



DOI 10.2478/sbe-2023-0006

SBE no. 18(1) 2023

## COMPARISON OF PHARMACY WEBSITES: AN INTEGRATED APPROACH BASED ON CONSUMER PERCEPTION AND TECHNICAL PARAMETERS

**DOROKHOVA Liudmyla**

*The National University of Pharmacy, Kharkiv, Ukraine*

**PENTUS Kristian**

*The School of Economics and Business Administration, University of Tartu, Estonia*

**KUUSIK Andres**

*The School of Economics and Business Administration, University of Tartu, Estonia*

**DOROKHOV Oleksandr**

*The School of Economics and Business Administration, University of Tartu, Estonia*

### **Abstract:**

*The development of e-commerce requires the strengthening of this component of the pharmaceutical business while providing the population with medicines. Improving the operation of pharmacy websites is an important task with a significant marketing effect. The purpose of the study is to identify errors on pharmacy websites that worsen their usability and communicative qualities when interacting with visitors, to offer an approach based on a joint assessment of consumer perception and technical parameters, and to carry out calculations for a comparative analysis of such sites functional and technical components using a multi-criteria approach. The objectives of the study were to analyze the Internet trade in medicines, to determine the criteria for comparison of pharmacy sites, to develop a model for website evaluation, and to analyze the results of site quality estimation. Multicriteria comparison with different importance of criteria was used as the methodology to evaluate the usability of sites for online buyers of pharmaceutical products. As result two main components of the quality of pharmacy sites are identified: user interface and technical characteristics. The parameters of site evaluation for these components are described, and evaluation is performed. A computer model in Excel has been developed. The proposed approach and the program allow for assessing pharmacy sites' quality, comparing their marketing opportunities, directions to improve functionality, pharmaceutical services, and business position of pharmacies. The described steps for website estimations can be used not only in pharmaceutical services but for wide kinds of sites for e-commerce.*

**Keywords:** *e-commerce, customer satisfaction, online medicine trade, pharmacies website quality*

## **1. Introduction**

Currently, in the contemporary market, the trends of e-commerce, in particular online commerce, represented by B2C-type online stores, are significantly increasing. The B2C (business-consumer) trading model means selling goods (services) from the company to the final consumer. At the same time, B2C trading of pharmaceutical products is still carried out mainly in the traditional offline store format (Liu et al., 2020). It is vital to note that the active development of online commerce, including the global one, began in the late twentieth century.

In 2021, the world's sales volume of online stores reached \$5.211 trillion according to data from <https://www.statista.com>. At the same time, the last few years have been characterized by a hyper-increase in consumer purchasing activity in the web environment, which is certainly a danger, challenge, and problem to the traditional retail model. For example, a sharp decline in the number of offline shoppers in the United States has led to the closure of several large, powerful retail brands that have failed to adapt in time to a new market and consumer trends and demands (Charm et al., 2022). A similar situation is observed in other developed market economies of Europe (<https://ecommerce-europe.eu/>), Japan, Australia, China, Brazil, and India (Fokina, 2023). Megabrands, which survived in the new market situation, had to increase its activity in the virtual environment while significantly reducing the number of offline outlets (Hirche et al., 2022).

Of course, the degree of implementation of Internet commerce in a country is directly related to the level of development of the national economy, the specifics of its current state, as well as political, legal, technological, and sociocultural factors of the macroenvironment. In this respect, the Ukrainian economy has not yet fully experienced (unlike the United States and many European and Asian countries) the revolutionary situation in e-commerce.

However, there are several objective reasons that prove the relevance and inevitability of the reorientation of all segments of the trading business to Internet marketing platforms. The main ones are briefly considered.

First, it is vital to note that an extraordinary, powerful, and urgent stimulus to the comprehensive development of online commerce and services was a prolonged pandemic in 2020 (Dawoud and Soliman, 2020; Elbeddini et al., 2020).

It has caused the rapid development of online services and drug sales worldwide (Babar, 2021). At the same time, the global economic crisis continues, forcing all sellers to look for less expensive forms of sales, and in this regard, the benefits of online sales are obvious (Ruey, 2020; Shrestha, 2018).

Also, at the domestic level in Ukraine, several government decisions were made aimed at the comprehensive acceleration of digitalization of the economy and public life in general (electronic signatures, smartphone documents, digital government services, etc.). Finally, it is the global development of Internet technologies and related technical means and household appliances and gadgets, and, consequently, the increase in Internet availability for the population.

Along with these objective reasons for accelerating the development of e-commerce in Ukraine, it is necessary to highlight such an important socio-psychological factor as a high

degree of readiness of Ukrainian consumers to adopt a new model of consumer behavior, which, in turn, is an indicator of their successful adaptation to innovative processes of Ukraine's transition to the stage of the information society.

