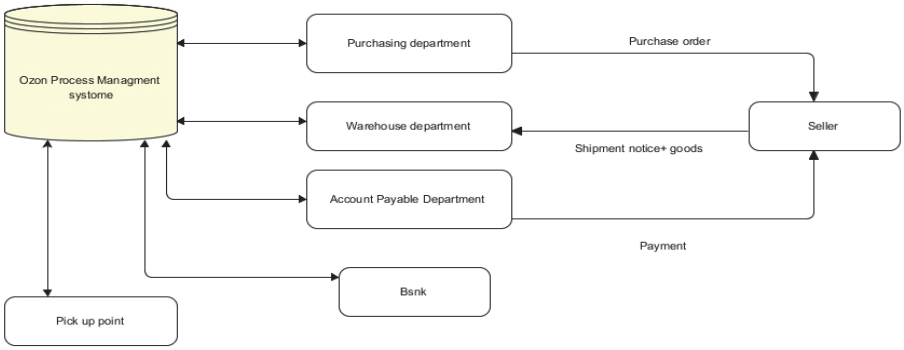

Figure 4. Purchasing process in Ozon with BPMS
Source: Figure created by the author with Visual Paradigm software

The implementation of BPMS at Ozon also involved adopting innovative technologies in order to change manual tasks into automated or semi-automated tasks: every product is equipped with a specific barcode, read in BPMS of the company, considering as the identity of the item (parcel) in fulfillment processes. The scanner is considered as a worker, decreasing workforce and time cycle of the related tasks in the crowded e-commerce space.

In order to understand the context of the Ozon Order Fulfillment Center and capture the requirements of that, Use Case Diagram can help us specify all externally visible system behavior. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior. (For more information see: https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-use-case-diagram/) Figure 5 depicts the Use Case Diagram for this company with showing all main processes and sub-processes for the Order Fulfillment Center as well as all the actors playing roles and the customer. As the main part of the Ozon company transaction is categorized under B2C, and the size of the selected item by buyers is ranged from very small to very big, the company provided pickup points across of very streets so that customer can pick up their delivered item as their convenience. A pickup point is a very small warehouse where customers can check, try on and then decide to pick up or return an item. For this reason, these pickup points play a vital role in fulfillment centers of the Russian e-retailer. It is worth mentioning that these centers are organized by franchised systems; in other words, Ozon delivered its products to its end-customers with the help of a third party [13]. Figure 5 illustrates Use Case Diagram for order fulfillment of Ozon.ru.

Now that the main activities of the Ozon Fulfillment Center are clarified, there is a need to obtain the business processes of order-to-deliver for the e-commerce provider. The business process model of order fulfillment is shown in Figure 6.

Identifying bottlenecks in order fulfillment in Ozon. Generally, there are global processes for e-commerce that are the same for every company providing e-business, even though the implementation of the process can be different for them due to difference strategic objective they are moving forward. Figure 1

above illustrates the main processes for online shopping from the moment when the customer places an order to the time when they receive the desired product. It is clear that every problem or bottleneck encountered at every stage of these processes can lead to order cancelation, which is the opposite side of order fulfillment.

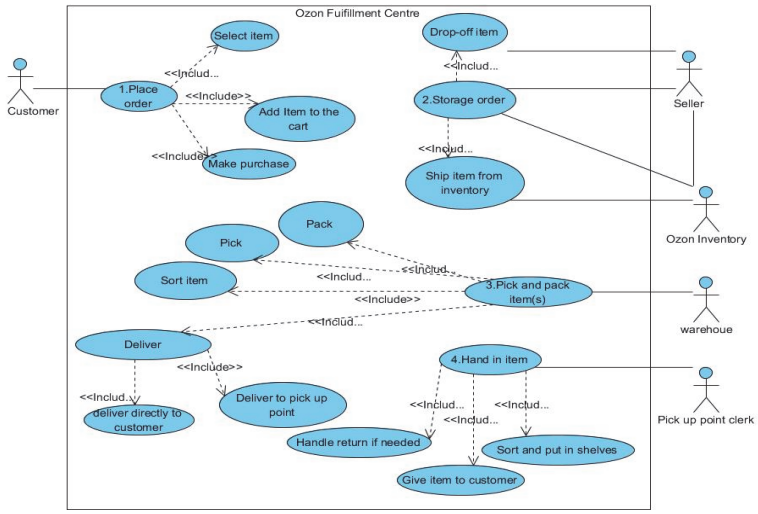

Figure 5. Use Case Diagram for the Ozon Order Fulfillment Center
Source: Figure created by the authors with Visual Paradigm software

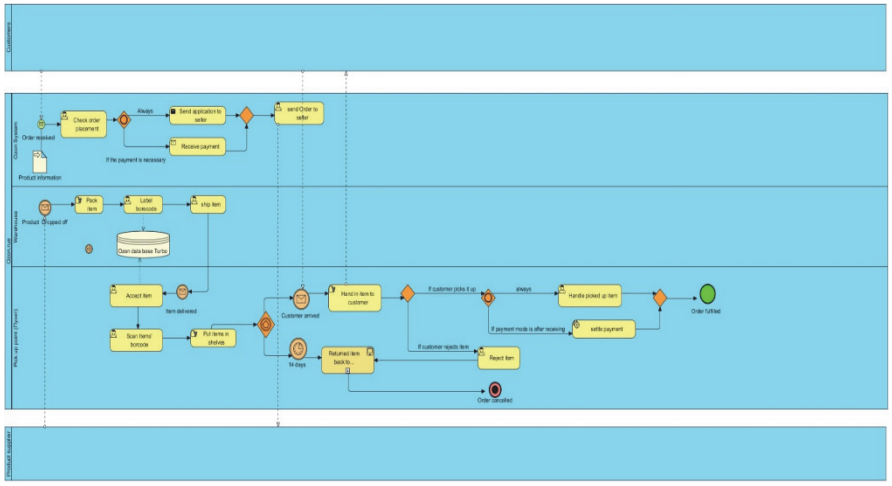

Figure 6. Buiness process model for the Ozon Order Fulfilment Center
Source: model created by the author with Visual Paradigm software
(For visibility, the model can be accessed at https://drive.google.com/file/d/1YoLw2-FglGRw2FNROzZGHA2eX9GZQKxh/view?usp=sharing)

