Optimization of Service in Pharmacy Networks Based on Customer Experience Modeling

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Annotation. The increased competition is observed in the pharmaceutical market among the retail pharmaceutical companies in the differentiation of the range of medicines, on one hand and in large numbers of similar commercial parameters of the supply of medicine on the other hand. One of the most important tasks of retail pharmaceutical enterprises is to provide the population with high-quality, effective, safe medicines at reasonable prices.

It is necessary for retail pharmaceutical enterprises, to search new ways to attract customers, applying scientifically based logistic approaches to the organization of sales activities and streamlining the customer service process as a key influence factor while choosing a place to buy medicines under such conditions of functioning. The mentioned above actualizes the in-depth study of the process, elements and level of customer service of retail pharmaceutical enterprises and necessitates the implementation of effective mechanisms aimed at improving the level of customer service.

The purpose of the article is to justify the feasibility of providing a high level of customer service to retail pharmaceutical companies in order to preserve and improve public health and ensure competitiveness.

In the process of research, general scientific and special methods were used: synthesis and system analysis, economic analysis, comparative and indicative methods, groupings, logical analysis, and queuing theory.

The article proves the positive economic and social effect of raising the level of customer service in retail pharmaceutical companies, and the well-founded aspects on which the customer service strategy should be based. Future investigations in this direction may deals with the consideration and analysis of statistical interdependence between the companies single value index and its customer service level.

Keywords: service elements, customer service level, standards of customers service, customer, pharmaceutical company.

Introduction

Ukraine is only at the initial stage of establishing an adequate framework for the pharmaceutical trade. The absence of a well-developed logistics infrastructure currently imposes significant constraints on the activities of both distributors and pharmacies, which constitute the final link in the distribution chain. A number of critical factors negatively affect the quality of customer service, including underdeveloped distribution logistics, insufficient professional competence of pharmaceutical personnel, and the limited scope of pharmaceutical services available. In order to attract and retain customers, pharmacies are increasingly required to develop and implement comprehensive customer service strategies that are tailored to the needs and expectations of clients. Such strategies must ensure high-quality service delivery through an effectively organized system, which, in turn, facilitates the formation of a stable customer base and the development of customer loyalty.

The intensification of competition in the pharmaceutical market among pharmacies, as the final link in the sales channel, is manifested in two primary ways: through the differentiation of product assortments and through the high degree of similarity between competing offers in terms of commercial characteristics. Consequently, one of the essential tasks of pharmacies is to guarantee the population's access to safe, effective, and affordable medicines. Under these conditions, pharmacies are compelled to identify innovative approaches to attracting customers by employing scientifically grounded logistics methods aimed at optimizing sales activities and improving customer service processes. The service experience thus becomes a decisive factor influencing consumer choice of a pharmacy as a point of purchase.

In the existing academic discourse, the optimization of services in pharmacy networks is conceptualized as a multidimensional phenomenon, encompassing process modeling, waiting time analysis, customer satisfaction assessment, and digital transformation. A significant research direction involves the application of mathematical and simulation models to enhance pharmacy operations. For instance, Dorokhova, L., Beloeva, S., Venelinova, N., & Dorokhov, O. (2024), as well as Adeoye, W. A., Erah, P. O., & Macauley, B. O. (2023), provide evidence that queuing models can determine the optimal number of service points and employees, thereby reducing staff workload and improving customer satisfaction. Comparable results are presented by Kruik-Kollöffel, W. J., Moltman, G. A. W., Wu, M. D., Braaksma, A., Karapinar, F., & Boucherie, R. J. (2024), who employed queuing theory to optimize medical reconciliation processes, and by Yinusa, A., & Faezipour, M. (2023), who examined optimal resource allocation in healthcare systems.

Another pivotal determinant of customer retention is the speed of service delivery. Research conducted by Yulia, R., Hartono, R., Indrayanti, M., Ayumuyas, N. P., & Herawati, F. (2025), and by Alodan, A., Alalshaikh, G., Alqasabi, H., Alomran, S., Abdelhadi, A., & Alkhayyal, B. (2020), highlights that minimizing waiting times is a key factor in generating positive customer experiences. Modeling of such parameters provides opportunities for forecasting network workload and developing targeted strategies to reduce queues.

Equally important are studies addressing customers' perceptions of service quality. For example, Bîrsan, M., Focșa, A.-V., Cristofor, A. C., Scripcariu, S.-I., Antonoaea, P., Vlad, R.-A., Todoran, N., Ciurba, A., Stan, C. I., Apostol, M. M., & Stan, C. D. (2023), and Arief, I., Fahriati, A. R., & Kartikasari, N. (2022), employ the SERVQUAL approach to assess consumer satisfaction with

pharmaceutical services. These findings provide insights into service deficiencies and facilitate the development of innovative managerial solutions aimed at enhancing customer experience.

A separate research dimension focuses on the digital transformation of pharmacy networks. For instance, Odebunmi, O. O., Hughes, T. D., Waters, A. R., Urick, B. Y., Herron, C., Wangen, M., Rohweder, C., Ferrari, R. M., Marciniak, M. W., Wheeler, S. B., Brenner, A. T., & Shah, P. D. (2024) investigate the readiness of older adults to engage with telemedicine, while Bulaj, G., Coleman, M., Johansen, B., Kraft, S., Lam, W., Phillips, K., & Rohaj, A. (2024) propose the integration of digital therapeutic solutions into pharmacy practice. Similarly, Wick, A., Koczian, B., & Králiková, K. (2024) demonstrate the efficiency of multichannel marketing strategies, whereas Kenneth, C. H., Turner, K., Harland, M., Frederick, K., Rein, L., Atchley, D., Woodyard, A., Wasem, V., & Desselle, S. (2024) emphasize the scalability of optimized service models within community settings.