However, the psychological readiness of an average Ukrainian consumer to adopt a new culture of consumption of services in online commerce does not mean its automatic updating solely through technological and technical innovations.

After all, a professionally created (from the point of view of IT professionals) online store can be, however, economically inefficient due to ignoring psychological requirements for building effective marketing web communication by its developers and operators, which is now quite common and often a typical situation for Internet trade.

As a result, such an online store loses its customers, who, feeling psychological dissatisfaction and discomfort, leave the site, interrupt, or do not finish the purchasing process. A small percentage of medicine purchases on the Internet have certain, specific to these products, restrictions, historical, social, and mental reasons, and preconditions.

However, the rapid development of this segment of e-commerce requires strengthening this component of the pharmaceutical business to provide the population with medicines in the safest, fastest, and most convenient for pharmaceutical retailers, end-users, and buyers, in various ways. One of which, of course, is the Internet trade.

Considering all the above, the aim of the study is to improve the user-friendliness of pharmacy websites in terms of the perception and use of them by customers for a comfortable, convenient, and quick order (purchase) of medicines and medical products via the Internet. To do this, you should study possible errors on pharmacy sites that worsen their usability and communication qualities when interacting with visitors. When considering specific pharmacy sites, it is necessary to obtain joint assessments of consumer perception and technical parameters, and a comparative analysis of the functional and technical components of sites using a multi-criteria approach.

Accordingly, the specific objectives of the study were as follows: analysis of the online trade in medicines, determination of criteria for comparing pharmacy sites, development of a site assessment model and its computer implementation, and analysis of the site quality assessment results.

## **2. Features and problems of online orders and purchases of medicines by end consumers**

Today, the Internet has revolutionized our lives, communication, purchasing practices, and strategies. With increasing access to the Internet, its use to search for health information is also expanding (Hussain, 2021). It is estimated worldwide that approximately 4.5% of all Internet searches are related to health issues.

The survey results showed that 72% of the online population in the United States and 71% of European Internet users searched for health information at least once in the previous twelve months (Desselle, 2020). These trends are even more widespread with the use of mobile devices (smartphones and tablets). However, consumers today turn to the Internet for medical information, self-diagnosis, and various medical services or products (Lombardo, 2019).

According to the established definitions, an online pharmacy is a provider of goods from the Internet (legal or illegal) that sells medicines and can operate as an independent website operating on the Internet, as an Internet branch of a real network of a pharmacy (pharmacies), or a site that represents and provides a partnership between pharmacies. Shortly speaking, an online pharmacy is a website that offers delivery and distribution of medicines online directly to consumers (end-users).

The rapid expansion of the Internet facilitates the growing market of online pharmacies, ever-growing digital health, the transition to self-diagnosis from direct doctor-patient relationships, online consumer experience, easiness of purchasing by post, and distance selling, legal permits for online medicine trade (Kevrekidis, 2018; Zucco et al., 2018). The supply of pharmaceutical products on the Internet has developed differently and according to different models in each part of the world (Domínguez-Falcón et al., 2018). This is due to the diverse regulatory, economic, and cultural environment.

Thus, in the United States, the online pharmacy market is mainly based on prescriptions, while throughout Europe, this segment is formed according to a model that is not based on prescriptions. Today Internet pharmacies can be observed all over the world.

The corresponding legislative and economic aspects should be considered separately for concrete countries. At the same time, online pharmacies create regulatory confusion, as do pharmaceutical products and medical services move between jurisdictional boundaries of countries. Although the country in which the company operates sets licensing requirements and quality standards to support online medicine sales practices, ordering by post must be by the law of the receiving party.

The issue of legitimacy (officiality, authenticity) of websites is very relevant in general for any site. This is especially important for sites related to health care and pharmaceutical services. While in developed countries (in particular, the European Union, the USA, and Canada, China, and Australia), strict legislative control over the relevant sites is ensured, in third-world countries, the problem of the uncontrolled online drug trade has not yet been resolved.

Many illegal websites are reluctant to provide their actual location, you cannot be sure of the legal framework for online pharmacies. This is further complicated by the fact that national authorities are generally powerless outside their borders.

Several risks to patient safety are associated with purchasing drugs online outside the traditional supply chain, including counterfeit drugs. The proportion of counterfeit medicines is estimated to be 10% worldwide, ranging from less than 1% in developed countries to over 30% in developing countries such as Africa, Asia, India, and Latin America (WHO, 2017). Illegal online pharmacies mainly focus on the uncontrolled sale of prescribed medicines outside the regulated medical supply system. Their marketing strategy includes emphasizing the most important benefits of online pharmacies (convenience, speed, discounts, privacy, no doctor visits, mass orders and discounts, bonus medicines as a gift) and concealment of information on side effects, contraindications, and medicine interactions.

