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Journal of Research on Trade, Management and Economic Development
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MODERN MARKETING INSTRUMENTS FOR THE COMPANY'S MARKET PROMOTION

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Abstract

Currently, a specific feature of the Russian economy development is its digitalization. Many business entities use digital marketing instruments to conquer markets, strengthen customer loyalty and increase sales. Therefore, the problem of promoting companies in the market with the help of modern marketing instruments is now particularly relevant. In this article, the authors proposed actual classification of BTL-communications suggesting their division into 3 types: sales promotion, public relations and Internet advertising. The classification of sales promotion instruments has been updated; in particular, the authors attributed direct marketing and sponsorship to consumer incentives (promotion actions with image-based communication). Unlike many interpretations, this group includes merchandising and event marketing. The instruments of moral and remunerative incentives for employees were highlighted. The authors emphasized the Internet advertising comprising such marketing promotion instruments as content marketing, e-mail marketing, social media marketing, guerrilla marketing, influencer marketing, etc., and defined Internet advertising as an important component of BLT-communications.

The study focuses on social media marketing (SMM): the number of social networks and instant messengers' users over a three-year period has been analyzed; advantages and disadvantages of social networks for company's market promotion have been highlighted.

***Keywords**: ATL- and BTL-communications, email marketing, social media marketing, hidden marketing, influencer marketing, blogging, search engine optimization*

1. Introduction

In the period of fierce competition between business entities, special attention is given to the instruments for the company's market promotion and their modern means, notably marketing communications.

The economic literature identifies various types of marketing communications. According to many domestic and foreign scientists, the main instruments of marketing communications are advertising, sales promotion, public relations (PR), direct marketing [1, 3, 11].

2. The extent of the current study of the problem, objective of the study

Actual issues of the company's market promotion by using modern marketing instruments are investigated in the works of Tarasova E. E. [12, 13], Isaenko E. V. [2], Makrinova E. I., Rozdolskaya I. V. [9, 10], Matuzenko E. V. [4, 7], Kolesnikova E. V. [4], Golubkova E. N., Konovalenko V. A. and other scientists.

In the researches of Marochkina S. S., Dmitrieva L. M., Azarova E. V., Senderov D. V., Romat E. V. on marketing communications much attention is paid to their classification.

However, classification of marketing communications requires detailed clarification and systematization under the conditions of economy digitalization. It can help to identify modern marketing instruments for the company's market promotion, which is the exact subject of this article.

Many domestic and foreign authors divide marketing communications into 2 types: ATL-communications (direct communications) and BTL-communications (indirect communications). Direct communications include traditional types of advertising: radio advertising, TV advertising, cinema advertising, transportation advertising, outdoor advertising, print advertising, point-of-sale advertising [5, 6, 8]. Marketers' approach to indirect communication instruments is somewhat different.

In the context of the economy digitalization and Internet technologies development, various new instruments are used to promote companies on the market, and therefore this issue requires detailed consideration.

The objective of the study is to systematize certain types of marketing communications, in particular, to structure types of the company's Internet promotion.

3. Methods and materials applied

The validity and reliability of the research results are based on the use of general scientific methods (dialectics, analysis, synthesis, consistency, complexity), as well as economic and mathematical research methods.

4. Findings and discussions

Having analyzed various classifications of marketing communications the authors suggest grouping BTL-communications into 3 types: sales promotion, public relations and Internet advertising (Figure 1).

The last group includes modern types of Internet advertising, which affect the target audience, rather than directly, notably SEO promotion, SMM, influencer marketing, native advertising, etc. In addition, the authors grouped instruments for sales promotion in appropriate clusters: consumer promotion, intermedia promotion and employees' promotion. Each of these groups has its own promotional instruments (Figure 2).

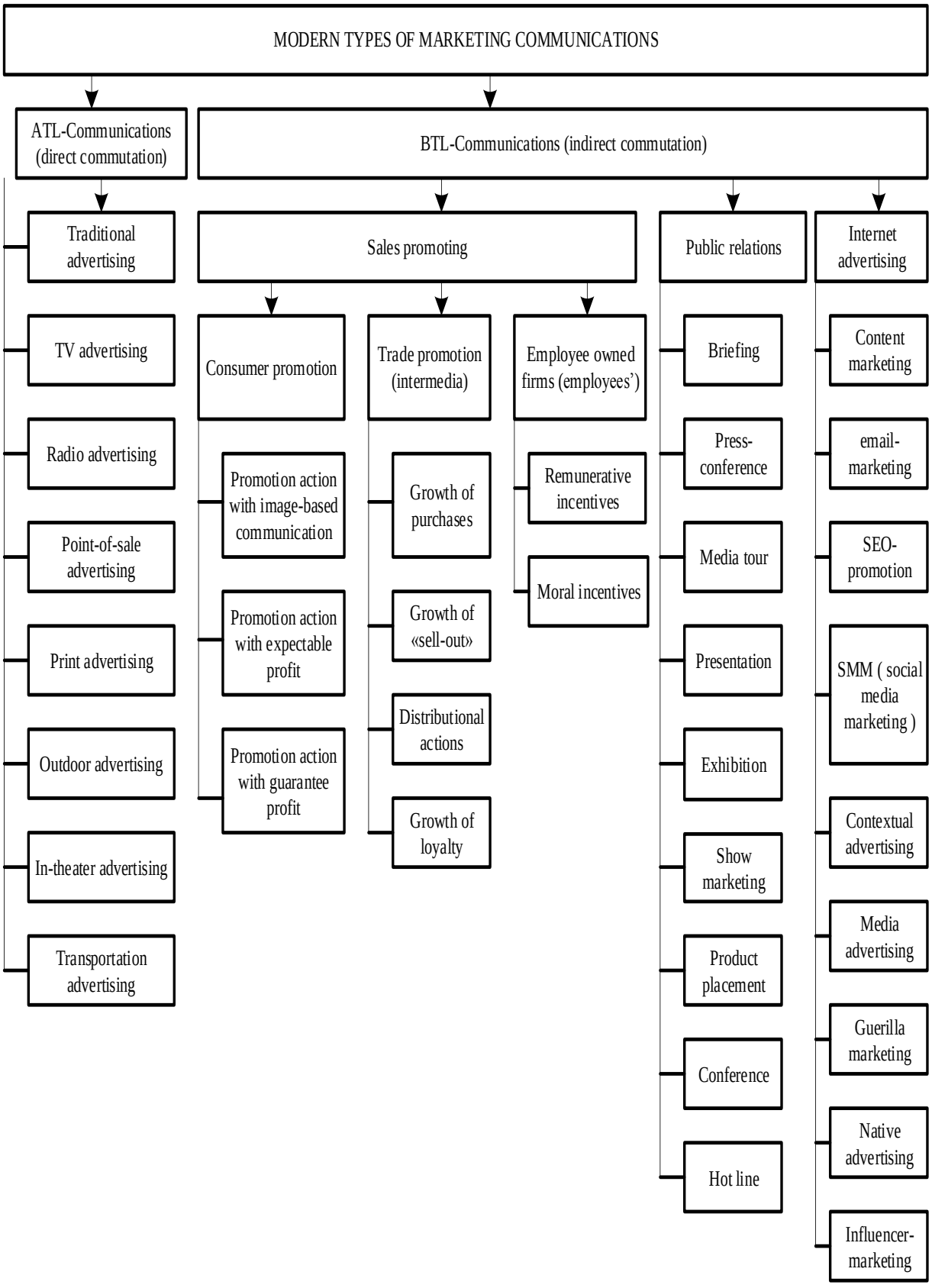

Figure 1. Modern types of marketing communications (author's narrative)

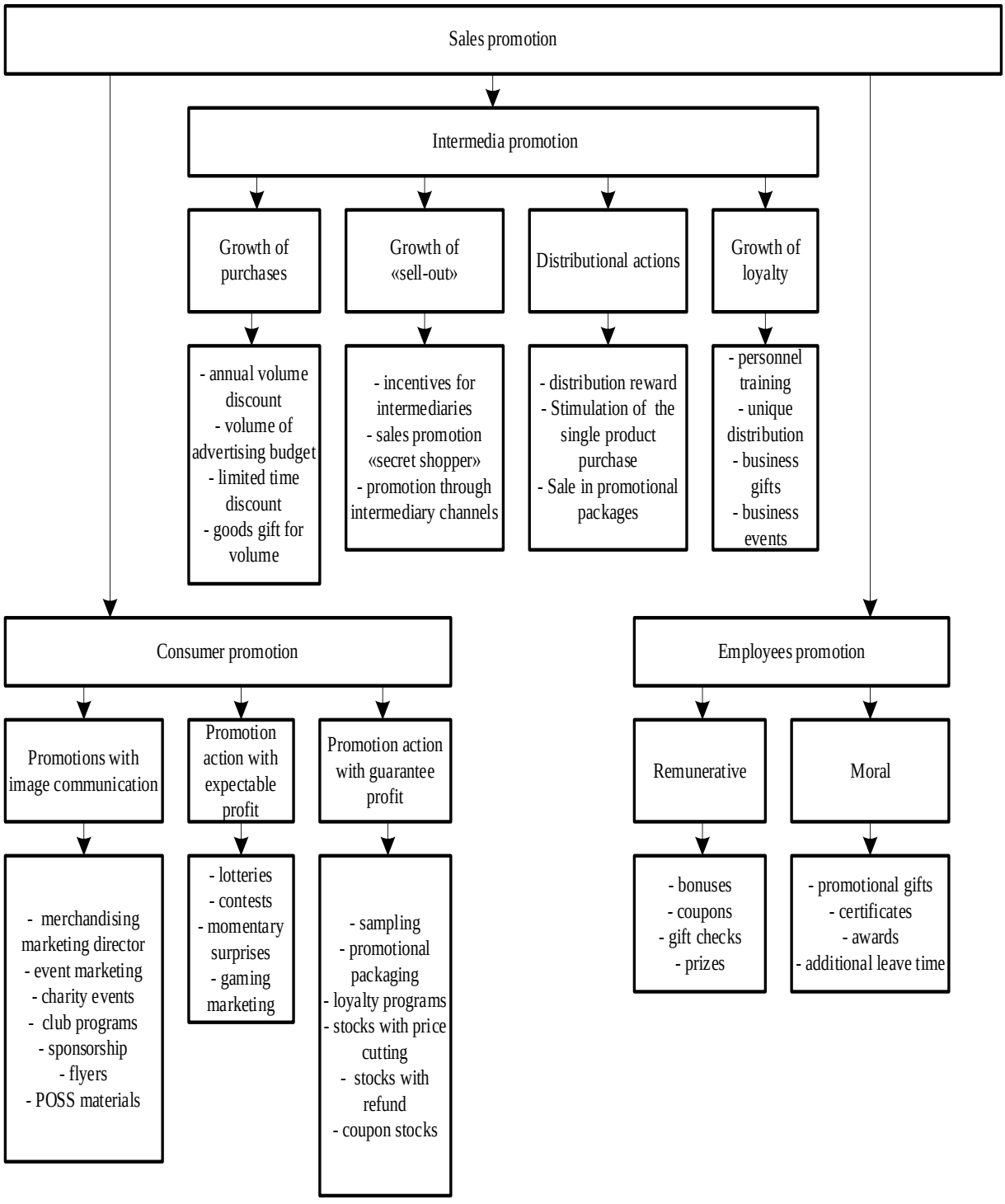

Figure 2. Classification of sales promotion instruments (author's narrative)

The authors attributed direct marketing and sponsorship – the instruments of BTL-communications – to consumer's promotion, in particular, to promotions with image communication. In contrast to many interpretations, this group includes merchandising and event marketing. Employees' promotion is divided into 2 groups – remunerative and moral, and each of them presents a corresponding instrument.

However, according to the authors, a fundamentally new type of BTL-communications is Internet advertising, which they classify as an innovative marketing activity. Pioneering marketing instruments for the company's Internet promotion are systematized in Figure 3.

However, according to the authors, a fundamentally new type of BTL-communications is Internet advertising, which they classify as innovations in marketing activities. Innovative marketing instruments for Internet promotion of the company are systematized in Figure 3.

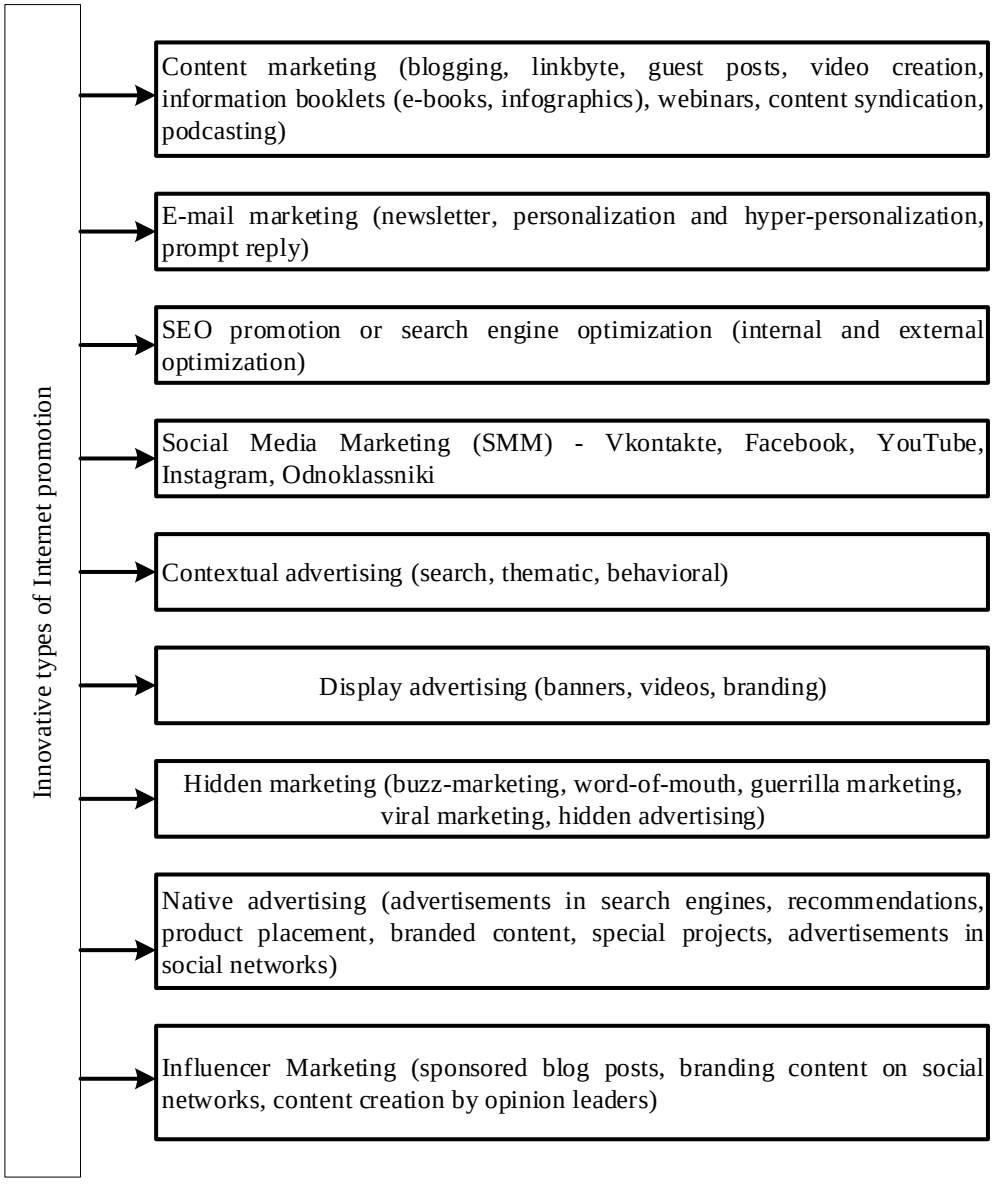

Figure 3. Innovative marketing instruments for Internet promotion of the company

Let us consider these instruments in more detail.

Content marketing is a form of marketing that focuses on creation and exchange of online materials (videos, blogs, and posts in social media) that do not promote the brand openly but draw attention to it and increase the interest for its products or services.

The following forms of content marketing are applied in practice:

- blogging – existence of a blog (weblog) or an information channel;
- linkbyte – content that is written specifically to enhance the link mass;
- guest posts – materials or articles posted on third-party resources in order to get back links to the owner's website or blog;
- video creation – if a company can produce useful content for video creation then it will be able to attract more users;
- information booklets, e-books and infographics – creation of any of these content forms helps the company strengthen its credibility in an expert capacity;
- conducting webinars – one of the few Internet marketing instruments that allows company specialists to communicate with their audience in real time;
- syndication of content – full or partial distribution of publications to other sites or pages;
- podcasting – an online audio file that is currently very popular all over the world.

Email marketing is a document that describes:

- goals that should be achieved by means of email marketing;
- specific actions necessary to achieve these goals.

The most common forms of email marketing are: newsletters; personalization, prompt replies; lead magnets; segmentation; split testing of letters (or A / B testing); automation.

Search engine optimization (SEO) is the process of maximizing the number of web visitors by advancing resource's position in the search engine results. For company promotion it is advisable to monitor the website optimization.

Social Media Marketing (SMM) is advertising on social networks and instant messengers.

Let us consider the most popular social networks and instant messengers in Russia (tables 1, 2).

As seen in Table 1, during the considered period the most popular social networks in Russia were: VKontakte (1st place), Instagram (2nd place), Odnoklassniki (3rd place), Facebook (4th place).

Table 1. The number of users of popular social networks in Russia for 2016-2018

Types of Social Networks	Number of monthly Russian audience by types of social networks, thousand people			Growth rate, %	
	2016	2017	2018	2017/2016	2018/2017
VKontakte	13278	25722	36453	193,7	141,7
Instagram	4645,7	7143	23740,6	153,8	332,4
Odnoklassniki	13350	14200	15800	106,4	111,3
Facebook	1021,7	1953	2250,5	186,0	118,5
Twitter	669,5	1170,7	818,3	174,9	69,9
Moy Mir	165,5	169,9	99,1	102,7	58,3
LiveJournal	196,2	81,4	55,9	41,5	68,7

Source: [13]

In 2016-2018, the most rapidly growing social networks were Instagram and VKontakte. So, over a three-year period, the number of Instagram platform users increased by more than 5 times, and Vkontakte – by 2.7 times. The number of Facebook social network users has increased by 2.2 times, and the total growth of Twitter's visitors amounted to 148.8 million only. As for such social networks as Moy Mir and LiveJournal the number of users has significantly decreased over the analyzed period.

In addition to social networks, Russian customers actively use instant messengers (Table 2).

Table 2. The share of popular instant messengers' users in Russia for 2016-2018

Types of instant messengers	The share of users by type of messengers,%			Growth rate, %	
	2016	2017	2018	2017/2016	2018/2017
WhatsApp	24	30	38	125,0	126,7
Viber	23	27	33	117,4	122,2
Skype	30	14	10	46,7	71,4
Telegram	3	11	14	366,7	127,3
Others	20	18	5	90,0	27,8
Total:	100	100	100	-	-

Source: [13]

At present WhatsApp is the most popular messenger in Russia, Viber is running second, and Telegram is in the third place. During the period under review, the Telegram channel developed at the fastest pace. So, in 2018, 14% of the population used it, which is 4.7 times more than in 2016. WhatsApp audience increased by 14% and Viber became popular by 10%. At the same time, over a three-year period users began to communicate less via Skype.

Having studied the characteristics of the most popular social networks in Russia (VKontakte, Instagram, Odnoklassniki, Facebook), the authors systematized their advantages, disadvantages and application features for marketing promotion. The results are presented in Table 3.

Table 3. Comparative analysis of popular social networks in Russia

Social network	Main formats	Benefits	Disadvantages
1	2	3	4
VKontakte	– advertising tape record (carousel, universal record, record button); – banner advertisements (for communities, applications and external websites); – advertising in overlapping content communities	broader reach, a large number of targeting settings, effective organic reach, possibility of inviting users to a group	high competitiveness, users' blockage to invitations to groups and meetings, strict moderation

1	2	3	4
Instagram	– images; – video; – ring gallery; – selection	broader reach, easy advertising set up, easy promotion through mass liking and massfollowing	inability to publish links in posts and posts visibility dependence on the participation level, which makes it difficult to start something from scratch
Odnoklassniki	– carousel; – mobile video advertising; – audio advertising; – video posts; – notes with an active button; – notes with lead ads; – video banners	– reach of solvent customers, interesting content virality; – when a user appreciates a video with the mark "Klass", all user's friends and subscribers see it	complicated advertising settings, lack of a solvent youth audience and the network's unsuitability for doing business
Facebook	– photo; – video; – stories download; – Messenger download; – ring gallery; – slide show; – selection of goods; – interactives	a huge number of advertising settings, wide promotion functionality, broad coverage of foreign target audience	truncated organic reach and sophisticated interface

The authors singled out the peculiarities of marketing promotion within the following social networks: advertising in VKontakte, advertising in Facebook, advertising in Instagram, advertising in Odnoklassniki.

Advertising in VKontakte. VKontakte is the most popular social network in Russia. This platform enables active promotion of both internal and external resources. MyTarget, a special service of Mail.ru, allows posting advertisements in VKontakte providing more options than the internal platform does.

Advertising in Facebook. Facebook is one of the largest social networks of the world with over 2 billion users. Advertising on this platform's basis is known for its wide functionality and high efficiency. Flexible adjustments are available in AdsManager profile.

Advertising in Facebook is mainly aimed at promoting the posted information (each post is provided with the button underneath) and personal accounts; attracting visitors to the website; acquiring a great number of leads; receiving responses to invitations; advancing proposals.

Advertising in Instagram. Instagram is growing exponentially and has already numbered more than one billion users. In Russia 23 million people use this social network.

Advertising in Instagram is used variously: advertisement placement in the feed; advertising in stories; advertising in bloggers' websites (agreed personally or through external instruments).

Advertising in Odnoklassniki. Odnoklassniki is the third most popular social network in Russia, providing options both to media and target advertisements. There is also a possibility to reach an agreement with network's owners directly.

Advertising through social networks is preferable for both large corporations and small businesses. Social networks place advertisements on reasonable prices and suggest many options for testing. It is necessary to choose the right platform and adjust targeting properly.

Contextual advertising. This type of advertising can be seen on search engines websites and in advertising blocks of various sites. There is a 100% possibility for such advertising to be seen by potential customers as it addresses precisely users' queries (key words or triggers).

The following types of contextual advertising are practically applied: *searching, thematic and behavioral.*

The advantages of contextual advertising include precise targeting the group of users defined by the advertiser (searching, thematic, geographical targeting, etc.); prompt results; payment for the obtained results only.

The authors singled out the following peculiarities of contextual advertising application used for business promotion:

- unstable effectiveness when advertisements are not shown if funding has ended;
- the price of a click can be changed several times during the payment period as systems use the auctioned model of placement advertisements in their blocks;
- for some categories of businesses the price of a click may be more expensive than the unit price of the sold items during the high sales season.

Media advertising is a graphic message placed in advertising blocks of a website, in ICQ client windows, on pages of searching systems, etc. It resembles the newspaper advertisement but possesses the advantageous interactive form and has the possibility to measure the result. The main characteristics of the most widely spread types of media advertising are presented in Table 4.

Table 4. Characteristics of the most widely spread types of media advertising

Types of media advertising	Characteristics
1	2
Banners	It is one of the first types of media advertising. A banner can cover all the site contents for some seconds and after clicking, a promo page opens automatically. This type of banner is called rich media. Currently, animated banners are of great popularity.
Video	Users watch video advertisement at information and entertainment portals or via video hosting. A commercial is shown in the beginning (pre-roll), in the middle (mid-roll) and in the end (post-roll). There is a specific format for each type of commercials depending on its aim described in the rules of the video platform, for example, in YouTube instruction.

1	2
Branding	Advertisement is posted within popular news and entertaining platforms. It is possible to brand the main page (e.g. at Kinopoisk website while promoting movies) or the only page. Branded advertisement is considered to be one of the most expensive media formats due to certain complications while posting and some specifics of platforms with a great number of users.

The advantages of media advertising include the effect of memory, which implies a rapid memorization of a brand or a company name; immediate start of work and acquiring fast results; creation of a brand or a company sustainable image; possibility to adjust flexibly to target audience.

In authors' opinion, when promoting companies it is necessary to take into account some particular traits of media advertising: high price in comparison with other Internet promotion instruments; necessity to apply new methods of visitors' attraction; use of a new format for special projects, which brand thematic websites and a banner turn into an independent game application so that its price rises significantly.

Guerilla marketing. A company is promoted by latent influence upon target customers through forums, blogs, social networks, feedback services, etc. This type of advertising is incredibly simple and efficient. Some agents are embedded in the masses, starting a thematic discussion. If it is done competently, users are not even aware that somebody is trying to manage and direct their preferences and do not perceive information as an advertisement.

Guerilla marketing includes the following types of promotion: buzz-marketing, marketing, rumor marketing, marketing of talks, WOM marketing, oral marketing, viral marketing, and hidden advertisement.

The advantages of guerilla marketing include the following:

- low-pressure advertising of goods implying the possibility to describe all their qualities and differences from the ones offered by competitors;
- a real customer considers that he or she has come to the conclusions independently without any influence on their opinion;
- possibility to participate in a discussion, which can lower the quality of a product/company and change the situation in their favor;
- long-term results implying thematic discussions at forums, posts in networks and communication in blogs, which remains in Internet for a long period.

Nevertheless, the use of guerilla marketing comprises some specifics:

- possibility of disclosure and negative feedback from visitors and administration of a website;
- some technical complications, namely, some resources demand to carry out certain additional activities as to change IP, re-register, etc.
- efficiency of an advertisement can be evaluated by only measuring the audience size and the degree of users' involvement into a discussion, but it is almost impossible to measure the number of visits on a company's website.