In this context, the optimization of services in pharmacy networks must be addressed in a comprehensive manner. This includes the implementation of process modeling, reduction of customer waiting times, systematic monitoring of service quality and customer satisfaction, and the incorporation of digital technologies. Such an integrated approach not only enhances the operational efficiency of pharmacy networks but also reinforces their competitiveness in the rapidly evolving pharmaceutical market.

The principal objective of this study is to substantiate the optimization of pharmacy network services through the modeling of customer experiences.

To achieve this goal, the following research tasks have been defined:

1) to examine approaches and directions for the effective organization of customer service processes in pharmacy networks;

2) to present the results of an empirical investigation into the elements of pharmacy customer service;

3) to substantiate the determinants influencing consumer choice of pharmacy for medicine purchases;

4) to identify logistics-based approaches to the development of programs aimed at improving customer service quality.

In general, this paper proposes to highlight the fundamental aspects of pharmacy customer service through the application of queuing theory, and to determine the required number of pharmacists necessary to provide services under defined operational parameters, thereby ensuring a high standard of customer care.

Methodology

Customer service in retail pharmaceutical companies encompasses a structured set of processes and operations aimed at ensuring timely, efficient, and high-quality interaction with clients. In the course of analyzing and evaluating these processes, it becomes evident that pharmaceutical customer service operates within a system of repetitive and standardized functions, designed to address similar needs across a broad customer base. These repeated functions, referred to as *service processes* (Krykavskyy, 2017), are embedded in what is defined as a mass service system—a framework typically applied to retail pharmaceutical enterprises due to the high frequency and regularity of customer interactions.

In this context, the problem of mass servicing clients in retail pharmaceutical settings takes on considerable scientific importance, as it directly influences customer satisfaction, operational efficiency, and business competitiveness. Customers seeking pharmaceutical assistance, consciously or not, often evaluate their potential experience through probabilistic expectations: *Will there be a queue? How long will it take to be served?* These are not merely practical questions but quantitative variables that can be systematically modeled and analyzed using the queuing theory or the theory of mass service. This theoretical framework allows for the establishment of functional relationships between the key indicators of service quality (such as waiting time or queue length) and several system parameters, including customer inflow rates, the number of available service channels (i.e., pharmacists), and the configuration of service processes (such as one-line or multi-line queues).

In our research, we employ the theory of mass service to analyze retail pharmaceutical enterprises operating under a dual-mode service model. Specifically, we examine a system in which a pharmaceutical outlet is staffed by p pharmacists and features a waiting area that accommodates up to m clients. Once the waiting hall reaches its capacity (m clients), any subsequent customer ($m+1$) is denied service and must seek an alternative pharmacy. This scenario introduces the concept of client loss due to overflow, which is critical in evaluating service efficiency and client retention. The model assumes that both arrival and service times follow exponential probability distributions, implying that the input and output client flows conform to a Poisson process, a standard assumption in mass service theory that facilitates analytical tractability.

The methodological approach based on queuing theory provides a robust framework for quantifying and optimizing the service capacity of pharmaceutical enterprises. It enables the identification of optimal staffing levels—i.e., the minimum number of pharmacists required to maintain a given level of service quality under predefined operational parameters. Ultimately, such modeling supports managerial decision-making aimed at enhancing service delivery, minimizing client waiting times, and reducing the probability of client loss, thereby ensuring a high-performance service system in the retail pharmaceutical sector.

During the research, a combination of general scientific and specialized methods was used, which allowed for a comprehensive study of the problem. System and synthesis analysis helped characterize the complex structure of customer service processes in pharmaceutical networks and identify the interrelations between service quality, customer experience, and the competitiveness of enterprises. Logical analysis made it possible to reveal cause-and-effect relationships between service standards and consumer behavior models when choosing a pharmacy.

Special attention was given to the application of economic analysis, which enabled the assessment of the effectiveness of implementing new service approaches and their impact on company costs and profitability. Comparative and indicative methods allowed for the evaluation of customer service levels across different pharmacy networks, contributing to the identification of best practices and existing service gaps. The use of grouping methods enabled the classification of pharmaceutical enterprises according to their level of service, market positioning, and performance indicators.

In addition, queuing theory was employed in the study to model customer flow at points of sale, which made it possible to assess staff efficiency, optimize service time, and reduce waiting lines. This enabled the development of well-founded proposals for improving service standards, which contribute not only to increased customer satisfaction but also to the enhancement of public health and the strengthening of the competitive positions of pharmacy networks.

Results

1. Approaches and Directions for an Effective Customer Service Process in Pharmacy Networks

Modern pharmacy is a medical and social complex that deeply affects all aspects of human and societal life. As a complex socio-economic system and a specific sector of the healthcare industry, it is designed to fulfill one of the most important social functions—preserving and improving public health through the provision of highly qualified pharmaceutical care. This function is properly implemented within the framework of pharmaceutical practice, particularly in pharmacies, through the personal activities of pharmaceutical specialists whose role is to provide citizens and healthcare institutions with the full range of medicines and medical devices. Under current conditions, in addition to delivering high-quality pharmaceutical care, pharmacy staff must also possess knowledge and skills related to customer service, as patients are increasingly becoming clients with clearly defined needs and requirements not only for medicines but also for the quality of service.