Almost every therapeutic category of medicine is available online. Not only drugs that improve lifestyle (“medicines for lifestyle”) such as 5 inhibitors phosphodiesterase or anti-alopecia medicines but also lifesaving products (e.g., out of the World Health

Organization's List of Essential Medicines), analgesics (nonsteroidal anti-inflammatory medicines), psychiatric, anti-obesity, cardiac medicines can be purchased without any control over the Internet.

The main characteristics of this illegal market segment are trading seemingly identical products in an uncontrolled environment, without restrictions for consumers (for example, people under 18 can also buy medicines online) or for goods (larger quantities can be purchased) from a large virtual stock. Over the past two decades, the Internet has become a common way to purchase medicines because of its convenience, cost savings, and privacy.

Ukraine has adopted the Law of Ukraine dated September 17, 2020, №904-IX about modification of article 19 of the Law of Ukraine "About medicines" concerning the implementation of electronic retail trade of medicines according to which electronic retail trade of medicines via the Internet standardized. Such legal action aims to increase the availability of medicines for the population. Online trade of medicines should protect consumers from the risks of purchasing low-quality or counterfeit medicines. In the case of self-treatment of a visitor-customer, the website of the online pharmacy should have the option of contacting a pharmacist and the ability to provide online advice to a pharmacist, i.e., to provide pharmaceutical care.

Current reports on using the Internet to purchase medicine indicate that the practical reality of purchasing medicines without a prescription on the Internet is quite significant. Also, recent research allows us to confidently say that online pharmacies and the number of people receiving medicines and other health products on the Internet are growing rapidly (Cosentino, 2022). The percentage of people who buy medicine online varies, as published data vary, depending on the country, region of study, product type, population, education, and income status or predisposition to treatment.

Thus, the general task of obtaining data on patients in Ukraine who purchase medicines and health products on the Internet, and their understanding of domestic online pharmacies, remains relevant. This may be the subject of a separate study.

### **3. Methods**

The analysis of the literature and the practical side of the issue shows that the current problem of many Internet sites of pharmacy networks is the insufficient level of communicative efficiency (Zwier, 2017). There is insufficient psychological support for the processes of both development and subsequent use of Internet sites (Wallace, 2016), as well as further monitoring of its communicative effectiveness. Based on the issue of insufficient communicative efficiency of pharmacy websites, we have investigated the peculiarities of buyers' perception of marketing communication processes of online purchase of pharmaceuticals and medicines, i.e., marketing web communications and communicative efficiency of online pharmacies.

Until now, a large part of the population, especially the middle-aged and elderly, perceived online pharmacies as a forced replacement for the traditional form of purchase in pharmacy (Hussain, 2021). This is largely due to the limited opportunities (from these buyers' point of view) to study the product in an online pharmacy before making a purchasing

decision, distrust of online pharmacies and the Internet as a place of purchase in general, perception of Internet sites as that carry out deliberately unfair trade. Often psychologically uncomfortable for such buyers is the communication process of online shopping.

Before starting to study pharmacy websites, we decided to conduct a brief pre-survey on the use of pharmacy Internet sites by consumers. The purpose was to obtain initial confirmatory information about the frequent use of online pharmacy sites and online ordering of medicines. The preliminary survey in the form of an online questionnaire has been used.

Here it should be noted separately that the results of the survey do not claim to fully comply with the requirements of statistical processing, and are only a general guideline and confirmation of the need to study the use of pharmaceutical websites by buyers.

The sample consisted of middle-aged people (25-45 years). During the study, responses were received from 115 people. This target group was chosen to study the perception of online pharmacies for the following reasons: this socio-demographic group today is already quite adapted to new information technologies and suffers little from technophobia; for them, there is no problem of destruction of traditional patterns of purchasing behavior, which characterizes the older generations.

The questions concerned the use of pharmacy websites in general (as such), without the need to specify/detail the names of pharmacy websites, the date of access, and similar details. That is, the general attitude, preferences/inclination towards the method of purchase (online and/or offline) of medicines, medical goods, and devices were found out.

Compared to the traditional form of purchasing activity, it turned out that the frequency of purchases made by respondents in online pharmacies is generally low, as illustrated by the data in Table 1. It also presents the reasons for the negative attitude to online pharmacies of those respondents who mainly buy medicines directly in pharmacies, and the typical communication failures in the online ordering and purchasing process, which cause psychological discomfort for a buyer.

**Table 1. Customer feedback on online orders and purchases in online pharmacies**

<b>The analyzed questions</b>	<b>The possible answers</b>	<b>%</b>
Separation of purchases in a pharmacy into online and offline	often buy online	16,6
	sometimes buy online	47,8
	seldom, better to buy offline	35,6
Reasons to buy medicines directly at the pharmacy	distrust of online pharmacies	45,1
	the need to contact a pharmacist	23,5
	dissatisfaction with the delivery of orders	15,7
	lack of benefits of online pharmacy	15,7
Communication failures in the online ordering and purchasing process	site content and feedback	39,0
	user interface	27,6
	delivery and assembly process	21,1
	graphic design of the site	12,3

As you can see, the reasons for refusing to buy at online pharmacies are closely related to errors in the construction of online commerce.