Native advertising is considered to be a natural one. It is organically included into the contents so that it causes no irritation and is more credible among potential customers. The following types of native advertising are applied currently: advertising in searching systems; recommendations; product placement; branded contents; special projects; advertising in social networks.

Influencer marketing is a form of marketing, which primarily considers the opinion leaders, but not the target market as a whole. It defines the range of people who can influence upon potential customers and concentrate its marketing activities around them. Not only a certain person, but also any group, brand, company or even place (for example, a hobby club) which, for some reasons, is trusted by users can turn to be the "influencer".

There are the following types of influencer marketing: sponsored posts in blogs; placement of branded contents in social networks; creation of contents by leaders of opinions.

According to authors' judgement, the main peculiarity of influencer marketing usage is the high price of advertisement: the more subscribers the opinion leader possesses, the higher is the price of his or her advertising.

5. Conclusions

Thus, the following results have been obtained during the study**:**

- it has been suggested to classify BTL-communications into 3 types: sales promotion, public relations and Internet advertisement;
- in authors' opinion, Internet advertising is a fundamentally new form of BTL-communications implying such business promotion instruments as content marketing, e-mail marketing, marketing in social media, guerrilla marketing, influencer marketing, etc.;
- classification of sales promotion has been specified. In particular, direct marketing and sponsorship have been categorized by authors as activities aimed at encouraging customers (promo actions with branding communication);
- the important role of social media in promotion of goods and services to the market has been exposed (social networks and instant messengers' users over a three-year period has been analyzed); advantages and drawbacks of social networks in business promotion have been revealed.

Modern innovative business promotion marketing instruments include SEO-promotion, SMM, Influencer marketing, native advertising, e-mail marketing, contextual marketing, guerilla marketing, contextual and media advertisement. It is indispensable to comprehensively apply all the above-mentioned innovative business promotion marketing instruments to succeed in business.

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Rezumat

Actualmente, o caracteristică specifică a dezvoltării economiei Federației Ruse reprezintă digitalizarea acesteia. Multe entități economice folosesc instrumentele marketingului digital pentru ocuparea pieței, sporirea fidelității clienților și creșterea vânzărilor. Prin urmare, o importanță deosebită capătă astăzi problema promovării companiilor pe piață cu ajutorul instrumentelor moderne de marketing. În articol, autorii au propus o clasificare a comunicațiilor BTL, cu divizarea lor în 3 tipuri: promovarea vânzărilor, relațiile cu publicul și publicitatea online. Clasificarea instrumentelor de promovare a vânzărilor a fost precizată. Marketingul direct și sponsorizarea au fost trecute de către autori la categoria stimulării consumatorilor (acțiuni promoționale cu comunicare de imagine). Spre deosebire de multe interpretări existente, acest grup include merchandisingul și marketingul de evenimente. Au fost relevate instrumentele de stimulare morală și materială a angajaților. Publicitatea pe internet, cu instrumentele de promovare a unei companii pe piață precum content marketing, email marketing, marketingul media social, marketingul ascuns, influencer marketing etc., este evidențiată de autori ca o componentă importantă a comunicațiilor BTL.

Studiul s-a concentrat pe marketingul media social (SMM): a fost analizat numărul de utilizatori din rețelele de socializare și mesageria instantanee pe o perioadă de 3 ani, au fost identificate avantajele și dezavantajele utilizării rețelelor de socializare pentru promovarea unei companii pe piață.

***Cuvinte-cheie**: comunicări ATL și BTL, email marketing, marketing media social, marketing ascuns, influencer marketing, blogging, optimizarea căutării*

Аннотация

В настоящее время особенностью развития российской экономики является ее цифровизация. Многие хозяйствующие субъекты рынка с целью завоевания рынков, повышения лояльности потребителей и увеличения продаж используют цифровые маркетинговые инструменты. Поэтому проблема продвижения компаний на рынке с помощью современных маркетинговых инструментов является в настоящее время особенно актуальной. В статье авторами предложена классификация BTL-коммуникаций, предполагающая их разделение на 3 вида: стимулирование сбыта, связи с общественностью и интернет-рекламу. Уточнена классификация инструментов стимулирования

сбыта, в частности директ маркетинг и спонсорство отнесены авторами к стимулированию потребителей (к промо-акциям с имиджевой коммуникацией). В отличие от многих трактовок, в данную группу включены мерчандайзинг и событийный маркетинг. Выделы инструменты морального и материального стимулирования сотрудников. Интернет-реклама, представляющая собой такие инструменты продвижения компании на рынке, как контент-маркетинг, email-маркетинг, маркетинг в социальных медиа, скрытый маркетинг, influencer marketing и др., выделена автарами как важная составляющая BTL-коммуникаций.

В исследовании особое внимание уделено маркетингу в социальных медиа (SMM): проанализировано количество пользователей в социальных сетях и мессенджерах за 3 года, выделены преимущества и недостатки использования социальных сетей для продвижения компании на рынке.

***Ключевые слова**: ATL- и BTL-коммуникации, email-маркетинг, маркетинг в социальных медиа, скрытый маркетинг, influencer marketing, блоггинг, поисковая оптимизация*

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WHEN IS IT NECESSARY TO USE THE MANAGEMENT TOOL?

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JEL Classification: M10, M19

Abstract

The decisive contribution of management modernization to the overall efficiency of public and private organizations, regardless of their size, is well known. Among the ways to modernize it, managerial methodology is crucial. What does managerial methodology entail? First of all, using a modern managerial tool, adapted to the dimensional and functional specifics of the organization; secondly, the promotion of methodologies and other rigorous methodological elements (procedures, rules, standards, etc.), able to discipline the performance of managers, materialized in the exercise of management processes. Managerial tools, materialized in complex methods, methods and management techniques facilitate the substantiation and adoption of forecasting, organization, coordination, training and control-evaluation decisions, providing real help to managers for establishing and achieving the objectives assumed in efficiency. However, the use of managerial methods and techniques should not be regarded as a whim of a particular manager but should meet certain needs. Our article highlights the need and ability to use the managerial tools, situations that require its promotion and effective use. The focus will be on the most representative management methods and techniques, established internationally, such as profit center management, exception management, project management, SWOT diagnosis and analysis, delegation or dashboard. They are joined by a method proposed by the author in the field of employee evaluation and motivation.

Keywords*: managerial methodology, managerial tools, management methods and techniques, management decision, managerial efficiency and effectiveness*

1. Introduction

Specialized literature abounds in presenting the most significant aspects regarding the content of management methods and techniques applicable at the level of organizations. The practice has significant quantitative resources - over 300 such managerial tools. For each, there are detailed methodological guides that highlight the steps and phases to be followed when applying them. These are accompanied by the advantages and limitations of actual use. Most managers who want and decide to use a management method or technique have, as a starting point, the benefits generated by using it, if possible, in the short term, neglecting or paying less attention to the complexity of the implementation methodology or situations where presence is required, for example, a managerial tool. Our research addresses the answers to the question: when is it necessary to promote and use the X method/technique? We proceed from the fact that those who are decisively and operationally involved in the use of

managerial tools - managers and specialists in public and private organizations - know the specific methodology of each management method or technique, as well as the managerial and economic implications of their operationalization. Here, we refer to the management based on profit centers (business formats or strategic business units), project management, exception management, diagnosis, SWOT analysis, delegation, dashboard, evaluation and motivation grids. The elimination of arbitrariness in the selection of the most appropriate managerial tools will allow the amplification of their contribution to the efficiency of management and the organization as a whole.

2. When is it necessary to use the most important managerial tools?

The managerial tools to which we refer include:

- Complex management methods: profit center management, project management, management through exceptions;
- Management methods: diagnosis, SWOT analysis, delegation, dashboard, evaluation and motivation grids.

2.1. In what situations is it necessary to call the management of profit centers?

Profit center management or management of profit center is a complex management method based on the promotion of the management center (profit or cost) as a business format, with a high degree of decision-making and operational autonomy. Often considered as a development of management by objectives, the management based on profit centers is the most complex and sophisticated management tool known and operationalized in public or private enterprises, medium and large. Its complexity is explained by the fact that it constructively takes over both some components and operating mechanisms specific to the management by objectives, management by budgets and the cost-hour-production system (SCOP) [2, pp. 41-42].

The use of this complex method is recommended in the following situations:

- when the management of the enterprise really wants to imprint characteristics of order, discipline and rigor to the managed field, as a premise of its efficiency and effectiveness;
- when the exercise of a truly predictive, anticipatory management is pursued, supported by the substantiation and elaboration of objectives at all organizational levels (up to the job level);
- in situations when the management of enterprise has initiated complex managerial redesign actions;
- when managerial and economic decentralization within the company is a necessity for its economic success;
- when the responsibility of the managers of business formats and their components is pursued; the delimited business formats or management centers (profit or cost) have a high degree of decisional and operational autonomy, and its capitalization is conditioned by the competence of its own managers;
- when the professionalization of management is pursued to its lower levels;

- when searching for the "right ground" for the implementation of management processes and each of their functions, from forecasting to control-evaluation. Practically, as it will continue to be, both the components and the methodology of operationalizing the management based on profit centers set in motion the managerial functions, imprint them new dimensions and give special importance to them in the economy of management processes;
- when an amplification of motivational dimension of management is desired; the granting of material and moral spiritual rewards/sanctions is conditioned by the degree of achievement of individual objectives, objectives of the management centers (business formats) and objectives of the enterprise, as well as by the degree of involvement in their achievement.

2.2. Evaluation and motivation grids

Evaluation and motivation grids recommended in terms of promoting and using management of profit centers are encouraging in this regard.

At the level of each month, quarter, semester and year, the obtained results (budgets) are evaluated and analyzed focused on:

- the registered differences compared to the budgeted level (objectives, expenses, revenues, results);
- the dynamics of results/objectives and results/results, during a calendar year;
- the causes that generated favorable or unfavorable deviations.

The motivation of employees, in the sense of providing material and/or moral and spiritual rewards/sanctions should be focused on*:*

- the degree of achievement of individual objectives;
- the degree of achievement of business format (management centre) objectives; and
- the degree of achievement of company's objectives.

In this regard, we recommend the use of an evaluation and motivation grid, designed to provide specific motivation.

Such a grid plays two important roles:

- evaluates the results obtained from the achievement of objectives inserted in the company's budget, budgets of business formats (management centers) and job descriptions;
- facilitates the promotion of a differentiated motivation of each participant in achieving the objectives, by taking into account the degree of achievement of enterprise's objectives, business and individual format.

Recommended situations for promoting and using such a managerial tool:

- when the organization operates on the basis of a categorical system of objectives, decentralized to the level of management and execution positions;
- when the accountability of managers and executors is pursued as a principle;
- when the classical mechanisms of evaluation and motivation tend to approach the populist and undifferentiated contribution of employees to achieving objectives.

The evaluation and motivation grid proposed below (functional in the context of management of profit centers) has monthly use, since the launch, execution, monitoring and analysis of budget execution take place monthly. This managerial tool is a novelty for the theory and practice of management in Romania.

Evaluation and motivation grid

I. Objectives

- *At enterprise level:* $O_1, O_2, \ldots\ldots\ldots O_n$
- *at business format level:* $OFa_1, OFa_2, \ldots\ldots\ldots OFa_m$
- *at job level (individual objectives):* $OI_1, OI_2, \ldots\ldots\ldots OI_p$

II. Results

- *At enterprise level:* $R_1, R_2, \ldots\ldots\ldots R_n$
- *At business format level:* $RFa_1, RFa_2, \ldots\ldots\ldots RFa_m$
- *At job level:* $RI_1, RI_2, \ldots\ldots\ldots RI_p$

III. Degree of achievement of objectives (Index = Objective / Achieved × 100)

- *At enterprise level:* $I_1, I_2, \ldots\ldots\ldots I_n$
- *At business format level:* $IFa_1, IFa_2, \ldots\ldots\ldots IFa_m$
- *At job level:* $II_1, II_2, \ldots\ldots\ldots II_p$

IV. The employment salary of person X is Sx

Determine the importance of each objective within the overall objectives, at each organizational level: enterprise, business format, position, so that the sum of the importance coefficients is 1. The size of the importance coefficients Kn (enterprise), Km (business format) and Kp (position) is established either by consulting the members of the management team (at enterprise level) or the directors of the business formats (at the level of business format and position)

V. Determination of the coefficients of correction of the employment salary, at three levels:

- *At enterprise level:* $KcI = \sum I_n K_n$ (1)
- *At business format level:* $KcFa = \sum I_m K_m$ (2)
- *At job level:* $KcP = \sum I_p K_p$ (3)

VI. Calculation of the global correction coefficients: $Kg = (KcI \times k1) + (KcFa \times k2) + (KcP \times k3)$, (4)

where k1, k2, k3 are the importance levels of the correction coefficients, so that their sum is 1.

VII. Determination of actual income/employee: Se = Sx × Kg (5).

2.3. When is it recommended to use project management?

Project management is a complex management method with a limited duration of use, which facilitates the solution of complex problems, of a strategic and innovative nature, by specialists with heterogeneous training, temporarily constituted in an organizational network parallel to the formal organizational structure.

Private companies, public organizations, non-governmental organizations, etc. can appeal to its services. The element of specificity is the simultaneous existence during the time necessary

to complete the project, the project team (team), the project manager and a specific organizational formula of project management (with facilitation, with individual responsibility, with staff or mixed).

The use of project management is therefore recommended in the following situations:

- when the organization encounters some very complex problems that have a pronounced strategic and innovative character (for example, promoting strategic management, managerial reengineering, company restructuring);
- when it is desired to shorten the period of realization of some projects (complex problems);
- when different substantiation of solutions is pursued for solving certain projects, by involving specialists with heterogeneous training, recruited from the functional and operational departments of the organization or from outside it.

2.4. When is it necessary to use exception management?

Exception management is a simplified management system, based on the upward flow of information that represents deviations from the pre-established tolerance limits, in order to simplify management processes and make better use of resources. Its applicability is restricted to enterprises with large series or mass production, with repetitive character, where the objectives and other elements of characterization of the conducted activities are judiciously delimited and dimensioned. Situations requiring the presence of this management system [1, pp. 37-43]:

- the aim is to streamline the company's information system or an organizational unit. Information, information flows and circuits are targeted with priority;
- the time budget of managers is too crowded, they are "suffocated" by small actions, less important, which realization requires a large amount of information with a degree of aggregation inconsistent with their hierarchical position;
- a reasonable, tiered hierarchical structure of authority is demanded, along with the determination and proper sizing of duties and responsibilities, as a prerequisite for streamlining the organizational management subsystem;
- in the context of management by objectives, when pursuing the degree of achievement of objectives (especially those related to physical production) and deviations from their budgeted level (with priority deviations in the cost of raw materials, materials and workmanship);
- when the production assortment structure is a simplified one (few products), and the type of production is large scale or mass. Management by exception can be used also in other types of companies, but to pursue the deviation recorded in a particular area (consumption norms, raw materials and workmanship, physical production-level benchmarks, and so on).

2.5. When is it necessary to perform diagnostic and/or SWOT analysis studies?

Diagnosis is a management method that provides research, analysis and evaluation of an organization, by identifying the main strengths and weaknesses and formulating strategic and

tactical recommendations to improve its viability potential. Even if through diagnosis we know the past and the present of the organization and its procedural or structural components, let us not omit the fact that, without this knowledge, we cannot substantiate the future!

SWOT analysis, in turn, is a management method focused on investigating, analyzing and evaluating the organization and its environment (regional, national, international), highlighting strengths and weaknesses, opportunities and threats.

There are several situations that require priority diagnosis:

- whenever the managers of an organization or its organizational units want to know in detail the „state of affairs" in the managed field, respectively the main dysfunctions and positive aspects, the reasons that generate them and „areas" in which it is necessary to intervene decisively;
- when launching large-scale initiatives, with a pronounced strategic touch, such as managerial redesign (remodeling), privatization, restructuring, etc. of an organization;
- in situations when, especially in public organizations, the managerial teams are being replaced;
- at the end of important periods (usually at the end of the year) to identify the potential for economic and managerial viability of the organization and the effectiveness of the management team;
- before projecting the future of an organization, respectively, before developing its strategy.

SWOT analysis is used when:

- substantiating, elaborating and implementing organization's strategy;
- there are significant changes in the configuration and functionality of the organization.

The two methods of analysis can be found in any type of organization and are required, more than ever, with the resumption of activities in organizations affected by the coronavirus pandemic.

There are similarities and differences between SWOT diagnosis and analysis. Similarities, derived mainly from their status as foundations of a strategy, refer to [5, pp. 120-121]:

- both can be considered important cornerstones of the organization's strategy, providing valuable information on its functioning, efficiency and effectiveness, or regarding procedural or structural and organizational components that are investigated and analyzed;
- both can be considered an important basis for the design and operationalization of organizational and managerial changes, such as restructuring, privatization, management redesign, retrofitting, etc., with major impact on future economic, commercial and managerial levels;
- both provide an overview of the organization's configuration and functionality at time „t", requested by its top management;
- both are made in a specific typology, depending on socio-professional configuration and origin of research developers, the mixed ones, the result of

involving professional teams from inside and from outside the investigated organization being more attractive in terms of content;

- both involve using a variety of tools for collecting, recording, processing and interpreting data and information relating to the investigation, such as questionnaires, interviews, direct observation, study of documents (information situations) etc.;
- both apply methods to stimulate brainstorming-type creativity for identifying and defining strengths, weaknesses, opportunities and threats;
- both highlight the organization's competitive advantage.

Similarities of the two methods make it difficult for those who want to investigate and analyze their own organization. „Trendy" is the SWOT analysis today, mainly through the way of visualizing strengths, weaknesses, opportunities and vulnerabilities.

The scope, methodological complexity and managerial utility generate significant differences between the management methods approached - SWOT diagnosis and analysis:

- a much higher complexity of a diagnostic study, compared to the SWOT analysis;
- a causal highlighting of the main strengths and weaknesses is specific to diagnosis; moreover, a serious diagnosis, carried out by professionals, deepens the cause-effect analysis to the smallest detail. Thus, we call such a diagnosis „in cascade", extremely beneficial for study users (organization managers);
- SWOT analysis is completed by a matrix that describes the strengths, weaknesses, opportunities and threats; a diagnostic study is completed by strengths and weaknesses, causally addressed, by determining organization's viability potential with regard to domestic, foreign and global aspects and making recommendations related to increasing its attention on the reasons of strengths and shortcomings. From this perspective, diagnosis detaches from the SWOT analysis by complexity and value for managers and other stakeholders.
- strengths and weaknesses are defined and characterized in a quantified diagnostic study by specifying the period of comparison, the causes and implications of their manifestation; in case of a SWOT analysis, strengths and weaknesses are highlighted as such without substantiation, which can bring additional elements of understanding;
- a diagnostic study may „suffer" from external diagnostics, given that its makers focus only on the internal environment;
- recommendations focused on the reasons causing strengths and weaknesses of the strategy are found mainly in the form of strategic options, while the strategic dimension of a SWOT analysis is provided by a combination of strengths, weaknesses, opportunities and threats;
- frequently, SWOT analysis summarizes the SWOT matrix, whose recovery and interpretation says little to an unprofessional manager; a diagnostic study highlights the relevant tabular forms, the strengths and weaknesses of a causal relationship, much easier to interpret, including insufficient managerial competence of managers; also, recommendations developed on causes facilitate the decisional intervention of managers and their transformation into solutions to the problems faced by an organization or its component at the time of analysis;

- the combinations of inventories of four quadrants, in fact, are more suggestive in terms of the types of strategies to be adopted and promoted in the „life" of an organization compared to the findings of a diagnostic study; suitable answers to questions like „how can we use strengths to capitalize on identified opportunities?" or „how can we take advantage of opportunities to overcome weaknesses?" cannot be discovered only by harnessing a SWOT matrix; as for diagnosis, the choice of a certain type of strategy can only be given by the potential for global sustainability, whose size allows a choice between a recovery, consolidation or development strategy.

The correlative approach of the two methods, very close in terms of methodological content, allows us to see that diagnosis is a much more complex and suggestive method for the „real health" of organization and, at the same time, much „closer" to its strategic future.

2.6. When do managers turn to delegation?

Delegation is a management method that consists in temporarily transferring the exercise of tasks, together with the necessary skills and responsibilities, from the manager to a direct subordinate [3, p. 178].

Then, the use of delegation by managers occurs:

- when their time budget becomes insufficient to perform the tasks limited to the position, they suffocate from the pressure of small but urgent problems;
- when they want to train future managers, the delegation being a real school of management, if used professionally;
- when they want to create, maintain and develop an atmosphere of trust in the potential of subordinates, collaboration with them and, implicitly, appreciation of the role they play in fulfilling the objectives of their organization and the structure of which these two players of delegation are part.

2.7. In what situations is it necessary to use the scoreboard?

The scoreboard is a set of relevant information regarding the results obtained in the led field, presented in a synthetic form, pre-established and operatively transmitted to the beneficiaries. It follows from this brief definition that the instrument panel can be approached in two ways [4, p. 339]:

- on the one hand, as a way of rationalizing the information system, which acts, practically, on all its primary components (information, information flows and circuits, information procedures, etc.);
- on the other hand, as a managerial method with a direct impact on the time budget of managers and on its structure.

It can be used (as a method, n.a.) on its own or in the context of more complex management tools, such as management based on profit centers.

The scoreboard is recommended in the following situations [1, pp. 37-43]:

- when tracking is required on the way to achieving the objectives and the level of results obtained to ensure an improvement in the degree of soundness of management decisions.
- when one or another area or the organization as a whole, are subject to control, monitored by the top management due to poor results recorded continuously during a preceding interval time.
- when organization's information system is malfunctioning, which means recording numerous changes of the information message (filtering, distortion) of parallelisms during transmission and processing of information (redundancy) or existence of an oversized volume of information that can not be responded appropriately by relevant decisions and actions. Manifestation of this situation naturally leads to consequences both "upstream" by affecting the quality of decisions taken (degree of substantiation inappropriate) and "downstream" through influencing the actions undertaken to implement the decisions.
- when the time budget for managers, especially those located on the top floor of organization's management, is tight because they are "bombarded" with all kinds of information, some of them – most of them, at some point - having little importance and relevance to the occupied position. "Informational suffocation" of managers can have only negative consequences for the quality of decisions, and also for the level and quality obtained as a result of achieving goals. In addition, there may be common conditions of stress, physical fatigue and nervous irritability for managers, which can negatively affect the subordinated staff.

3. Degree of investigation of the problem currently, and purpose of research

Managerial tool approach is not a novelty anymore but, on the contrary. There are numerous specialized works, studies, articles, etc. which emphasize the methodological part of management, perhaps as the most dynamic and with a decisive role in sizing the manner of exercising management processes. Unfortunately, there are few references to situations in which managers of public or private organizations have to take a decision in order to promote and use a management method or technique or to try empirically solve the problems they face. The selection of managerial tool must be made according to the nature, complexity and difficulty of solving respective problems, and also to the degree of knowledge of the methodological content of managerial methods and techniques. For these reasons, our research focused on signaling the main motives of managers' decision-making interventions in identifying those useful managerial tools at a given time or at a certain stage in order to ensure the continuity of organization's development in improved conditions of efficiency and effectiveness. Otherwise, chaos is created by using management methods and techniques. The competence of managers who make decisions in connection with the typology of a managerial tool and the moment of its use in the exercise of management processes is, in our opinion, decisive.

4. Applied methods and materials

When conducting research, we capitalized on didactic experience, scientific and managerial research, study of specialized literature from the country and abroad on management, managerial tools and methodological-managerial efficiency of organizations. We also capitalized on the ideas from numerous scientific papers - books and specialized articles - published in prestigious publishers or internationally listed journals. To these, we added the results of scientific research carried out over time with the support of national research grants or Romanian business environment (public and private enterprises).

5. Results

The scientific research we referred to materialized in a managerial methodology of two types of enterprises, by promoting modern managerial tools, improved in terms of content (see management based on profit centers, diagnostics, dashboard or evaluation and motivation grids, the latter being an absolute novelty). It is known that the management by profit centers is specifically Romanian, countries with advanced economy have been using, for over 7 decades, the management by objectives and the management by budgets. The combination of these complex methods, together with the cost-hour-production system (SCOP), allowed the methodological shaping of the management by profit centers. In recent years, changes have been made to this complex method, in the sense that the management center (profit or expenditure) has been redefined as a „business format", and the operationalization of the last stage of the application methodology, intended to evaluate and motivate the personnel participating in achieving the objectives; it developed a new method, entitled "evaluation and motivation grid". All these results have allowed a more rigorous definition of the situations that make necessary and possible the promotion and use of management methods mentioned above.

6. Conclusions

The presented aspects highlight the special importance of the temporary and situational location of decisions for the promotion and use of extremely important managerial tools in the management of Romanian organizations, with major impact on the efficiency and effectiveness of management and, in general, on the efficiency of organization. It is absolutely true that the decision to choose and implement a management method or technique, at the level of organization, belongs to its top-level managers. As such, their managerial competence is decisive in this regard. Moreover, because of the desire to "be fashionable" from this point of view, they make many mistakes and choose methods that "do not correspond" to the dimensional and functional peculiarities of the managed field and record losses, instead of gains. At the same time, bureaucratic phenomena can be exacerbated. In order to avoid such undesirable situations, generated by the reckless, random use of managerial tools, we consider that action must be taken in several directions to de-bureaucratize Romanian organizations, presented below [6, pp. 486-489]:

- *The first solution:* management reengineering after a preliminary diagnosis of the managerial viability of organizations with a high degree of bureaucracy. The

methodology to be operationalized comprises several distinct sequences, such as: objectives, processes, structures, people (managers and executives), results.