A study of customer service in pharmacy networks in Lviv revealed that the main reasons for failing to maintain an adequate level of service are poorly organized logistics in the context of timely medicine supply to pharmacies and the shortage of pharmaceutical staff. These issues hinder the

ability to give sufficient attention to clients, provide qualified consultations, and offer additional service options.

Meeting customer needs in medicines is a key factor for the strategic planning of pharmacy logistics. However, the specific characteristics of the Ukrainian pharmaceutical market do not allow for the construction of a clearly defined logistics chain. Challenges include a generally low level of medicine consumption, high competition within certain market segments of limited size, rapid—though not always economically and socially justified—increases in drug prices, and the presence of a significant number of counterfeit products. Manufacturers are forced to consider that none of the national distributors currently have sufficient pharmacy coverage to ensure the uniform distribution of products and the broad accessibility of medicines across Ukraine. As a result, nearly 20% of purchases are lost due to incorrectly formed pharmacy assortments or the absence of required medicines on shelves. Leading wholesale companies have no more than 25% of loyal pharmacies; thus, in order to ensure 90% accessibility of their products in retail, a manufacturer must distribute through 35–45 distributors—a highly complex task. Furthermore, research shows that 83.3% of Ukrainian pharmacies regularly replenish their stocks from six or more distributors. At the same time, 75% of pharmacies would prefer to reduce the number of suppliers but are unable to do so (Posylkina, O. V.).

Pharmaceutical distributors offer pharmacies various terms of cooperation, taking into account delivery frequency, medicine assortment, and additional service types (Table 1). The conditions for servicing clients by a domestic pharmaceutical distributor depend on the degree of warehouse automation, delivery timelines, the level of logistics organization, and the cost of services.

Table 1. Customer Service Conditions Provided by a Pharmaceutical Distributor

Indicator	Europe	America	Ukraine
Warehouse automation level	High	As much as necessary	High among large distributors
Frequency of medicine delivery	5–7 times per day	Next day	1–2 times per day in cities
Number of additional service types	Low	Medium	High
Logistics level	High	High	Depends on the region
Cost of services	Very high	Medium	Below average

Source: prepared by the author based on research by Posylkina, O. V.

The foundation for developing a program to improve the level of customer service lies in researching and identifying customer needs, as well as assessing the current level of service provided in pharmacies. The ability of pharmacies to deliver customer (patient) service in accordance with established standards and service levels requires the implementation of marketing and logistics solutions and the effective use of logistics potential to enhance customer service.

2. Study of Pharmacy Customer Service Elements.

Customer service is understood as the ability of pharmacies, as the final link in the distribution of medicines, to meet the needs of their end customers—patients—in terms of service time, availability of medicines and/or substitutes from stock (and at a given moment in case of shortages), and the location and accessibility of pharmacies. Pharmacy customer service is also accompanied by a broader range of services related to pharmaceutical care. Logistics support in pharmacy operations has a positive impact both for the pharmacy itself and for customers, in terms of reducing medicine

prices, improving efficiency and cost savings, and raising the level of customer service. Ultimately, this creates a positive effect on society by improving public health and well-being.

Pharmacy customer service lies at the intersection of three main elements: the objectives set for service by the enterprise, the expectations of customers regarding service, and the performance of the service process. It should be noted that pharmacy customer service has a somewhat different context compared to customer service in, for example, the restaurant industry. Pharmacy clients often purchase medicines out of necessity, and in some cases, their health and well-being depend directly on these medicines. Therefore, pharmacies should approach the formulation of customer service objectives and elements in a somewhat different way (Fig. 1).
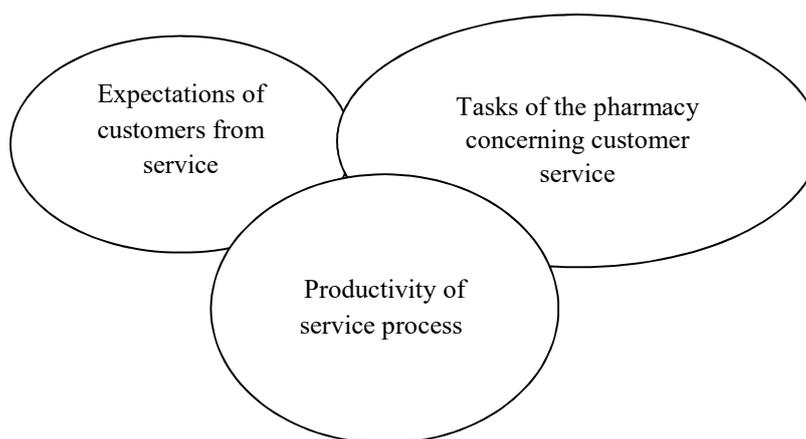
Fig. 1. Key elements of pharmacy customer service
Source: Author's elaboration

In order to meet customer expectations, pharmacies are required to clearly articulate their service objectives while being equipped with the necessary technical facilities, qualified personnel, a wide assortment of medicinal products, and appropriate infrastructure in the immediate vicinity to ensure customer convenience, including for persons with disabilities. From the perspective of logistics, the fulfillment of customer expectations necessitates the maintenance of safety stocks of medicines and the organization of timely deliveries. From the standpoint of marketing, meeting customer requirements presupposes the formation of a broad product assortment (including substitute medicines), which enables the offer of medicinal products across different price categories.

