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INCREASE IN ORDER VOLUME AND TOTAL REVENUE OF PHARMACEUTICAL WHOLESALERS THROUGH THE IMPLEMENTATION OF E-COMMERCE

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Abstract

Pharmaceutical Pharmaceutical Wholesalers play an essential role in ensuring the availability of medicines within the healthcare service system; however, their distribution performance is often constrained by conventional sales mechanisms. The implementation of e-commerce is expected to improve managerial efficiency and support sales performance in pharmaceutical distribution. This study aimed to assess the impact of e-commerce implementation on increasing order volume and total revenue at the pharmaceutical wholesaler PT. Wahana Fajar Utama in Bali. A quasi-experimental study with a one-group pretest–posttest design was conducted by analyzing transaction data for three months before and three months after the implementation of e-commerce. Data were analyzed using the Shapiro–Wilk normality test ($p > 0,05$) and the Paired Sample T-Test. The results showed an increase in the average monthly order volume from 194 to 256 (32%) and an increase in the average monthly revenue from IDR 264,723,293 to IDR 396,445,539 (49.7%). Statistical analysis indicated significant differences in both order volume (p value=0.034) and revenue (p value=0.018) before and after the intervention. The implementation of e-commerce was proven to significantly increase order volume and total sales revenue at PT. Wahana Fajar Utama.

Keywords: E-commerce, Pharmaceutical Wholesaler, Distribution Management, Sales Performance.

INTRODUCTION

The rapid development of digital technology has transformed business paradigms across various sectors, including the pharmaceutical industry, which has traditionally been regarded as conservative. This transformation is driven by the need for operational efficiency, expanded market reach, and enhanced customer service in the era of the digital economy. Within Indonesia's pharmaceutical ecosystem, Pharmaceutical Wholesalers (Pedagang Besar Farmasi/PBF) play a strategic role as vital intermediaries between drug manufacturers and end healthcare service facilities, such as pharmacies, clinics, and hospitals (Regulation of the Minister of Health of the Republic of Indonesia No. 34 of 2014). Therefore, adaptation to digital innovation has become imperative in order to maintain competitiveness and respond to increasingly dynamic market demands.

Specifically, many PBFs, particularly those of medium scale, continue to rely on conventional sales systems dependent on sales representatives. This method has several fundamental limitations, including a high dependency on the number of sales personnel, limited geographical coverage, and less flexible ordering processes constrained by time and distance (Fatmawaty et al., 2020). A preliminary study conducted at PT. Wahana Fajar Utama Bali, a central PBF located in Badung, confirmed these challenges. Internal data from 2024 indicate an average of only 208 orders per month, with a turnover of approximately IDR 216 million figures considered suboptimal given Bali's market potential. These limitations are primarily attributable to the fact that only three sales representatives serve the entire Bali region, resulting in many potential customers particularly those located far from the head office experiencing difficulties in accessing products.

The implementation of e-commerce is regarded as a strategic solution to overcome the constraints of conventional systems. E-commerce enables buying and selling transactions to be conducted via computer networks, accessible 24 hours a day and 7 days a week, while improving process efficiency and expanding market reach without significant geographical limitations (Laudon & Traver, 2017). Empirical evidence from other sectors supports the effectiveness of this approach. Research on retail pharmacies demonstrates that the implementation of web-based e-commerce systems significantly improves service quality and sales performance (Fatmawaty et al., 2020). Similar findings among Small and Medium Enterprises (SMEs) in Denpasar reveal that the use of e-commerce positively

affects firm performance through operational efficiency and expanded market access (Sarastyarini & Yadnyana, 2018). Furthermore, the concept of the e-marketing mix (e-product, e-price, e-promotion, and e-place) has been shown to have a positive correlation with consumers' online purchase intention, including within digital distribution contexts (Bisma & Pramudita, 2019; Fitriasti & Kumalasari, 2023). The novelty (state of the art) of this research lies in its specific focus on the Pharmaceutical Wholesaler (PBF) sector, which operates under far stricter and more complex characteristics and regulations such as Good Distribution Practice for Pharmaceutical Products (Cara Distribusi Obat yang Baik/CDOB) compared to retail pharmacies or general SMEs (BPOM RI, 2020). Most previous studies have concentrated on retail sectors, SMEs, or general marketplaces, while in-depth analyses of the impact of e-commerce implementation on PBF distribution performance, as well as its interaction with existing conventional sales systems, remain highly limited. This study seeks to fill this gap by not only measuring the impact of e-commerce on increasing sales volume but also analyzing shifts in purchasing patterns and examining how both systems (digital and conventional) can be integrated within the highly regulated PBF business ecosystem. Based on this urgency and background, the present study aims to comprehensively evaluate the impact of e-commerce implementation on increasing order volume and total revenue at PT. Wahana Fajar Utama Bali, as well as to analyze shifts in customer purchasing patterns and the factors influencing the adoption process of digital technology within the pharmaceutical distribution business.

