

Social Media as Communication Channels of Academic Libraries During the Covid-19 Pandemic

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Abstract

The communication interaction of Ukrainian academic libraries with the target audience regarding the formation and use of information space is an actual scientific problem. It gained particular importance in remote work conditions during the Covid-19 pandemic. The study aims to develop a methodology for analyzing the communication interaction of academic libraries and the target audience in social media. Achieving the set goal involves the implementation of tasks: to identify the dominant social platforms used by the analyzed university libraries; to determine the quantitative indicators of posting of the dominant social platforms used by the analyzed university libraries; to identify adaptive changes in the information presentation of university libraries to meet the situational information needs of the academic community in social media. The research methodology includes methods of analysis, synthesis, comparison, content analysis, grouping, generalization, stratification, and visualization. Results. The dominant social media in the information presentation of Ukrainian university libraries are Facebook and Instagram. The proposed methodology makes it possible to carry out a diachronic analysis of the functioning of the dominant social media of Ukrainian academic libraries. Quantitative indicators of coverage, posting, feedback and topics were chosen as criteria for evaluating the effectiveness of identified social media libraries. The use of coverage coefficient (CC), number of posts per day (NPD) and feedback coefficient (FC) is proposed to stratify the social media of academic libraries by levels.

The remote work format in quarantine conditions led to the formation of a multi-platform information presentation of Ukrainian university libraries on social networks. The analysis of the posts' subject dynamics shows adaptation to the new conditions of communication interaction with the library's target audience. Activation of the communication interaction of the target audience and university libraries should provide for the actualization of information presentation, taking into account the features of meeting users' basic and situational information needs.

Keywords 1

Social media, Facebook, Instagram, university library, Covid-19

1. Introduction

In the conditions of digitization and rapid development of Internet technologies, Ukrainian university libraries are undergoing significant transformations in their functional purpose. They are gradually acquiring the status of academic information-analytical and information-communication centers. Implementing bibliometrics and scientometrics in the arsenal of traditional library technologies allows for high-quality cooperation between the library and the scientific and pedagogical staff.

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University libraries of Ukraine actively implement various services for multifaceted information support scientific activities.

Communication interaction of Ukrainian academic libraries with the target audience regarding the formation and use of information space is an actual scientific problem. It gained particular importance in remote work conditions during the Covid-19 pandemic.

The academic community actively uses social networks as an alternative tool for establishing communication interaction. The development of an effective content strategy for posting on library social media involves a complex approach, which consists of the implementation of several mandatory stages:

- analysis of the state of communication interaction;
- planning;
- practical implementation;
- evaluation of results.

An analysis of the state of communication interaction between university libraries and the target audience on social media reveals their weaknesses and strengths. The incompleteness of studies on the evaluation of the effectiveness of the information presentation of university libraries on social media creates informational and competence barriers to developing and implementing a content strategy. The study aims to develop a methodology for analyzing the communication interaction of academic libraries and the target audience on social media. Achieving the set goal involves the implementation of tasks:

- to identify the dominant social media used by the analyzed university libraries;
- to determine the quantitative indicators of posting of the dominant social media used by the analyzed university libraries;
- to identify adaptive changes in university library information presentation to meet the academic community's situational information needs on social media.

It will make it possible to open the prospect of identifying priority directions for the modernization of academic social media, taking into account the positive experience of authoritative academic communities and quantitative and qualitative indicators of feedback from the target audience.

2. Review of Literature

2.1. Use of social networks to promote library services during the Covid-19 pandemic

The Covid-19 pandemic has caused significant changes in the activities of university libraries. The remote format of the work helped to improve the monitoring of digital services and intensify posting on social networks. In particular, the growing number of registered profiles on the social media of USA university libraries was used as alternative communication channels to inform users about changes in services and promote other library information resources [1].

Researchers point to a shift in priority roles in implementing online learning in university libraries due to Covid-19. The authors define the combination of adaptive content of the website and social networks as the optimal model for Nigerian university libraries in remote work conditions. Researchers emphasize providing new skills to academic librarians to implement the library model [2].

Brazilian researchers point to the need for new skills and knowledge of librarians as one of the challenges of establishing university libraries in the Covid-19 pandemic. At the same time, researchers have identified social networks as the dominant information and communication technologies for providing reference services and disseminating information [3].

Spanish academic libraries have also actively reoriented their activities and services during the Covid-19 crisis. Analysis of 11,867 tweets and retweets from 56 libraries based on particular thematic categorization confirmed the primary role of these institutions as important information and communication centers in conditions of isolation and lack of reliable information [4].

A comparison of Polish library approaches to using social media for adjusting communication and collaboration with customers during the Covid-19 pandemic shows that Facebook, Instagram, and Twitter are the most frequently used social media platforms. Much less often, university libraries use YouTube in their information presentation. At the same time, the author points out the heterogeneity of

social media involvement in Polish university libraries, despite the communication benefits of these resources [5].

During the pandemic, an investigation of the online learning environment's structure of Arab public universities discovered commonly used online learning social media platforms: Youtube, Whatsapp, presentation tube, Google classrooms, Zoom, Blackboard, and Facebook [6].

Thus, Covid-19 accelerated the implementation of social media and other information and communication technologies in the everyday work of university libraries. The most popular social media platforms are Facebook, Instagram, Twitter, YouTube, and WhatsApp.

2.2. Research on the quality of library websites

Study of the quality of the websites of top QS medical university libraries shows the absence of libraries that meet all the criteria. Almost half of the analyzed libraries do not use modular applications. Facebook, Twitter, Instagram, YouTube, and LinkedIn are the most popular information dissemination tools [7]. Research on the quality of university library information resources indicates that Malaysia's public university institutional repositories that use hyperlinks and promote university publications through academic community pages on social networks are more visible [8].

Analysis of the popularization and promotion means of the Spanish scholars in the field of library and information (LIS) discovered the use of digital platforms such as personal blogs, personal websites, ORCID, Twitter, LinkedIn, Google Scholar, ResearchGate, Academia.edu, Mendeley, and the Exit Directory. The study results show that ResearchGate and Google Scholar are the most popular platforms for managing scientific reputation [9].

A study of Web 2.0 tools implementation by Indian university libraries indicates that social networks Twitter, Facebook, and Youtube are the most popular Web 2.0 tools for rapidly disseminating news and announcements about new library resources and services. Pinterest, Flickr, RSS, and Blogs are less in demand among Indian university libraries. The authors point to the lack of policies and planning, lack of funding, and staff qualification level as the main problem areas in the implementation of Web 2.0 services by university libraries [10].

Exploration of recent trends of using Web 2.0 applications by academic libraries in Asia through their library websites shows similar results. The most widely used Web 2.0 applications are Facebook, RSS, Twitter, and YouTube [11].