The survey confirms that the communicative efficiency of many online pharmacy sites is insufficient for success in the competitive e-commerce market and is at a low, unsatisfactory level. Therefore, in a typical situation, the online purchase marketing communication process is perceived as psychologically uncomfortable, resulting in the online pharmacy losing many potential and real customers.

The above-mentioned data prove that currently, the basic elements of the marketing communication process for online shopping in many online pharmacies and pharmacy networks are problematic and need serious improvement. The frequency of purchases made by this category of consumers in online pharmacies, relative to purchases in the traditional way, is currently not high. Often, online shopping is perceived as forced and psychologically uncomfortable, which is a replacement for offline pharmacy due to the subjective inconvenience of buying traditionally and saving money.

For analysis and comparative evaluation, we selected 10 major pharmacy networks in Ukraine. To obtain information about the statistical characteristics of these websites, we used the *Similarweb* software.

#### **4. Results**

The corresponding names of selected for consideration pharmacy networks and the Internet addresses of their websites are given in Table 2. In about 79% of cases, the site visitor is a MobileWeb (smartphone and tablet) user, and nearly 21% uses a computer.

**Table 2. Website analysis (fragment) for pharmacy networks websites in Ukraine**

<b>The name of the pharmacy network</b>	<b>Website address</b>	<b>Desktop %</b>	<b>Mobile Web %</b>	<b>Visit Duration min: sec</b>	<b>Pages per Visit</b>	<b>Bounce Rate (seen only one page), %</b>
Gamma-55	apteka911.com.ua	1,73	98,27	0:10	1,07	96,23
Sirius-95	apteka.net.ua	25,83	74,17	6:08	5,85	30,81
Podorozhnyk	podorozhnyk.com	18,73	81,27	1:57	4,55	34,96
Pharmstore	add.ua	12,24	87,76	1:55	2,28	58,50
Med-Service	online-apteka.com.ua	18,31	81,69	1:22	2,20	66,63
Farmacia	farmacia.ua	43,94	56,06	1:13	3,33	37,60
3i	3i.ua	25,49	74,51	1:17	2,15	67,70
Healthy Family	zr.in.ua	15,07	84,93	1:22	2,04	64,94
BADM	apteka24.ua	19,31	80,69	1:08	1,76	70,11
I.K.VEL	receptika.ua	25,01	74,99	1:37	4,33	67,80
	<b>average</b>	20,56	79,44	1:48	2,96	59,53

The average duration of a visit is 1:48. However, there are significant differences between sites, and this requires further research. The average number of pages viewed by the consumer during one visit is 3, and also differs significantly for the analyzed sites. And finally, the percentage of website visitors who have seen only one page is on average 59,53. It is obvious that all the above characteristics are interconnected in a certain way, and the identification of these dependencies should be the subject of a separate study.

The distribution of site visitors by age and gender is shown in Table 3. Note that in the analysis tool used, such data for pharmacy chains and their websites (*Gamma-55*, *apteka911.com.ua*; *Farmacia*, *farmacia.ua*; *Healthy Family*, *zr.in.ua*) were not available.

Data on the prevailing age range of users of online pharmacy sites (about 71 percent of users in the age range of 25-44 years) confirm the sufficient importance of the results of surveys of this particular age category (in particular, the data of our preliminary survey).

**Table 3. Age and gender visitor distribution for pharmacy websites in Ukraine**

The pharmacy network	Website address	The age distribution, %						Gender, %	
		18-24	25-34	35-44	45-54	55-64	64+	male	female
Sirius-95	apteka.net.ua	9,84	48,14	24,49	10,64	5,00	1,88	34,91	65,09
Podorozhnyk	podorozhnyk.com	9,90	48,60	25,22	10,34	4,49	1,45	33,52	66,48
Pharmstore	add.ua	9,84	49,10	23,85	10,30	5,16	1,76	32,21	67,79
Med-Service	online-apteka.com.ua	9,92	47,70	24,27	11,00	5,23	1,88	37,03	62,97
3i	3i.ua	9,08	45,64	25,19	12,12	6,02	1,97	35,52	64,48
BADM	apteka24.ua	10,37	45,03	23,46	11,91	6,80	2,43	32,14	67,86
I.K.VEL	receptika.ua	8,73	43,72	25,51	12,79	6,89	2,36	36,16	63,84
	<b>average</b>	9,67	46,85	24,57	11,30	5,66	1,96	34,50	65,50

When establishing the criteria for evaluating pharmacy sites, we should consider the points associated with the most typical scenarios of consumer behaviour.