METHOD

This study employed a mixed-methods approach with a primary quantitative quasi-experimental design, specifically a one-group pretest–posttest design without a control group, complemented by qualitative data to enrich the interpretation of the findings. The research was conducted at the Pharmaceutical Wholesaler (PBF) PT. Wahana Fajar Utama Bali, with data collection carried out over a six-month period from January to June 2025. The study population comprised all pharmaceutical items recorded in the company's system. The sample was selected using a consecutive sampling technique based on inclusion criteria, namely pharmaceutical products recorded in the conventional sales system and registered in the e-commerce application. The exclusion criteria included products that were out of stock or discontinued during the study period. Data collection techniques consisted of two types. Quantitative data were obtained from monthly transaction reports of the conventional system (pretest period: January–March 2025) and the e-commerce system (posttest period: April–June 2025). Qualitative data were collected through in-depth interviews with key informants, including the operational manager, sales representatives, administrative staff, and active customers, using an interview guide and audio recording devices. Quantitative data analysis involved the Shapiro–Wilk normality test, followed by the Paired Sample t-Test (if the data were normally distributed) or the Wilcoxon Signed-Rank Test (if the data were not normally distributed), at a significance level of $\alpha = 0.05$. Qualitative data from the in-depth interviews were analyzed thematically through the following stages: verbatim transcription, repeated reading for in-depth understanding, inductive coding to identify patterns, grouping codes into themes, and interpretation to develop a holistic understanding of the supporting and inhibiting factors in the implementation of e-commerce. The findings were presented integratively in the form of descriptive narratives. This study received ethical approval from the Health Research Ethics Committee of Universitas Respati Yogyakarta, with approval number: 033.3/FIKES/PL/V/2025.

RESULTS AND DISCUSSION

Based on the established inclusion and exclusion criteria, the sample of this study comprised 510 pharmaceutical products actively traded. The characteristics of the sample by drug category were distributed as follows: prescription-only medicines constituted the majority with 360 items (70.6%), followed by over-the-counter (OTC) medicines with 61 items (12.0%), limited OTC medicines with 37 items (7.3%), pharmaceutical precursors with 34 items (6.7%), and external or topical medicines (OOT) with 18 items (3.5%). A descriptive analysis of transaction data for the three months prior to (January–March 2025) and three months following (April–June 2025) the implementation of e-commerce revealed increases in both primary variables. The average monthly number of orders rose from 194 to 256, representing a 32.0% increase. Meanwhile, the average monthly revenue experienced a more substantial increase, from IDR 264,723,293 to IDR 396,445,539, equivalent to a 49.7% rise. A complete comparison of the monthly data is presented in Table 1, while the visual trends are illustrated in Figures 1 and 2.

Table 1. Monthly Transactions Before and After E-Commerce Implementation

No	Month	Period	Number of Orders	Turnover (Rp)
1	Jan 2025	Before	183	255.272.718
2	Feb 2025	Before	190	207.065.399
3	March 2025	Before	210	331.831.761
4	Apr 2025	After	235	412.642.189
5	May 2025	After	238	347.766.493
6	Jun 2025	After	295	428.927.934