With regard to the internal arrangement of pharmacies, the premises must comply with established standards, provide sufficient space, and ensure cleanliness, while the interior design should be consistent with the specific features of the facility. Pharmacies are expected to maintain an adequate number of service counters between the pharmacist and the customer, necessarily include a designated rest area and a children's corner, and provide facilities for the self-measurement of blood pressure as well as access to promotional and informational materials. Additionally, access to drinking water should be guaranteed. An important task of pharmacies is also the provision of services for the preparation of medicinal mixtures and specialized cosmetics. In the contemporary context of increasing environmental awareness within both business and society, the provision of services for the collection of expired medicines for safe disposal is emerging as a priority.

From the customer's perspective, the service process may be considered productive when the pharmacy provides low prices and extended operating hours, qualified and friendly personnel, short service times without queues, and a sufficient and diverse assortment of medicines. These service characteristics must be supported by the continuous availability of medicinal products and a conveniently located pharmacy.

From the pharmacy's perspective, the service process is considered productive if customers are able to purchase all necessary medicines, while a steady increase is observed both in the number

of repeat customers—given that pharmacy profitability largely depends on a high level of customer retention—and in the overall profit.

3. Substantiation of factors influencing customers in choosing a pharmacy for the purchase of medicinal products.

When selecting a pharmacy, customers demonstrate specific expectations which are, first and foremost, associated with the assurance that the pharmacy possesses a wide assortment of medicines that are consistently available, including a considerable number of substitute drugs. Medicines should be sold at comparatively low prices, while pharmacists are expected to offer products across different price categories, thereby granting customers the opportunity to exercise choice. Pharmacies must also provide customers with a variety of payment options. Qualified personnel are required to possess the necessary knowledge to provide advice when needed, ensure pharmaceutical care, and maintain politeness and honesty in interactions (Fig. 2). The service process is deemed effective when it is characterized by the absence of queues, the availability of professional advice, and the continuous presence of necessary medicines.
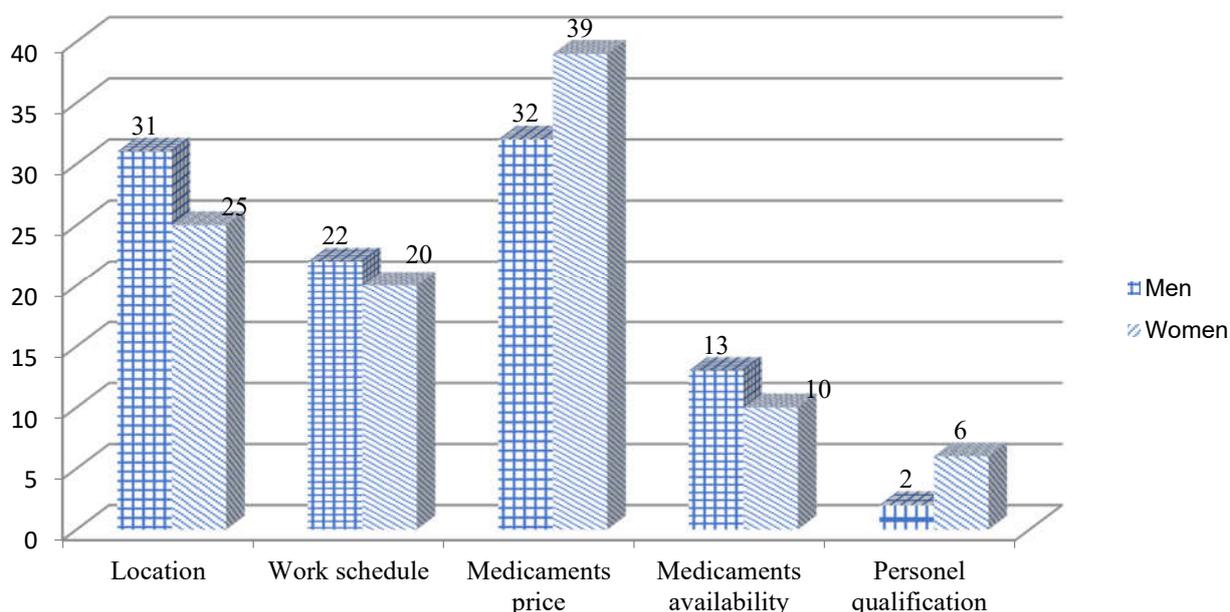
Figure 2. The factors of influence on the client while choosing a place of purchase of medicinal products, %

Source: Author's elaboration

As personnel and customer service costs in pharmacies continue to rise, coupled with the increasing number of pharmacies and intensifying competition among them, the necessity of optimizing customer service during the direct purchase of medicinal products becomes increasingly acute. Under market conditions, a rational, economically justified, and enterprise-beneficial organization of the work of pharmaceutical staff is required, taking into account labor law standards, working conditions, and related factors. Models are therefore necessary to study the influence on service quality of such factors as the probabilistic characteristics of customer arrivals, the duration of their service by pharmaceutical personnel, customer behavior in the presence of queues and service delays, as well as the availability of additional consultative medical services in the pharmacy (Dorokhov, O. V., Udovychenko, I. K., & Dorokhova, L. P., 2009).

The service of customers purchasing medicines in a pharmacy represents the functioning of a queuing system, which includes both general components and specific elements reflecting the distinctive features of pharmaceutical customer service. At the initial stage, it is advisable to

determine the parameters of customer arrivals and the performance of pharmaceutical staff. In the course of this study, the theory of queuing systems has been applied, the purpose of which is to establish the functional dependence of the indicators characterizing the quality of customer service on the parameters of the incoming flow of clients awaiting service, the number of service channels (pharmaceutical staff), the specific features and methods of organizing the pharmacy customer service process, and the service rate.