Defects in order fulfillment stages in Ozon

Stages	Bottlenecks
Order placement	Unconventional payment
	Shopping cart abandonment Unclear product image on the site
Order Storage	–
Order picking &packing	Poor packaging
Order delivery	Products arriving damaged
	Differences between delivered products and those selected online
	Non-standard size of products for clothes Shopping cart abandonment

So, in the following we delve into each problem in detail.

Non-standard size of products for clothes. This is the case when the customer receives a selected item, realizes that it is not the product he or she selected on the site. This is the case for clothes and shoes, when the customer needs to check the products for size and color before deciding whether to receive them or not. Most of the problems here come from these causes: (1) poor standard measurement for clothes and shoes implemented by the producer; (2) deficiency between the colors shown on the site with the real ones of products.

Shopping cart abandonment is an important aspect of order fulfilment and is related to both technical and marketing sides of e-commerce. This is the situation when a potential customer starts a check-out process for an order but decides to drop out of the process before completing the purchase. 70 percent of online carts are abandoned before the customer completes the order (www.pimer.io). According to Optimizely [14], every online shopper can face this issue because of seven common reasons: lack of trust, high shipping costs, complexity, browsing, lack of payment options, excessively high price, and technical problems.

Unconventional payment. There is no user interface between Ozon Bank and other bank applications like Tinkoff or Alfa Bank. As a result, the shopper must switch the web page or his Ozon application to the targeted bank application, from which he or she wants to transfer money. This situation can be a reason for cart abandonment.

Poor packaging. The quality of packages that the items must put into is very crucial, especially the plastic ones, otherwise the product such as clothes or small items like electronic devices can be damaged on the way. Imagine that a T-shirt is going to be sent from abroad like China to Russia, Moscow. If the plastic package is torn or is not wrapped adequately, a white T-shirt can become dirty on the way. Furthermore, packing methods are important not only for goods maintenance but also for keeping the barcode which sticks to the package or plastic package and is considered as the goods ID in the supply chain processes in the e-commerce company.

Products arriving damaged. In addition to poor packaging, careless movement of the product ordered by the customer is another cause why the item is damaged on the way from the warehouse to the point where couriers deliver the

item. 80 percent of reasons for returned products in e-commerce stem from damaged or broken goods [15].

Differences between delivered products and those selected online. This is the case that when a customer checks the parcel he receives, realizes that this is not the order he or she placed on the web site. For example, the client has chosen model x for some cattle, but he or she has been delivered model y of the same brand. This is also the case for size, color, brand and even type of the product. This defect originates from both the dispatcher's routing of the item within the warehouse and the seller's dropping off the package at the distribution center or pickup point.

With the help of the Why-Why diagram (tree diagram), which is a technique to analyze the causes of negative effects, we can capture the series of cause-to-effect relations that lead to a negative effect that is order cancellation (Figure 7).

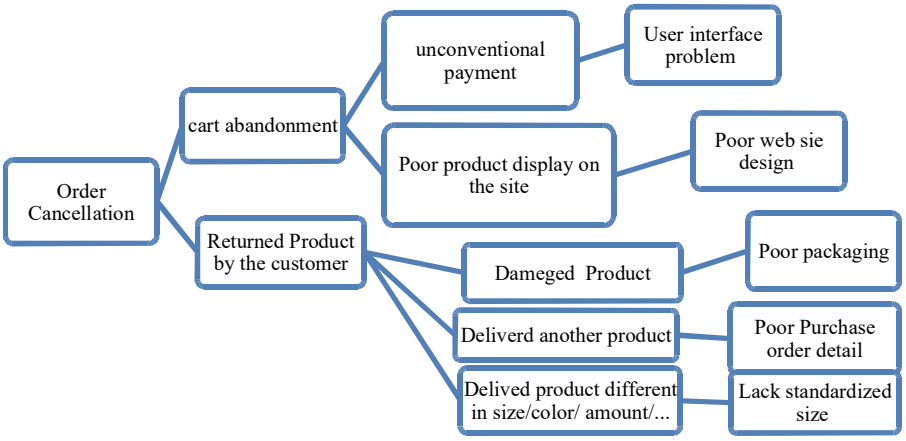

Figure 7. Why-Why diagram for order cancellation

Conclusion

This article explored the transformative role of BPM in order fulfillment within the rapidly growing e-commerce sector, with a particular focus on the Russian platform Ozon. Through a detailed examination of BPM's application across the platform, several key insights and contributions emerged. Firstly, BPM serves as a strategic tool for enhancing operational efficiency by streamlining workflows, minimizing redundancies, and integrating advanced technologies. By leveraging these technologies, companies can improve their decision-making processes, automate routine tasks, and respond more efficiently to fluctuating customer demands. The case study of Ozon reveals that this company utilized BPM to enhance its workflows and supply chain operations, focusing on faster delivery times and improved service quality. By optimizing key processes, these platforms achieved improved delivery speeds, reduced operational costs, and enhanced customer experience. Finally, the article identified the defects on order fulfillment in Ozon.ru,

and the ways of problem solving for this stage can be the future research as a practical suggestion.

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