Source: Primary Data, 2025

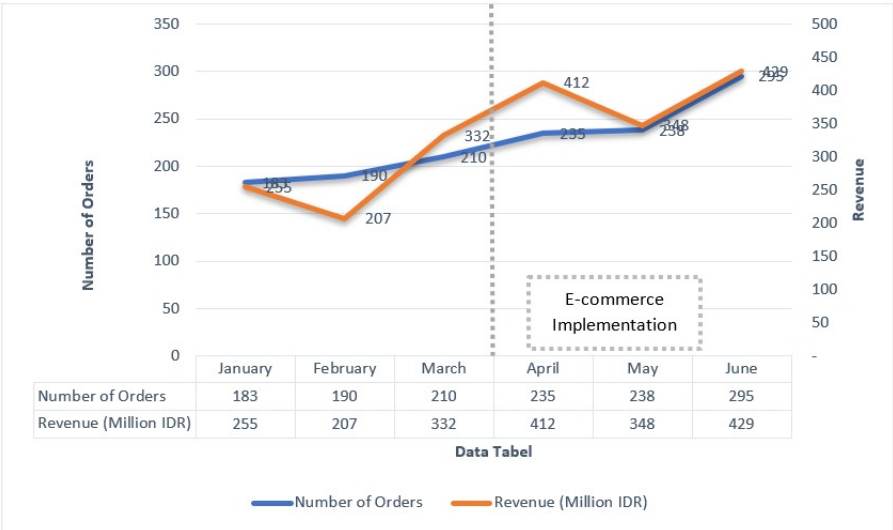

Figure 1. Monthly Trends in Number of Orders and Revenue (January–June 2025)
Source: Primary Data, 2025

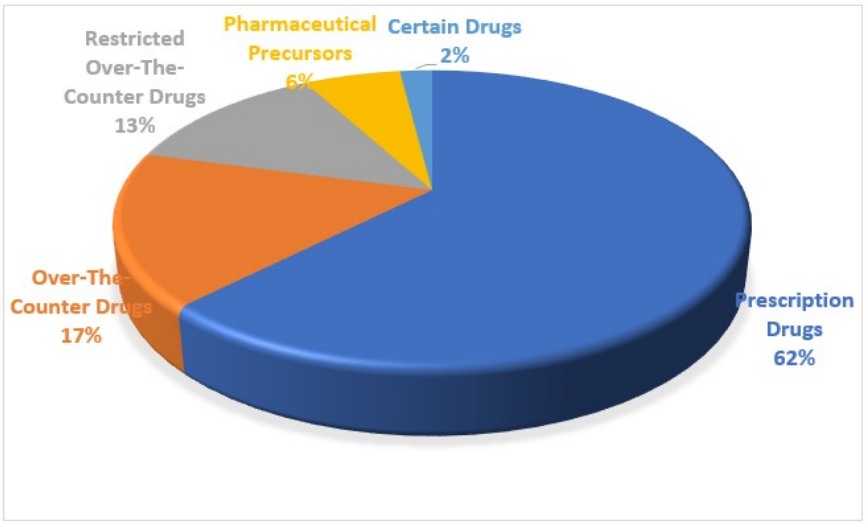

Figure 2. Percentage (%) of Orders by Drug Category After E-Commerce Implementation
Source: Primary Data, 2025

Prior to hypothesis testing, a normality test was conducted on the order volume and revenue data for the pre- and post-intervention periods using the Shapiro–Wilk test. The results indicated that the data were normally distributed. The significance (p) values for order volume and revenue prior to e-commerce implementation were

0.482 and 0.085, respectively, while the post-implementation values were 0.746 and 0.383. As the assumption of normality was satisfied, the analysis proceeded using the Paired Sample t-Test.

Table 2. Data Normality Test (Shapiro–Wilk)

No	Variable	Period	P Value
1	Number of Orders	Before	0,482
2	Total Revenue	Before	0,085
3	Number of Orders	After	0,746
4	Total Revenue	After	0,383

Source: Primary Data, 2025

The results of the Paired Sample t-Test indicate that the observed increases were statistically significant. The mean increase in the number of orders following the implementation of e-commerce was 61.7 orders, with a standard deviation of 20.3 and a significance value of p = 0.034. Meanwhile, the mean increase in revenue reached IDR 131.7 million, with a standard deviation of IDR 31 million and a significance value of p = 0.018. These findings demonstrate a statistically significant difference between the conditions before and after the implementation of the e-commerce system at the 95% confidence level. Therefore, the null hypothesis (H_0), which stated that there would be no increase, is rejected.