- *The second solution:* promoting a systemic approach to objectives, which includes fundamental objectives (at the organizational level), derived objectives (at the level of functions/activities and, implicitly, departments), specific objectives (associated with the tasks and functional/operational compartments) and, which is very important, individual objectives, at the level of management and execution positions. From this perspective, the use of job description as a management tool and not just as an organizational document is a priority. Within it, one must find the individual objectives, derived from the specific ones, together with the support elements necessary for their fulfillment (tasks, competences, responsibilities), delimited and dimensioned so as to respect the „golden triangle" of the organization, respectively, a quantitative balance between tasks, competences and responsibilities throughout the existence of the position.
- *The third solution:* promoting efficient mechanisms for the functioning of positions, focused on the correlation between the official authority confined to positions and the personal authority of the holders of positions; in other words, the professional exercise of management and executive positions require the compatibility of occupants with them through competence.
- *The fourth solution:* promoting a true „document management"; an avalanche of papers of all kinds, some justified, others just to justify the inability of some employees to solve their tasks, calls for the amplification and intensification of „paper cutting" action, launched in 2016, along with a real redesign of the content of those who are considered useful. Document management has two major objectives: streamlining internal processes in public institutions and streamlining relationships with citizens. Achieving these objectives, in the sense of de-bureaucratization, involves a document management approach in close connection with digitization.
- *The fifth solution:* digitization, respectively, increasing the degree of computerization of public institutions by promoting integrated IT applications; such a solution takes into account the still very low degree of electronic processing of information, against the background of the reluctance of some employees to use a computer to perform tasks (fear of job loss). In a broader sense, this major way of substantially mitigating the bureaucracy is called „digitization", an area in which, as we have already mentioned, Romania occupies the last position between the countries of the European Union.
- *The sixth solution:* stability and consistency in the application of legislation; to do this it is necessary to eliminate the legislative chaos that regulates the functioning of institution and relations with the citizens, efforts to lean up legislation and a unitary regulatory approach.

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Rezumat

Este bine cunoscută contribuția decisivă a modernizării managementului în eficientizarea de ansamblu a organizațiilor publice și private, indiferent de mărimea acestora. Între modalitățile de modernizare a acestuia, metodologizarea managerială este determinantă. Ce presupune metodologizarea managerială? În primul rând, apelarea unui instrumentar managerial modern, adaptat specificului dimensional și funcțional al organizației; în al doilea rând, promovarea de metodologii și alte elemente metodologice (proceduri, reguli, standarde etc.) riguroase, capabile să disciplineze prestația managerilor, concretizată în exercitarea proceselor de management. Instrumentarul managerial, concretizat în metode complexe, metode și tehnici de management facilitează fundamentarea și adoptarea deciziilor de previziune, organizare, coordonare, antrenare și control-evaluare, constituindu-se în veritabile ajutoare la îndemâna managerilor pentru stabilirea și realizarea obiectivelor asumate în condiții de eficiență. Numai că, apelarea metodelor și tehnicilor manageriale nu trebuie tratată ca un capriciu al unui manager sau altul ci trebuie să răspundă unor nevoi. Articolul nostru evidențiază tocmai necesitatea și oportunitatea folosirii instrumentarului managerial, situațiile ce reclamă promovarea și utilizarea efectivă a acestuia. Accentul va fi pus pe cele mai reprezentative metode și tehnici de management, consacrate pe plan internațional, precum managementul pe centre de profit, managementul prin excepții, managementul prin proiecte, diagnosticarea și analiza SWOT, delegarea ori tabloul de bord. Lor li se adaugă o metodă propusă de autori în domeniul evaluării și motivării personalului.

***Cuvinte-cheie**: metodologizare managerială, instrumentar managerial, metode și tehnici de management, decizia de management, eficiența și eficacitatea managerială*

Аннотация

Решающий вклад модернизации управления в общую эффективность государственных и частных организаций, независимо от их размера, хорошо известен. Среди способов его модернизации решающее значение отводится методологизации управления. Что влечёт за собой методологизация управления? Прежде всего, использование современного управленческого инструмента, адаптированного к размерам и функциональным особенностям организации, во-вторых, продвижение приёмов и других методологических элементов (процедур, правил, стандартов и т. д.), способных дисциплинировать работу задействованных менеджеров в управленческих процессах. Управленческий инструментарий, включающий сложные приёмы, методы и техники управления, облегчает обоснование и принятие решений по прогнозированию, организации, координации, обучению, контролю и оценке, предоставляя реальную помощь менеджерам при установлении и достижении задач в условиях эффективности деятельности. Однако использование методов и приёмов управления не должно рассматриваться как прихоть того или иного менеджера, а должно отвечать определенным потребностям. Наша статья подчеркивает необходимость и возможность использования инструментов управления, ситуации, необходимого продвижения и эффективного использования. Основное внимание уделено наиболее эфективным методам и приёмам управления, разработанным на международном уровне, среди которых управление центрами прибыли, управление исключениями, управление проектами, диагностика и анализ SWOT, делегирование или панель инструментов. В дополнение к рассмотренным методам авторами предложен приём или метод оценки и мотивации персонала.

***Ключевые слова**: управленческая методология, инструменты управления, приёмы и методы управления, управленческое решение, эффективность и результативность управления*

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Abstract

The digitalization of the economy, scientific and technical progress, the elimination of language barriers along with the internationalization of economic life have led to the development of new business models called multidimensional platforms. Such names as MasterCard, Visa, Airbnb, Amazon, Facebook, etc. are widely known for their fast development and represent business models in the form of multidimensional platforms. Defining multidimensional markets, identifying the characteristic elements, determining the relevant market, and analyzing the competitive environment in multidimensional markets, represent a real challenge for competition authorities. Assessing unilateral or coordinated behavior in the multidimensional market is a rather difficult exercise due to the complexity of these relationships, for which traditional approach is insufficient. In order to clarify these issues, a theoretical analysis of this structure is needed, but the decision-making experience of the competition authorities in the European Union is also useful. Multidimensional markets are found in different sectors of the national economy, therefore several segments of the financial market have the characteristics of multidimensional markets, and, at the same time, thanks to a complex, theoretically grounded approach to multidimensional platforms one can avoid errors and identify solutions.

This paper presents and analyzes the concept of a multidimensional market, the particularities of determining the relevant market, and the analysis of the competitive environment depending on the type of market and the specifics of the financial sector.

Keywords*: multidimensional market, financial market, relevant market, competition*

1. Introduction

The concept of multidimensional market has become more widespread in recent decades thanks to the work of Jean-Charles Rochet and Jean Tirole [14] who were among the first to distinguish between traditional (one-dimensional) markets and multidimensional markets. Subsequently, it was accepted that multidimensional markets require a different approach from traditional markets, but for a correct assessment of the multidimensional market, it is necessary to determine how they differ from traditional markets. Currently, there is no consensus on the terminology applied, for these reasons we consider that the notions of "two-sided market", "two-dimensional market", "platforms", and "multidimensional platforms"

could be used in the same sense as the notion of "multidimensional market", for a uniform exposure. If a business serves two or more distinct consumer groups (each group represents a market size), it is considered to be active in a multidimensional market. There are many examples of multidimensional markets: the media market, the payment card market, stock exchanges, shopping centers, digital platforms, the press, etc.

Although it may seem that multidimensional markets have emerged with the digitalization of the economy, this impression is wrong. Along with the digitalization of the economy, these markets have stood out and developed. Multidimensional markets previously existed in the "off-line" environment, such as the print media market, which serves: readers, content trainers (journalists) and advertising agencies.

In the opinion of the OECD Competition Committee Chairman, Frédéric Jenny [13], platforms (multidimensional markets) are not a new business model, but rather an old one that has been invigorated on a larger scale in the interest of participants in the modern economy. Platforms differ from traditional markets and, in particular, due to important externalities, which, if ignored, can lead to wrong decisions. Platforms are business models used in various branches of the national economy and should be seen as technologies that minimize trading costs, facilitating transactions that would not possibly take place outside the platform. The issue of multidimensional market analysis is also determined by the lack of relevant statistical data, so official statistics do not have data on the economic activity of entities or systems qualified as multidimensional platforms or these data reflect the truncated situation and do not characterize the complexity of economic relations.

This paper analyzes the research results related to multidimensional markets, the criteria for defining the multidimensional market, its characteristics, typology and their specificity in the process of analyzing the competitive environment, especially on the financial market.

2. Present stage of problem investigation, the aim of the study

2.1. Defining the multidimensional market

The delimitation of a multidimensional market from a traditional one starts from its features. In the case of a traditional (one-dimensional) market, we have a confrontation between supply and demand for the same goods. The market in conventional vision [1] is presented as a vast complex of bilateral relations, involving information, negotiation, and an indispensable institutional framework.

The pioneers of multidimensional market theory, Rochet and Tirole [14], delimit one-dimensional markets, starting from Coase Theorem. They suggest that the market is considered one-dimensional if end-users adjust the actual allocation of the task, the asymmetry of information between buyer and seller is maintained, and the price is determined by monopoly or the negotiation of the parts. Rochet and Tirole define the multidimensional market relying on the price structure. Thus, "a market is two-dimensional if the platform can affect the volume of transactions by charging more on one side of the market and reducing the price paid by the other part, by an equal amount. In other words, the pricing structure matters, and the platforms need to design it to bring both sides on board. However, their approach to price structure may not always be applicable. For example, if a party does not pay for using

the platform's service (for example, free newspapers, free smartphone applications, etc.), prices for different parties cannot be "tied together in a fixed proportion" because there is no price for one of the parts.

Most multidimensional markets are free to consumers; platform managers have waived the fee to enter or use their platform services but instead have used the available technology to monetize the information given by users. Thus, platforms differ from traditional markets due to the existence of externalities, in particular the demand manifestation, which, if ignored, can lead to inaccurate conclusions and decisions.

According to Marc Rysman [15], the following elements portray the two-dimensional markets:

1) Two groups of participants (agents) with different interests cooperate through an intermediary or a platform;
2) Decisions of each group of participants (agents) affect the results of the other group of agents, usually through external factors.

Andre Hagiu and Julian Wright [11] introduced a new definition for multidimensional platform enterprises, which is based on two elements: (i) multidimensional platform enterprises allow direct interactions between two or more distinct sides and (ii) "each part is affiliated to the platform". This definition is completed by the explanation of the notions of "direct interactions" and "affiliation". "Direct interactions" are described as occurring if "two or more distinct parts preserve control over the key terms of the interaction, as opposed to the intermediary taking control of those terms". "Affiliation" is used in the sense that "users on each side make platform-specific investments that are necessary for the interaction directly with each other". Thus, Hagiu and Wright do not consider prices as a key term of interaction between the parties, and the qualification of the market as multidimensional.

Evans and Schmalensee [7] suggested a less formal definition that captures the key characteristics of platform enterprises. A multi-sided platform (called an economic catalyst), "has (a) two or more customer groups; (b) who need each other; (c) but which cannot capture the value on its account; and (d) rely on a catalyst to help value-creating interactions between them". This definition focuses on the platform's role in creating the value that would not exist (or would be much lower) in its absence. This value is created as a result of solving a coordination issue and the cost of the transaction between customer groups. Production and allocation of this value between several sides are determined simultaneously. How much value each party gets, determines whether they will participate, and also how much remains in profit for the platform. Price structure is essential for determining this allocation.

There are numerous definitions of multidimensional markets. We believe that the multidimensional market is the one in which a company acts as a platform and sells different products to diverse consumer groups, recognizing that the demand for a product from a group of customers depends on the demand for another product, from the other group.

2.2. Characteristics of a multidimensional market

Certain aspects of multidimensional markets are more or less common in each definition. There are four specific elements of multidimensional markets: platforms, users gathered by platforms, pricing structure and indirect network effects.

- **Platforms**

Evans and Schmalensee [7] refer to platforms as "catalysts". The reason is that it works as an interface, connecting different users, which, without the help of platforms, would be particularly difficult or even impossible to transact. Multidimensional platforms considerably reduce trade costs and vary extremely: academic journals, payment card systems, search engines, PC operating systems, dating sites, auction sites, etc. In terms of competition, the platforms compete with others, but they can also face traditional market companies. An illustrative example is Uber service and traditional taxi services.

- **Users**

Users in multidimensional markets can be either distinct groups, or also the same users who can change sides in each transaction. Besides, users can access and use multiple platforms (multi-homing). A user may find several platforms attractive because of distinct features and may use multiple platforms for a particular service. This is possible due to the differentiation of the product, which is materialized by the differentiation of the platforms. This is done either by product quality (vertical differentiation) or by characteristics and prices (horizontal differentiation).

- **Price**

Platforms would charge fees for all parts, as they provide products or services on each side of the platform. However, the price in multidimensional markets is based not only on its costs and demand but also on the benefits of their participation on the other side/part, in particular-demand and profits on the other side. An important consequence is that in many multidimensional markets, the cost of interaction on one side is reduced, sometimes to zero. In fact, in multi-part markets, one group of agents using the platform is usually subsidized by the platform, while another group of users pays for the services provided by the platform.

- **Indirect network effects**

There is an indirect (or intergroup) network effect "when the utility of a consumer belonging to one group of consumers depends on the number of consumers in the other group (s)". In other words, there are indirect network effects when "the value that a consumer derives from a good or service increases with the number of additional users of identical and/ or interoperable complementary goods". Therefore, in markets with network effects, each consumer's choice affects the value obtained from the market for other consumers.

Demand characterized by the *indirect effect of the network* is the process when the consumer's desire to purchase a product depends on the number of consumers of another product. *The direct network effect* is when consumers are willing to pay for a product depending on the number of consumers of that product.

The different parts of a multidimensional market are interconnected due to the existence of network effects. Several agents on one side bring more agents to the other side. Often, network effects are associated with limitations to entry, with anti-competitive potential. On the other hand, network effects are not "necessarily problematic". In this regard, in the case of the Facebook/ WhatsApp merger [6] the Commission provided that no network effects are indicating a competition issue in the market affected by the merger.

2.3. The typology of multidimensional markets

Although the presence of several groups of customers with whom a certain type of interaction takes place characterizes all multidimensional markets, the type and purpose of the interaction, as well as the role of the platform operator, may vary.

Multidimensional markets can be divided into two groups, depending on the role of the platform:

- ***Platforms on which transactions can take place*** are intermediaries whose purpose is to allow direct (observable) transactions between two distinct customer groups. Both groups have the same goal, to make a transaction with the other part. There are indirect positive network effects between the two groups that are internalized by the trading platform. (The card payment market, where the payment of the right to use the consumer card and POS terminals for purchases takes place upon fee. Thus, the higher the number of cardholders, the greater demand from membership merchants to payment systems.)
- ***Platforms on which transactions cannot take place (non-transactional)*** mediate another type of interaction. They do not necessarily involve a subsequent transaction (observable) and do not necessarily have positive bilateral effects in the network. They can be divided into:
  a) *Non-transactional platforms that connect users* (e.g. social networks)
  b) *Non-transactional platforms* that provide information to some users and access to an audience for other users (e.g. the media market, where the sale of content and advertising takes place. In this market, the demand of merchants for advertisement space in a media market increases, as the number of content consumers (viewers, readers, listeners, etc.) rises. Although, the amount of publicity can latter affect them, positively or negatively).

From another point of view [17] multidimensional markets can be divided into matching platforms and advertising platforms (information).

Matching platforms are intermediaries that connect customers with common interests to achieve common goals. Transactions can take place as a result of these actions. Thus, platforms on which transactions can take place are as a variation of matching platforms.

Advertising (information) platforms create conditions for the interaction of one group of users - advertising providers, with another group- the public that accepts advertising. The platform facilitates interaction between advertising providers and users in the form of subsequent transactions because of the reaction to publicity.

2.4. Defining the relevant market for multidimensional platforms

Traditionally, the starting point for analyzing an anti-competitive practice is to define the relevant market that may be affected. This allows us to define demand and identify competitors. However, when an anti-competitive practice involves a platform or a company that has a business relationship with a platform, the situation is different because it is necessary to define the markets at the preliminary stage.

The problem is that multidimensional markets, as mentioned, involve distinct groups of customers, different products, and for these reasons, there can be two alternative approaches to market analysis: defining markets separately for each group of customers or defining a single market that includes all customer groups. To answer this question, we should take into account the following suggestion [9]:

- In multidimensional (non-transactional) markets, we must define several interdependent markets for each side,
- In multidimensional (transactional) markets, we should define a single market.

For companies with several products and locations, which work in traditional markets, it is necessary to determine the relevant market for each product, location to determine whether they are part of the same or different markets.

In contrast, in multidimensional markets, the product supplied on one side of the market does not compete with the product supplied on the other side of the market. Nevertheless, the demand for the product on one side of the market influences the product demand on the other side.

The most common method of determining the relevant market is the Hypothetical Monopoly Test or the SSNIP (Small but Significant Non-transitory Increase in Price). This speculative analysis examines whether a hypothetical single supplier of a product can profitably apply a small but significant and lasting price increase, in conditions that all other products' prices remain unchangeable. A small, significant and long-term rate increase is 5-10% for one year. If this cost increase is considered not profitable, since the product would have been substituted with other products, then these products as well as the areas where their suppliers are located will be included in the relevant market. The process is repeated for a new product group and a new geographical area until the price increase is profitable, therefore no other products or areas can be included in the relevant market.

The definition of the relevant product market in multidimensional markets should include all elements "to properly assess the competitive restraints faced by firms". However, it may not be beneficial [10] to set a uniform SSNIP methodology for all multidimensional cases, due to the variety of multidimensional markets and pricing structures, as well as the level of indirect effects of the network on multidimensional markets.

The method of applying the SSNIP test in multidimensional markets:

i. In a multidimensional non-transactional market, we should monitor the profitability of a price increase on each side of the market;
ii. In a multidimensional transactional market, we must examine the profitability of an overall increase in the price level (the sum of the prices paid per transaction by the other parts).

Because the transaction price is often zero, the task of defining the relevant market in multidimensional markets is complicated. However, in this situation, the Hypothetical Monopoly Test can be used. In this case, Lapo Filistrucchi suggests the SSNDQ (Small but Significant Non-transitory Decrease in Quality) Test, which can be applied since the Hypothetical Monopolist Test is a test of profitability. A company can gain surplus value, both by increasing price and reducing costs, by investing less in quality [13]. The problem

with applying the SSNDQ Test [8] is due to the fact that consumers cannot always make a difference between quality reductions and cost reductions.

Competition authorities may be tempted to determine the relevant product market only on a payment basis, as one part of a multidimensional market is usually subsidized by another one. Each part of a multidimensional market, paying or non-paying, could theoretically be a separate product - market, which should be taken into account when forming a market opinion. In addition, it should be broader, multidimensional.

Although firms operating within two-sided markets have a strategy similar to those in unilateral markets with complementary (interdependent) products, the fact that buyers do not notice and appreciate indirect network effects differentiates the two-sided platform from the market with additional products. In the case of complementary products, they are bought by the same consumers who take into account both prices when making a purchase decision. Two-sided platform customers do not consider both prices.

The Court of Justice of the European Union has confirmed by its decision in the Groupement des cartes bancaires [12] that the interaction between activities in multidimensional markets is to be taken into account in the analysis of anti-competitive practices.

Important aspects could be omitted by the fact that one of the facets is not taken into account in defining the relevant market. For example, if one platform increases the price on one side, this would have an impact not only on the number of consumers deciding to leave this facet but also on the consumers from the other side [16].

In a multidimensional market, we have to analyze all the needs of its units, as we can achieve all benefits of the network's indirect impact when participation of several entities from all sides is ensured. In a traditional market, consumers and producers are often considered as a whole, while in multidimensional platforms, consumers with different preferences could be divided and considered as independent groups. Increased use of the platform by one consumer group would create an external effect compared to other groups [16]; therefore, special attention must be paid to indirect externality of the network from the demand side.

The use of quantitative methods in determining the relevant market also involves certain difficulties, in particular when estimating the impact of indirect network effects. Accumulating the necessary data is a real challenge for assessing the indirect network effects because a part of the demand change is a feedback effect. In addition [18], the time before indirect network effects can fully manifest themselves may vary. Thus, beyond the econometric methods in determining the relevant market for multidimensional platforms, it would be useful to apply quantitative descriptive and qualitative methods.

In general, characteristics of multidimensional markets do not allow competition authorities to continue operation in their usual ways. One can use the tools previously created to define the relevant product market in multidimensional markets with the necessary adjustments. To properly assess the competitive environment for multidimensional markets, we need a clarification of the concept of a multidimensional market and a review of financial market approaches.

The aim of the research is to identify the characteristics of the multidimensional market, especially in the financial market, so that the analysis of the competitive environment in these markets takes into account the identified particularities.

3. Applied methods and materials

Different research methods were used during the research process, such as systemic, normative and dynamic approach, as well as other research methods, such as synthesis; economic analysis; induction and deduction, applied in the dialectic of knowing the researched problem. We also examined the decisions of competition authorities of the European Union and the USA.

In addition, to recognize the main concepts presented in the paper, we used the results obtained in a series of publications and articles by relevant experts that are an important source of arguments based on empirical data.

4. Obtained results and discussions

Multidimensional aspect of a financial market

Approaching the concept of financial market in the competitive analysis involves reviewing the criteria that underlie the configuration of a financial market.

Competition between rival subjects in a financial market is a dynamic process that provides consumers with identical or similar financial services, and tends to improve their performance. The financial market is specific and its structure (number of competitors, barriers of entry and exit from the market, etc.) mostly determines the character and intensity of competition.

Economic advantages which financial institutions are aiming, determined by the market share, profitability, etc. represent the object of competition on the financial market.

Financial institutions are entities whose main function is to finance, namely to collect, transfer and distribute financial resources. The role of these institutions is to mediate, with profit or commission, between economic entities seeking funds and those seeking investments for their economies. *The existence of an intermediary, of a financial institution, does not necessarily mean that a full financial market is to be qualified as multidimensional without analyzing its characteristic elements.*

Consumers, whether natural or legal individuals are subjects of financial market relations, around which financial institutions revolve. This fact mainly determines the intensity of competition in the sector. Consumer preferences form the demand for certain financial products (services), and the satisfaction of these needs by financial institutions enhances their results.

Considering the fact that the consumer is the central element of competitive relations, one can divide the financial market in terms of competitive analysis according to consumer interests into the following components: the savings market; the multiplication market; the insurance market; the loan market; the money transfer market.

The structure of a financial market presented above better corresponds to the objectives of the competitive analysis of the financial market. At the same time, if solving a competitive problem requires a more detailed classification it is necessary to take into account the methods for defining the relevant market and the following sources of competitive constraints: substitutability of demand and supply sides and possible competition.

An interesting case of a multidimensional financial market is the payment card market, which is part of money transfer market and is one of the most obvious and studied examples of a multidimensional market. The card payment system provides services to cardholders that facilitate the purchasing process and renders services to merchants who receive cash more efficiently, but also make a larger amount of sales. Much more significant is that the demand on the given market sides is interdependent, so the value that the buyer assigns to a certain type of card depends on the number of merchants willing to accept the card to make the payment, while the value of the card payment system depends on the number of buyer users. Consequently, the operator of a card payment system must adopt such a pricing policy to ensure the widest possible presence on both sides of the platform.

The payment card market comprises two distinct business models: open system and closed system. *The closed system* (AmEx) is a payment system between the retailer and the purchaser operated by a single enterprise that interacts with both groups of customers. *The open system* (Visa, MasterCard) is not operated by a single company, but by an association of banks, which through their cooperation facilitates the payment process between the buyer and the merchant. In the last system, banks and other members of a payment association issue cards and provide POS services.

Both open and closed card payment systems imply the existence of certain fees for the services provided. Since the open system includes several participants, the transfer of resources through such systems involves additional fees and is more expensive.

Because of regulatory intervention and competition policy, the associations of banks involved in card payments were transformed into enterprises, giving rise to a fifth participant in the system. It is therefore possible to distinguish between the three-, four- and five-part payment systems.

Several competition authorities focused on cooperation between banks in the open card payment system and fees for services provided under the payment system. Although all agreed that the payment card market is multidimensional, they did come to a consensus on defining the relevant market limits.

In Visa-I [2] and Visa-II [3] cases, the European Commission has defined a single market for card payment transactions between cardholders and retailers. Thus, the Commission has identified competitive pressures in the upstream market, that refer to inter-system competition between different card payment systems and in the downstream market for intra-system competition between different banks, to attract as many customers as possible (merchants and cardholders). It should be noted that in these cases the European Commission did not find a violation of competition law, so a detailed market analysis was not required.

In more recent cases Master Card [4] and Visa-III [5] depending on the identified competitive problem, the European Commission has delimited: the upstream market or the network market which refers to inter-system competition, respectively the rivalry between different card payment systems, and the downstream market (intra-system), which was divided into two relevant markets: the issuance market and the acquisition market.

Supply and demand analyses of the purchasing and issuing markets have shown that neither the purchase nor the issuance of cards has been sufficiently substitutable for any equivalent

services of other payment means, in particular cash, checks, credit transfers or debit payments, to be considered part of the same market. The European Commission has left open the question of whether procurement and issuance markets should be further subdivided.

In the Master Card case, the European Commission [9] acknowledged the two-dimensional nature of the market but refused to define a single relevant market. The reasons are the following: 1) the definition of a single market will not reflect the complexity of structural market relationships and will not be sufficient for the assessment of intra-system competition; 2) a relevant market includes not only payment services, but also issuance and acquisition services; 3) such an approach will be incompatible with the Commission's previous practices with multidimensional markets, for example in the case of newspapers. As can be seen in this case, the Commission did not distinguish between the transactional and non-transactional multidimensional market (media market).