In our research, the theory of queuing systems has been employed to analyze pharmacy outlets that provide customer service under two different scenarios. A pharmacy serving customers is assumed to have p pharmaceutical staff members and a waiting area with a queue not exceeding t clients. When the waiting area is fully occupied, the $(m+1)$-th client leaves the pharmacy without being served in search of another facility where service can be obtained without delays (Table 2).

Table 1. The main characteristics of the pharmacy's functioning and the results of calculating the parameters of customer services provided by the pharmacy

Index	Case 1	Case 2
Number of pharmacists (n)	1	2
Number of seats in the waiting room (m)	11	11
Average customer arrival (λ), client / min.	0.35	0.35
Average customer service time (t), min.	5	5
Duration of pharmacist work (T), h.	12	12

The calculation of being probability of services point in every possible state						
State	Number of clients, μ		Probability	Number of clients, μ		Probability
	Near pharmacist	In queue		Near pharmacist	In queue	
S_0	0	0	0,0005	0	0	0,0798
S_1	1	0	0,0009	1	0	0,1396
S_2	1	1	0,0016	2	0	0,0611
S_3	1	2	0,0028	2	1	0,1069
S_4	1	3	0,0049	2	2	0,0935
S_5	1	4	0,0085	2	3	0,0819
S_6	1	5	0,0149	2	4	0,0716
S_7	1	6	0,0261	2	5	0,0627
S_8	1	7	0,0457	2	6	0,0548
S_9	1	8	0,0800	2	7	0,0480
S_{10}	1	9	0,1400	2	8	0,0420
S_{11}	1	10	0,2451	2	9	0,0367
S_{12}	1	11	0,4289	2	10	0,0321
S_{13}				2	11	0,0281

Calculation of customer service parameters by the pharmacy		
	Case 1	Case 2
Probability of system failure, which corresponds to the state of the pharmacy, in which all channels and places in the queue are occupied, ($P_{rejec.}$)	0.4289	0.0281
Probability of customer service ($P_{i\text{M}}$) is equal to the relative throughput of the pharmacy item (q)	0.571	0.972
Absolute throughput of the pharmacy item (A), clients / min	0.20	0.34
Average number of busy customer service places (Z), pcs	0.99	1.7
Average number of customers in the queue (R), people	16.9	2.7

Average number of clients (K) who are at the pharmacy, person	17.0	4.4
Average time for customers waiting in a queue for service (ta), min	48.33	7.94
Average time of client's stay at the pharmacy (t_{shop}), min	51.18	12.8
The average number of clients who arrive at the pharmacy during the day (V_{day}), person	252	252
The average number of clients who arrive at the pharmacy during the year (V_{year}), person	91980	91980
The average number of clients who will be satisfied with the service at the pharmacy during the year (V_{serv}), person	52532	89393

Source: Author's elaboration

For modeling the operation of the customer service point, the apparatus of the theory of mass service systems is used. The customer service point is considered as the multi-channel system of mass service with a limited waiting queue. Within the framework of the accepted model, the basic characteristics of the functioning of the retail pharmaceutical company, which implements customer service, are being calculated. The investigated pharmaceutical company that provides customer service can be in 12 states is option 1 (Fig. 3) and in 13 states is option 2 (Fig. 4), which depends on the number of occupied customer service locations and customers in the queue.
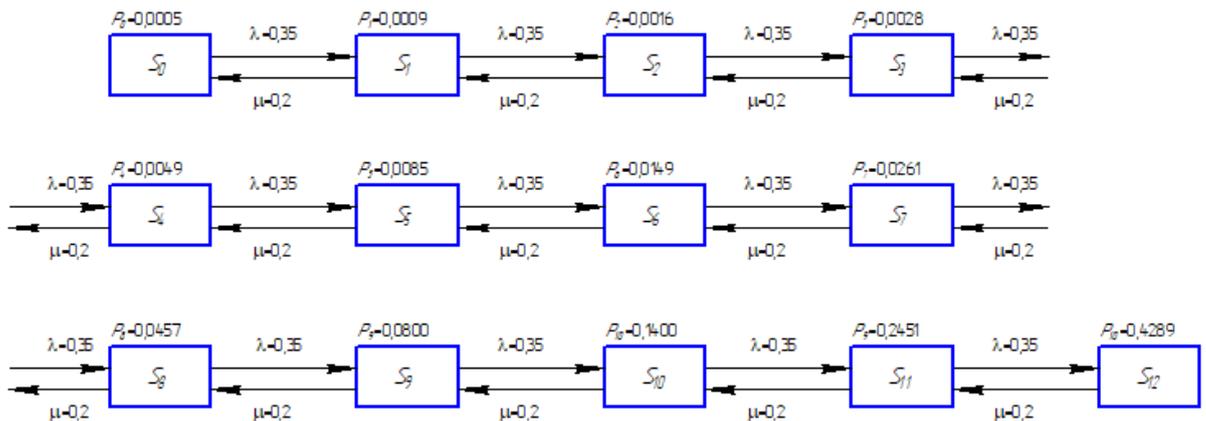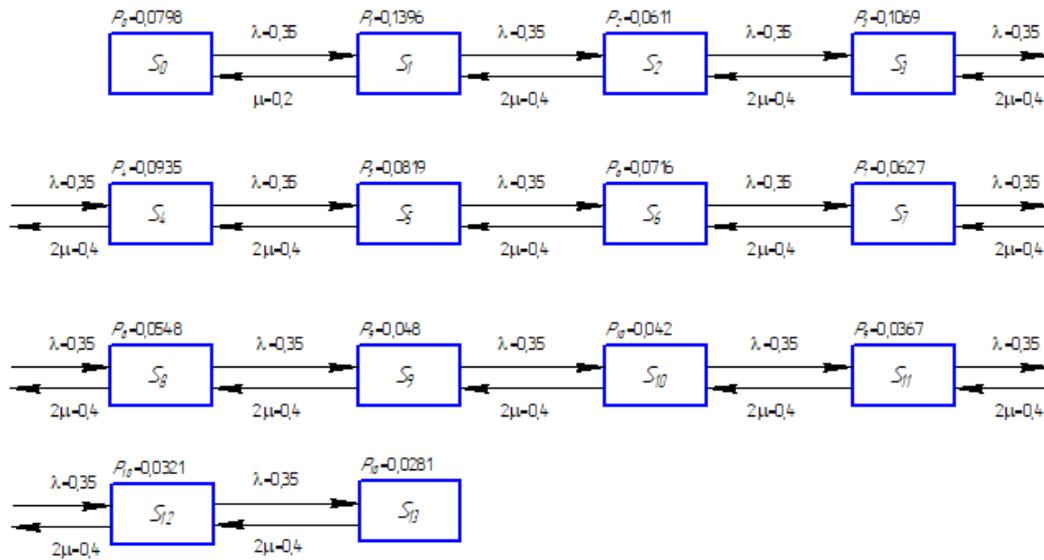