Table 3. Statistically Significant Differences in Order Volume and Total Revenue Before and After E-Commerce Implementation

No	Variable	Mean	Standar Deviation	P Value
1	Order Volume (Before–After)	61,7	20,3	0,034
2	Revenue (Before–After)	131,7	31	0,018

Source: Primary Data, 2025

The implementation of e-commerce has significantly contributed to improving the sales performance of PT. Wahana Fajar Utama Bali, as reflected in the increase in order volume (p = 0.034) and total revenue (p = 0.018). The surge in orders and revenue is further substantiated and clarified by qualitative narratives derived from interviews. Informants, particularly customers and sales representatives, stated that enhanced accessibility and flexible ordering time key features of the e-commerce system served as direct drivers of increased ordering frequency.

A salesperson stated:

"Previously, customers could only place orders when I was on-site or during working hours. Now, they can order anytime sometimes even at midnight. This flexibility makes them more consistent in placing orders because they are no longer dependent on my schedule."

Similarly, customers reported:

"Now, when there's free time at the pharmacy, I just open the application, check stock, and place an order easily. This flexibility really helps, so I order more frequently than before."

"Our clinic operates until the evening. Previously, we had to wait until the next day to call the sales representative. Now, even after checking stock at night, we can order directly through the app. The timing fits our operational needs, so naturally we order more often."

"At first, I was just trying it out, but it turns out to be very convenient. When I see stock running low, I simply open my phone and complete the order. This flexibility encourages me to restock more regularly without waiting for the sales representative or worrying about office hours."

These findings align with the e-marketing mix framework, which posits that digital platforms can optimize the dimensions of e-place and e-promotion, thereby facilitating customer access, expanding market reach, and ultimately increasing transaction volume (Kotler & Keller, 2016).

In-depth interviews with the operational manager and administrative staff further indicated that process digitalization significantly reduced administrative burdens and reliance on sales representatives, creating operational efficiencies that were subsequently reflected in revenue growth.

The Operational Manager stated:

"Previously, a single order involved multiple phone calls or messages between sales and admin to confirm stock and pricing. Now, everything is automated in the system. There's no need to chase the salesperson, and admin no longer needs to input data repeatedly. Time and effort can now be allocated to more productive tasks."

"Processes that once took half a day can now be completed in minutes. From order placement to shipping, everything is recorded in real time. Sales representatives are no longer a 'bridge' that can cause delays. This efficiency allows us to handle more orders without adding personnel, which ultimately increases revenue."

An administrative staff member added:

"Previously, I had to check order messages from sales representatives and manually input them one by one sometimes leading to duplication or typing errors. Now, orders are automatically recorded; I only need to verify them. The process is faster and more accurate, and my workload is significantly lighter."

Qualitative findings also provide contextual explanations for why the percentage increase in revenue (49.7%) was more substantial than the increase in order volume (32.0%) following e-commerce implementation. Interviews with customers and sales staff revealed several mechanisms underlying this disparity.

First, there was a transition from routine limited purchases to higher-value strategic purchases, as the ease of navigating digital catalogs encouraged exploration of new products, including branded variants with higher margins that were previously less optimally introduced through sales representatives.

Second, real-time price transparency and algorithm-based recommendation features facilitated cross-selling and up-selling, thereby increasing the average transaction value.

Third, real-time stock notifications provided reassurance to customers in remote areas, encouraging them to consolidate purchases into larger but less frequent orders, thereby reducing order fragmentation.

Fourth, the platform democratized access to high-value products that were previously marketed selectively, generating new high-value demand.

Customers explained:

"When I open the application, all prices are immediately visible, including discounts. Next to the product I usually buy, there are recommendations like 'other customers also bought this.' I often add them to my cart. Sometimes these new products sell well in my pharmacy."

"I'm located far from the city. Previously, I hesitated to place large orders because I was unsure about stock availability. Now, with real-time stock notifications, I feel confident placing large monthly orders."

"Previously, it was difficult to obtain certain high-priced branded medicines requested by patients. I had to wait for the sales representative to confirm price and availability. Now, I can check directly in the application. As long as the margin is acceptable, we are confident in ordering even high-priced products."

This synthesis demonstrates that statistical figures do not stand alone; they are shaped by behavioral transformation, operational dynamics, and human experiences behind them. E-commerce not only increases transaction volume but fundamentally transforms the economic value of each transaction.

The shift from a conventional push-selling model dependent on sales representatives to an independent online pull-buying system has created operational efficiencies (Kotler & Keller, 2016). These efficiencies reduce bottlenecks caused by limited sales personnel and provide greater flexibility in ordering time, thereby increasing both transaction frequency and value.