At the same time, researchers emphasize the need to optimize social networking services to communicate between university libraries and users. Understanding users' information needs and setting goals, indicators, and strategies for each social network is the key to developing the social networking services of libraries [12].

Consequently, research showed no strategy or method for conscious management of digital platforms and academic reputation and the need to implement updates and restructuring. University libraries' most popular Web 2.0 tools are Facebook, Twitter, Instagram, YouTube, and LinkedIn.

2.3. Updating the library for modern standards

The definite trend of the current state of scientific communication is the implementation of open access to scientific information. Research results on the performance by the University of Manchester Library of an innovative project to expand the target audience of consumers of scientific content through the non-academic community show that developed open access services systematically allow simplified short research expressions in English via Twitter [13].

An increasing number of resources in university libraries and diversifying users' information needs make it challenging to find the necessary resources. Researchers propose a hybrid book recommendation algorithm based on contextual awareness and social networking to solve this problem. The proposed algorithm demonstrates the advantages over the traditional co-filtering algorithm in accuracy and response speed [14].

Thus, with the help of new ideas and their realization, scholars enable libraries to improve their internet skills and attract new audiences.

2.4. Perception of libraries' social networks by students and researchers

Despite the popularity and convenience of using social networks in everyday communication, the adoption and use of social media for scientific communication remain ambiguous. In particular, a study on the acceptance of Belgian students' use of social media, namely Facebook and Twitter, in an academic library based on the Unified Theory of Acceptance and Use of Technology (UTAUT) demonstrates that university libraries' introduction of social media is positively influenced by the expected duration of efforts, expected productivity, and social impact. At the same time, the problem areas are poor access to the Internet and students' rejection of Facebook and Twitter for scientific communication [15].

The content analysis of information resources of The Hong Kong University Library revealed that both Facebook and Instagram received low user engagement. Dissatisfaction with library social media is uninteresting content about library news and events. At the same time, respondents recommend diversifying the posting topic and more actively using the style and features of social media to attract the audience [16].

The study of the effectiveness of the Facebook page of The Hong Kong University Library was conducted based on comparisons of the involvement of students and faculty members. The obtained results concluded that the level of audience involvement in the social media of the university library depends on the number of library services used by this audience [17].

The study results confirm such conclusions regarding Assam Central University's social media library's effectiveness in meeting scholars' information needs. The study's authors point out that topical information about library services is the primary motivating factor for using a library's social media by researchers [18].

Consequently, most of the respondents congratulate the use of social media. However, they illustrate poor activity through site style, content, and internet access.

2.5. Twitter as a Library Marketing Strategy

Analysis of the use of Twitter as a digital marketing strategy for the library system of the Federal University of Sergipe concludes that increasing the effectiveness of digital marketing strategies in social networks by university libraries requires the creation of particular policies. It will ensure the appropriate level of interaction of the library with users, dissemination, and exchange of information [19].

Researchers also compare the content of academic and public library profiles on Twitter to assess posting and audience engagement. The results show that the posting of public and academic libraries differs by topic, and the level of engagement is a factor in the number of tweets in any case [20].

Thus, the results showed insufficient awareness of promotion on Twitter. The topics of posting and the number of tweets are crucial for establishing informational interaction with the audience via Twitter.

2.6. Components of successful promotion of library services on social networks

Research on the individual abilities of librarians as an integral component of the effective use of social networks in libraries of Iranian State University finds that the skills of establishing communication through social networks, familiarity with the social network, and cognitive skills to meet users' needs in information have the most significant impact on the quality of marketing activity in academic libraries [21].

A survey of librarians showed that most librarians mainly use social media platforms to provide library services. With the help of social media platforms, librarians raise their awareness of library resources and services and disseminate library news and events. Based on the results, researchers recommend that library management provide opportunities for librarians to train and retrain in social media skills and new technologies as a tool to increase their effectiveness [22].

Researchers offer a detailed quantitative and qualitative data analysis on posting libraries at the Josip Juraj Strossmayer University in Osijek on Facebook. Researchers point out that the popularity of

Facebook pages largely depends on the type and content of posts, the number of photos, videos, and events. The library's Facebook page of the Faculty of Humanities and Social Sciences has the best feedback. Libraries can use the results of this study as a guide for implementing strategic planning and monitoring the audience's information needs [23].

Consequently, having analyzed the activities of libraries on Internet platforms, researchers showed such regularities of success: individual abilities of librarians, assistance to readers in awareness of library resources and services, as well as the spread of library news and events, feedback as preferences.

3. Methodology

3.1. Sampling for analysis

The sample of libraries was formed by stratometric selection from the general number of all university libraries in Ukraine. The Consolidated Ranking of Higher Education Institutions 2020 was taken as a basis [24]. The analyzed sample consists of libraries of Ukrainian universities that are in the top 10 of this ranking. That is, the sample size is 10 libraries that are units of the Taras Shevchenko National University of Kyiv, National University of Kyiv-Mohyla Academy, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ivan Franko National University of Lviv, V. N. Karazin Kharkiv National University, Danylo Halytsky Lviv National Medical University, Lviv Polytechnic National University, Odessa I. I. Mechnikov National University, Bogomolets National Medical University and Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine.

3.2. Analysis of information representation of Ukrainian university libraries

Analysis of the information representation of university libraries on the Internet involves the following stages:

- identification of names of social media platforms in the system of information representation of university libraries and determination of dominant platforms;
- correction of the sample of university libraries;
- content analysis of specific dominant social media platforms of the corrected sample of university libraries.

Identification of names of social media platforms in the system of information presentation of university libraries is to find active pages of libraries on social media and record their names. We define social media platforms as dominant information resources if they are used by at least 80% of selected university libraries.

Correction of the sample of university libraries is to ensure the completeness of content analysis and comparability of data. Criteria for selecting university libraries to correct the sample determine:

- the simultaneous use of defined dominant social media;
- the active use of certain dominant social media during the statistical period from January 1, 2019, to December 31, 2020.

3.3. Content analysis of dominant social media

Content analysis of the dominant social media platforms of Ukrainian university libraries involves determining the quantitative indicators of coverage, posting, and content topics for 2019-2020.

Quantitative coverage indicators are calculated for a corrected sample of university libraries that simultaneously use certain dominant social media. Quantitative indicators of coverage include:

- number of subscribers to the university library account on social media;
- coefficient of coverage (CC) of the university library account in social media. CC is the ratio of the total number of subscribers to this account to the average number of subscribers of all accounts in the dominant social media of the corrected sample of university libraries.