In the case of Groupement des Cartes Bancaires, a relevant market was defined as the market for issuing payment cards. The European Commission accepts that there is an interdependent demand from merchants and cardholders, but not that there is a common amount of a single product. Card issuers and purchasers offer their services to individual customers. Issuing and purchasing are fundamentally different activities, involving different specializations and costs. Therefore, issue, purchase, and payment system each are a separate market, and according to the Commission's practice [12], a relevant product market comprises all those products and/ or services that are considered interchangeable or substitutable by the consumer, due to the characteristics of products, prices or intended use.

In the Commission's view, interdependencies are possible between issuing and acquiring activities, each of these being claimed to generate positive externalities for the other (the "two-sided" nature of card payment services). The Commission does not dispute that payment by card has two "sides" to the existence of network effects. Issuing and purchasing activities are indispensable for each other and for the operation of card payment system in general. Merchants would not agree to join a card payment system if the number of cardholders was insufficient. Similarly, consumers would not want to own a card if it was not used by a sufficient number of merchants. However, the "two-sided" nature of economic activity does not in any way mean that the system in question constitutes a single market.

Although the Court of Justice of the European Union in its judgment (T ‑ 491/07) upheld the decision of the European Commission of 17 October 2007 (COMP / D1 / 38606 - Groupement des cartes bancaires "CB"), the Court of Justice of the European Union in its judgment of 11 September 2014 in Case C ‑ 67/13 P revoked that judgment. The reason for this action is that not all relevant factors were taken into account, in particular the nature of affected services, the actual operating conditions and structure of markets, with regard to the economic or legal context. Thus, in the opinion of the Court of Justice of the European Union, the Commission had to take into account the interaction between the two facets of a two-dimensional system when defining the relevant market.

In the case of multidimensional platforms, the risk of market expansion determines the concern of competition authorities in defining a relevant market. This fact would depreciate the importance of practices, which in authorities' view generate competitive problems. At the same time, we cannot ignore the specific nature of relationships in multidimensional markets, which are to be examined and assessed in the process of defining a relevant market.

5. Conclusions

The multidimensional market is at an early stage of research and is a challenge for competition authorities. At the same time, we consider relevant the definition that reflects the key characteristics of a multidimensional market: it has two or more groups of customers, who need each other but cannot independently achieve value and rely on a catalyst to facilitate interaction with customers, creating values between them.

Due to structural relationships, a multidimensional relevant market cannot be defined without taking into account all its aspects, including dynamic mutual impact (feedback). Indirect network effects are to be taken into account even at the risk of widening the market, and it is always necessary to take into account competition objectives, consumer welfare improvement, and innovation stimulation. Thus, in the case of multidimensional platforms, one could avoid errors and identify appropriate solutions only through a complex, theoretically grounded approach of the relevant market.

Currently, there is no single approach to the concept of multidimensional markets and the methodology for analyzing the competitive environment in these markets. For these reasons, clarification of these issues would allow a more complex analysis of multidimensional markets and a review of approaches to competition in financial markets.

The development of digital technologies is expanding the development of financial markets. Due to its characteristics, especially the existence of intermediation, they should be carefully studied in terms of consistency with the elements characteristic to multidimensional markets, and the development of a methodology that would allow identification of multidimensional financial markets.

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Rezumat

Digitalizarea economiei, progresul tehnico-ştiinţific, eliminarea barierelor lingvistice şi internaţionalizarea vieţii economice a dus la dezvoltarea unor modele noi de business denumite platforme multidimensionale. Aşa denumiri precum MasterCard, Visa, Airbnb, Amazon, Facebook etc. sunt pe larg cunoscute datorită dezvoltării sale vertiginoase, şi reprezintă modele de afaceri sub forma de platforme multidimensionale. Definirea pieţelor multidimensionale, identificarea elementelor caracteristice, determinarea pieţei relevante şi respectiv analiza mediului concurenţial pe pieţele multidimensionale reprezintă o adevărată provocare pentru autorităţile de concurenţă. Evaluarea comportamentului unilateral sau coordonat pe piaţa multidimensională este un exerciţiu destul de dificil datorită complexităţii acestor relaţii, pentru care abordarea tradiţională este insuficientă. În scopul clarificării acestor aspecte este necesară analiza teoretică a acestei structuri, dar este utilă şi experienţa decizională a autorităţilor de concurenţă din Uniunea Europeană. Pieţele multidimensionale se regăsesc în diferite sectoare ale economiei naţionale, astfel, mai multe segmente ale pieţei financiare au caracteristicile pieţelor multidimensionale, totodată numai printr-o abordare complexă, teoretic fundamentată a platformelor multidimensionale se pot evita erorile şi respectiv identifica soluţii.

Această lucrare expune şi analizează conceptul pieţei multidimensionale, particularităţile de determinarea a pieţei relevante şi analiză a mediului concurenţial în dependenţă de tipul pieţei şi specificul sectorului financiar.

***Cuvinte-cheie**: piaţa multidimensională, piaţa financiară, piaţa relevanta, concurenţa*

Аннотация

Цифровизация экономики, научно-технический прогресс, устранение языковых барьеров и интернационализация экономической жизни привели к разработке новых бизнес-моделей, называемые многомерными платформами. Такие имена, как MasterCard, Visa, Airbnb, Amazon, Facebook и т. д. широко известны своим головокружительным развитием и представляют бизнес-модели в виде многомерных платформ. Определение многомерных рынков, выявление характерных элементов, определение соответствующего рынка и анализ конкурентной среды на многомерных рынках, соответственно, являются реальной проблемой для антимонопольных органов. Оценка одностороннего

или скоординированного поведения на многомерном рынке является довольно трудным делом из-за сложности этих отношений, для которых традиционный подход недостаточен. Чтобы прояснить эти вопросы, необходим теоретический анализ этой структуры, но также полезен опыт принятия решений антимонопольными органами в Европейском Союзе. Многомерные рынки находятся в разных секторах национальной экономики, поэтому несколько сегментов финансового рынка имеют характеристики многомерных рынков, и в то же время только благодаря комплексному, теоретически обоснованному подходу к многомерным платформам можно избежать ошибок и найти решения.

В данной статье представлена и проанализирована концепция многомерного рынка, особенности определения соответствующего рынка и анализ конкурентной среды в зависимости от типа рынка и специфики финансового сектора.

***Ключевые слова**: многомерный рынок, финансовый рынок, соответствующий рынок, конкуренция*

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MICROFINANCE IN LEBANON: PERCEPTION AND FACTS

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Abstract

This exploratory research aims to investigate the perception and facts on how Lebanese residents understand microfinance, aiming to better understand this topic and to develop microfinance sector and policies in Lebanon.

This study follows a quantitative approach and clustered simple random sampling approach targeting current and prospected microfinance clients. Data pointed out that almost 60% of the Lebanese consider microfinance institutions as social charities and 18.7% knows nothing about them. Surprisingly, the majority of respondents believed that microfinance loans interest rate is lower than traditional banks.

The majority of the respondents believed that microfinance credit and loans would positively affect the society, education and economy, they also believed that these loans could reduce unemployment and poverty level.

The inability to pay and exchange of collateral are the two main reasons that prevent the Lebanese from taking microfinance loans. However, satisfying personal needs such as paying debit, buying a new car and marriage encourages the Lebanese to take a microcredit, followed by developing their business. Unlike other countries that conducted similar researches, the Lebanese would get a loan for personal needs and not food enhancement.

***Keywords**: Microfinance, Microcredit, Lebanon*

1. Introduction

Until recent years, the international community has regarded foreign aid as a primary source of poverty reduction through spending a huge amount of money to finance large infrastructure and create the necessary public institutions. These investments are aimed at reducing the unemployment rate, increasing productivity, and reducing poverty [1]. However, according to Erixon [1] there is an inverse relationship between economic growth and foreign aid.

Recently, the International community embraced microfinance as a new tool for poverty reduction and economic development, after perceiving that foreign aid and macro development have limitations in enhancing economic development or decreasing poverty. Yet, the growing popularity of microfinance institutions **(MFIs)** in decreasing poverty level, which is a prerequisite for peace, was highlighted when Mr Yunus and Grameen bank were awarded the Nobel peace prize for 2006 [2]. Accordingly, international organizations, private

companies, donors, and governments see microfinance as an important tool for developing economy and reducing poverty.

With such views, while both poverty and micro financial institutions are increasing in Lebanon, this research aims to find how the Lebanese people perceive microfinance and whether these institutions have a positive or negative impact on their lives.

2. The degree of investigation of the problem and purpose of research

The concept of microfinance was first introduced in Bavaria in the mid of the 19th century, in Ghana in 1920, and in Kenya and Nigeria in 1955. Scholars viewed microfinance as a model shift and a light of hope for people with low income [3]. In reality, in opposite to commercial banking, which normally targets people who have money, microfinance activities include savings, credit and other needed financial services with an aim to reach poor people who have difficulties in collecting adequate collateral and who are usually ignored by commercial banks [4]. In literature, microfinance refers to "the provision of financial services to low income, poor and very poor self-employed people" [5]. While other scholars defined microfinance as "the attempt to improve access to small deposits and small loans for poor households neglected by banks" [6]. Since many of those who seek microfinance services, especially loans, to launch their own business, microfinance firms require borrowers to have, at least, minimum business qualifications for the proper use of funds [7].

Credits, saving facilities and other products or services, and financial services provided to poor households and low-income people distinguish microfinance organizations from large organizations [8]. Many changes have happened since 2001; industry investments, type of providers, number of borrowers and clients have grown significantly over the past decade [9]. Therefore, the overall interest in the microfinance business is having a dynamic advancement as the years progress. In fact, in 2014 it was around $10 billion compared with $4 billion reported in 2006 [10]. Moreover, in 2011 Symbiotic reported that hundred microfinance institutions managed nearly $7 billion [11]. This sector has seen a huge shift going from just microcredit to general microfinance services, such as insurance services and savings in order to make the financial market work better for low-income population. Many studies showed that micro-savings have a better outcome on individuals than micro credits [12-14].

It is essential to highlight the distinction between microfinance and microcredit, as these two words are often used interchangeably in literature, not to mention that many people believe that microfinance is just about providing microcredit. In fact, microfinance is not only about microcredit; it has a wider basket including transactional services, insurance, and, most importantly, savings [15].

Microcredit is related to small loans, but microfinance is applicable where NGOs and MFIs supplement the loans with other financial services (savings, insurance, etc) [16]. Therefore, microcredit is regarded as the most well-known microfinance product, as it provides loans to low income borrowers, whereas microfinance is a whole aspect containing other noncredit financial services like insurance, payment services, and savings [17].

Considering that social and economic backgrounds are different in different countries, the purpose of microfinance is still the same in all countries. In 2005, UNDP conducted a study

that found that nearly 1.25 million Lebanese out of 4.5 million citizens are living on less than $4 per day. Lebanon economy is mainly focused on service sector, in particular banking and tourism. Given that 30% of the Lebanese population is poor, Lebanese perception of such programs is necessary to develop them in this small country. In addition, poverty is also expected to increase due to the bad economic situation in Lebanon in the last four months.

Facing the high rates of unemployment in the Arab and MENA regions [18], micro and small enterprises are increasingly seen as a new alternative to work styles, which can reduce overall poverty and increase employment rates. According to a report published by the UNDP, microfinance has proven to be an appropriate and effective tool in alleviating poverty during the last years That being stated, poverty alleviation is probably one of the most tangible benefits of microfinance worldwide. Other benefits can be foreseen in microfinance. For example, it allows entrepreneurs seeking credit to start up their small businesses, by giving them a chance to become micro entrepreneurs [20]. In addition, other benefits can be expected, for instance, women's empowerment is regarded as one of the influential force of microfinance. Women with access to financial services are more likely to benefit their entire family, confront gender inequalities and get more involved in the community activity [21]. Thus, microfinance can, to a certain point, eliminate the gender inequality assumption in developing countries. Alternatively, microfinance has also limitations; it is not a silver bullet in itself. Many researchers doubted the capability of microfinance programs to help develop both social and economic levels [22]. Microfinance raises important questions with respect to its application and the heavy burden it places on borrowers. Higher interest rates imply lower repayment performance and longer repayment terms. Globally, microfinance is experiencing a small crisis in countries like Bangladesh and India, where micro lenders were accused of over lending and driving the poor into debt situations that they could not possibly escape from. In fact, in 2010 the Indian government attributed over 80-death suicides to microcredit loans [23].

The perception of microfinance can differ from country to country; whereas social, cultural, geographical differences can lead to different results. Most of the research related to microfinance has elaborated its impact on businesses, communities, individual service users and households. However, the perception of potential clients of microfinance has not been much highlighted in the literature. For example, previous studies showed that when people aim to expand their business activities, they seek to apply for microfinance loans [3, 24-26], others showed that people perceive an increase in their education level, health conditions and food consumption [27-32], however few studied what people know about microfinance [3, 33, 34].

In the Arab context, one of the studies was conducted by Planet Finance in 2007 in Jordan to analyze people's perception of microfinance. It showed that 70% had better food quality and consumption since participating in microfinance programs, almost 58% indicated a change towards better children education, 87% believed that they experienced an increase in their sense of autonomy. Moreover, 48% believed that their health has been improved, 36.8% have not noticed any change and 16% noticed negative change [28].

Another study conducted in Oman showed that 79% of the respondents agreed that microfinance activities have a positive impact on the society, while 75.4% believed that these

activities will decrease the unemployment rate. Moreover, 87% of the respondents also believed that microfinance would decrease poverty level [31].

Siddiqui and Gilal [3] found that in Pakistan, 21% of the respondents described microfinance as "microfinance bank", 7% described it as "banking for poor", and 69% described it as "small loans". Also, this study indicated that uneducated people said that microfinance institutions helped them a lot, while educated people showed a negative view of these institutions.

Throughout this literature, it can be noticed that low income people perceive microfinance as a mean to improve their life style (business, education, food consumption, personal activities) wherever they are located. Although microfinance is endorsing a hopeful new strategy, empirical research and academic studies have not yet been carried out in Lebanon to examine how Lebanese society perceives microfinance.

In the case of Lebanon which is considered the smallest country in the Middle East with a 4.5 million estimated population [35], a recent study conducted by UNDP showed that 28% of Lebanese residents are considered as poor while they are living on less than $4 per day and 8% are suffering from extreme poverty because they live on less than $2.4 per day [36]. The country in general has a structural trade deficit and gross public debt [37]. In addition to these facts, it is necessary to highlight the presence of 1.2 million refugees [38]. The Lebanese government reported that the Syrian crisis negatively affected around 1.5 million Lebanese nationals. Moreover, in 2013, the World Bank reported that these crises would cost around $7.5 billion in lost economic activity.

Nevertheless, with all these economic difficulties, the country was able to establish commercial banking services, which are considered the best in the region. A total of 54 banks and 876 branches were registered with the Lebanese central bank, 55% of them are concentrated in urban areas such as Beirut, the capital and its suburbs.

Microfinance activities were launched by Lebanese banks in 1995; commercial banks at that period offered their clients several products, either in cooperation with microfinance institutions or by providing small loans to SME's guaranteed by local funds. After the Israeli war in Lebanon in 2006, BLOM bank, a leading Lebanese bank, reported 27% growth from 2007 to 2014 for the microfinance industry.

In Lebanon, there are around 24 micro-financial institutions. Three main institutions dominate the Lebanese market: *Al Quard Al Hasan* supported *by* Hezbollah, *Al Majmoua* and *VITAs* authorized by the *United States Agency for International Development,* which offer micro microcredit or micro savings [39]. Due to the fact that almost 40% of the population does not hold bank accounts, there is a strong demand for microfinance in Lebanon [40]. BLOM Bank reports that, in Lebanon, the loans of microfinance institutions range from $300 to $5000 for a repayment period between 6 and 24 months. The beneficiaries of these loans are spread across the country and are mainly concentrated in Beirut and South Lebanon.

Accordingly, this research aims to study how Lebanese perceive microfinance activities in Lebanon and if they see it as a source of reducing their poverty, enhancing their lifestyle and well-being in general, to better understand this concept in Lebanon and how Lebanese citizens perceive it. Thus, this research aims to answer the following research questions:

- What is the general and personal attitude of Lebanese towards microfinance?
- Do income and education level, gender and age affect this perception?
- How Lebanese perceive the benefits of microfinance loans at personal and national level?
- What could encourage or impede Lebanese obtaining microfinance loans and for what they may use it?

Answering these questions will contribute to better understand this topic and will also help to develop the microfinance sector and improve policies in this country and others similar.

3. Applied methods and materials

In order to measure how Lebanese perceive microfinance and address a large sample size, a quantitative approach was adopted, using a well-structured questionnaire, which was developed on the basis of microfinance literature, and relying on open ended and closed ended questions. The questionnaire was composed of 3 open ended questions that aimed at finding out the reasons and motivations of Lebanese to receive microfinance loans and what respondents know about microfinance, as well as 14 closed ended questions aimed at finding out how Lebanese perceive microfinance, and if such loans could decrease poverty, increase education level, reduce unemployment, and if it could have a positive impact on the economy and the society in general. Using this questionnaire will help to measure the respondent's perception by analyzing the numerical values provided through closed and summarizing open ended questions.

Lebanon population is estimated to be around 4 million people distributed across five provinces, Beirut, the capital, (9.6% of the population) and Mount Lebanon (38.5 % of the population), which are considered urban areas; Southern Lebanon (17.5% of the population), which is in between urban and rural areas; and Northern Lebanon (20.8% of the population) and Bekaa (13.6% of the population), which are considered as rural areas. Nevertheless, in Lebanon, there is high inequality in wealth, whereas almost 0.3% of the Lebanese population owns 49% of the Lebanese wealth, which it estimated to be 91 billion dollars, and most of the work force are low income people, which make them potential microfinance clients [41].

The sample of this research intended to cover all provinces proportionally, but due to security reasons, it was difficult to interview citizens living on the Syrian borders in Bekaa and Northern Lebanon. Yet, citizens in these areas are mostly uneducated and work in the agricultural industry (UNDP, 2005). Accordingly, a cluster simple random sampling was adopted to carry out the survey, whereas each province is considered as a cluster and the heterogeneity of respondents is ensured within the sub-cluster. Additionally, the criterion considered 95% as confidence interval, 5% margin of error and 0.05 significance level, 385 samples were collected from the Lebanese provinces, respondents over 20 years old were targeted proportionally based on the population of these provinces [42].

Field survey was conducted rather than online to interview low-income people who are unfamiliar with online surveys and the Internet. The questionnaire was also translated into Arabic since some respondents may not understand English language. Data collected was imported into SPSS V23 to be analyzed and reported in tables and figures.

4. Obtained results and discussions

Several analyses were conducted to answer research questions that were mainly focused on descriptive analysis to understand how Lebanese perceive microfinance and the facts about their general view. First, demographic analysis was essential to ensure the accuracy of the sample size for low income people who are considered as prospected microfinance clients. Demographic analysis presented in Table 1 showed that almost 88% of the respondents earn less than $1000 per month, and almost 20% of them are unemployed. Regarding the level of education, 34.8% of the respondents graduated from high school, they represent most of the rural areas in Lebanon, and 48.6% of the respondents obtained a bachelor's degree. In addition, 68% of the respondents were below 35 years old. Moreover, the sample was almost the same between males and females, whereas 47.3% of the respondents were females and 52.7% of them were males.

Table 1. Demographic Analysis

Demographic Analysis		F	%
Gender	Female	182	47.3
	Male	203	52.7
Education Level	Bachelor's degree	187	48.6
	High School Certificate	134	34.8
	Master's Degree	35	9.1
	Vocational Degree	11	2.9
	Uneducated	18	4.7
Monthly Income	$100 to $600	180	46.8
	$600 to $1000	159	41.3
	$1100 to $2000	41	10.6
	Above $2000	5	1.3
Profession sector	Public Sector	84	21.8
	Private Sector	222	57.7
	Unemployed	79	20.5
Age	Below 26 years old	139	36.1
	26 to 35 years old	123	31.9
	36 to 45 years old	75	19.5
	46 to 55 years old	33	8.6
	Above 55 years old	15	3.9
Marital status	Divorced	7	1.8
	Married	185	48.1
	Single	191	49.6
	Widowed	2	5
Total		385	100.0

As for the general perception, 60% of the respondents said that microfinance institutions are social charities, and only 34.8% believed that these institutions represent a profitable activity (Figure 1). Yet, 37.4% of the respondents described microfinance institutions as organizations that give small loans, 20.5% of the respondents described these institutions as "institutions that provide financial services for low income people" and 16.1% of the respondents said that

microfinance institutions provide loans in exchange of collateral (Figure 2). However, 94.5% believed that the interest rate on microfinance loans is lower than that of traditional banks. Yet, for a more focused look, cross tabulation analysis was conducted. Almost 32.5% of Lebanese whose salary is less than $600 believe that microfinance institutions are social charities. While, 16.6% of this salary category said that MFIs give small loans, and 8.8% said that MFIs give loans in exchange of collateral. Moreover 16% of the respondents who earn less than $1000 per month know nothing about MFIs. With respect to the gender, the knowledge of Lebanese women and men is almost the same, for example, 19.7% of males and 17.7% of females described MFIs as institutions that give small loans, and 8.8% of males and 7.3% of females described them as institutions that give loans in exchange of collateral. In addition, 29.1% of males and 30.9% of females described MFIs as social charities.

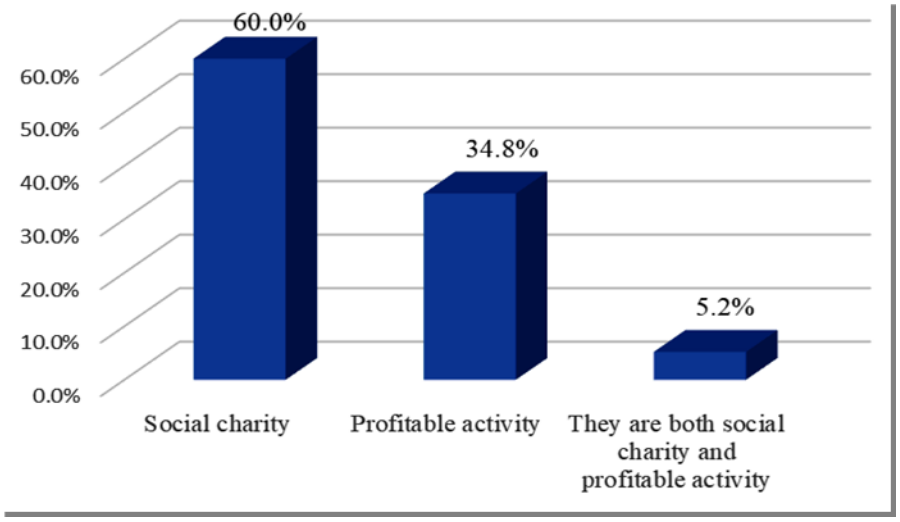

Figure 1. General Perception Towards Microfinance

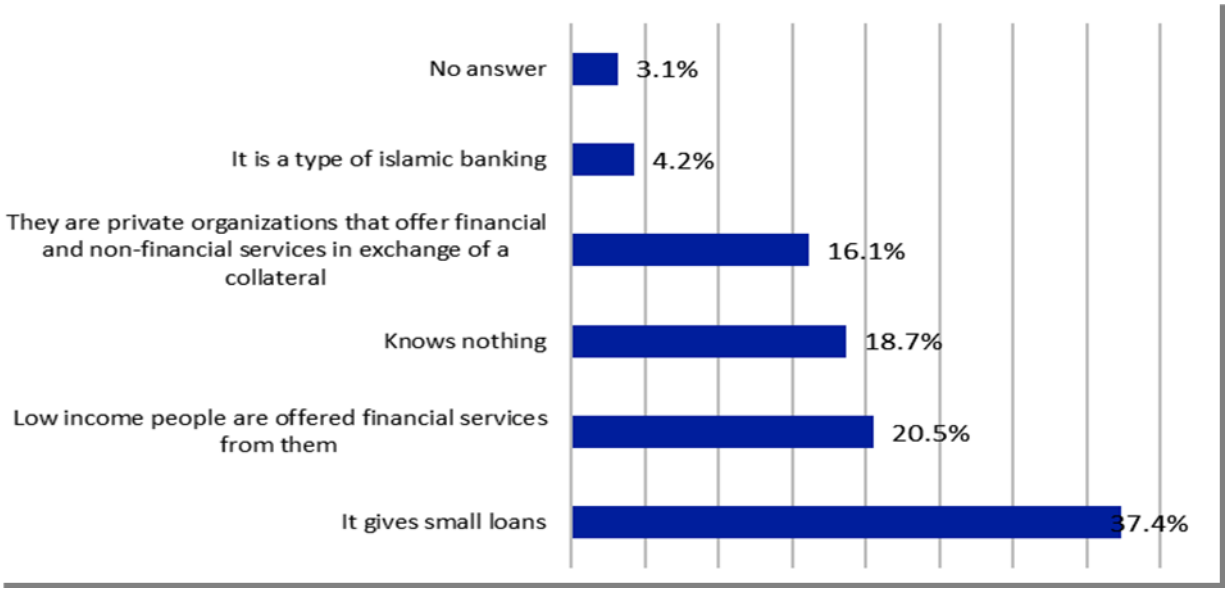

Figure 2. General Perception Towards Microfinance

The analysis also showed that educational level affects perception. For instance, 20.2% of the respondents who held master's and bachelor's degree answered that MFIs offer small loans, while 14.8% holding high school degree had the same perception. In addition, 9.1% of master and bachelor holders described MFIs as providing loans in exchange of collateral, while 5.5% of high school holders have the same perception. As for age, most of the respondents who perceive MFIs as institutions offering small loans are less than 34 years old.