The first scenario assumes that the user is looking for a product for a specific disease or with a specific active ingredient. The main expectations of the user in this scenario contain the ability to see a product list that meets the request; and after select the appropriate product from the list.

The second scenario occurs when a user searches for a specific product by its name. The user's expectations in this scenario are to find and see a specific product and the price for a specific dosage or volume.

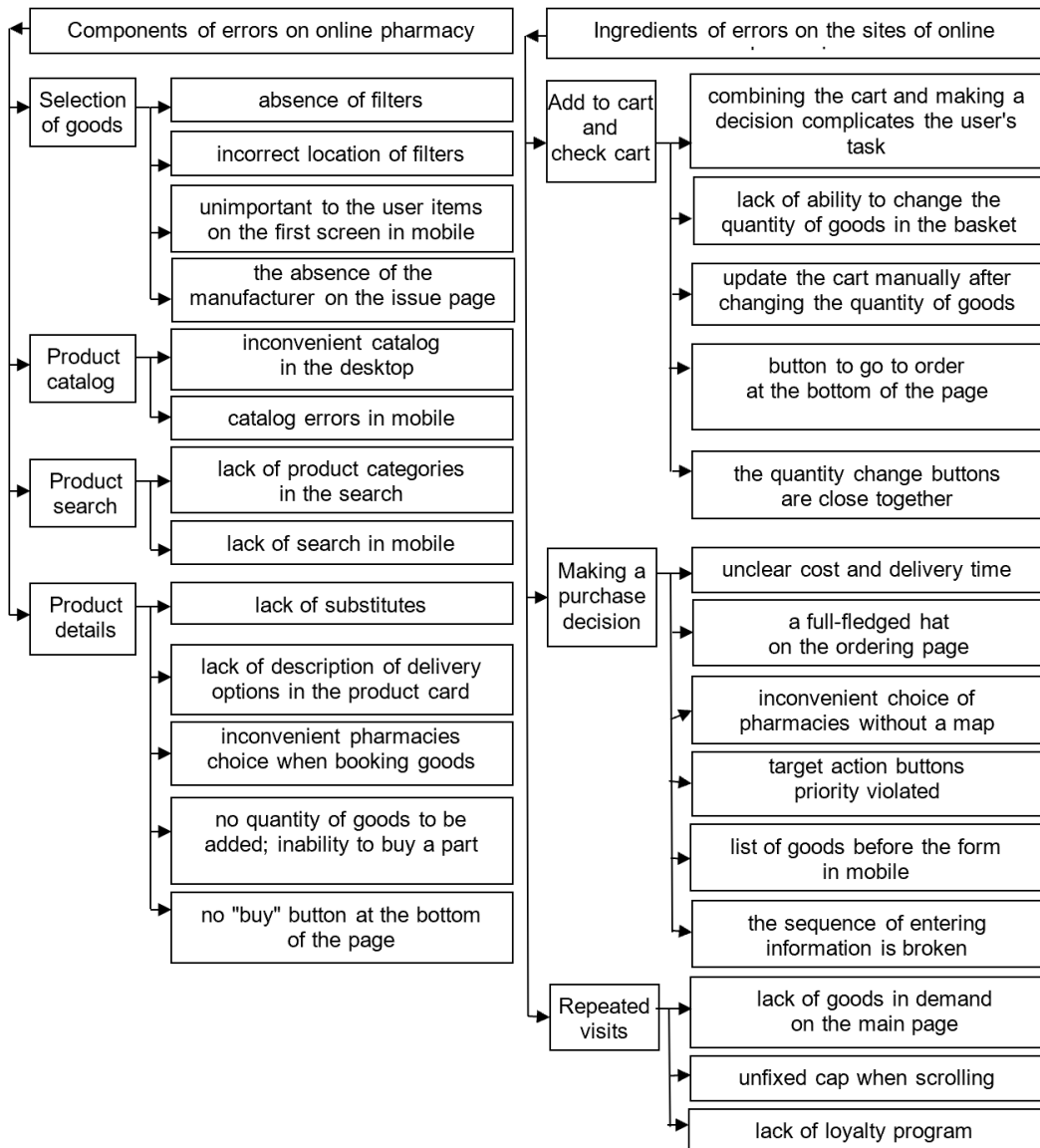
The third scenario occurs for a regular user when he/she types the pharmacy name in the search results and goes to the main page of the pharmacy site. In this case, in addition to solving common problems and the first two scenarios, he/she expects to see new and relevant offers; to quickly log in to be a part of a loyalty program; to solve tasks from the first two scenarios through a directory, search or ad unit.