Quantitative posting indicators are calculated for a corrected sample of university libraries that actively use defined dominant social media during the statistical period 2019-2020. Quantitative posting indicators include:

- the total number of posts of the university library on social media for 2019-2020;
- the average number of posts per day (NPD) is the ratio of the total number of posts of the university library on social media for 2019-2020 to the number of calendar days for this period (731 days);
- the total number of likes of university library posts on social media for the selected period;
- the average number of likes per post is calculated as the ratio of the total number of likes for the selected period to the number of posts for this period;
- feedback coefficient (FC) is the ratio of the average number of likes per post to the total number of subscribers of library account on social media and multiplied by 100 percent. Therefore, FC is the percentage of followers actively interacting with library social media posts.

Coverage coefficient (CC), the number of posts per day (NPD) and feedback coefficient (FC) are tools to stratify the social media of academic libraries by coverage, posting and feedback levels.

The topics of the content of the dominant social media of academic libraries were studied by identifying the subject of the posts, grouping and generalizing according to the proximity of the subjects, and formulating topics of posts. We determine the adaptability of social media in academic communities by the dynamics of the topics of posts during 2019-2020.

4. Results

4.1. Analysis of information representation of university libraries in social media platforms

Analysis of the information presentation of 10 libraries of top universities in Ukraine showed that 100% of libraries have official autonomous websites and actively use various social media platforms. Seven names of social media platforms where university libraries present their content were identified (Tab.1).

Dominant social media platforms used by Ukrainian university libraries as their information presentation are Facebook and Instagram. 90% and 80% of selected libraries, respectively, prefer these social networks. Using YouTube video hosting libraries, where 70% of the analyzed libraries have their channels, is unexpected. In parallel, the components of information representation of Ukrainian university libraries are Telegram (40%), Twitter (20%), LinkedIn (10%), and TikTok (10%).

Table 1
Social platforms of Ukrainian university libraries

No	Library title	Facebook	Instagram	LinkedIn	Twitter	Telegram	Tik Tok	YouTube
1	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	+	+					+
2	National University of Kyiv-Mohyla Academy Library	+	+	+	+			+
3	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	+	+			+		+
4	Scientific Library of Ivan Franko National University of Lviv	+						+

No	Library title	Facebook	Instagram	LinkedIn	Twitter	Telegram	Tik Tok	YouTube
5	Central Scientific Library of V. N. Karazin Kharkiv National University	+	+		+	+		
6	Library of Danylo Halytsky Lviv National Medical University	+	+					
7	Scientific Library of Lviv Polytechnic National University	+	+			+		
8	Scientific Library of Odessa I.I.Mechnikov National University	+						+
9	Library of Bogomolets National Medical University	+	+			+	+	+
10	Scientific Library of Dnipropetrovsk Medical Academy of the Ministry of Health of Ukraine		+					+

Thus, selecting university libraries to correct the sample is the simultaneous use of Facebook and Instagram as the dominant social media platforms. According to the chosen research methodology, we are forming a sample of 7 university libraries.

4.2. Content analysis of university library pages on Facebook and Instagram

4.2.1. Quantitative indicators of posting

The level of activity of use and demand for library pages on Facebook and Instagram is determining by quantitative indicators of posting: coverage, posting and feedback. Coverage is the number of subscribers of libraries' pages on Facebook and Instagram as of February 17, 2022 (Fig. 1).

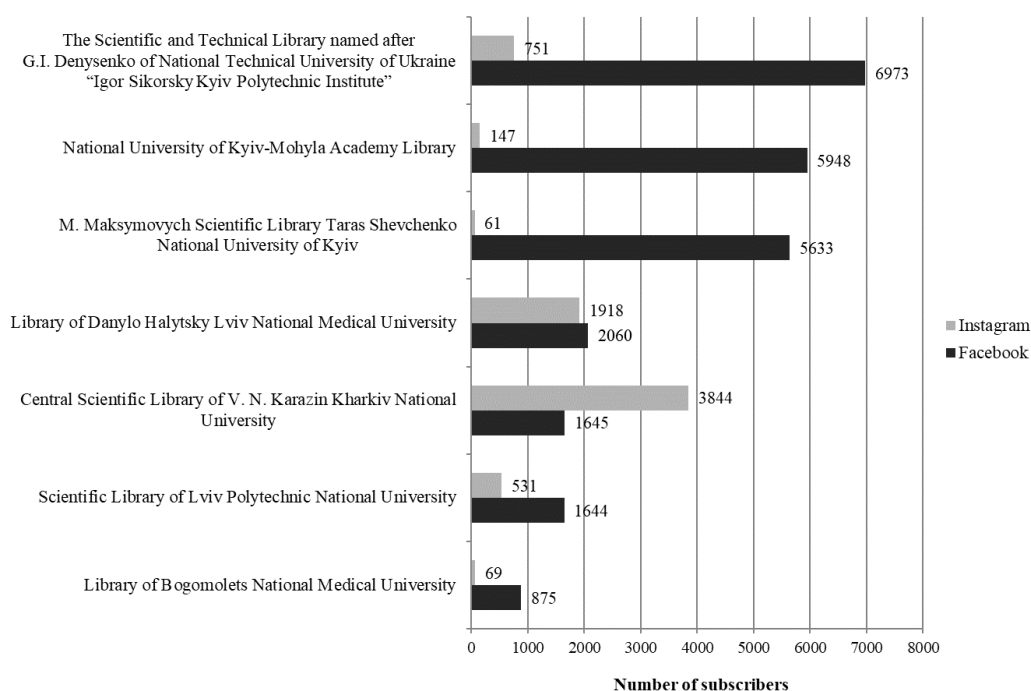


Figure 1: Coverage of libraries' pages on Facebook and Instagram by the number of subscribers

There is a significant spread in the number of active subscribers both on Facebook and Instagram of one library and in general among social media of all analyzed libraries. We determine coverage levels by setting the coverage coefficient CC as a comparison tool. The coverage of social platforms divides into three levels according to the CC coefficients (Tab. 2).

Table 2

Ranges of coverage levels of university library pages on Facebook and Instagram

Coverage level	Coverage coefficient, CC
Low	$0 < CC < 1$
Medium	$1 \leq CC < 2$
High	$CC \geq 2$

Quantitative indicators of the coverage of university library pages on Facebook (number of subscribers and coverage coefficient) allowed us to highlight the social media of Ukrainian university libraries of high and low levels of coverage (Tab. 3).

Table 3

Indicators of the coverage of university library pages on Facebook as of February 17, 2022

Coverage level	Library title	Facebook	
		Number of subscribers	CC
High	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	6973	3,04
	National University of Kyiv-Mohyla Academy Library	5948	2,59
	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	5633	2,46
Low	Library of Danylo Halytsky Lviv National Medical University	2060	0,90
	Central Scientific Library of V. N. Karazin Kharkiv National University	1645	0,72
	Scientific Library of Lviv Polytechnic National University	1644	0,72
	Scientific Library of Odessa I.I.Mechnikov National University	1198	0,53
	Library of Bogomolets National Medical University	875	0,38

In contrast to Facebook, the pages of Ukrainian university libraries on Instagram show other levels of coverage. According to the total number of active subscribers and the coverage coefficient, we highlight the pages of university libraries on Instagram with medium and low coverage (Tab. 4).