Accordingly, from this analysis it is concluded that both males and females have the same perception of MFIs. In addition, as the salary and education category decreases, the perception of describing MFIs as social charities increases, yet those also understand that these types of loans are provided in exchange of collateral or as small loans. Here, it should be mentioned that Al-Qard El Hasan operates in a way, that the lender should deposit gold or money equal to the loan value, unlikely other operating MFIs.

As shown in Figure 3, Al-Qard El Hasan is the most known MFI in Lebanon, this institution operates mainly in South Lebanon and Beirut, followed by Al-Majmoua which declared that most of its clients are from Beirut and South Lebanon and the least of them are from North Lebanon [43]. Accordingly, these results confirm the report published by BLOM bank report (BLOM, 2014). The descriptive analysis also showed that the awareness of these institutions is higher for low income people and youth, whereas almost 30% of those who earn less than $1000 per month mentioned Al-Qard El Hasan and 24% of those who are less than 34 years old mentioned the top two MFIs.

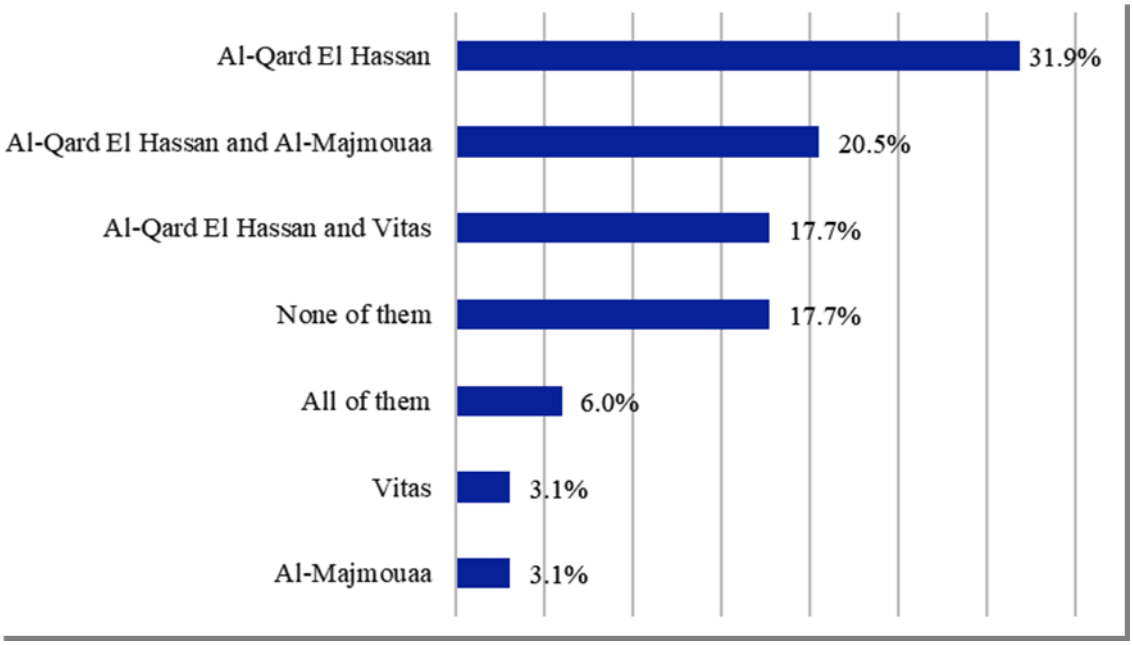

Figure 3. Knowledge on MFIs Operating In Lebanon

The general perception of Lebanese on MFIs is that they help decrease the unemployment rate and poverty, which have a positive impact on society, economy and education. However, almost 77.4% of the Lebanese think that microfinance could not lead to political stability. For instance, 67% percent of low-income people agreed that MFIs could reduce unemployment, 57.6% believed that they reduce poverty, 45% believed that they could have positive impact

on society, 52.5% said that they have a positive impact on economy, and 42% believed that they could improve education. These results are mostly associated with people younger than 34 years old (Figure 4).

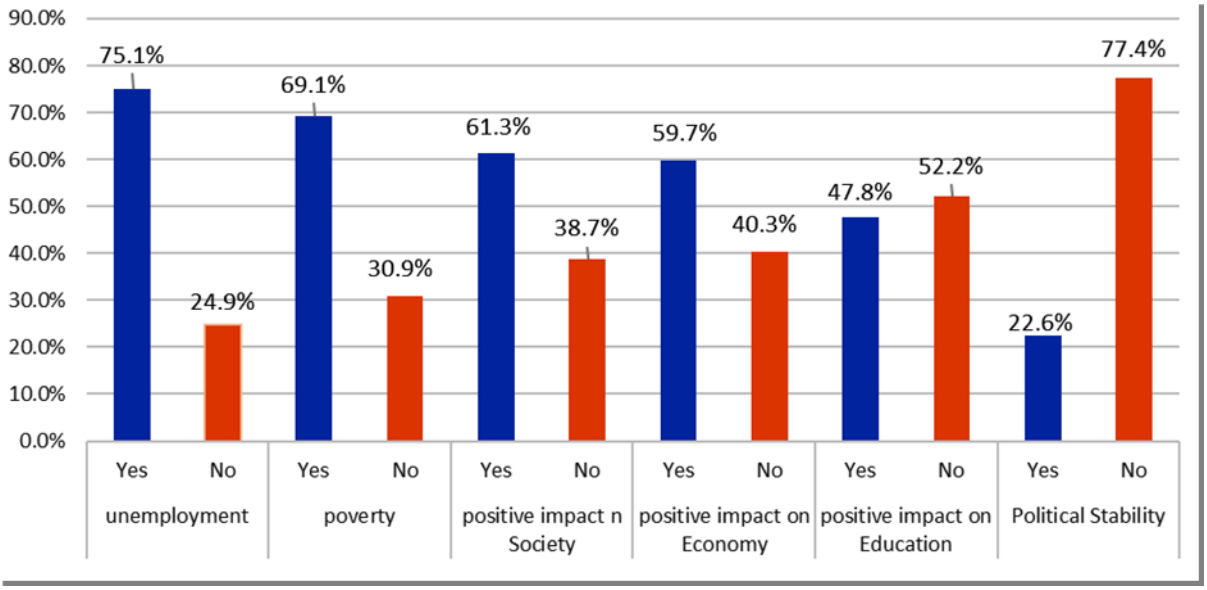

Figure 4. General Perception Of Microfinance Impact

As for the personal perception, 52.7% believed that MFIs represent a way to improve education, 18.7% agreed that MFIs could improve health, while 19% believed that MFIs could improve both health and education; and only 8.3% said that MFIs help to improve food supply (Figure 5). In addition, almost 64% of the respondents said that MF loans should be given to people living in rural areas and 16.1% said that they should be given to people in both rural and urban areas (Figure 6).

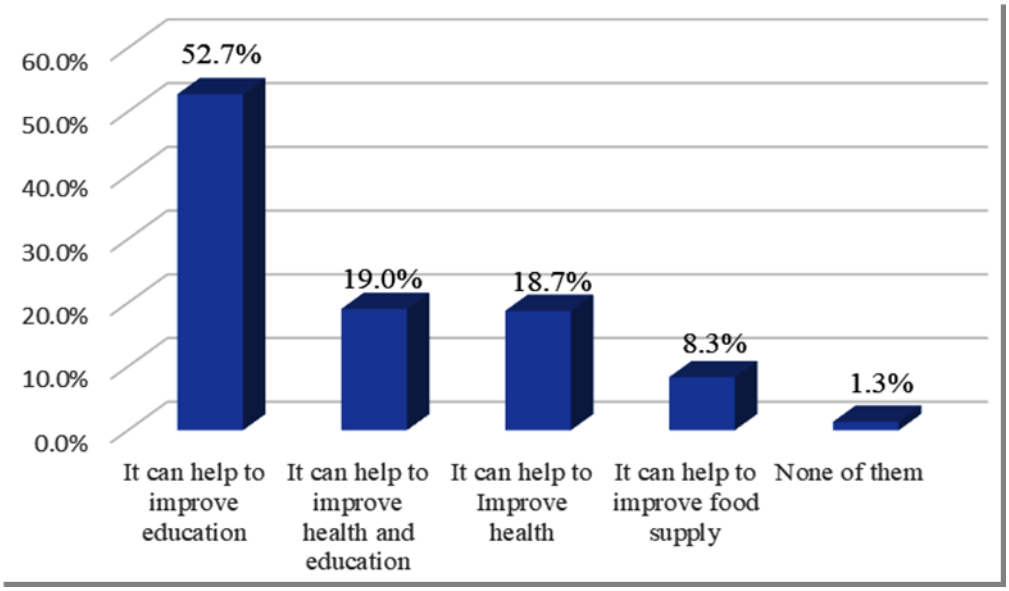

Figure 5. Personal Perception Of Microfinance Impact

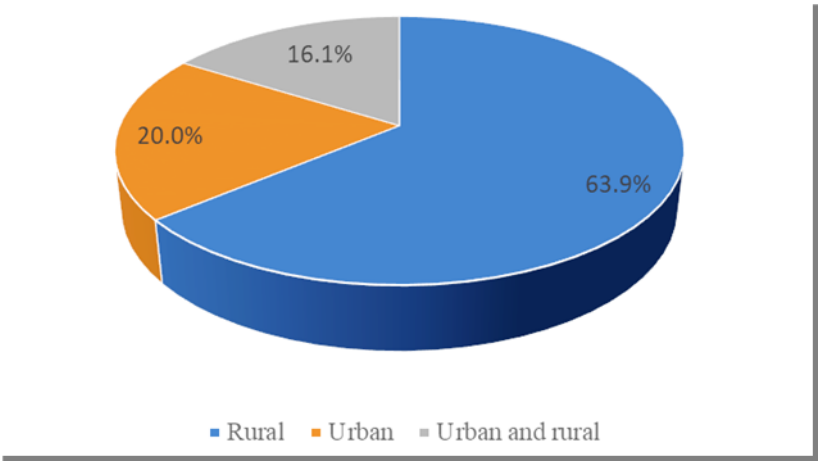

Figure 6. Who Should Receive Microfinance Loans

At the top of main reasons not to take a loan from micro MFIs it is the fear of being unable to pay the loan (33.20%) followed by conditions to get a loan such as providing a deposit or guarantee (31.60%). Such results are expected because Lebanon is facing an economic crisis and loss of Lebanese pound value against dollar value. Moreover, 18.7% of the respondents expressed that they have no fear of taking a loan (Table 2).

Table 2. Reasons for not taking Microfinance loan

Reason for not taking Microfinance Loan	Percent
Being Unable to repay the loan	33.20%
High demands such as guarantee, deposit	31.60%
Nothing	18.70%
They offer small amount of money	8.57%
Trust	5.97%
I am used to banks	1.03%
Religion matters	0.70%
Total	100%

An in-depth analysis showed that 16.1% of Lebanese earning less than $600 are the most who said that a guarantee or deposit, prevents them from taking a loan and 6.5% of them said that these institutions offer a small amount of money. In addition, 15.8% of respondents earning less than $600 expressed their fear of not being able to repay the loan and 14% of those who earn from $600 to $1000 also expressed the same fear.

Moreover, 15.8% of bachelor's degree holders mentioned that the existence of guarantee prevents them from taking a loan, while 10.6% of high school graduates expressed this fear. In addition, 16.5% of bachelor's degree holders expressed their fear of not being able to pay and 14.8% of high school holders expressed the same fear.

The last multiple choice question allowed respondents to select as many answers they found applicable for taking a loan from MFIs. On the top of the list respondents expressed that they would have a loan for a personal reason (45.55%), those could include education, marriage, buying a new car or mobile phone, repaying debt, food enhancement and, surprisingly, doing

a plastic surgery. Almost 30% of the respondents expressed that they would take a loan for improving business, 27.79% would take a loan from MFIs for having lower interest rate and 20.91% would take loans for education (Table 3).

Table 3. Reasons for thinking of taking Microfinance loan

Reasons to take Microfinance Loan	Percent
Personal Things	45.55%
Improve Business	29.79%
Lower Interest Rate	27.79%
Education	20.91%
Home reconstruction/Needs	17.76%
Marriage	14.04%
Repay Debt	12.3%
Buy New Car	11.74%
No answer	10.31%
Food Enhancement	9.45%
Plastic Surgery	4.87%
Total	100%

40.6% of low-income respondents expressed that they would take a loan for personal reasons, those included marriage 10.6%, education 16.4%, home reconstruction or needs 15.5%, improvement of business 25.8, and only 7.9% for enhancing their food. As for age, 10.9% of bachelor's degree holders and 6.3% high school graduates said that such loans help them to continue their personal or their children education, while 12.6% of the bachelor's degree holders would take loans to improve their business followed by 9.7% of high school graduates. However; 20% of the youth would need such loans to improve their business.

5. Conclusions

This research was conducted in Lebanon, where 30% of its population is considered to be poor, to better understand how the Lebanese perceive microfinance credits, to develop this sector and to set new policies.

Research showed that 18.7% of Lebanese are not knowledgeable about microfinance, and 17.7% have never heard about any microfinance institutions operating in Lebanon. Al-Qared Al Hasan that operates in exchange of collateral is the top well known institution in Lebanon; this institution was mentioned by 70.1% of respondents.

In general, people around the globe, have positive and good impressions and perception of microfinance [27-32]. But awareness may vary from country to country. For example, the level of awareness was low in Yemen [33], and higher in India and Pakistan [3, 34]. However, the findings of this research show that Lebanese tend to have a negative opinion, pointing out that microfinance could not affect political stability, as well as a positive view with regard to decreasing unemployment rate, poverty, enhancing economy and education.

Several researchers mentioned that microfinance has a positive effect on income, strengthens social relations, reduces unemployment rate and increases the level of education [44-47].

Almost 30% of Lebanese find microfinance loans as a way of developing their businesses. In reality, having a personal business can generate more personal income, decrease unemployment and poverty, improve education, health and society. Accordingly, the economic cycle would be positively influenced by these factors. [49]. However, credit is not the only factor that affects the prosperity of a business, among other factors that affect business profitability are borrower entrepreneurial skills, education, vision, motivation and persistence [24, 48]. Thus, these business loans should cope with innovation programs and training to achieve their intended purpose on the economy.

Compared to results from other countries, the Lebanese perceive a lower level of microfinance impact on health and food consumption than Morocco, Jordan and Egypt, which could be related to the fact that Lebanon is well known for its good health services in the region, as well as life expectancy of Lebanese is 80 years old, which is higher than in other Arab countries [36]. Moreover, Egypt and Morocco believe that education is less important than Lebanon and Jordan, due to cultural differences, whereas Lebanon is well known due to the reputation of the educational institutions and educated people.

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Rezumat

Acest studiu preliminar își propune să examineze percepțiile și faptele cu privire la modul în care poporul libanez înțelege microfinanțarea, în vederea unei mai bune înțelegeri a acestui subiect și dezvoltării sectorului microfinanțării și a politicii de microfinanțare din Liban.

Acest studiu urmează o abordare cantitativă și o abordare cluster a eșantionării simple aleatorii, axate pe clienții actuali și potențiali ai organizațiilor de microfinanțare. Datele au indicat că aproape 60% dintre libanezi consideră instituțiile de microfinanțare drept organizații de caritate socială, în timp ce 18,7% nu cunosc nimic despre ele. În mod surprinzător, majoritatea respondenților au considerat că rata dobânzii la împrumuturile de microfinanțare este mai mică decât cea oferită de băncile tradiționale.

Majoritatea respondenților au considerat că creditele și împrumuturile din microfinanțare vor afecta în mod pozitiv societatea, educația și economia, și, de asemenea, ei au considerat că aceste împrumuturi ar putea reduce nivelul șomajului și al sărăciei.

Incapacitatea de plată și schimbul de garanții sunt două motive principale care îi împiedică pe libanezi să ia împrumuturi de la organizațiile de microfinanțare. Totuși, satisfacerea necesităților personale, cum sunt plata debitului, cumpărarea unui automobil nou și căsătoria, încurajează libanezii să ia microcredite pentru lansarea unei afaceri. Spre deosebire de alte țări în care au fost efectuate cercetări similare, libanezii iau împrumuturi pentru necesitățile personale și nu pentru îmbunătățirea nutriției.

Cuvinte-cheie*: microfinanțare, microîmprumut, Liban*

Аннотация

Данное предварительное исследование направлено на изучение представлений и фактов касающихся осмысления феномена микрофинансирования ливанским народом, уяснения проблемы и развития сектора микрофинансирования и политики микрофинансирования в Ливане.

При изучении проблемы авторами применены количественный и кластерный подход простой случайной выборки. Ориентированно исследование на текущих и потенциальных клиентов микрофинансовых организаций. Данные показывают, что почти 60% ливанцев считают микрофинансовые организации социальными благотворительными организациями, а 18,7% ничего не знают о них. Удивительно, но большинство респондентов считают, что процентная ставка по микрофинансовым займам ниже, чем ставка по кредитам традиционных банков.

Большинство респондентов полагают, что микрофинансовые кредиты и займы будут иметь положительное влияние на общество, образование и экономику. Также они считают, что эти кредиты смогут снизить уровень безработицы и бедности.

Невозможность оплаты и обмен залога являются двумя основными причинами, которые не позволяют ливанцам брать займы у микрофинансовых организаций. Однако удовлетворение личных потребностей, таких как погашение долга, покупка нового автомобиля и вступление в брак, побуждает ливанцев взять микрозайм, а затем развивать свой бизнес. В отличие от других стран, в которых проводились подобные исследования, ливанцы получали займы на личные нужды, а не на улучшение питания.

Ключевые слова: *микрофинансирование, микрозайм, Ливан*

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ASSESSING THE RATING OF INNOVATIVE ACTIVITIES OF HIGHER EDUCATIONAL INSTITUTIONS: ON THE EXAMPLE OF ISRAEL

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Abstract

This article discusses the theoretical and practical aspects of assessing the innovative activities of higher education institutions using ratings on the example of Israel. The higher education system in Israel includes universities and colleges. The status of the university is a matter of prestige, increased state funding for research and educational process, as well as the possibility of awarding doctoral degrees. They are engaged in research and development and represent the scientific community of Israel.

The article presents a comparative description of the main world ratings. The focus is on the international ratings of higher educational institutions. The higher education system in Israel is highly regarded in the world. The data of international ratings of the higher education system, in recent years, indicates a number of achievements of Israeli universities. The assessment of the innovative activities of Israeli universities was carried out according to six international ratings.

Keywords*: higher education institution, innovative activity, ranking, assessment*

1. Introduction

Against the backdrop of the rapid changes taking place today in all spheres of society, the task of innovative development of the higher education system is extremely important for achieving socially significant positive results. The development of new approaches is required, the main purpose of which is to improve the quality of educational activity, the development of science and technology.

The modern activities of higher education institutions are characterized by such a distinctive feature as the rapid variability of knowledge, along with the growing informatization of society. These changes provide new opportunities for the introduction of innovations in the educational and research activities of universities. The ability to perceive innovation and the choice of the path of innovative development allow higher education institutions to survive and develop amid growing dynamics of social changes and increasingly fierce competition. The university's need for innovative development is associated with the development of a reaction to the evolution trends of society.

International ratings are one of the types of assessment of innovative activity of higher educational institutions. The purpose of this article is to compare various methodologies of international rankings and analyze the innovative activities of Israeli universities based on them.

2. The degree of investigation of the problem at the present moment, purpose of research

Currently, there are various methodologies for assessing innovation. The increasing number of publications examining innovation indicators and success factors reflects the demand for answers to this question [4; 8]. Some scientists describe indicators at various stages of the innovation process [9], while others evaluate effectiveness at each stage of the innovation process [10]. This is due to the fact that innovation in different sectors of the economy has its own specifics and different indicators of assessment.

The Oslo Manual (a joint publication of OECD and Eurostat) defines: "Innovation activities are all scientific, technological, organizational, financial and commercial activities which actually lead to the implementation of innovations or are conceived for this purpose." The Guide clarifies that "Some types of innovation are innovative in themselves; others do not have this property, but are also necessary for innovation. Innovation activity also includes research and development that is not directly related to the development of any particular innovation" [16].

The Frascati Manual is the internationally recognized methodology for collecting and using R&D statistics. It defines research as follows: "Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". The term R&D covers three activities: basic research, applied research and experimental development [21].

Currently, innovative activity is the most important condition for the development of the education system. Ratings have become a mean of comparing the achievements of higher education in various countries of the world in the field of innovation.

3. Materials and methods of research

The achievement of the objectives was solved by identifying and systematizing trends in the development of innovative activities of Israeli universities. The research methodology is based on an analysis of the world university rankings. The authors used statistical and comparative methods in their research. Statistical processing of data collected from analytical materials of international organizations and specialized agencies was used to identify the characteristics of scientific and research work of higher educational institutions of Israel [1, 17, 18, 20]. Numerous publications and reports served as support for the present research. The comparative method contributed to illustrate the peculiarities of Israeli innovation work in higher education.

4. Obtained results and discussions

The concept of the so-called "third generation university" is gaining popularity in many countries of the world. This concept assumes that the university, in addition to traditional educational and scientific activities, should actively engage in innovations, implement its developments and know-how in life, be a source of entrepreneurial activity, and create new business projects and companies based on an intellectual product [22].

Since innovation is actually a combination of interconnected processes, the authors propose the following definition of innovation: innovation in higher education is a combination of educational, scientific, technological, organizational, managerial, financial and commercial processes that actually lead to innovation.

Higher educational institutions are one of the elements in the innovation system "universities - enterprises - state". This implies the participation of representatives of industry, business and the state in assessing the university's innovative activities in the field of commercialization of technologies and developments. High rates in these areas are not yet a sufficient and indispensable condition for success in the field of innovation.

The best universities in the world receive their recognition due to the high quality of graduate training. They train highly qualified specialists who are in great demand in the labor market; conduct research in the most advanced areas of science, publish in the best scientific journals and those that are focused on scientific and technical activities, contribute to technological innovation through patents and licenses. Revenues from research and development, the results of intellectual activity, the number of small innovative enterprises created at the university are important - all these indicators characterize the "innovative component" of universities.

Many scientists are working to build a system of indicators that would give the most complete and reliable picture of the development of innovative activities of higher education institutions. Evaluation of the innovative activities of universities is also needed in general to manage the higher education system and make appropriate managerial decisions. Moreover, since universities play a large public role, in addition to the state, a large number of individuals are interested in evaluating the activities of universities - individuals and organizations, such as international students and teachers, graduate students, academic partners and organizations, politicians, employers, sponsors, and the public.

But to date, there is no single and universal system for assessing the innovative activities of universities. World experience in publicly evaluating the activities of universities shows that various methods are mainly used, which are developed by world rating agencies, various national centers in the field of education or innovation, associations in the field of university technology transfer and others.

There are 10 major world ratings and more than 70 countries have national ratings. Classifications of ratings of higher education institutions are developed in order to provide information that is more consistent with the needs of users [14].

Figure 1 presents types of methodologies for assessing the activities of universities. Rating examples: world (international) university rankings (THE, QS, ARWU and other); national university rankings (CHE in Germany, The Guardian and jointly by The Times and The

Sunday Times in the United Kingdom and other); reports of global associations in the field of knowledge and technology transfer (AUTM).

Figure 1. Types of methodologies for assessing the activities of universities

Source: developed by the authors

In general terms, the rating of universities is the arrangement in a certain ranked order of groups of universities. For this, various criteria are used that are comprehensively evaluated by universities. The ratings are characterized by different target audiences (the main consumers of information), assessment methodology and way of presenting the results.

Global ratings are based on internationally comparable information. However, there are large differences in the context, accuracy and reliability of data, as well as in data definitions. Not all rating organizations audit data, and even if they have done, the context remains important.

International university ratings are traditionally perceived as an important component in assessing economic development and comparing the achievements of higher education in different countries of the world. Table 1 provides a comparative description of the four most popular world ratings.

Table 1. Innovative orientation of international university assessment ratings

Criteria	QS	THE	ARWU	Web
1	2	3	4	5
Type of study	Expert analytical research, ranking	Statistical analysis and global expert survey, ranking	Statistical Research Ranking	Analysis of the university's representation in the Internet space

1	2	3	4	5
Research direction (industry)	Science and education	Scientific and teaching activities at the university, scientific productivity and citation	University research work	Research activity
Rating Types	Global ranking; Rating by subjects; Rating by faculty; Rating of the best universities and others	Global ranking of world universities; Rating by subjects; World reputation rating and other	Global ranking; Rating by subject area; Disciplines Rating	Global ranking; Country rating
Study frequency	Annually	Annually	Annually	Twice a year
Organization	Consulting company Quacquarelli Symonds	Times Higher Education; Thomson Reuters	Center for World Class Universities of Shanghai Jiao Tong University	Cybermetrics Lab
Year of foundation	2004 (in conjunction with THE); 2010 year (independently)	2004 (in conjunction with QS), 2010 year (independently)	2003	2004

Source: developed by the authors based on 1, 16, 17, 19

The differences in the considered ratings are confirmed by the difference in the type of research (methodology) used by rating agencies. If we analyze the influence of scientometric data, statistical indicators and expert judgment, the weight of these groups will differ in these ratings. So, THE rating is 33% dependent on subjective expert assessments [18]. The QS rating is subject to the influence of subjective ratings by 50% and by 30% depending on the citation index [17]. UK THE and QS ratings are more correlated with each other than with Shanghai ARWU. ARWU rating virtually eliminates the subjective factor: 60% of the rating is formed by citation indexes of authors and 30% depends on awards and bonuses [1]. Ranking Web of Universities (Webometrics) presents the result of ranking universities in terms of content and content updates, as well as the relevance and popularity of websites [20].

If we start from the main tasks of the university, we can distinguish two key vectors - educational and scientific activities. Accordingly, the composite indicators of the rating can be rearranged depending on which of the vectors they characterize - research or educational.