However, the digitalization process was not without social dynamics within the company. Qualitative findings indicate that initial resistance among human resources including concerns about changing roles and work patterns is common in digital transformation processes and is often not fully captured through quantitative approaches alone (Suleiman et al., 2025). This dynamic explains why many companies maintain conventional systems alongside digital platforms, forming hybrid strategies in response to evolving human and organizational cultural factors.

These findings are consistent with literature emphasizing that successful digital adoption in the pharmaceutical sector depends on an organization's ability to manage socio-technical change, including behavioral aspects, trust, and user readiness for new technologies (Sampene et al., 2024). Thus, the success of digital transformation in the PBF sector is determined not only by quantitative metrics such as order volume and revenue but also by effective socio-technical transition management, complementary system integration, and alignment with strict regulatory frameworks such as Good Distribution Practice (CDOB). Future digital strategies should therefore

be designed holistically, integrating measurable business logic (quantitative) with complex operational and behavioral realities (qualitative) (Zhang & Li, 2023). On the other hand, interviews also revealed technical barriers, such as slow loading times in areas with weak internet signals, which contributed to order fluctuations in May. Furthermore, the April launch of the e-commerce platform was accompanied by intensive promotion and socialization activities, prompting some enthusiastic customers particularly pharmacies to engage in stockpiling in April to anticipate future needs and take advantage of promotional offers. This resulted in demand borrowing from May to April, leading to a natural decline in orders in the subsequent month.

Customers stated:

"I intended to place orders quickly through the website, but sometimes it kept loading, which discouraged me. Occasionally, items already in the cart resulted in errors, so I canceled the order."

"In my area, the signal fluctuates. When it's stable, ordering runs smoothly. When it's slow, I postpone it. That's why my orders decreased in May."

"When the e-commerce website launched in April with attractive promotions, I stocked up for two to three weeks. As a result, orders in May were lower because inventory from April was still sufficient."

Empirically, the improvement in business performance following e-commerce implementation is consistent with previous research in other sectors. Studies on retail pharmacies (Fatmawaty et al., 2020) and SMEs (Sarastyarini & Yadnyana, 2018) similarly demonstrate that digital adoption enhances service efficiency, expands market access, and ultimately improves sales performance. The more substantial increase in revenue compared to order volume in this study indicates that e-commerce not only attracts new orders but also increases the average transaction value per customer. This phenomenon may be explained by the platform's ability to present comprehensive and transparent product catalogs, facilitate price comparisons, and provide recommendations that encourage higher-value purchases. The strict regulatory environment of pharmaceutical distribution adds a distinctive dimension to this study. The success of PT. Wahana Fajar Utama Bali in adopting e-commerce demonstrates that digitalization can be effectively implemented even within highly regulated business-to-business (B2B) pharmaceutical contexts, extending prior findings that were largely confined to retail or B2C sectors.

The continued contribution of conventional systems to overall revenue also suggests that digital transformation in this sector is complementary and evolutionary rather than entirely substitutive, particularly for long-standing customers accustomed to personal relationships. In conclusion, this study reinforces the proposition that digital innovation in the form of e-commerce constitutes an effective strategy for driving business growth in pharmaceutical distribution. Its success lies in addressing the limitations of conventional methods particularly in expanding market reach and improving efficiency while demonstrating adaptability within a strictly regulated business environment. Practically, similar technological adoption may be considered by other Pharmaceutical Wholesalers (PBFs), provided that supporting factors such as digital infrastructure and human resource readiness are adequately addressed to accelerate growth and enhance competitiveness in the digital economy era.

CONCLUSION

The implementation of e-commerce at the Pharmaceutical Wholesaler PT. Wahana Fajar Utama Bali has been proven to enhance sales performance, as reflected in the increase in both the number of orders and total revenue. The adoption of this system supports greater efficiency in the ordering process, expands customer access to products, and improves transaction flexibility within pharmaceutical distribution activities. In addition to increasing transaction volume, e-commerce also contributes to the optimization of sales value through a more structured and integrated ordering mechanism. These findings indicate that e-commerce represents a relevant strategic approach to strengthening the distribution performance of Pharmaceutical Wholesalers, particularly within a business environment characterized by strict regulatory requirements.

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