Table 4

Indicators of the coverage of university library pages on Instagram as of February 17, 2022

Coverage level	Library title	Instagram	
		Number of subscribers	CC
Medium	Central Scientific Library of V. N. Karazin Kharkiv National University	3844	1,68
Low	Library of Danylo Halytsky Lviv National Medical University	1918	0,84
	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	751	0,33

Coverage level	Library title	Instagram	
		Number of subscribers	CC
Low	Scientific Library of Lviv Polytechnic National University	531	0,23
	National University of Kyiv-Mohyla Academy Library	147	0,06
	Library of Bogomolets National Medical University	69	0,03
	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	61	0,03

The sample of university libraries has to be corrected due to the criteria of using Facebook and Instagram during the selected statistical period from January 1, 2019, to December 31, 2020, to ensure the completeness of the analysis of posting and comparability of data. To this end, we identify the registration dates of library accounts on these social media (Tab. 5).

Table 5

Instagram Registration dates of library accounts on Facebook and Instagram

Library title	Facebook	Instagram
M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	06/12/2014	23/04/2016
National University of Kyiv-Mohyla Academy Library	17/02/2011	14/05/2014
The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	10/09/2012	20/11/2014
Central Scientific Library of V. N. Karazin Kharkiv National University	09/08/2013	20/10/2020
Library of Danylo Halytsky Lviv National Medical University	09/02/2014	19/08/2016
Scientific Library of Lviv Polytechnic National University	03/12/2012	25/06/2020
Library of Bogomolets National Medical University	26/12/2014	27/06/2020

Thus, the finalized sample of university libraries includes four institutions: M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv, National University of Kyiv-Mohyla Academy Library, The Scientific and Technical Library named after G.I. Denysenko of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", and Library of Danylo Halytsky Lviv National Medical University. We define the posting of university libraries on Facebook and Instagram as the total number of posts for 2019-2020 (Fig. 2).

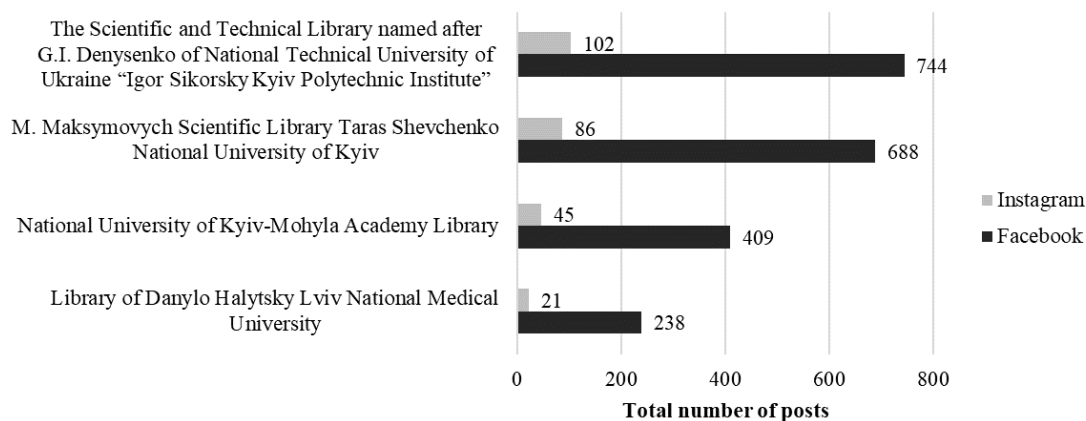


Figure 2: Posting of university libraries on Facebook and Instagram for 2019-2020

Comparing the features of posting on Facebook and Instagram, we find patterns inherent in all analyzed libraries. In particular, there is a dominance in using Facebook by university libraries. The total number of posts of the analyzed university libraries on Facebook exceeds the total number of posts on Instagram by 7-11 times for the same period. As a comparison tool, we determine the posting levels by the average number of posts per day.

The posting of university libraries on social media platforms is divided into three levels according to a certain average number of posts per day (Tab. 6).

Table 6

Ranges of university library posting levels on Facebook and Instagram

Posting level	Average number of posts per day, NPD
Low	$0 < \text{NPD} < 1$
Medium	$1 \leq \text{NPD} < 1,5$
High	$\text{NPD} \geq 1,5$

The general indicators of posting of university libraries on Facebook (total number of posts and average number of posts per day) allowed identifying social media platforms of university libraries of medium and low levels of posting (Tab. 7).

Table 7

General indicators of posting of university libraries on Facebook for 2019-2020

Posting level	Library title	Facebook	
		Total number of posts	NPD
Medium	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	744	1,02
Low	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	688	0,94
	National University of Kyiv-Mohyla Academy Library	409	0,56
	Library of Danylo Halytsky Lviv National Medical University	238	0,33

Unlike Facebook, the pages of university libraries on Instagram show only a low level of posting by the total number of posts and the average number of posts per day (Tab. 8).

Table 8

General indicators of posting university libraries on Instagram for the 2019-2020

Posting level	Library title	Instagram	
		Total number of posts	NPD
Low	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	102	0,14
	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	86	0,12
	National University of Kyiv-Mohyla Academy Library	45	0,06
	Library of Danylo Halytsky Lviv National Medical University	21	0,03

Trends in the implementation of information interaction between university libraries and the academic community during the Covid-19 pandemic are determined based on the analysis of posting dynamics for 2019-2020. Posting dynamics will provide a picture of the adaptation of university libraries to the new conditions of operation and communication with users.

The posting dynamics of the analyzed university libraries on Facebook is ambiguous. Posting for 2020 compared to 2019 of The Scientific and Technical Library named after G.I. Denysenko of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and the Library of Danylo Halytsky Lviv National Medical University decreased by 4% and 18% respectively. At the same time, the posting of M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv and National University of Kyiv-Mohyla Academy Library increased by 3% for the same periods (Fig. 3).