Figure 3. Structural diagram of the state of the pharmacy, which carries out customer service (option 1)
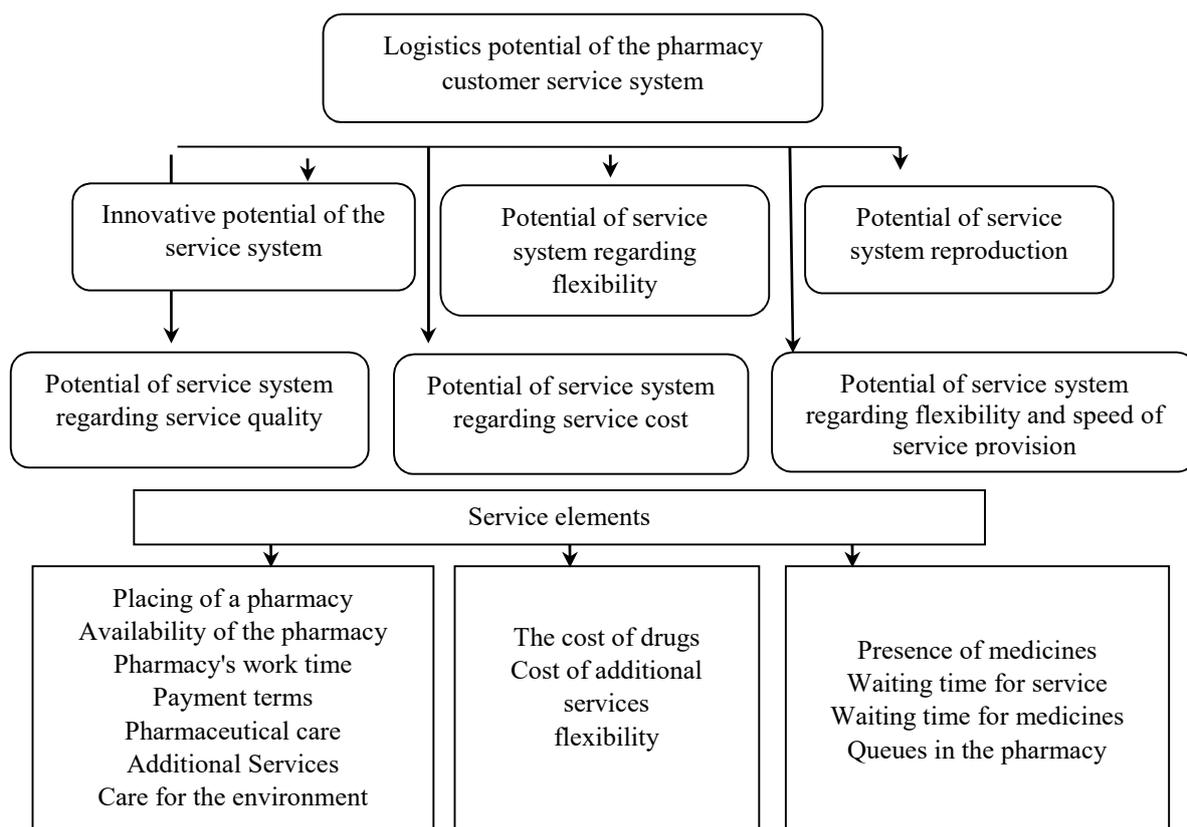
Source: Author's elaboration

Figure 4. Structural diagram of the state of the pharmacy, which carries out customer service (option 2)

Source: Author's elaboration

The presented calculation results demonstrate that the probability of serving pharmacy clients with one pharmaceutical staff member is 57%, while with two pharmaceutical staff members it increases to 97%. Therefore, it is advisable for pharmacies to analyze the efficiency of pharmaceutical staff performance in the context of customer service, to seek effective ways to improve the level of customer service, and to make efforts toward fully satisfying customer needs.