Table 2 presents indicators for evaluating the research activities of higher education institutions. All ratings use different methodologies. Some compare universities in different

countries, regardless of their profile, others (THE) publish only ratings in subject areas, while others (ARWU, QS) issue both industry and subject ratings. The methodology for calculating indicators is based on a survey of various respondents (teachers, students, employers, etc.). Each university rating has a different number of metrics. The proportion of research activities ("research results" in Table 2) in each of the ratings is different: THE - 37.5%, QS - 20%, ARWU - 40%, Web - 25%. Basically, these indicators are determined by the number of researchers citing in the databases of well-known scientific journals. In addition to this indicator, indicators of research results can be the number of published articles, the number of award-winning scientists, the most cited researchers from the universities listed and their contribution to the scientific community (ARWU), the volume and reputation of research at universities (THE), the reputation of universities (QS), the number of search results on the university website (Web), etc.

Table 2. Ranking criteria for university ratings

Rating	Indicator	Weight, %
Research results		
ARWU	Number of articles published in the journals Nature and Science	20
	Number of articles indexed in the Science Citation Index Expanded and Social Sciences Citation Index (Thomson Reuters) databases	20
THE	The average number of citations per article	30
	Scope and reputation of research	30
	Research Income	2,5
QS	The average number of citations per academic staffing unit (according to Scopus, Elsevier)	20
Web	The number of search results on the university website by the scientific search engine Google Scholar and the number of citations of documents found	12,5
	The number of "valuable" files on the site (the number of files with the results of studies of four formats: PDF, PS, DOC and PPT)	12,5
Teacher's level		
ARWU	Total number of university employees receiving a Nobel Prize or Fields Medal	20
	Number of frequently cited researchers in 21 subject areas (250 * top scientists using the Web of Knowledge database)	20
Web	The number of unique external links to the pages of the university's site found through search engines Yahoo Search, Live Search and Exalead	50
Academic performance		
ARWU	The indicator, defined as the ratio of the total number of points for all indicators to the number of full-time academic staff	10
Dimensions		
Web	The number of pages on a site resulting from searches by Google, Yahoo, Live Search, Exalead	20

Source: developed by the authors based on 1, 16, 17, 19

The massive use of ratings in assessing the activities of educational institutions is criticized in the academic environment [12, 15, 19]. It is the criticism and practice of application that helps the development of ratings, the improvement of methodology, the emergence of new ratings or alternative rating systems, for example, U-Multirank.

According to the authors, THE does not take into account such essential qualities of scientific work as the novelty and value of a scientific result and observance of ethical standards in scientific work in order to stimulate scientific activity. To do this, the rating may include additional indicators.

Authors believe that it is advisable to apply the existing university ratings both in relation to homogeneous groups of objects, and also when taking into account the interests of a potential user. At the same time, the clients' information content about the goals, advantages and disadvantages, the specificity of the evaluation criteria, methods of data collection and processing increases. Therefore, educational institutions must find new approaches to assessing innovation, taking into account their specificity and capabilities.

The orientation of educational institutions to higher ratings should be associated with certain goals in research work. To achieve the goals, heads of educational institutions need to understand the methodology for calculating indicators that make up the rating; evaluate and stimulate not only "what should be", but also reduce "what needs to be changed"; maximize useful information from all measured and observed indicators.

As a rule, national ratings are oriented to international ones, although many of them were developed before international ones. National ratings (commercial or state) have access to a wider array of data, and also have the ability to control their quality. For example, Germany's main national ranking CHE [6] conducts regular surveys of approximately 130,000 students and 16,000 teachers, covering about 250 higher education institutions. One of the rating components is research rating (CHE - Forschungs Ranking). It provides data differentiated by the university research results indicator, is based on extensive data material and focuses exclusively on university research, combining the results of various levels. Many countries of the world undertake activities to improve the national rating system, in which the educational function of the university is now presented to a greater extent, while world ratings place the main emphasis on the development of science.

Ideas or innovations are transferred from research laboratories and universities to the business sector through technology transfer. The reports of global associations in the field of university technology transfer contribute to studying the experience of building and developing technology transfer systems in the developed countries. For example, according to a report by members of the Association of University Technology Managers (AUTM), a survey on AUTM licensing activities includes detailed information on research funding, the impact of innovation, patent activity, license revenue, and the number of startups [3].

Practical recommendations on ratings and reporting in higher education are developed by the respective commissions of UNESCO [14]. As main disadvantages of such ratings are recognized: the desire to concentrate on the results of the past activities of universities and the emphasis on quantitative assessment indicators (which presumably characterize quality). Also among the shortcomings of the ratings there is, paradoxically, an excessive emphasis on research indicators.

Ratings should be made for comparable universities, classified in certain categories, taking into account the budgets and resources of universities, size, age, type and focus. This should be done at the national level to take into account the unique indicators of the country and at the international level, both in the framework of classifications and in general, but using key agreed weighted indicators.

Nowadays Israel is one of the leading states in terms of science and education. Its university system was formed based on the American model and is one of the youngest in the world, but at the same time it is one of the most powerful. In 2020, Israel ranks 6th (5th in 2019) out of 105 countries in the Bloomberg Innovation Index of the world's most innovative countries. According to the ranking of the world countries by the INSEAD, WIPO, Cornell University: The Global Innovation Index, in 2019 Israel takes the 10th place among 129 countries. In the ranking of national higher education systems Universitas 21: Ranking of National Higher Education Systems, in 2019, Israel ranks 18th among 50 countries. These ratings emphasize the level of development of innovative activity in the country.

The data of international ratings of the higher education system in recent years indicates a number of achievements of Israeli universities. A total of 10 universities are located throughout the country. Their main difference from other educational institutions is their high research activity. As a rule, universities combine all subjects (humanitarian, technical and scientific), but there are also institutions whose activities focus on certain subjects (for example, the Technion and the Weizmann Institute).

Table 3 shows the positions of Israeli universities in the world ratings of TONE, QS, ARWU, Web and in two ratings of CWTS Leiden Ranking [5] and U.S. News Best Global Universities [12] in 2019.

Table 3. Positions of Israeli universities in various world rankings in 2019

University	THE	QS	ARWU	Web	CWTS	U.S. News Best Global Universities
Tel Aviv University	189	230	151	149	77	183
Hebrew University of Jerusalem	201	154	101	200	187	222
Bar-Ilan University	501	601	401	522	506	618
University of Haifa	501	651	601	575	616	715
Technion-Israel Institute of Technology	401	247	85	282	218	258
Weizmann Institute of Science	-	-	101	293	490	99
Ben-Gurion University of the Negev	-	407	401	408	291	553

Source: developed by the authors on 1, 16, 17, 19

Unconditional leaders in TUE rating are the universities of the USA and Great Britain. This ranking includes 6 universities in Israel. Tel Aviv University occupies the 189th place in the overall ranking (among 1,400 universities in the world under study) in 2019.

In 2019, six Israeli universities were included in the QS World University Rankings, four of which were included in the list of 500 best universities in the world. In 2019 the best indicator among the data of Israeli universities belonged to Hebrew University of Jerusalem (154th place). At the same time, in 2018 ranking it was on the 145 place [17].

American universities took the vast majority of places in the top 100 according to Shanghai ARWU ranking. The United Kingdom is on the second place in terms of the representation of universities in the top 100, being 1.5–5.5 times behind the leader. In 2019, the Technion-Israel Institute of Technology has taken the 85th place. The dynamics of rating changes for 2015–2019 can be traced on the example of three universities: Technion-Israel Institute of Technology, Hebrew University of Jerusalem and Weizmann Institute of Science, shown in Figure 2.

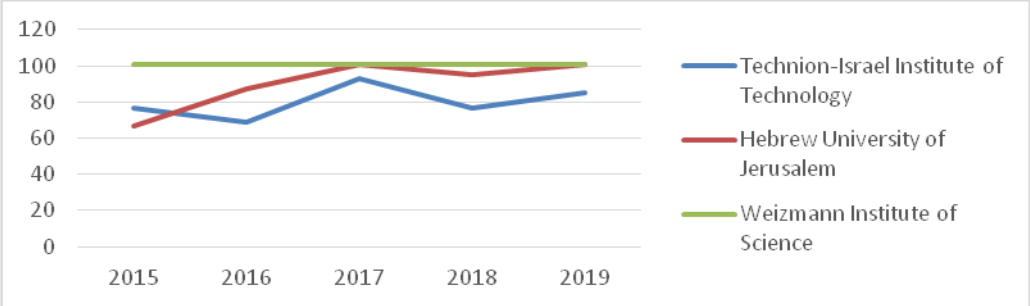


Figure 2. Dynamics of changes in the ARWU ranking of three Israeli universities for 2015-2019

Source: developed by the authors based on Academic Ranking of World Universities 2019 [2]

Over the past three years, the Technion-Israel Institute of Technology is among the top 100 best universities in the world according to ARWU rating and has the highest rating among Israeli universities in this rating. Hebrew University of Jerusalem takes the second place.

The final version of the Webometrics ranking includes about 4,000 universities in the world. At the same time, the number of universities analyzed is constantly growing. This rating includes all Israeli universities. Tel Aviv University takes the 149th place, which is higher than the ratings of other universities.

Table 4 shows the places of Israeli universities in the CWTS Leiden Ranking, which is a common, but narrowly targeted rating. It ranks the research activities of leading universities in the world and offers a complex set of bibliometric indicators on scientific impact, collaboration, and publicly available publications. The ratings of Israeli universities in CWTS 2019 (for 2014-2017) are presented in Table 4.

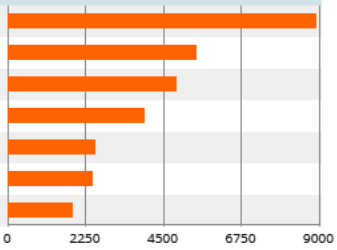
The designation P (top 1%) and PP (top 1%) is the number and percentage of university publications, which, compared to other publications in the same field and in the same year, belong to 1% of the most frequently cited ones. According to CWTS ranking in 2019, Tel Aviv University had the most cited publications.

Rating of U.S. News Best Global Universities differs from its competitors given that 75 percent of its criteria are determined on the basis of the bibliographic database Web of

Science / InCites. Weizmann Institute of Science entered the top 100 universities in the world in this rating.

Table 4. 1% ranking of Israeli universities in CWTS 2019 (for 2014-2017)

	University	P	P(top 10%)	PP(top 10%)
1	Tel Aviv Univ	8943	747	8.4%
2	Hebrew Univ Jerusalem	5468	578	10.6%
3	Technion - Israel Inst Technol	4916	488	9.9%
4	Ben-Gurion Univ Negev	3983	281	7.1%
5	Weizmann Inst Sci	2548	495	19.4%
6	Bar-Ilan Univ	2471	176	7.1%
7	Univ Haifa	1911	103	5.4%



Source: CWTS Leiden Ranking **[7]**

The Jerusalem Post informs that the "major contributor" to Israel's decline in the rankings in recent years is poor performance in citations per paper - the key indicator for research impact. The share of top-scoring research programs in Israel has more than halved in the past five years from 1.2% in 2016 to 0.5% in 2020 [11].

Though Israel is a global leader in terms of research intensity - topping the world in 2019 when nations were ranked based on the proportion of GDP they spent on research and development - a disproportionate amount of that R & D spending is concentrated on the business sector, rather than on Israel's universities [11].

Only international ratings are not enough to assess the innovative activities of Israeli educational institutions. National ratings and a system of indicators developed by the universities themselves are necessary for evaluating innovation.

Having determined the place of Israeli universities in international ratings, the authors tried to analyze the national ratings. Unfortunately, the authors could not find such information. Academic Ranking of World Universities has a National / Regional Rank indicator, but no data source. The Unipage website provides a complete list of Israeli universities, where universities are ranked internationally and nationally in the first and second columns. Moreover, the national rating is indicated in ascending order. No data source specified. Sites of ministries and universities also do not allow evaluating the rating of innovation.

The authors believe that the Council for Higher Education, together with the Ministry of Science and Technology, the Office of the Chief Scientist, can implement a national ranking of universities in Israel by means of a development project. The project team can include representatives of universities, businesses, ministries who will offer the methodology and quantitative indicators of the rating. The approaches to compiling a national rating should be as flexible as the surrounding reality is rapidly and variably changing under the influence of globalization and the intensification of the knowledge economy. Rating requirements should be constantly refined and improved, taking into account the strengthening of objectivity in reflecting the strengths and weaknesses of each university, increasing attention to applied results and research. The correct work of Israeli universities and the focus of all their units on raising the rating can lead to significant success in science and innovation. For the correct use of ratings the heads of educational institutions need to consider them only as part of the overall assessment system or comparative analysis of innovation.

5. Conclusions

Building a reputation in the international and national educational markets is a competitive advantage of a university. Ratings are tools for comparing university educational and research work. A comparative analysis of the methodology of world university rankings and an analysis of the innovative activities of Israeli universities, based on them, were the objectives of the research conducted in this article. At this stage of the research, in this paper, the authors identified the need to develop a national innovation rating of Israeli universities. Scientific work on the evaluation of innovative activities of Israeli universities based on various ratings will be continued.

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Rezumat

În acest articol sunt supuse examinării aspectele teoretice și practice ale evaluării activității inovaționale desfășurate de instituțiile de învățământ superior în baza ratingurilor. Teren de cercetare a fost selectat Israelul. Sistemul de învățământ superior din Israel include universități și colegii. Statutul universității este o problemă de prestigiu, de creștere a finanțării de către stat a cercetării și a procesului educațional, precum și posibilitatea acordării titlurilor de doctorat. Universitățile sunt angajate în lucrări de cercetare-dezvoltare și identifică comunitatea științifică din Israel.

Articolul conține o descriere comparativă a principalelor evaluări mondiale. Accentul principal este pus pe evaluările internaționale ale instituțiilor de învățământ superior. Sistemul de învățământ superior din Israel este foarte apreciat în lume. Datele privind evaluările internaționale ale sistemului de învățământ superior din ultimii ani indică o serie de realizări ale universităților israeliene. Evaluarea activităților inovaționale ale universităților israeliene a fost realizată în baza a șase ratinguri internaționale.

***Cuvinte-cheie**: instituție de învățământ superior, activitate inovațională, rating, evaluare*

Аннотация

В данной статье рассматриваются теоретические и практические аспекты оценки инновационной деятельности высших учебных заведений с помощью рейтингов на примере Израиля. Система высшего образования в Израиле включает в себя университеты и колледжи. Статус университета является вопросом престижа, увеличения государственного финансирования исследований и учебного процесса, а также возможностью присвоения докторских степеней. Университеты занимаются научно-исследовательскими разработками и представляют научное сообщество Израиля.

В статье представлена сравнительная характеристика основных мировых рейтингов. Основной акцент ставится на международные рейтинги оценки высших учебных заведений. Система высшего образования в Израиле высоко ценится в мире. Данные международных рейтингов системы высшего образования за последние годы указывает на ряд достижений вузов Израиля. Оценка инновационной деятельности университетов Израиля проведена по шести международным рейтингам.

***Ключевые слова:** высшее учебное заведение, инновационная деятельность, рейтинг, оценка*

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A MATHEMATICAL ALGORITHM FOR ASSESSING THE QUALITY OF TOURISM ACTIVITY

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Abstract

The complexity and heterogeneity of a tourism product have profound implications on the efficiency of the sector in terms of expanding the coverage and assessment spectrum, as a result of a series of specific activities: tourism transport, food retail, provision of other basic and complementary services, services, sales of goods, domestic and international tourism, the results by their nature having both direct and indirect effects. The diversity of services, the seasonal nature of rural tourism, the typology of tourism forms, price and tariff categories involve the use of a system of indicators, which can be viewed as a cybernetic system. In this paper, following rigorous selection and critical analysis of the concepts, we sought to establish an alternative method of quality assessment in tourism.

The purpose of the research was to propose an indicator for assessing the quality of tourism activity. For this purpose we performed the following steps: study of the relevant literature; gathering the required information by conducting complex market research, using a survey of managers of tourist accommodation establishments as a tool for data collection; obtaining the necessary information by conducting complex market research using a survey of customers of the same tourist accommodation establishments as a tool for data collection; using software to centralise data and information (Excel, MatLAB); Delphi study (opinion of specialists in the field); statistical modelling; calculation of importance coefficients; development of an indicator to assess the quality of tourist services.

The algorithm for assessing the quality index of the tourism activity which we have proposed is an original contribution, based on the comparative analysis of survey answers of businesses and customers respectively in a defined tourist area and on the evaluation of sub-criteria by experts.

Keywords*: tourism, algorithm, quality of tourism activity, criterion, assessment of tourism activity, indicators*

1. Introduction

Reality has demonstrated that the system of tourism-specific indicators must provide information on:

- *the tourism demand* - by measuring the domestic and international tourist circulation within the national borders;
- *the tourism offer* or the economic potential in terms of infrastructure and human resources;

- *the value outcomes of the tourist activity* in terms of expenditure, income and economic efficiency;
- *the quality of tourism activity*.

As regards their form, the above indicators can be expressed in: ***natural, natural-conventional and value units (lei, euro, and dollar)*** and are determined in the form of: ***absolute (global) indicators, average indicators, intensity indicators, structure indicators and dynamics indicators***.

The system of indicators present at the macroeconomic level is also found at the microeconomic level, yet much more detailed, allowing a highly detailed analysis of the process of tourism activity and of the factors that influence it.

These indicators can be structured on [2, p. 45]:

1. indicators of tourism demand;
2. indicators of tourism offer;
3. indicators of the demand-supply relationship;
4. tourism expenditure indicators;
5. tourism income indicators;
6. indicators of the economic efficiency of tourism;
7. indicators of the quality of tourism activity.

The indicators of the quality of tourism activity, which are the object of this paper, can be viewed as a set of specific components that contribute to the complete characterisation of tourism activity. They express the qualitative side of the offer, as well as the social, cultural-educational and policy effects of the tourism industry. The difficulties encountered in measuring the qualitative aspects of tourism also have an impact on determining the specific indicators. For this reason, the effects of the qualitative side of tourism activity are assessed indirectly.

The indicators of the offer quality can be assessed based on the increasing/decreasing demand as a result of improved/deteriorated and diversified/non-diversified tourism services. *For this purpose, the following elements are taken into account: the level of quality of offer and service diversification; the level of comfort and facilities provided by tourism establishments; the competitiveness indicators; the indicators for maintaining the ecological balance of the environment* [7, p. 148].

2. Extent of research into the matter

Most studies and research activities in the area of quality assessment of tourism activity emphasise that the individual experience of the customer with a particular product or service represents the basis of assessment. Research promoting this idea can be found both in the European school of thought (more precisely, in the Nordic school), represented by Grönroos, Gummesson, Lethinen and Olsen and in the American school, represented by Parasuraman, Zeithaml and Berry. According to experts such as Bergman and Klefsjö, Cosmescu, Lickorish, Kotler, Zait, the characteristics of tourism activity include: intangibility, heterogeneity, simultaneity, diversity, variability, seasonality, the impossibility to protect the trade mark and the non-transfer of ownership title [1, p. 21].

There are a range of mathematical models and algorithms focused on assessing the quality of tourism activity which particularly highlight strengths and weaknesses. Some of these models are applicable, but it is important for tourism industry professionals to know that they are aware of them and how they can be used to achieve quality and customer satisfaction.

The mathematical algorithm, which we propose in this research, involves the assessment of the ***tourism attractiveness index*** by taking into account the following major components (criteria):

- ***natural tourism resources;***
- ***anthropic tourism resources;***
- ***equipment and facilities;***
- ***general infrastructure***.

By applying the ***relevance tree technique*** (the decision-making process is complex, i.e. it does not require a single isolated decision, but rather a range of interdependent decisions, unfolding in a series over several periods of time), these groups of tourism attractiveness factors can be divided, in turn, into component elements that constitute a lower level of the tree (subcriteria) [3, p. 239]. The following factors are included and analysed in the structure of each element part of the tourism offer:

a) ***Natural tourism resources***: landscape; relief: variety of forms and attractiveness of landscapes; climate: climatic elements favourable to the development of tourism activities; hydrographic network: watercourses and water bodies; fauna: wildlife and fishing; flora: forests, specific vegetation; protected areas; therapeutic factors; environmental quality.
b) ***Anthropic tourist resources***: historical and art monuments; archaeological remains; churches and monasteries; museums; folk architecture; crafts and artisanship; traditional customs.
c) ***Equipment and facilities***: accommodation (lodging) facilities; tourism food services: restaurants, bars, etc. classical or specific (with traditional dishes); leisure facilities; spa facilities.
d) ***General infrastructure***: access ways: road, railway, air, naval; technical-municipal networks: water supply, sewerage, natural gas supply, electricity, heating; ecological waste collection points.

3. Methods and materials applied

The aim of the present research was to propose an indicator for assessing the quality of tourism activity. For this purpose, the following steps were performed: research of relevant literature in the field; gathering the required information by conducting complex market research using a survey of managers of tourist accommodation establishments as a tool for data collection; obtaining the necessary information by conducting complex market research using a survey of customers of the same tourist accommodation establishments as a tool for data collection; using software to centralise data and information (Excel, MatLAB); Delphi study (opinion of specialists in the field); statistical modelling; calculation of importance coefficients; development of an indicator to assess the quality of tourism services.

The approach ranges from the conceptual-methodological dimensions to those based on probing the experimental field, dominated by information, statistics, analyses and interpretations supported by concrete situations.

4. Findings and discussions

Stages of the mathematical algorithm for assessing the quality of tourism activity

Tourism activity is among the key phenomena that have emerged in the contemporary era, its spectacular development being a highlight of the past century. The quality of tourism activity (tourism products and services) is a microeconomic indicator part of the system of tourism indicators. According to the current standard, indicators of the quality of the tourism activity are quantitative expressions and respectively qualitative assessments of the features of tourism products and services [6, p. 61].

The mathematical algorithm that we aim to put forward presupposes, in the first stage, for any given case, the existence of 5 criteria (1- extremely important, 2- very important, 3- important, 4- not very important, 5- not at all important).

Using the Delphi study (opinion of specialists in the field), we called on 10 specialists in the field of tourism to perform an assessment based on a ranking scale from 1 to 10. The next step involves calculating the mean rate of answers to three questions addressed to both managers and customers of the tourism establishments regarding the quality of the tourism activity in a given area.

1. Please rate the importance of the following aspects in your choice of an establishment (hotel, bed and breakfast, others) to stay in:

Extremely important	Very important	Important	Not very important	Not at all important
1	***2***	***3***	***4***	***5***

2. Please rate the importance of the following aspects with regard to the quality of tourism products and services offered to you:

Extremely important	Very important	Important	Not very important	Not at all important
1	***2***	***3***	***4***	***5***

3. Please rate the overall quality of services:

Extremely important	Very important	Important	Not very important	Not at all important
1	***2***	***3***	***4***	***5***

Thus, we begin with the qualitative assessment and then perform the quantitative assessment. The answers to such questions, usually expressed by the rate of answers for each lower level sub-criterion, are rendered graphically, both for customers and for businesses in a certain tourist area. One criterion includes several sub-levels (sub-criteria), for example, for the criterion (question 2 of the questionnaire) - *very important*, we have the following:

Table 1. Criteria and subcriteria

No	Criterion (c – customers; a – businesses/agents)	Sublevels (subcriteria)		
		1	2	3
1.	2. Please rate the importance of the following aspects with regard to the quality of tourism products and services offered to you:	Spatial quality	- access facilities;	
2.			- clarity of markings (signals)	
3.			- parking facilities	
4.			- facilities in the vicinity of the accommodation provider	
5.		Quality of choice	- diversity of proposals (specific features of different types of rooms)	
6.			- variety of products and services	
7.		Quality itself	- facilities parameter (5 types of standards are considered)	1. facility standards
8.				2. usage standards
9.			- staff helpfulness	3. maintenance standards
10.				4. sanitation standards
11.				5. safety standards
12.				
13.		Quality of relationship	- direct (staff-customer)	
14.			- indirect (customer-customer)	

Source: Data processed by the authors

After centralizing the ratings from 1 to 10 submitted by the experts in the field, we calculated the arithmetic mean for each criterion and sub-criterion (quality sub-levels) in order to establish an importance coefficient (CIi).

Table 2. Calculating the importance coefficients linked to the subcriteria

General criterion		Sublevel (subcriterion)			Rating
1.	Please rate the importance of the following aspects with	Spatial quality **CI_1 = 0.62**	- access facilities; **CI_{11} = 0,82**		8.2
2.			- clarity of markings (signals) **CI_{12} = 0.88**		8.8

3.	regard to the quality of tourism products and services offered to you: **CI = 0.33**		- stopover facilities **CI_{13} = 0.89**		8.9
4.			- facilities in the vicinity of the accommodation provider; **CI_{14}= 0.97**		9.7
5.		Quality of choice **CI_2 = 0.86**	- diversity of proposals (specific features of different types of rooms) **CI_{21} = 0,89**		8.9
6.			- variety of products and services **CI_{22} = 0,97**		9.7
7.		Quality itself **CI_3 = 0.72**	Facilities parameter (5 types of standards are considered) **CI_{31} = 0,73**	1. facility standards **CI = 0.91**	9.1
8.				2. usage standards **CI = 0,95**	9.5
9.				3. maintenance standards **CI = 0,92**	9.2
10.				4. sanitation standards **CI = 0,96**	9.6
11.				5. safety standards **CI = 0,97**	9.7
12.			Staff helpfulness **CI_{32} = 0.99**		9.9
13.		Quality of relationship **CI_4 = 0.87**	direct (staff-customer) **CI_{41}=1,0**		10
14.			- indirect (customer-customer) **CI_{42} = 0,87**		8.7

Source: Data processed by the authors

Calculation summary

The importance coefficient for the immediately higher sub-criterion is obtained by multiplying the lower sub-level importance coefficients. The criteria and sub-criteria are interlinked, therefore a given importance coefficient is the result of the lower level sub-criteria multiplication.