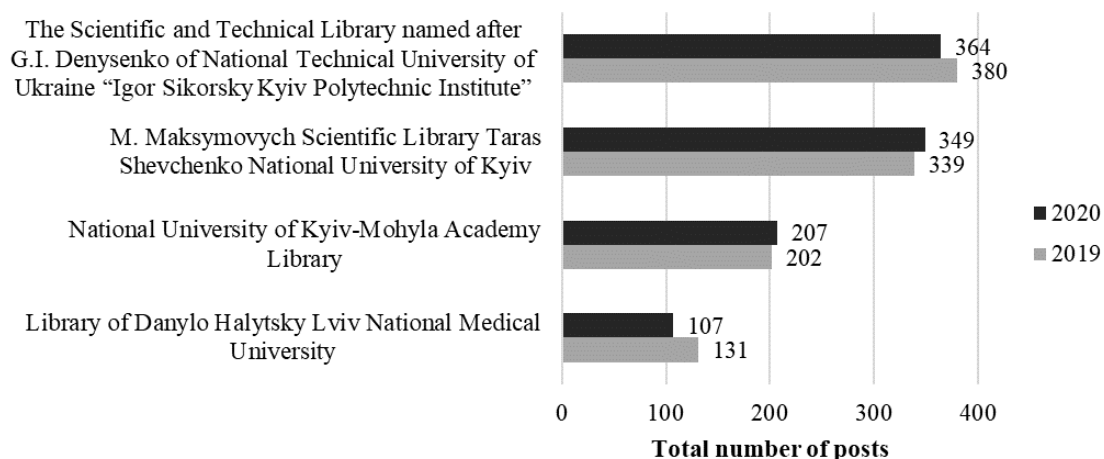


Figure 3: Posting dynamics of university libraries on Facebook for 2019-2020

The posting dynamics of the analyzed university libraries on Instagram are also different. The increase in posting in 2020 compared to 2019 is observed only for the Library of Danylo Halytsky Lviv National Medical University and is 63%. At the same time, posting of The Scientific and Technical Library named after G.I. Denysenko of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv, and National University of Kyiv-Mohyla Academy Library decreased by 24%, 9% and 71% respectively (Fig. 4).

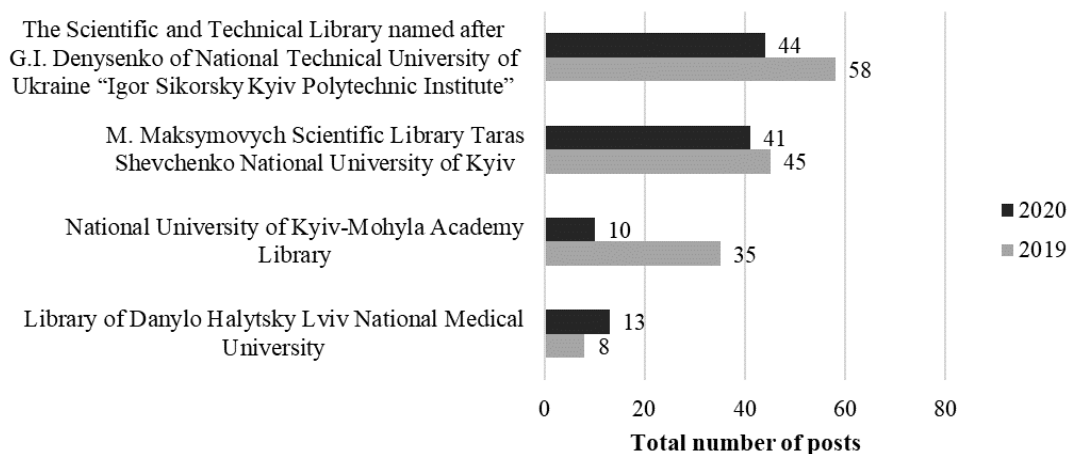


Figure 4: Posting dynamics of university libraries on Instagram for 2019-2020

Thus, the results of the posting analysis showed that university libraries used Facebook much more intensively than Instagram both before and after the pandemic, despite the general dynamics of posting.

The dynamics of posting levels on Facebook during 2019-2020 indicate the absence of posting shifts in the analyzed libraries through the levels (Tab. 9).

Table 9

Dynamics of posting levels of university libraries on Facebook for 2019-2020

Posting level	Library title	Facebook			
		2019		2020	
		Total number of posts	NPD	Total number of posts	NPD
Medium	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	380	1,0	364	1,0
Low	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	339	0,93	349	0,95
	National University of Kyiv-Mohyla Academy Library	202	0,55	207	0,57
	Library of Danylo Halytsky Lviv National Medical University	131	0,36	107	0,29

There were also no shifts in the posting levels on Instagram of university libraries after the beginning of the Covid-19 pandemic (Tab. 10).

Table 10

Dynamics of posting levels of university libraries on Instagram for 2019-2020

Posting level	Library title	Instagram			
		2019		2020	
		Total number of posts	NPD	Total number of posts	NPD
Low	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	58	0,16	44	0,12
	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	45	0,12	41	0,11
	National University of Kyiv-Mohyla Academy Library	35	0,10	10	0,03
	Library of Danylo Halytsky Lviv National Medical University	8	0,02	13	0,04

Feedback on Facebook and Instagram is defined as the number of likes of posts published during 2019-2020 (Fig. 5).

Due to the significant spread in the total number of likes and the different levels of posting of university libraries on Facebook and Instagram, it is advisable to compare feedback by the number of likes per post. Comparing the feedback, we observe an interesting phenomenon. Despite the significant advantage of Facebook by posting, the pages of all analyzed university libraries on Instagram dominate in the number of likes per post.

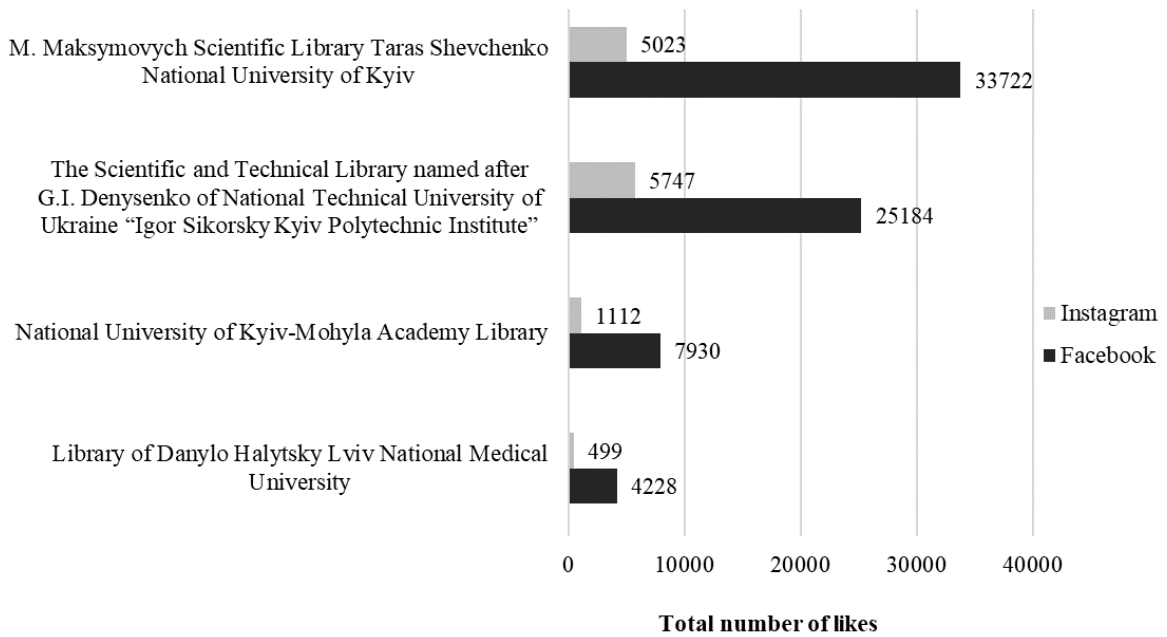


Figure 5: The total number of likes of posts published during 2019-2020 as of October 2021

The feedback may indicate a more active target audience, visibility, and relevance of the content of library Instagram pages to the information needs of users (Fig. 6).