4. Logistic approaches to developing a program for improving the level of customer service.

The foundation for constructing a program aimed at enhancing customer service lies in researching and identifying customer needs, both in terms of access to medicinal products and the service process itself. The ability of pharmacies to ensure customer (patient) service in accordance with established standards of logistic services requires a comprehensive examination of the logistic potential of the customer service system (Fig. 5).

Figure 5. Logistics potential of the customer service system

Source: Author's elaboration

The presented results indicate the necessity of utilizing logistic potential, which encompasses the potential of the service system in terms of the quality of pharmaceutical services, the potential of the service system in terms of the cost of pharmaceutical services, and the potential of the service system in terms of the flexibility and speed of providing pharmaceutical services. Enhancing the logistic potential of the pharmacy service system will enable the expansion of service elements and the improvement of the overall level of customer service.

Discussion.

Modern research on pharmacy customer service allows for the identification of several key directions. A central focus for increasing customer satisfaction in pharmacies is operational efficiency (reducing queues and dispensing time). In this context, the study by Yulia, R., Hartono, R., Indrayanti, M., Ayumuyas, N. P., & Herawati, F. (2025) examined the impact of waiting time in pharmacies on patient satisfaction. The authors demonstrated that service speed becomes a strategic factor in building trust and customer loyalty. Similar conclusions were reached by Alodan, A., Alalshaikh, G., Alqasabi, H., Alomran, S., Abdelhadi, A., & Alkhayyal, B. (2020), who analyzed the efficiency of outpatient pharmacies and confirmed that reducing delays directly improves service quality and positively influences the perception of pharmaceutical care. In the publication by Druică, E., Ianole-Călin, R., Băicuş, C., and Dinescu, R. (2021), factors of consumer satisfaction and the level of trust in the information provided in pharmacies were studied. Their results confirmed that trust in pharmacists is an integral element in shaping a positive perception of services.

Another approach relates to the quality of pharmaceutical services. Gül, O. et al. (2023) analyzed the relationship between service quality, patient satisfaction, and loyalty to pharmacies, emphasizing that service quality is a decisive factor in shaping long-term customer loyalty. A similar perspective is found in the study by Bîrsana, M. et al. (2023), which, using the example of Romanian pharmacies, considers patient satisfaction as a key indicator of the effectiveness of medical and pharmaceutical service provision. Leemanza, S. and Kristin, A. (2024) demonstrated that setting target indicators for waiting times can significantly reduce service delays in outpatient pharmacies, thereby increasing customer satisfaction. In the study by Kashfi, S. M., Karimian, E., Ravangard, R., Mehralian, G., and Bastani, P. (2022), the SERVQUAL model was applied to evaluate service quality in hospital pharmacies in southern Iran, highlighting the importance of dimensions such as reliability, empathy, and staff competence. A regional study conducted by Alanazi, A. S., Shah, S., Abbas, G., Hussain, M., Saleem, A., Khurram, H., Chand, U. R., Mallhi, T. H., Khan, Y. H., Ilyas, K., Tariq, S., Jamil, A., Alzarea, A. I., & Alzarea, S. I. (2023) in Pakistan confirmed high levels of satisfaction with pharmacy services but noted the need for improved customer communication. Conversely, Abu-Farha, R., Alzoubi, K. H., Alkhawaldeh, R., Awwad, O., Mukattash, T., & Alefishat, E. (2023) in their study conducted in Jordan emphasized the public's perception of pharmacists as full-fledged healthcare providers rather than mere dispensers of medicines, underlining their role within the healthcare system. Finally, the work of Vogt, C. J., Wiegand, A., Trajkov, K., Metzner, M., Wurmbach, V. S., Braem, A., & Seidling, H. M. (2025) in Germany demonstrated positive customer attitudes towards pharmacist-led medication reviews, associating them with enhanced safety and personalized treatment. High-quality pharmaceutical services, therefore, involve not only reducing the objective waiting time but also managing customer perceptions. Moreover, waiting can be transformed from a negative factor into an opportunity to enhance service quality. For instance, providing customers with informational materials, consultations, or access to additional services while waiting fosters a sense of care and attention. In this context, it is essential to highlight that the waiting process is an integral part of service quality, and its proper management is a strategic task for modern pharmacies.

Another block of studies emphasizes the use of mathematical models in substantiating queuing theory. Adeoye, W. A., Erah, P. O., & Macauley, B. O. (2023) applied queuing models to forecast the optimal number of staff and manage pharmacy workload. Their work demonstrated that effective modeling helps avoid peak overloads and sustain high service levels. Similarly, Kruik-Kollöffel, W. J., Moltman, G. A. W., Wu, M. D., Braaksma, A., Karapinar, F., & Boucherie, R. J. (2024) applied queuing theory to the field of medication reconciliation using computer simulations. They proved that such analytical approaches not only optimize speed but also reduce the risk of errors during medicine dispensing. This research direction demonstrates that forecasting and analytical technologies are promising tools for service improvement.

An alternative approach focuses on behavioral aspects and customer orientation. This perspective is represented in the study by Dorokhova, L., Beloeva, S., Venelinova, N., & Dorokhov, O. (2024), which models consumer behavior in queues. The authors emphasize that the subjective perception of waiting time does not always coincide with the actual duration. Critical factors include the service atmosphere, the extent of customer information provided, and staff friendliness. Even prolonged waiting may be considered acceptable if it is managed with regard to psychological aspects. This research direction highlights that the human factor and quality of communication are no less important than the speed of dispensing medicines.