The experts' ratings provide an assessment geared towards perfection and also express the relationship between criteria and sub-criteria, respectively. Moreover, such ratings serve as strong reference when assessing the relative quality index of the activity (tourism products and services).

$CI = CI_1 \times CI_2 \times CI_3 \times CI_4 = 0.62 \times 0.86 \times 0.73 \times 0.87 = 0.33$
$CI_1 = CI_{11} \times CI_{12} \times CI_{13} \times C_{14} = 0.82 \times 0.88 \times 0.89 \times 0.97 = 0,62$
$CI_2 = CI_{21} \times CI_{22} = 0,89 \times 0,97 = 0,86$
$CI_3 = CI_{31} \times CI_{32} = 0,73 \times 0,99 = 0,72$
$CI_4 = CI_{41} \times CI_{42} = 1 \times 0,87 = 0,97$

By processing the resulting values in EXCEL, we obtained a graphical modelling of the mean frequency of answers to the questions in the survey (referring to the qualitative assessment of tourism services and products by managers and customers).

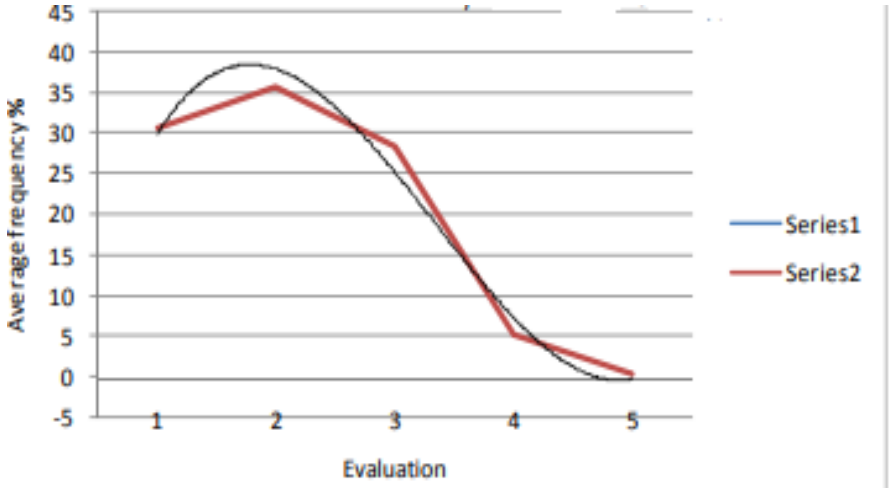

Figure 1. Modelling of results for the general criterion

As a next step, the distribution of points according to an n-degree polynomial function was modelled. The regression equation has the following general form: $\mathbf{Y_{ic(a-c)\ area} = bx^3+cx^2+dx+e}$. The regression equation is the result of modelling the results for the general criterion "Please rate the importance for you of the following aspects of the quality of tourism activity (products and services) offered".

Table 3 contains the polynomial equations obtained by modelling using the MatLAB 7 software with the **PS.m** function.

Based on the results (the bounded areas under the polynomial curves), the relative quality index of the activity (tourism products and services) is obtained, which we propose to calculate using the formula below:

$$IRCPST_{zona} = \sum_{i=1}^{m} \left[CI_{i} \cdot \frac{\int_{1}^{n} Y_{iczona}(x) \cdot dx}{\int_{1}^{n} Y_{iazona}(x) \cdot dx} \right] \quad (1)$$

where:

- $IRCPST_{zona}$ – relative quality index of the activity in the given area/zone;
- CI – importance coefficient of common criteria for customers (c) and businesses/agents (a);
- Y_{iczona} – polynomial equation for customers in the given area/zone;

- Y_{iazona} – polynomial equation for businesses in the given area/zone;
- 1 … n – integration interval according to rating levels (1 … 5) for the n degree polynomial equation:
- 1 … m – the criteria considered.

Table 3. Criterion and equation characteristic for customers and businesses

No	Criterion c – customers; a – businesses / agents;	Equation for the given area/zone is: $Y_{ic(a-c)\ zone} = bx^3+cx^2+dx+e$, i = criterion.	
		Customers	**Businesses**
1	2.c/a Please rate the importance of the following aspects with regard to the quality of tourism products and services offered to you. **CI_2 = 0.33**	y_{2cVD} =(2.414*x.^3 - 24.725*x.^2+ 67.213*x - 18.288); y_{2cNT} =(3.59*x.^3 - 36.508*x.^2+ 101.69*x - 45.027); y_{2cBE} =(3.8021*x.^3 - 35.787*x.^2+ 89.458*x - 25.813); ***Area:*** ***A_{2cVD} = 83.9010*** ***A_{2cNT} = 84.3529*** ***A_{2cBE} = 84.7916***	y_{2aVD} =(3.1136*x.^3 -29.498*x.^2+ 71.831*x -11.131); y_{2aNT} =(0.9567*x.^3 -14.306*x.^2+ 51.474*x -20.609); y_{2aBE} =(-9.2448*x.^3+ 88.449*x.^2 - 258.56*x+ 238.75); ***Area:*** ***A_{2aVD} = 89.7885*** ***A_{2aNT} = 84.3735*** ***A_{2aBE} = 45.1230***

Source: Data processed by the authors using MatLAB 7 with PS.m function [4, pp. 11-21]

$$\frac{\int_1^n Y_{iczona}(x)\cdot dx}{\int_1^n Y_{iazona}(x)\cdot dx}$$ (2), is the ratio of the areas for each distinct criterion.

The ratio of areas is equivalent to the ratio of demand (customers) according to questions and supply (businesses). Ideally, under equilibrium conditions, customer demand should be equal to the available offer of businesses and, as a result, the quality index should be characterised by the sum (Ci) value. A lower minus would mean that businesses offer more than customers' demand.

The proposed calculation methodology considers the assessment of the criteria in relation to:

- Customers' evaluation;
- Managers' evaluation;
- Ratings by specialists.

5. Conclusions

Indicators of the *quality of the tourism activity* serve to inform decision-makers on the state of the system at a given moment or on its evolution in time. Based on such indicators, decisions

can be made to mitigate seasonality by: making the best use of equipment and facilities; rational use of labour; changing tourist flows in favour of international ones; obtaining a higher volume of income; superior benefits and profitability based on the same material and human resources; diversifying the range of services; optimising the offer structure; cost reduction; increasing labour productivity [5, p. 192].

The results derived from the research allow us to draw some conclusions. Thus, we noticed that the models developed by most specialists rely on assessing the quality of services based on individual experience of the customer with regard to a particular service.

According to this perspective, the quality of tourism activities can be assessed by consumers only after consuming the service or product and according to their perception. As regards quality measurement, most models do not offer an explanation of how it could be performed/quantified. Through the proposed indicator, we took into account customers' opinions about the quality of tourism activities in addition to the opinion on the quality offered by specialists and providers in the field.

In our case, the quality of tourism activity is derived from the ratio between the quality demanded by the customer and the quality offered by the supplier. Both the quality demanded and the quality offered are based on the same quality aspects. One can observe significant differences between the two categories of subjects (managers and customers), following the analysis of polynomial equations obtained from modelling the mean frequency. It is obvious that the quality of tourism activity perceived by customers is lower than that offered by managers.

From a strategic and operational point of view, managers of tourist accommodation establishments should act to improve the quality of tourism activity in order to raise the relative quality indicator, compared to the maximum ideal value. Consequently, there will be a harmonisation of customers' quality requirements with the offer of tourist accommodation establishments.

The proposed algorithm represents an original contribution and leaves room to adding other criteria and to completing the model, taking into account the complexity of the tourism system. We believe that this indicator could be included in the quality of life indicators. The obtained results, namely the calculation relation of this indicator, reflect a particular situation of quality tourism activity, requested by clients and offered by the tourist accommodation establishments.

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Rezumat

Complexitatea şi eterogenitatea produsului turistic, are implicaţii profunde asupra eficienţei acestui sector în ceea ce priveşte lărgirea spectrului de acoperire şi evaluare, exprimând rezultatul unei serii de activităţi specifice: transportul turistic, alimentaţia publică, furnizarea altor servicii de bază şi complementare servicii, vânzări de bunuri, turism intern şi internaţional, rezultatele, prin natura lor, având atât efecte directe, cât şi indirecte. Diversitatea serviciilor, caracterul sezonier al turismului rural, tipologia formelor de turism, categoria preţurilor şi tarifelor implică utilizarea unui sistem de indicatori, care pot fi trataţi ca un sistem cibernetic. În această lucrare, după o selecţie riguroasă şi o analiză critică a conceptelor, ne-am propus să stabilim o metodă alternativă de evaluare a calităţii în turism.

Scopul cercetării a constituit propunerea unui indicator de evaluare a calităţii activităţii turistice. Printre obiective am realizat: studiul bibliografiei aferente; obţinerea informaţiilor necesare prin realizarea unor cercetări complexe de piaţă folosind chestionarul aplicat managerilor structurilor de cazare turistică ca instrument pentru colectarea datelor; obţinerea informaţiilor necesare prin realizarea de cercetări complexe de piaţă cu ajutorul chestionarului aplicat clienţilor aceloraşi structuri de cazare turistică ca instrument pentru colectarea datelor; aplicarea programelor pentru centralizarea datelor şi a informaţiilor (Excel, MatLAB), studiului Delphi (opinia specialiştilor în domeniu), modelării statistice; calculul coeficienţilor de importanţă; dezvoltarea unui indicator de evaluare a calităţii serviciilor turistice.

Algoritmul pentru evaluarea indicelui de calitate al activităţii turistice pe care l-am propus, reprezintă contribuţie originală şi se bazează pe analiza comparativă a răspunsurilor agenţilor economici respective a clienţilor dintr-o anumită zonă turistică şi pe evaluarea subcriteriilor de către experţi.

***Cuvinte-cheie**: turism, algoritm, calitatea activităţii turistice, criteriu, evaluarea activităţii turistice, indicatori*

Аннотация

Сложность и неоднородность туристического продукта оказывают значительное влияние на эффективность сектора с точки зрения расширения спектра охвата и оценки комбинации специфических видов деятельности: туристический транспорт, общественное питание, предоставление других основных и дополнительных услуг, продажа товаров, внутренний и международный туризм, с результатами прямого и косвенного влияния. Разнообразие услуг, сезонный характер сельского туризма, типология форм туризма, ценовые и тарифные категории предполагают

использование системы показателей, которую можно рассматривать как кибернетическую. В этой статье, после тщательного отбора и критического анализа концепций, авторы попытались создать альтернативный метод оценки качества туристической деятельности.

Целью исследования состояло в предложении авторами показателя оценки качества туристической деятельности. В этом контексте были выполнены следующие задачи: изучение соответствующей литературы; сбор необходимой информации путем проведения комплексного исследования рынка с использованием опроса руководителей учреждений размещения туристов в качестве инструмента сбора данных; получение необходимой информации путем проведения комплексного исследования рынка с использованием опроса клиентов тех же туристических объектов размещения в качестве инструмента для сбора данных; использование программного обеспечения для централизации данных и информации (Excel, MatLAB), исследования Delphi (мнения специалистов в данной области), статистического моделирования; расчет коэффициентов значимости; разработка показателя оценки качества туристических услуг.

Предложенный алгоритм оценки показателя качества туристической деятельности считаем оригинальным вкладом, основанным на сравнительном анализе ответов на опросы предприятий и клиентов в определенной туристической зоне и на оценке подкритериев экспертами.

***Ключевые слова**: туризм, алгоритм, качество туристической деятельности, критерий, оценка туристической деятельности, показатели*

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INDUSTRIAL REVOLUTION 4.0: A NEW PARADIGM FOR ECONOMIC GROWTH

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Abstract

Industry 4.0 is a political, economic and social challenge for the whole world, whose goal is to absorb digital innovations in products, processes and business models. Many developed countries in Europe, America and Asia have included the Industry 4.0 concept in their strategic development programs for the coming decades. Business leaders and global manufacturers accept digital challenges and opportunities as a conceptual leap of new realities generated by technical and scientific progress. At the same time, the criteria for evaluating the performance of transformations in Industry 4.0 are still not enough studied, and the structured and systemic implementation of these technologies in national economies of many countries is not fully finalized. Thus, in this study, the authors examine how European economies have joined the Industry 4.0 Strategy and implement in practice its tools, recording performance in various fields of activity. The second part of the research analyzes the degree of readiness of the Republic of Moldova to accept and address the challenges of the digital age in industry and agriculture in the context of sustainable development. Statistical reports and international and national policy documents on the recognition and acceptance of the notions of Industry 4.0 and the digital economy served as a basis for research to define a new stage of society's development.

***Keywords**: Industry 4.0, informational technologies, artificial intelligence, digital economy*

1. Introduction

In the last thirty years, humanity has gone through many world crises. None of them has changed our existence so deeply. The transportation and manufacture chains are being destroyed as a result of the coronavirus pandemic, which is constraining states to reclaim borders and restructure important public institutions, and universities are moving towards distance learning. Everything that happens in the modern world is not a step in the abyss, but a path to a new reality, based on the revolution in IT and the achievements of Industry 4.0.

Thousands of companies are moving their employees to on-line jobs. The outside office working has become a reality for millions of workers around the world. This forced global experiment will inevitably lead to a radical reform of the labor market and, consequently, to the emergence of new social challenges.

Industry 4.0 is a political, economic and social challenge for the whole world, which aims to absorb digital innovations in products, processes and business models. Many developed countries in Europe, America and Asia have included the concept of Industry 4.0 in their strategic development programs for the coming decades: "*Program 4.0",* implemented in German industry; in France and Italy – "*Factory of the Future"*; "*Society 5.0"*- to solve production and social problems in Japan; in the UK – "*Catapult"*; in the United States – "*Smart Manufacturing"*, in China –"*Made in China – 2025"*; Russia has also set ambitious tasks in the field of information technology. Companies in Europe, the United States and Asia have already entered the race to adopt and use elements of Industry 4.0 in their work, seeing the digital economy as basis for future prosperity [6].

Starting from the ancient world, the economy climbs several stages of development, and today it reaches the fourth stage, which we can call digital, for the simple reason that it is based on information processing and information technologies. Namely, they become suitable for use in traditional spheres, which, as a result, acquire new qualities and advantages.

The development of internet technologies, communication channels and digital platforms has driven the emergence of public information systems and global industrial networks beyond the particular boundaries of enterprises. By interacting, these systems and networks have a transformational impact on all sectors of modern economy, leading to a new era of industrial automation, the fourth industrial revolution.

2. Degree of investigation of the problem currently, and purpose of research

Like any other modern concept, the digital economy does not have a generally accepted definition. There is a whole range of definitions. Initially, the new term "*digital economy"*, designed to characterize trends in the global economy, was proposed in 1995 by Canadian Donald TAPSCOTT, a specialist in business and consulting [14, p. 8]. In his works, TAPSCOTT describes how people can and should change their lifestyle under the influence of information and communication technologies, but also emphasizes the relationships between users, in particular, the possibilities of networking for people from different geographical areas and spheres of activity, etc. Namely, the avalanche growth of information relations reinforces the new economy or Industry 4.0.

The term Industry 4.0 was introduced in 2011, as part of the German initiative, and is based on a digital revolution. World-renowned economist Klaus SCHWAB, Founder and Executive Chairman of the World Economic Forum, explains: "We have the opportunity to shape the fourth industrial revolution, which will fundamentally change the way we live and work" [10, p. 5]. Its main features are "ubiquitous": the Internet, miniature production devices (which are becoming cheaper), artificial intelligence and digital technologies based on hardware and software, as well as electronic networks that are no longer innovations, but every year, go beyond the third industrial revolution becoming more sophisticated and integrated, leading to the transformation of society and global economy.

Professors Eric BRINJOLFSSON and Andrew MCAFEE from the Massachusetts Institute of Technology called this period "the second century of the machine", claiming that "the world is on the brink of an epidemic-like explosion, in which the effects of digital technologies will

manifest themselves “throughout their beauty” in automating and creating “unprecedented things” [2, p. 33].

Some experts believe that the “digital economy” is a separate, specific field of activity that can exist on its own, can process data - this “digital” information - and brings profit, being self-sufficient. The American specialist Nicolas NEGROPONTE (1995) [7, p. 17] suggested that this is an economy that is moving from processing atoms to processing bits, i.e. from the material world to the virtual world.

Most experts share this interpretation of the notion of digital economy. This is valuable because we do not deviate from the specific tasks of humanity, but we see this as a possibility to meet the needs of people.

The cornerstones of Industry 4.0 are: cybernetics, studied by Nobert WIENER (1948) - conceived and formulated as the universal science of administration; cryptography, because the digital economy pays special attention to the issues of information security and truthfulness, which can only be achieved by using cryptography methods and quantum computing.

One of the “pillars” underlying the digital economy is artificial intelligence. Artificial intelligence (AI) technologies include developments such as mechanical training, image and speech recognition. AI is used in information and communication technologies, media industry, retail, health, etc. According to the McKinsey & Company portal, the largest technology companies invest between 20 and 30 billion dollars annually in AI, and the startups - between 6 and 9 billion dollars. At present, AI is best implemented in three areas: telecommunications, machine-building industry and financial services.

IBM experts consider that the basis of Industry 4.0 is the Big Data. Big data is a term applied to data sets the size or type of which exceeds the capacity of traditional relational databases to capture, manage and process low latency data. Big data has one or more of the following characteristics: huge volume, high speed, or great variety. Artificial intelligence (AI) and Internet of Things (IoT) lead to the complexity of data through new forms and data sources. For example, big data comes from sensors, devices, video/audio, networks, files, transactional applications, web and social media - most of the data is generated in real-time and on a very large scale. Big data analysis allows analysts, researchers and business users to make better and faster decisions using data that was previously inaccessible or unusable. Businesses can use advanced analytical techniques such as text analysis, machine learning, predictive analytics, data extraction, statistics, and natural language processing to retrieve new information from previously untapped data sources independently or in combination with existing enterprise data.

We cannot ignore the lock technology (*blockchain*), on the basis of which modern crypto-currencies are built. Blockchain technology is a computer protocol configured in the 1990s. However, its widespread use and success are associated with the spread of cryptocurrencies, the most famous of which is bitcoin.

Thanks to the combination of the increasing computing and analysis power of information system data, the strengthening of connectivity in Europe and the constant evolution of artificial intelligence systems, the potential for using multi-purpose distributed ledger technology is growing exponentially. At the same time, blockchain technology is a code, i.e. a

communication protocol, and a public register in which they are "annotated" with a high degree of transparency and without the possibility of modifying all transactions made between network participants, according to a sequential order. This registration order consists of a set of concatenated "blocks" (parts of the code), using a cryptographic function that tracks each part of the block forming a chain that cannot be modified. These "concatenated blocks" are recorded simultaneously on each of the devices through which the participants of the blockchain connect. Each participant is a chain "link" that contributes to the validation and archiving of the data exchanged.

We will emphasize that blockchain technology is relevant, especially for countries and branches, where the level of trust in banks, governments, contractors, etc. is low, also the technology is attractive thanks to its transparency and degree of protection. Examples include crowding, electronic elections, and new types of intellectual property protection and user identification, smart contracts, which require instant and secure data exchange. There is a step along this path - nano-technologies that work at the level of atoms and molecules and can do real miracles and all sorts of smart technologies: "smart home", "smart neighborhood" and even "smart city". All this is part of the notion of digital economy.

The purpose of this research is to define the concept of Industry 4.0, to study the impact of IT products on the sustainable development of world economies, how to approach this concept in the legislation of the Republic of Moldova, and the ability to assimilate and implement IT technologies in the development and growth strategy of the country.

3. Methods and materials applied

To achieve the objectives of the study the following research methods were used: documentation, comparative analysis, synthesis. The selected research methods made it possible to study and compare national and international legislation and strategies in the field of digitalization of the economy. The studied literature allowed the definition of the concept of Industry 4.0; the situational analysis carried out highlighted the technological potential and the problems faced by the economy of the Republic of Moldova in this field.

To quantify the potential global impact of Industry 4.0, we analyzed the reports of The Boston Consulting Group (Report: *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries* [15]*),* the opinions and reports of the European Commission in the IT field, international Statistical portals [8]. To analyze the perspectives of economic growth based on IT and the real situation in Moldovan economy we considered the International Data Corporation Report for Moldova 2019 [9], data of the National Bureau of Statistics, National Strategy „Digital Moldova 2020" [12], Reports of enterprises on investments in information technologies. The research is based on statistical and scientific data analysis approach.

4. Results obtained and discussions

According to the Industry 4.0 BCG Report [15] and the Global Digital Operations Study 2018 [4] the prospects for economic growth in the European Union will be determined by the implementation of Industry 4.0 technologies in seven main areas of activity.

1. **Productivity**. In the next five years, Industry 4.0 will be embraced by several multinational companies, which will lead to increased productivity in all production sectors. For example, in Germany, productivity gains from conversion costs, which exclude the cost of materials, will range from 15% to 25%. Taking into account material costs, productivity growth is from 5 to 8 percent. These improvements will vary by industry. Manufacturers of industrial components will achieve some of the largest increases in productivity (from 20 to 30%), and car manufacturers can expect an increase of 10-20% (see Figure 1).

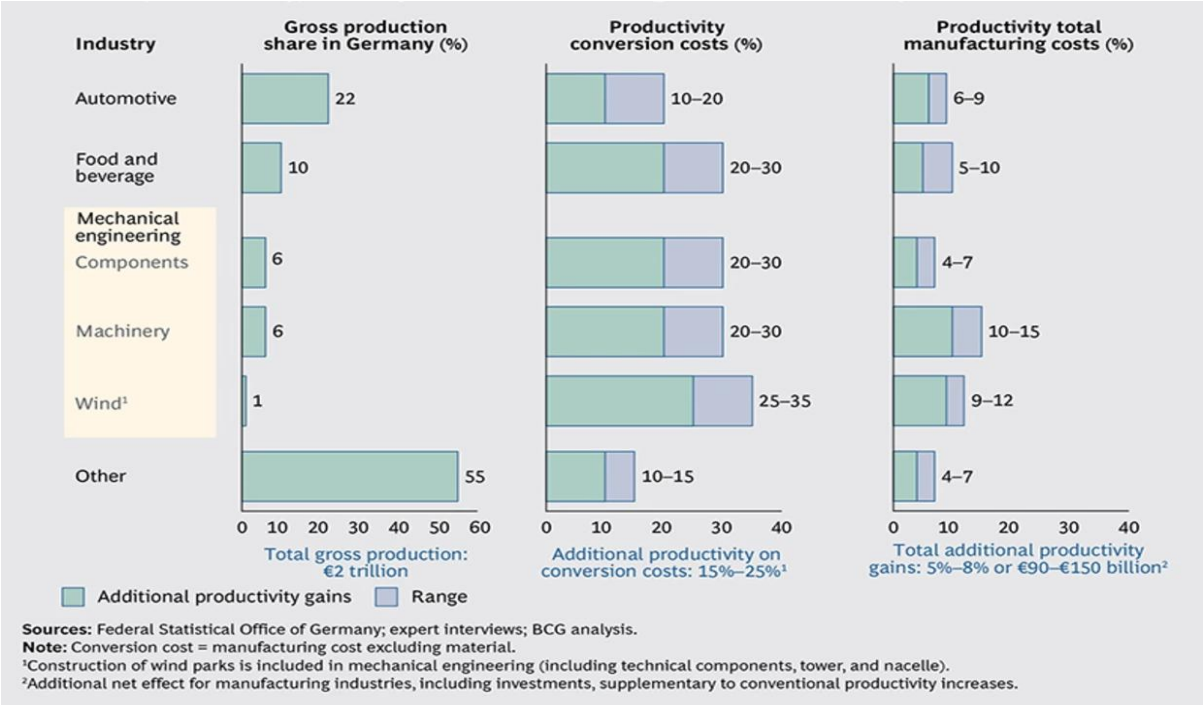

Figure 1. Increase in industrial productivity in Germany as a result of the implementation of Industry 4.0

Source: BCG Report [15]

2. **Increasing income.** Industry 4.0 will also lead to higher revenues. Manufacturers'demand for improved equipment and new data applications, as well as consumer demand for a wider range of increasingly customized products, will lead to further revenue growth of around € 30 billion a year or about 1% of Germany's GDP**.**
3. **Employment**. An analysis of the impact of Industry 4.0 on German production, found that the growth it stimulates would increase employment by 6% over the next ten years (see Figure 2). Demand for employees in the mechanical sector could increase even more - by up to 10% over the same period. However, different skills will be required. In the short term, the trend towards greater automation determines the dismissal of low-skilled workers, who perform simple, repetitive tasks. At the same time, the increasing use of software, connectivity and analytics is increasing the demand for employees with skills in software development and IT technologies, such as mechatronics experts with software skills. This transformation of skills is one of the key challenges.

4. **Investment.** Adapting production processes to incorporate Industry 4.0 will require German manufacturers to invest between one and 1.5 percent of producer revenues over the next ten years. The estimated benefits in Germany illustrate the potential impact of Industry 4.0 on global production. Industry 4.0 will have a direct effect on manufacturers and their workforce, as well as on companies that supply production systems.