It is important to separate the behaviour of regular and new users (Dorokhova, 2018). For the first ones, the benefits of ordering in a particular pharmacy are already known.



New information on the delivery of medicines or the availability of goods may be critical. When analyzing sites, you should consider the various options for completing the user's actions: placing an order with delivery, booking goods at the pharmacy, or purchasing goods directly through the site on the Internet. Considering the question of online pharmacy sites, depending on the scenarios of user movement on the sales funnel, you can divide them into sections, shown in Figure 1.

**Figure 1 - Typical errors in the web pages of pharmacy sites**



Considering the Internet websites of pharmacy networks and individual pharmacies, it should be noted that the effectiveness of these Internet tools depends largely on the technical level of the sites themselves, so it is necessary to analyze the sites from this point of view also. As you know, site visitors, especially during the first search, use search

engines, so the order of appearance of sites in them at the request of the user (the order of issuance) is very important (Jokinen and Puumalainen, 2019).

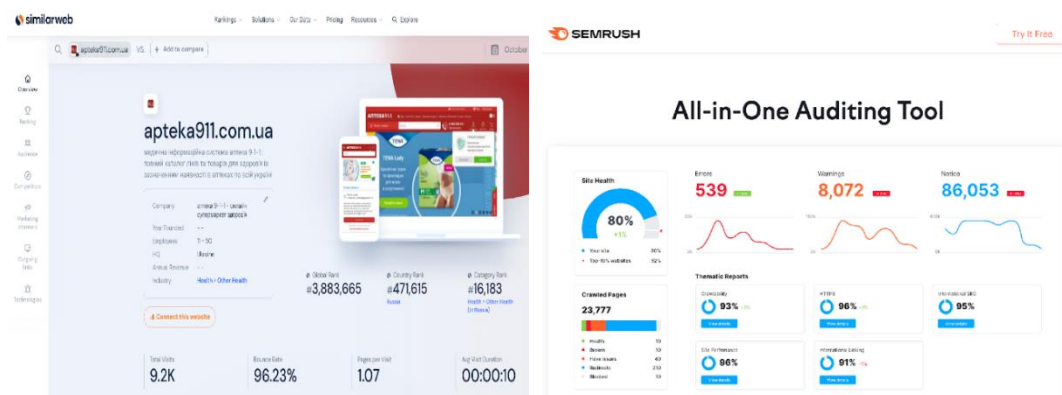
Modern search engines rank sites in their search results pages according to their own complex algorithms. This considers a few internal and external factors that in one way or another, demonstrate the quality of websites and allow you to find the most relevant results for user search queries. Therefore, it is necessary to analyze not only the user (external) but also the technical (internal) components of websites under study, checking these web resources for several key SEO-significant factors that affect its position in search engine rankings (Nobre and Rodrigues, 2018; Roblek et al., 2018). The main components of the technical analysis of the sites are shown in Table 4.

**Table 4. Parameters of technical analysis of websites and their components**

Technical parameters	Technical components
Indexing	the number of pages in the index of Google and other search engines; checking the site quality index and page rank; availability of filters.
Visibility	a list of inquiries according to which the site occupies certain positions; the number of effective page views, graph of the general dynamics of visibility
Competitors	top competitors of the site; data on intersections with competitors on this issue
Metatags	title; description; keywords.
Reference mass	report on the number of unique links; mentions on social networks; types of links
Text uniqueness	checking the texts of the site for plagiarism; texts that are boring; variability of word distribution.
General data	webpages download speed; WHOIS (Search, Domain Name, Website, and IP Tools); site owner information; assessment of the market value of the site.

Note that for such an analysis, there exist many free and paid programs and tools (Figure 2). There are many similar resources, but all of them practically offer similar data, and use the same, generally accepted algorithms and sources for evaluating site parameters.

**Figure 2 - Website validation tools (examples)**



As an example, Figure 3 shows the view of the main page for four of the considered sites (Ukrainian-language interface, there are no English versions)

Figure 3 - Main pages of Ukrainian pharmacies' websites (examples)



For further comparative evaluation, it is necessary to first build numerical evaluations of the sites under consideration, according to the selected parameters.

According to the previous sections, we will consider two groups of such parameters, namely, consumer perception of the quality and convenience of the website, technical parameters of operation, traffic, statistical characteristics of its popularity, and ranking on the Internet.

Also, it is important to correctly determine the relative weights of each of the involved and considered criteria.

We have divided all the criteria into three groups: *Most important*, *Quite important*, and *Important*, and in the middle of each group we consider the importance of the criteria included in it as the same. It is shown in Table 5.

Further calculations were conducted in *Excel* using specially programmed authors' macros. First, we normalized the criteria considering their importance; the corresponding results are also presented in Table 5.

Next, we carried out a multi-criteria comparison of alternatives (in our case, the websites of pharmacy networks under consideration), according to the defined above criteria.