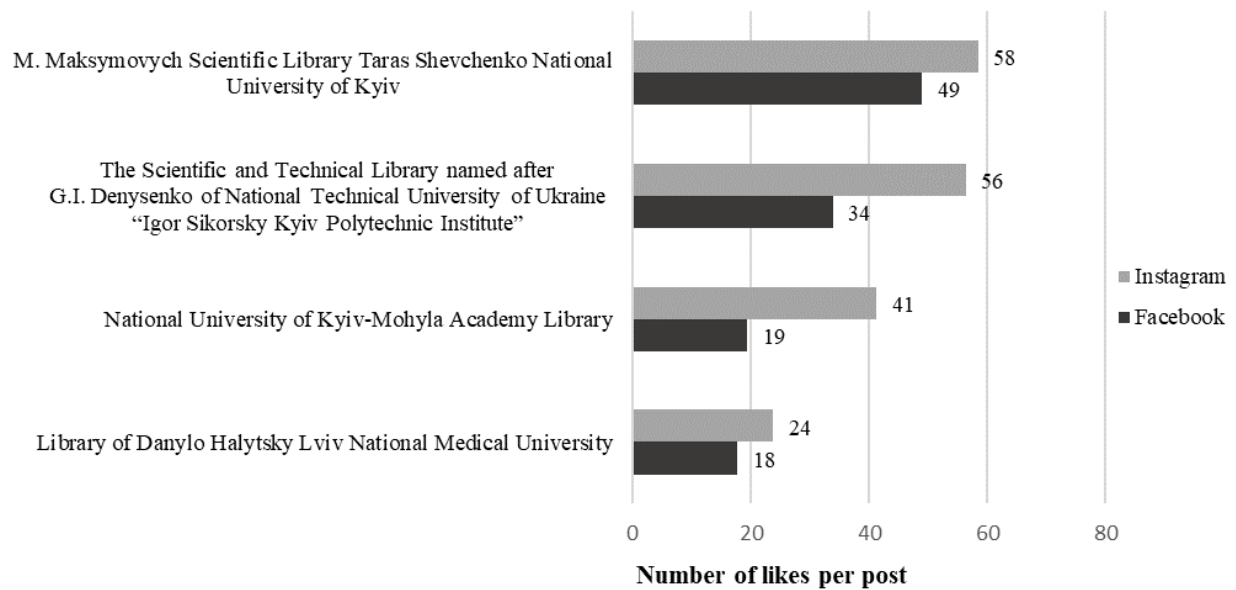


Figure 6: Number of likes per post of pages of university libraries on Facebook and Instagram for 2019-2020 as of October 2021

The dynamics of likes on Facebook indicate a decrease in the target audience's interest in the content of the analyzed university libraries during the Covid-19 pandemic by 16-33%. At the same time, the page of M. Maksymovych Scientific Library of Taras Shevchenko National University of Kyiv on Facebook shows an increase in interest of the target audience by 23%, with an increase in posting by only 3% (Fig. 7).

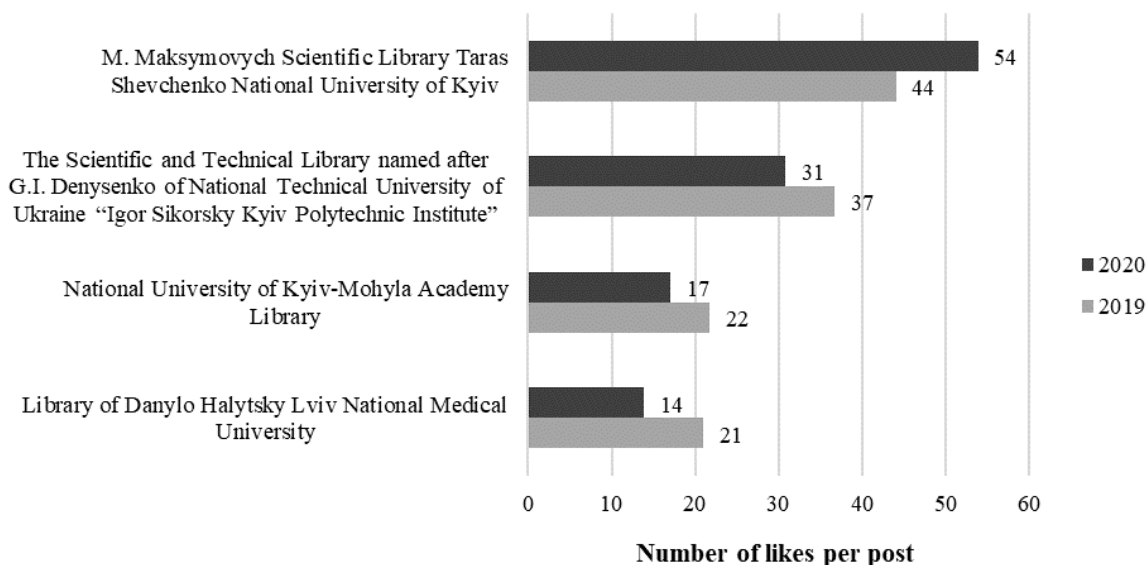


Figure 7: Dynamics of likes of university library pages on Facebook for 2019-2020 as of October 2021

There is a similar situation with the dynamics of likes of university libraries on Instagram. The decrease in the target audience's interest in the content of the analyzed university libraries on Instagram during the Covid-19 pandemic is 16-28%. At the same time, the National University of Kyiv-Mohyla Academy Library's Instagram page shows a 49% increase in the target audience's interest, despite a 71% decrease in posting (Fig. 8).