To enhance the level of pharmacy customer service, the integration of digital and innovative approaches is of great significance. The study by Odebunmi, O. O., Hughes, T. D., Waters, A. R., Urick, B. Y., Herron, K., Vangen, M., Roeder, K., Ferrari, R. M., Marciniak, M. W., Wheeler, S. B., Brenner, A. T., & Shah, P. D. (2024) investigates patients' readiness to use telemedicine services, based on a national survey of older adults in the United States. Their findings emphasize the necessity of incorporating digital channels into pharmacy operations. In a related article, Bulay, H., Coleman, M., Johansen, B., Kraft, S., Lam, V., Phillips, K., & Rohay, A. (2024) propose the transformation of pharmacies into spaces for implementing digital therapeutic solutions that could replace products

negatively affecting population health. This approach demonstrates the growing role of pharmacies in prevention and public health.

Another research direction concerns marketing and managerial strategies. Vik, A., Kocian, B., & Kralikova, K. (2024) emphasize the importance of multichannel marketing for pharmacy development. According to the authors, the integration of offline and online tools ensures the success of pharmacy networks and enhances their competitiveness.

A contemporary strand of research addresses the digitalization of pharmacy services and the expansion of online pharmacies. Alfageh, B. H., Abanmy, N. O., Kentab, B. Y., & Almohammed, O. A. (2024) analyzed the legal framework for online pharmacies in the Gulf countries, where regulatory policy directly determines the growth trajectory of this segment. Similarly, Fittler, A., Ambrus, T., Serefko, A., Smeykalova, L., Kijevska, A., Sopa, A., & Kaplar, M. (2022) argued that the COVID-19 pandemic became a catalyst for consumers, who increasingly transitioned to online pharmacies now perceived as a legitimate alternative to traditional brick-and-mortar establishments. In Saudi Arabia, Bahamdan, A. K., & Almanasef, M. (2024) explored consumer perceptions of e-pharmacies, highlighting high satisfaction with convenience while also noting concerns about medicine safety and authenticity. This body of literature illustrates that regulatory, technological, and consumer trust factors jointly shape the trajectory of digital pharmacy services.

Thus, a comprehensive literature review allows the identification of several key directions in current research on pharmacy customer service:

1.   Operational efficiency, aimed at minimizing waiting time as a central indicator of service quality and increasing the role of trust in pharmacy services;

2.   Mathematical modeling and analytics, focused on the application of queuing theory and simulations to optimize pharmacy operations;

3.   Customer orientation and behavioral factors, which consider consumer psychology and subjective service perception;

4.   Integration of digital technologies in pharmaceutical services, expanding the role of pharmacies in prevention and public health;

5.   Marketing and managerial optimization, which promotes the use of modern marketing approaches to enhance the competitiveness of pharmacies.

The combined application of these approaches enables not only the reduction of service time but also the enhancement of overall service value for customers, which is critical in the competitive environment of pharmacy networks.

Conclusions

Today, in order to enhance the competitiveness and financial stability of pharmacies, non-price factors of consumer stimulation are gaining particular importance. Among these, the quality and speed of pharmaceutical services provided to the population play a decisive role, as they are directed towards attracting new visitors and fostering their loyalty while retaining existing customers.

The key elements of the pharmacy's customer service system that contribute to the company's logistical potential include: location, accessibility, operating hours, payment conditions, pharmaceutical care, additional services, and environmental protection. Each of these factors directly affects customers' perception of service and determines the competitiveness of a pharmacy. A rational combination of these parameters forms the basis for developing a sustainable, customer-oriented service model.

Spatial and temporal accessibility of pharmacies is of critical significance. Convenient locations in high-traffic areas, such as medical or shopping centers, along with flexible working hours, ensure easy access to medicines. The establishment of 24-hour pharmacies or evening service points is equally crucial, as it minimizes time-related constraints and increases customer satisfaction.

Another important area for improvement lies in payment conditions and their accessibility. Modern pharmacies should offer diverse payment tools: from traditional cash payments to online

transactions, mobile services, and contactless cards. The implementation of loyalty programs, cumulative discounts, and bonuses strengthens customer loyalty and encourages repeat visits. Therefore, financial conditions become one of the most important factors in building trust and satisfaction.

Particular attention should also be given to pharmaceutical care and additional services. Contemporary customers expect pharmacies not only to sell medicines but also to provide professional consultations regarding their use, drug interactions, and preventive care. The introduction of blood pressure and glucose level monitoring, as well as rapid diagnostic tests, enhances the role of pharmacies as healthcare centers. At the same time, the development of online consultations and mobile applications expands access to pharmaceutical assistance.

Environmental responsibility of pharmacies also represents a key element. Programs for the disposal of expired medicines, the use of eco-friendly packaging, and educational initiatives for customers contribute to building a positive image and social standing of pharmacies. Environmental care becomes not only an ethical requirement but also a strategic competitive factor, as modern consumers increasingly prioritize corporate social responsibility.

Thus, improving the logistical potential of pharmacy customer service systems relies on a comprehensive approach: from optimizing location and working hours to advancing digital services, loyalty programs, pharmaceutical care, and ecological initiatives. The integrated combination of these elements makes it possible to establish a high level of service that ensures customer trust and loyalty, enhances the efficiency of pharmacy networks, and strengthens their position in the healthcare sector.

In conclusion, customer service ultimately comes down to understanding clients' expectations, identifying advantages in pharmaceutical provision compared to competitors, and working out high-quality service parameters (standards). Therefore, the concept of pharmacy customer service must address a range of issues related to meeting customer needs on the basis of marketing and logistics approaches under conditions of intense competition in the pharmaceutical market.

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Conflict of Interest

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