When filling in the table of characteristics of pharmacy sites, each site was given a score in the range of 1 to 10 points. In comparison, the site with the best scores got a higher score: 10 points for the maximum value of the parameter, and, vice versa, 1 point for the minimum value.

This approach is quite standard and is often used when it is necessary to translate qualitative perception into a simple, integer quantitative scale (Dorokhova and Dorokhov, 2019; Liudmyla et al., 2020).

**Table 5. Order of criteria by importance and the resulting normalized criteria weights for website comparison**

Most important	Quite important	Important
<i>Catalog work</i> <i>Organization of search</i> <i>Adding to cart</i>	<i>Convenience of product selection</i> <i>Product information</i> <i>Purchase decision</i> <i>Site indexing</i> <i>Visibility dynamics</i> <i>Download speed</i>	<i>Repeated visits</i> <i>External links</i> <i>Mobile adaptation</i> <i>Links in social networks</i>
Criteria weights – 0,141	Criteria weights – 0,083	Criteria weights – 0,019

The corresponding input data for the calculation are presented in Table 6. After performing the calculations, we obtained the final, integrated estimates for the Internet sites of the pharmacy networks under consideration, which are also shown in Table 6 in the last row.

*Mobile adaptation* assumes the presence of a technically correctly created mobile version of the site (compliance with a number of certain technical requirements).

This is not always visible to the user, but it significantly affects the speed of the site under load, access speed, reliability, etc.

According to the received data, *Mobile adaptation* was performed correctly only for the *Pharmstore* site, and for all others with significant violations of the requirements for mobile versions. Therefore, a binary assessment was chosen and applied for this parameter.

*Visibility dynamics* were analyzed as of 15-11-2021. At the same time, it should be borne in mind that this parameter is very dynamic and can change very significantly every month.

The dynamics of visibility take into account the number of impressions of the site to users according to data about the visibility of the site. It considers the coefficient of the position: 1-3 positions - 100%, 4-5 positions - 70%, 6-10 positions - 50%, 11-20 positions - 10%, 21-50 positions - 3%, 51-100 positions - 1%.

*External links* show the number of unique domains that have at least one link to the site being analyzed.

*Download speed* has two Google ratings for desktop and mobile versions, so we will use the total value. It is a test of the loading speed of site elements on a computer (or mobile device), and it is measured by the *Google PageSpeed Insights tool*, and the score can range from 0 to 100 points.

*Site indexing* is the number of site pages in Google's search results. It is determined using a site: site address request and is updated approximately once a month.

*Links in social networks*, as an indicator, take into account the presence (or absence) of this pharmacy network in the leading messengers, namely: *YouTube, Instagram, Twitter, Facebook, and Telegram*.

Table 6. Input data for calculations and results of the evaluation

Website evaluation criteria	Pharmacy networks									
	Gamma-55	Sirius-95	Podorozhnyk	Pharmstore	Med-Service	Farmacia	3i	Zdorova Rodyna	Internet BaDM storage	I.K.VEL
<i>Parameters of consumer perception of the website quality and convenience</i>										
Catalog work	8	1	0	9	10	2	0	0	10	7
Organization of search	10	4	3	6	7	2	3	0	5	7
Adding to cart	10	8	9	9	9	0	0	0	8	8
Convenience of product selection	6	1	2	9	1	0	1	0	1	2
Product information	9	8	5	8	5	0	1	0	10	9
Purchase decision	10	5	9	8	7	1	2	0	10	7
Repeated visits	8	7	6	10	6	4	5	2	3	10
<i>Technical parameters of traffic, statistical characteristics, ranking on the Internet.</i>										
Site indexing	31700	24900	438	12400	22700	1270	684	189	54700	47400
	0			0						0
	9	6	2	8	5	4	3	1	7	10
Visibility dynamics	14866	71	10	7071	861	2	0	0	2256	63
	10	6	4	9	7	3	1	1	8	5
Download speed	66/32	52/20	65/25	0/32	73/22	0/0	0/0	0/0	93/75	0/31
	9	6	7	5	8	1	1	1	10	4
External links	464	316	84	822	414	29	95	34	1047	279
	8	6	3	9	7	1	4	2	10	5
Mobile adaptation	no	no	no	yes	no	no	no	no	no	no
	0	0	0	1	0	0	0	0	0	0
Links in social networks	2	0	2	0	3	4	0	4	3	2
	4	1	4	1	7	10	1	10	7	4
<i>Final integrated estimate</i>										
<b>Total score (results)</b>	0,78	0,40	0,33	0,71	0,58	0,11	0,10	0,01	0,60	0,56

## 5. Conclusion

Analyzing the results of the study, it should first be noted that the niche of online pharmacies in Ukraine is still not very developed.