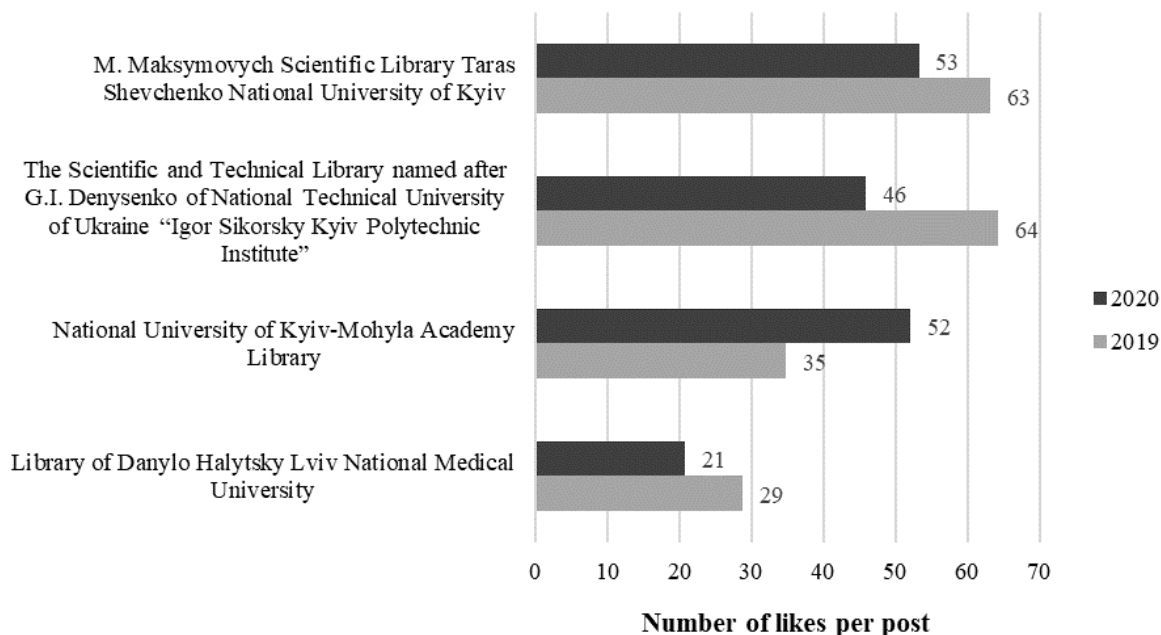


Figure 8: Dynamics of likes of university library pages on Instagram for 2019-2020 as of October 2021

An increase in the number of likes may indicate a rapid adaptation of the library to the new conditions of communication with users and the presentation of content that meets the basic and situational information needs of the target audience.

Differences in the dynamics of the number of likes on Facebook and Instagram may indicate the lack of a comprehensive policy of parallel development of all information resources of Ukrainian

university libraries, which are finding and establishing optimal channels of communication with the target audience.

The feedback of university libraries on social media platforms is divided into three levels according to corresponding to the effect of the feedback coefficient (FC). Stratification of feedback on the level involves the following approaches:

- 100% of library social media account followers can potentially like posts;
- the average number of likes per post reflects the average number of active subscribers interacting with library social media;
- the percentage of subscribers actively interacting with library social media is the ratio of the number of likes per post to the total number of followers. The resulting percentage of active subscribers is the feedback coefficient.

We define three levels of feedback as thirds of 100%, which is the maximum value of the feedback coefficient (Tab. 11).

Table 11

Ranges of university library feedback levels on Facebook and Instagram

Feedback level	Feedback coefficient, FC
Low	$0\% < FC < 30\%$
Medium	$30\% \leq FC < 60\%$
High	$FC \geq 60\%$

The dynamics of feedback levels on Facebook during 2019-2020 indicate the absence of feedback shifts in the analyzed libraries through the levels. All analyzed library Facebook pages are characterized by low levels of feedback. Only M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv shows a positive trend in the growth of the feedback coefficient (Tab. 12).

Table 12

Dynamics of feedback levels of university libraries on Facebook for 2019-2020

Feedback level	Library title	Facebook				
		Number of subscribers	2019		2020	
			Number of likes per post	FC, %	Number of likes per post	FC, %
Low	National University of Kyiv-Mohyla Academy Library	5948	22	0,4	17	0,3
	The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	6973	37	0,5	31	0,4
	M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	5633	44	0,8	54	1,0
	Library of Danylo Halytsky Lviv National Medical University	2060	21	1,0	14	0,7

The distribution of feedback by level on Instagram of university libraries differs significantly. We observe university library Instagram pages in all three levels of feedback. Also, after the beginning of the Covid-19 pandemic, there has been a shift between the levels of feedback. Interesting results regarding the feedback coefficient were obtained by M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv. The FC=103.5% indicates interaction with all subscribers and not-subscribers of the library's Instagram (Tab. 13).

Table 13

Dynamics of feedback levels of university libraries on Instagram for 2019-2020

Library title	Instagram						
	Number of subscribers	Feedback level	2019		2020		FC, %
			Number of likes per post	FC, %	Feedback level	Number of likes per post	
Library of Danylo Halytsky Lviv National Medical University	1918	low	29	1,5	low	21	1,1
The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	751		64	8,6		46	6,1
National University of Kyiv-Mohyla Academy Library	147		35	23,7	medium	52	35,4
M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv	61	high	63	103,5	high	53	87,3

Thus, with a much smaller number of followers, Instagram of university libraries is characterized by a higher level of feedback than Facebook. It characterizes Instagram's target audience as more active interacting with library posts.

4.2.2. Analysis of posting changes during the Covid-19 pandemic

Content analysis of 2333 posts of the selected sample of Ukrainian university libraries on Facebook and Instagram for 2019-2020 allowed us to identify 12 specific posting topics. An analysis of library social media content changes after the start of the Covid-19 pandemic is presented in Table 14 and Table 15.

Dominant topics in the posting of Ukrainian university libraries during 2019-2020 are the library and its activities, book collections and new arrivals, calendar of significant dates and greetings, famous personalities, event announcements and descriptions, information for researchers, information for students and communication with users. The presentation of topics on general-purpose information and academic integrity becomes selective. It is important to note that since the beginning of the Covid-19

pandemic, all analyzed university libraries have supplemented the topic of posting on Facebook with relevant information materials about Covid-19 or advice on rational organization of study, work, leisure in quarantine (Tab. 14).

Table 14
Posting topics of university libraries on Facebook for 2019-2020

Posting topics	LDHLMU ⁱ		NUKMAL ⁱⁱ		MSLTSNU ⁱⁱⁱ		STLDKPI ^{iv}	
	2019	2020	2019	2020	2019	2020	2019	2020
Library and its activities	+	+	+	+	+	+	+	+
Book collections and new arrivals	+	+	+	+	+	+	+	+
Calendar of significant dates and greetings	+	+	+	+	+	+	+	+
Famous personalities	+	+	+	+	+	+	+	+
Event announcements and descriptions	+	+	+	+	+	+	+	+
Information for researchers	+	+	+	+	+	+	+	+
Information for students	+	+	+	+	+	+	+	+
General-purpose information	+		+	+	+	+	+	+
Academic integrity	+		+		+	+	+	+
Communication with users	+	+	+	+	+	+	+	+
Covid-19		+				+		+
Study, work, leisure in quarantine		+		+				+

At the same time, the posting topics on Instagram do not have an utterly dominant core. Posting topics of the analyzed university libraries are presented in different combinations. A significant part of the posting is devoted to the library's activities, the coverage of book collections and new arrivals, the calendar of significant dates, and information for students. There is little or no information for scientists. This shows the orientation of university libraries on Instagram to the youth audience. Posting topics on Covid-19 and advice on the rational organization of study, work, and leisure during quarantine are presented by three of the four analyzed Ukrainian libraries. It evidences the adaptability of university libraries posting on Instagram (Tab. 15).