Of all the sites, we can highlight the Internet site Gamma-55 (9-1-1 Pharmacy; Total score is 0,784), whose interface is quite user-friendly on all devices, but for this site, there are also opportunities for improvement, and there are errors that can affect the conversion.

Calculations showed the division of the considered Internet sites of pharmacy networks into four groups, the last two of which are represented by sites of very low quality, practically unsuitable for online orders and purchases of medicines. In general, especially for pharmacies with low site ratings, the focus of the business is on offline pharmacies rather than online.

Given the above-mentioned data, the general recommendations for online pharmacies can be as follows. Pharmacies should care for the users. To do this, it is possible to show the most popular products on the main page, give comprehensive information about the delivery options, and offer online consultation and delivery to a convenient place for the customer.

Care about users should be visible on every key page, as it largely depends on whether the user will remain on the site of this online pharmacy or not. It is necessary to emphasize to users the benefits, safety, reliability, and profitability of purchases or orders of medicines through online pharmacies, including, home delivery.

Usability errors (user-unfriendliness) and identified potential site improvement points should not be underestimated, as they can significantly affect conversion rates. Even minor changes can improve traffic, efficiency, and the popularity of the site.

It is advisable to make the interface equally user-friendly on different devices, and also for people with special needs. Given the rise of mobile technologies, extremely important points of growth in popularity and traffic to the sites are their mobile versions, which provide a significant number of new potential customers. At the same time, mobile versions of websites quite often contain many technical and content errors.

It should be noted that the main practical research (expert evaluation of the reviewed sites in terms of consumer usability, as well as determining the technical characteristics of sites and their positioning on the Internet) was carried out by us in the fall of 2021 - in the winter of 2022, before the attack on Ukraine.

Accordingly, this is reflected in the calculations and results.

The monitoring conducted by the authors in the summer of 2022 showed that the results obtained, and the conclusions presented have retained their relevance. However, the importance of some components and elements of the Internet sites of pharmacy networks has increased significantly, in particular, those listed below.

The presence of mobile (specially adapted) versions of sites becomes very important in the absence of a stationary Internet and the possibility of access only through mobile telephony.

The maximum reduction in the initial volume of downloading information and increasing the speed of loading the site itself is an important advantage and a vital necessity for users in conditions of limited access to the Internet, both in terms of traffic volume and access time. It is desirable to have simplified (alternative) versions of web pages with the minimum necessary information and without downloading unnecessary graphic elements and design.

The presence of the English version of the website, according to the authors, also becomes mandatory. After all, almost all Internet sites of Ukrainian pharmaceutical networks do not have such a version. Further, a wider study of the issue of the availability of the English version of websites showed that for many pharmacy websites in European countries this drawback also now takes place. The sites provide information only in the state (official) language.

This significantly impairs the use of such sites by foreigners (for example, foreign students, workers, tourists, and refugees). Finally, in our opinion, Ukrainian pharmacy networks on their web pages could provide information, and recommendations about similar networks in the European Union, which is very important for Ukrainian refugees at the present time.

The relevance of the orientation of pharmaceutical services to the Internet is determined. The readiness of consumers to perceive the new model of consumer behavior, and their adaptation to the transition to the stage of the information society is noted. It is established that the purchase of medicines online has specific reasons, limitations, social, and mental prerequisites.

The development of this segment requires strengthening to provide the population with medicines in a safe, convenient way, which is online commerce.

The peculiarities of Internet pharmacies' activity in the retail Internet trade of medicines have been analyzed. The marketing communicative features of pharmacy sites and the perception of buyers of online medicines purchases have been studied.

Part of the population perceives this as a forced replacement of traditional purchases in pharmacies. The components of a negative attitude to online pharmacies and the reasons for refusing to buy from them have been identified.

It was found that the communicative components of pharmacy sites often have a low level. Therefore, the process of online shopping is perceived as psychologically uncomfortable, resulting in a loss of customers.

Typical shortcomings are given, recommendations for improving the consumer quality of sites are developed, and typical errors on pharmacy sites are analyzed. The characteristics of pharmacy sites in terms of their popularity, traffic, links, and inquiries are determined.

The sites of several pharmacies were selected for comparison, and their multi-criteria comparative evaluation was carried out. Numerical evaluations of pharmacy network websites on the selected parameters were defined by means of specialized services for a rating estimation of sites.

Two groups of parameters were considered: consumer perception of the quality and convenience of a site and parameters of attendance, popularity, and a rating on the Internet.

The results show that the quality of pharmacy sites in Ukraine is generally unsatisfactory. Still dominates a focus of the business on offline pharmacies.

Taking into account the development of the Internet and mobile technologies, recommendations are given for improving the websites of online pharmacies, their marketing communications components, content, interfaces, mobile versions, and convenience for the elderly and people with special needs.

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