Table 15
Posting topics of university libraries on Instagram for 2019-2020

Posting topics	LDHLMU		NUKMAL		MSLTSNU		STLDKPI	
	2019	2020	2019	2020	2019	2020	2019	2020
Library and its activities		+	+	+	+	+	+	+
Book collections and new arrivals	+		+	+	+	+	+	+
Calendar of significant dates and greetings	+	+	+		+	+	+	+
Famous personalities			+				+	+
Event announcements and descriptions					+		+	+
Information for researchers			+	+				
Information for students	+	+	+	+		+	+	+
General-purpose information	+		+		+	+		+
Academic integrity								
Communication with users				+	+	+	+	+
Covid-19		+				+		+
Study, work, leisure in quarantine						+		

Thus, Ukrainian university libraries within both social platforms tried to adapt their information presentation by publishing posts on the features of distance work and learning, leisure in self-isolation, announcing a large number of online events, and current information about Covid-19. We should note that the peak of posting on the topic of Covid-19 fell on March-May 2020 and then fell to almost zero. There was a slight increase in posting about Covid-19 in October 2020 due to the second wave of the pandemic (Fig. 9).

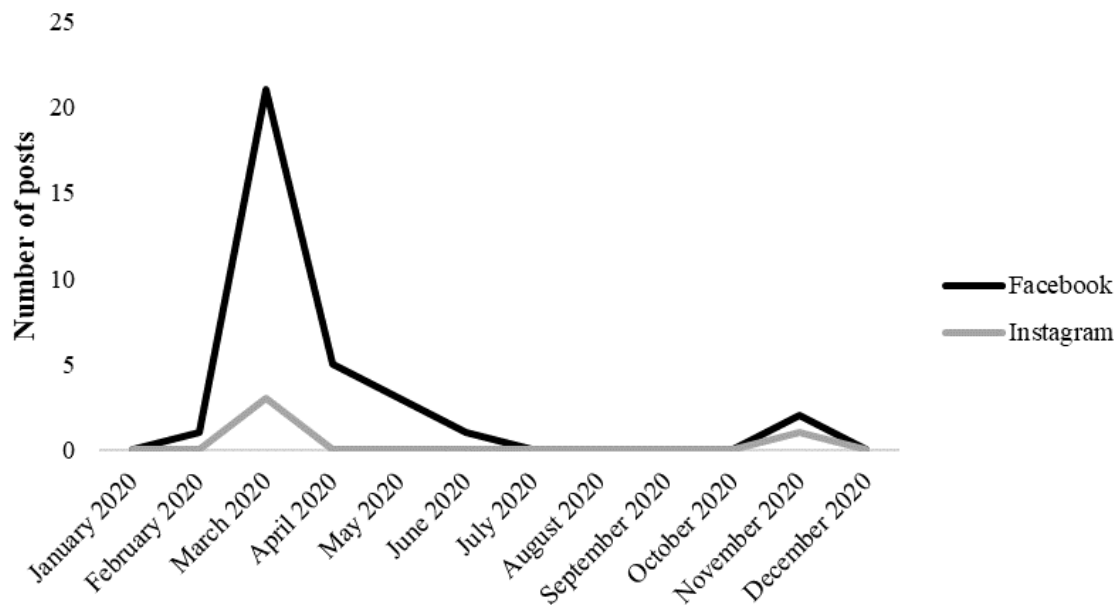


Figure 9: Posting dynamics about Covid-19 and the organization of activities during quarantine

The adaptation of the information presentation took place by changing the content of the posts and registering new library pages on various social media platforms or activating the content of pre-registered but empty Instagram pages. Libraries that have both Facebook and Instagram pages do not duplicate content. In general, the topics of the posts are combined and supplemented on different platforms.

5. Conclusions

The dominant social media in the information presentation of Ukrainian university libraries are Facebook and Instagram. The proposed methodology makes it possible to carry out a diachronic analysis of the state of communication interaction between Ukrainian academic libraries and the target audience in the dominant social media. Quantitative indicators of coverage, posting, and topics were chosen as criteria for evaluating the effectiveness of identified social media libraries. The use of coverage coefficient (CC) and number of posts per day (NPD) is proposed to stratify social media of academic libraries by levels. It has been determined that Facebook significantly outperforms Instagram in terms of coverage of followers and terms of posting. Facebook has been an integral component of the information space of most Ukrainian university libraries for a long time. At the same time, both stylistically and chronologically, Instagram is just beginning to enter the library's information toolkit fully. However, Instagram shows a significant advantage over Facebook in feedback, which indicates its potential as a promising and used information resource for academic communities.

The adaptability of the functioning of libraries and their information presentation on social media serve as a measure of the quality of meeting the information needs of the target audience. The remote format of work in the conditions of the Covid-19 pandemic contributed to the diversification of posting topics and the multi-platform nature of the information environment of Ukrainian university libraries due to the activation or creation of new library pages on various social media.

Information presentation of university libraries in social media in the conditions of the Covid-19 pandemic has undergone certain transformations. It is evident that before the pandemic, social media served as a tool for informing users and promoting Ukrainian university libraries' activities. In the conditions of the pandemic, there was a need to ensure quality communication and fill the information vacuum caused by the isolation of the academic community. 50% of analyzed libraries on Facebook and 25% on Instagram followed the path of increasing posting. However, the increase in the number of likes during the pandemic was observed regardless of the level of posting, which was obviously caused by the relevance and demand for library content on social media.

The creation of high-quality content in social media today is a separate competence segment of the professional profile of librarians. The maximum involvement and expansion of the target audience in the information environment of the library require creating original content following the basic and situational information needs of users.

The proposed methodology of analysis of libraries' social media provides an opportunity to open the perspective of determining the priority areas of modernization of the academic virtual information environment.

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ⁱ LDHLMU – Library of Danylo Halytsky Lviv National Medical University

ⁱⁱ NUKMAL – National University of Kyiv-Mohyla Academy Library

ⁱⁱⁱ MSLTSNU – M. Maksymovych Scientific Library Taras Shevchenko National University of Kyiv

^{iv} STLDKPI – The Scientific and Technical Library named after G.I. Denysenko of National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”