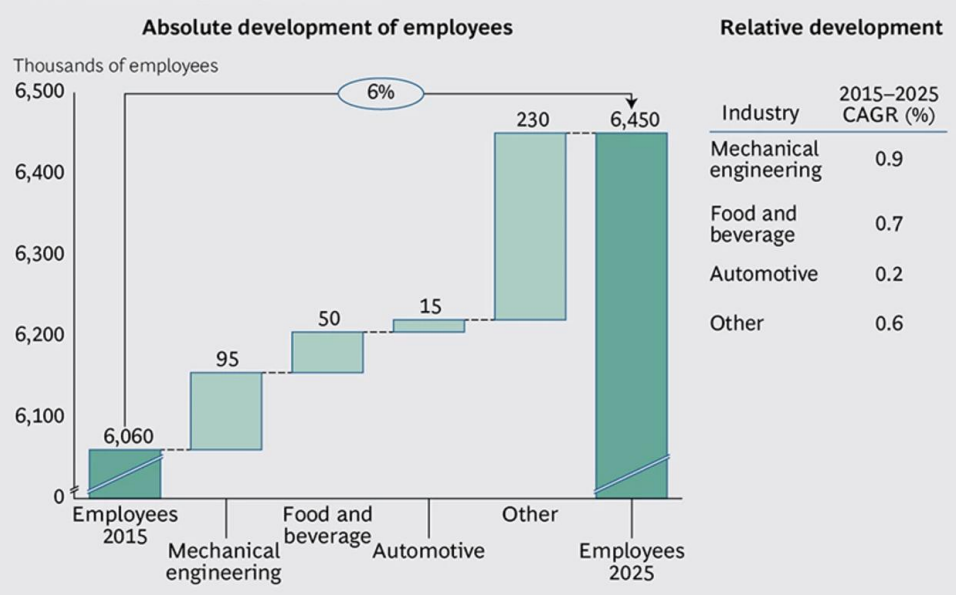

Figure 2. Increase in production employment in Germany as a result of the implementation of Industry 4.0

Source: BCG Report [15]

5. **Producers.** The next wave of production affects the entire value chain of manufacturers, from design to after-sales service. Throughout the value chain, production processes are optimized through integrated IT systems. As a result, fully automated integrated production lines are replacing today's production cells**.**

Industry 4.0 enables a faster response to customer needs than is possible today, improving flexibility, speed, productivity and quality of the production process. It lays the groundwork for the adoption of new business models, production processes and other innovations. This will provide a new level of mass customization, as more manufacturers, investing in industry, also invest in Industry 4.0 technologies to improve and customize their offerings.

Industries and countries will embrace Industry 4.0 at different rates and in different ways. Industries with a high level of product variants, such as the automotive, food and beverage industries, will benefit from a higher degree of flexibility that can generate productivity gains, for example, and industries that require high quality, such as semiconductors and pharmaceuticals, will benefit from improvements based on data analysis, which reduce error rates.

Highly skilled countries will be able to capitalize on a higher degree of automation, combined with an increase in higher labour demand. However, many emerging markets with a young

and technologically intelligent workforce could also create completely new production concepts.

In general, enterprise software is aimed at improving productivity and efficiency, meeting the needs of one or more core processes through single software architecture. Human resources, accounting and sales are frequently targeted functions of such programs. The enterprise software marketplace includes smart applications for enterprise resource planning, customer relationship management, supply chain management, and project and financial portfolio management.

International statistics and forecasts show that enterprises' overall spending on IT and software technologies has increased several times from 2009 to 2019. In 2018, software spending reached $ 391 billion. In the same year, spending on the global information technology market increased to 3.683 billion US dollars, while IT services, the second largest segment in the field of communications services - to 1003 billion US dollars [8].

According to an analysis carried out by the Statista portal, in 2020, it is estimated that IT expenses for enterprise software will amount to approximately 503 billion US dollars worldwide. The software market registered a high growth in recent years, with revenues doubling in the decade between 2009 and 2019. Recent forecasts suggest that this rapid expansion trend will continue in the coming years, with market revenues reaching 556 billion by 2021 (see Figure 3).

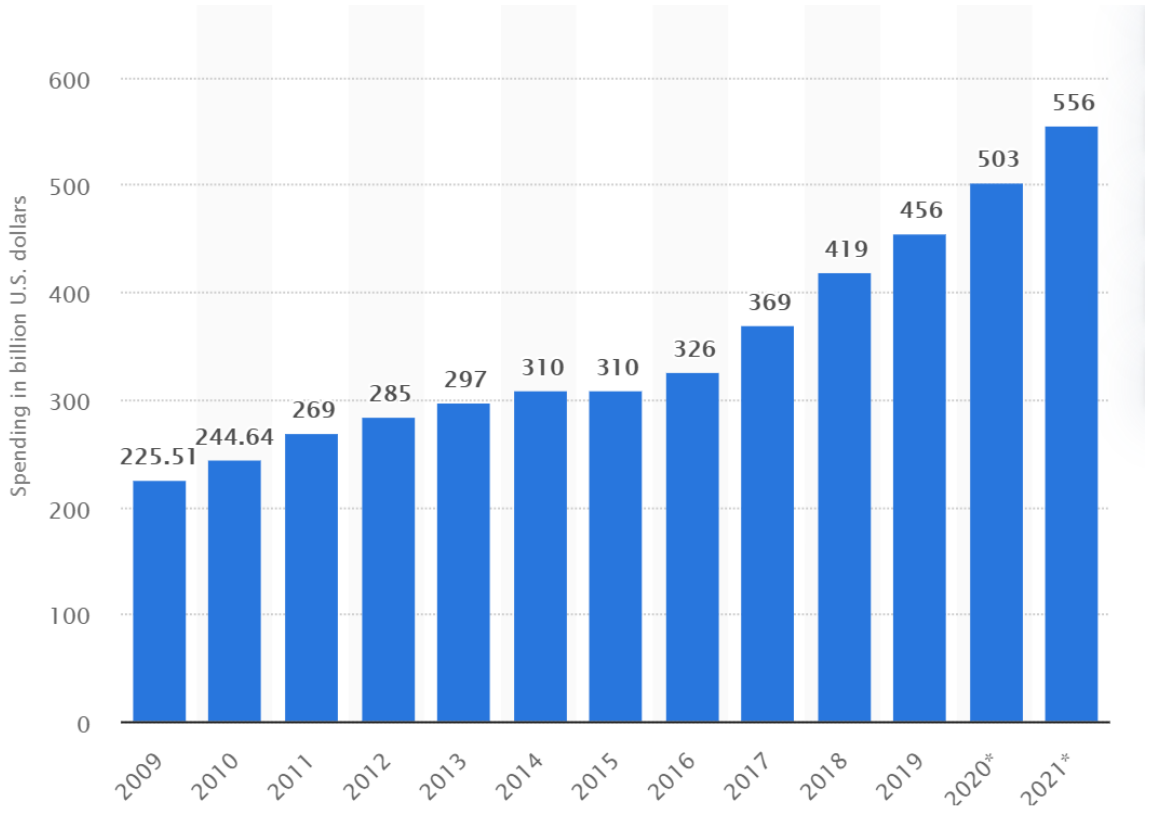

Figure 3. Evolution of global spending on IT and Software (2009-2021)

Source: https://www.statista.com/statistics/203428/total-enterprise-software-revenue-forecast/

With year-on-year growth, often exceeding 10%, the enterprise software market is the fastest growing segment in the IT industry. Enterprise software is aimed at meeting the needs of organizations, addressing in particular the efficiency of their core business processes. In recent years, many enterprise software sub-segments, such as business process management software, enterprise resource planning software, and customer relationship management software, have developed in massive markets.

According to the consulting firm Strategy & Global, German companies invest 40 billion euros annually in industrial internet infrastructure. This is a significant part of European investment in the fourth industrial revolution, which is expected to reach 140 billion euros per year. Out of 278 companies surveyed in Germany, 131 reported that they were already "involved in Industry 4.0" [13].

According to the statistical portal OECD Stats (Organization for Economic Co-operation and Development), in 2017, 87.32% of German companies had websites and used IT resources in business, in France this index was 66.53%, in the US and Great Britain - 83.63%, and in Finland - 96.28% [8].

Analysing the situation regarding the implementation of IT in the economy of the Republic of Moldova, international experts found that given its level of development, our country has an extensive information technology infrastructure. The International Telecommunication Union (ITU) examined the indicators of access and use of IT in 2012, and attested that the situation in our country is better compared to the average in the CIS countries and is close to that of the Central and Eastern European countries, however, IT is not a defining element in the organization of domestic business. The findings made by ITU are presented in the Innovation Strategy of the Republic of Moldova for the period 2013-2020 "Innovations for competitiveness", approved by Government Decision no. 952 of November 27, 2013 [11].

To analyse IT knowledge and its application in entrepreneurial practice, Global Innovation Index (IGI), allowing international comparison of innovation results, as well as Innovation Union Scoreboard are applied [3].

According to the findings of the Innovation Strategy of the Republic of Moldova, "the positions of the Republic of Moldova are insignificant in terms of online presence". The number of higher-level generic web domains per 1000 people in the Republic of Moldova is only 2.0 units, compared to 2.9 units/1000 people in the CIS and 22.3/1000 people in Central and Eastern Europe. It speaks about a low presence of Moldovan companies and organizations on the Internet, which is an essential barrier to the promotion of national products (see Figure 4).

According to the same document, rapid expansion of ICT use is taking place in the Republic of Moldova. Increasing the level of digitization by 10 percentage points contributes to increasing the country's score in the Global Innovation Index by 6 percentage points. Between 2005 and 2012, the number of Internet users increased from 16.2 users per 100 inhabitants to 50.5 users. Sixty seven percent of companies submit electronic tax returns via Internet. Broadband Internet penetration reached 14% in 2012.

The use of IT and Internet is of crucial importance for the innovation process. First, they ensure cheap and efficient dissemination of information about existing innovations and allow

companies to copy, adapt and improve these innovations. Second, Internet has a huge impact on educating consumers, who become more informed, and even become creators of innovation.

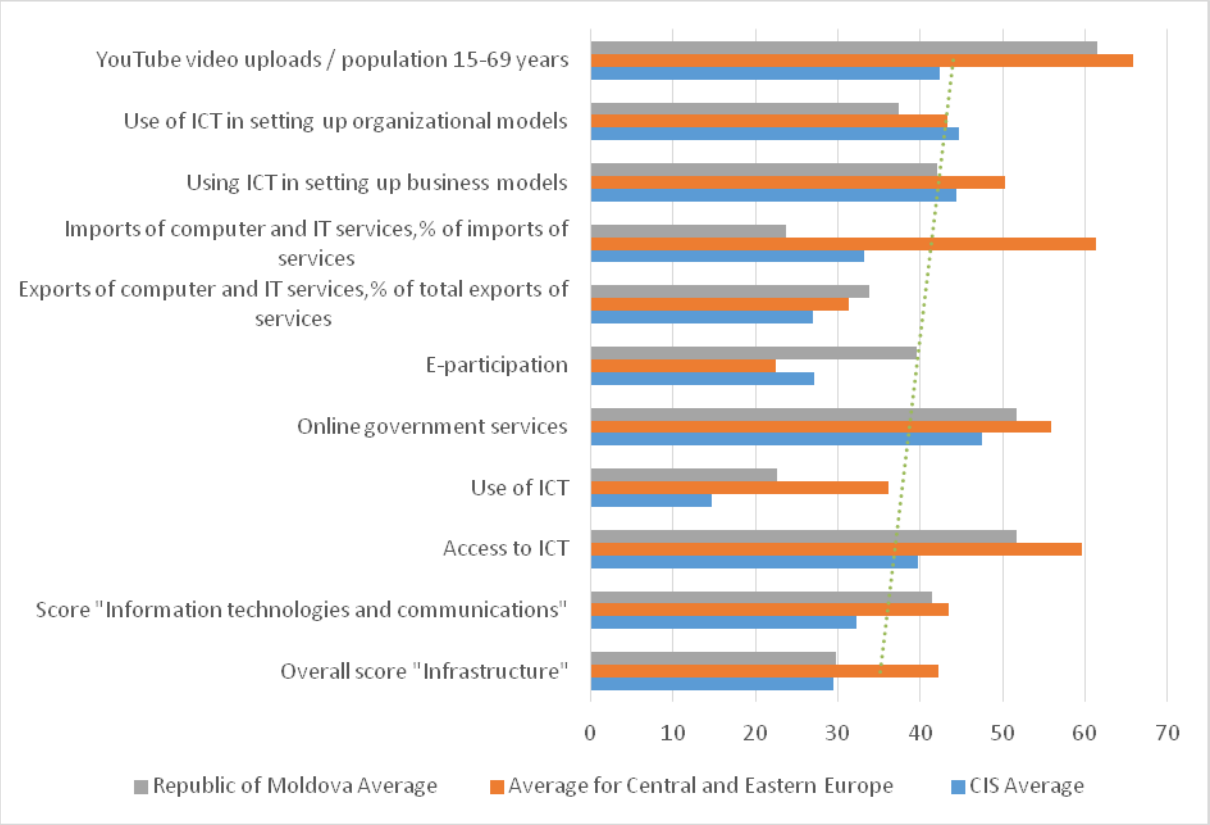

Figure 4. Comparative analysis of the Global Innovation Index components: Republic of Moldova, CIS, Central and Eastern Europe

Source: adopted from the data presented in the Innovation Strategy of the Republic of Moldova for the period 2013-2020 "Innovations for competitiveness", GD no. 952 of November 27, 2013, IGI 2012[1] [11].

Another document on computerization and digitization of our country was the National Strategy for building the information society – "Electronic Moldova", GD No. 255 of 09.03.2005. (Repealed in 2013). In 2005, the Government of the Republic of Moldova considered as priority directions of the Information Society Building Strategy increasing the competitiveness of companies and creating new jobs, using the opportunities offered by new information and communication technologies in the development of e-commerce, modernization of business, finance and human resources management, promotion of new products and services.

Instead of the repealed Strategy, the National Strategy for the Development of the Information Society "Digital Moldova 2020", GD no. 857 of 31.10.13 [12], presents, starting with 2013, the situation regarding the number of Internet users, the degree of households endowment with computers, broadband Internet access, mobile phone penetration, etc. Although our country is ranked 7th in the world in terms of Internet speed, and ICTs have reached the level

[1] Note: IGI 2012 scores are the result of normalizing some indicators on the scale from 0 to 100, higher values indicating better results or higher inputs.

of 10% of GDP - all these are characteristic elements of the third industrial revolution and not the Industrial Revolution 4.0., which requires the use of robots, artificial intelligence, cloud computing, blockchain in industrial production.

Analysis of the degree of use of robots in the industry of the Republic of Moldova shows a very low level. Robots require huge investments, as well as knowledge for their handling and maintenance, which the country is lacking. Even world's major industrial manufacturers, which have invaded the country's economy in recent years, such as automotive companies, manufacturers of wiring, car parts and accessories, use human labour that is currently cheaper than robotic. At the same time, automation of production processes will reduce the number of jobs and cause withdrawal of these companies from the country, which will happen very soon.

According to "Digital Moldova 2020" Strategy, building the country's future is inconceivable without a digital strategy that would create ICT-based information and communication opportunities. In addition, entrepreneurs and government institutions need to maximize the use of government data in favour of services for citizens.

The data of the National Bureau of Statistics say that the expenditures of legal entities for ICT were insignificant in 2018, being related to GDP.

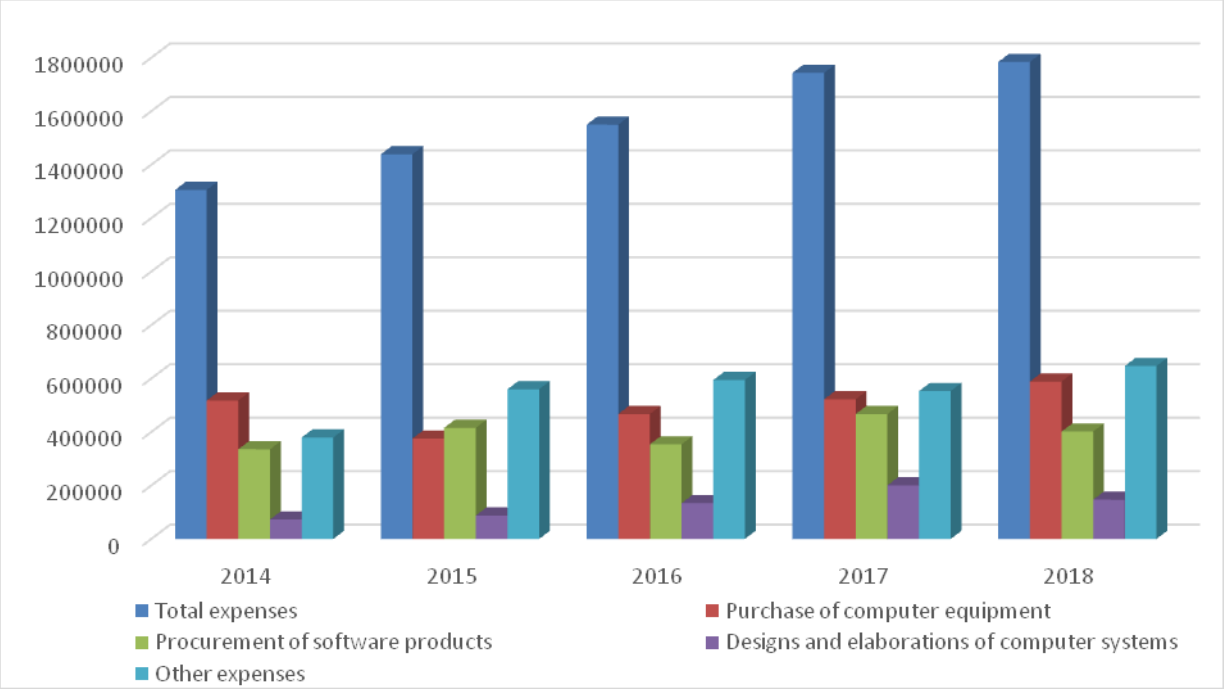

Figure 5. Expenses of legal entities on information technologies, by cost categories in 2014-2018, thousand lei

Source: developed by the authors based on NBS data http://www.statistica.md/category.php?l=ro&idc=139& [1]

The dynamics of these expenses is positive for the entire analysed period (from 1,305 thousand lei in 2014 to 1784 thousand lei in 2018) (see Figure 5). The largest share in total expenses belongs to expenses for the purchase of computer equipment (40% of total expenses in 2014 and 33% in 2018) and the smallest share was spent on the design and development of information systems (respectively 6% in 2014 and 8% in 2018).

By areas of economic activity, these expenditures are shown in Figure 6. The largest share of investments in ICT belongs to information and telecommunications activities (25% of total expenditures for information technologies in 2014 and 26% - in 2018) and to financial activities and insurance (16% of the total in 2014 and 23% - in 2018). The share of investments in ICT in the manufacturing industry reached 3.8% in 2014 and 6% in 2018 and in agriculture - 0.24% in 2014 and 0.27% in 2018.

According to statistical data, investments, costs and expenses for computerization of enterprises in 2018 amounted to a total of 1,549,706.6 thousand lei, which represents 1.14% of GDP (in current prices, 135,396,791 thousand lei).

The largest share of funds allocated for computerization in 2018 went to own funds in the amount of 77.8% of the total and allocations from grants and donations - 3.8%.

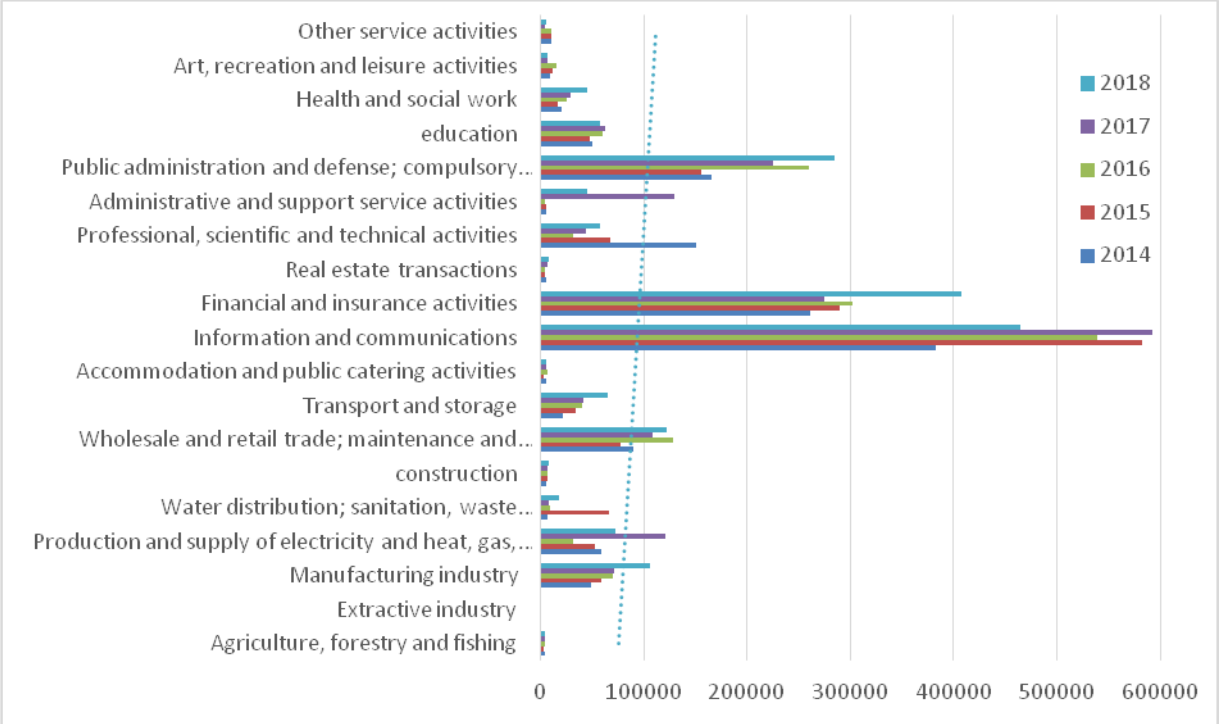

Figure 6. Expenditures of legal entities on information technologies by economic activities in 2014-2018, thousand lei

Source: National Bureau of Statistics, http://www.statistica.md/category.php?l=ro&idc=139& [1]

Investments in computerization, although growing year by year, are mainly costs and expenses for communication services and for purchase of computers, very few companies invest in digital technologies, software, automation and robotics of activities.

Unlike technologically advanced countries, in the Republic of Moldova there is no discussion about the Industrial Revolution 4.0. (there are only a few articles in the popular and press literature, as well as publications at specialized conferences). Industry 4.0 is very actively promoted by multinational companies located in Moldova (*Microsoft, FBS group, Endava, Star Lab*) and international audit companies (*PwC Moldova, KPMG, Baker Tilly Klitou and Partners*, etc.).

In Romania, Industry 4.0 is promoted by such companies as SIMENS, BOSH, FESTO, and Vodafone. However, neither in Moldova nor in Romania there is an interest from domestic companies for Industry 4.0.

Several Romanian researchers have already been warned about the huge impact of Industry 4.0 on the competitiveness of producers and products in the European market and the need for Romania to participate actively in this qualitative leap of European industry.

The main expectations from the implementation of Industry 4.0 innovations are the optimization of production processes and resource consumption by connecting equipment to the network, using artificial intelligence in production systems at supply, production and sales levels, also the use of "app-store" and "cloud" applications as new concepts in management. All this will generate an increase in productivity, a reduction in the duration of the technological process, a reduction in waste, customer satisfaction, an increase in quality and a reduction in the cost of manufactured products.

Next, we aim to perform the SWOT analysis regarding the implementation of Industry 4.0 tools in domestic production systems.

SWOT analysis regarding the implementation of Industry 4.0 tools in the national economy

Strengths (S)	Weaknesses (W)
▪ existence of a skilled workforce in the IT field; ▪ existence of communication networks; ▪ high-performance internet infrastructure; ▪ implementation of institutional projects: biometric passport, e-Declarations system, digital map, "e-government", etc.; ▪ master's programs in robotics, TUM; ▪ presence of courses in robotics and IT clubs for young people; ▪ attractiveness of the economy for foreign investments; ▪ a supplier industry for the automotive industry (this sector being one of the most attractive for Industry 4.0); ▪ collaboration relations with the German industry, promoter of Industry 4.0.	▪ lack of an efficient IT sector, with competences in the essential fields for Industry 4.0; ▪ lack of a coherent government program in the field of Industry 4.0; ▪ lack of research (with some exceptions) in the field of Industry 4.0; ▪ lack of research in the field of processing technologies in the literature; ▪ lack of financial resources and investments in IT; ▪ lack of interest from the banking sector in financing the activities specific to Industry 4.0; ▪ lack of specialists in organizing the production; ▪ lack of workforce qualifications in interdisciplinary fields; ▪ lack of interdisciplinary specializations (computers-sensor-mechanical technologies-materials-production organization); ▪ poor quality of students in some areas essential for Industry 4.0: machine building, mechanics, materials science, production organization, etc.

Opportunities (O)	Threats (T)
▪ development of digital skills, retraining of the workforce; ▪ increasing productivity and competitiveness of national products; ▪ increasing investments in human capital development; ▪ increasing investments in Industry 4.0 technologies; ▪ adapting to global and European trends in the digitalization of manufacturing.	▪ security of personal data and information; ▪ increasing the risk of cyber-attacks; ▪ job cuts as a result of automation and robotization of production processes; ▪ lack of qualified staff for the IT field.

5. Conclusions

The economy of the Republic of Moldova is not ready to face the challenges of the fourth industrial revolution, which began almost 10 years ago. There are many organizational, conceptual, financial and operational problems that, in our view, need to be addressed in the near future, namely:

1. Defining an Agenda for Industry 4.0 in the Republic of Moldova.
2. Inclusion of Industry 4.0 in the National Development Strategy of the Republic of Moldova.
3. Introduction of Industry 4.0 in the National Program of Research, Development and Innovation.
4. Promotion of Industry 4.0 concept in the academic environment.
5. Introduction in the curricula of colleges and universities of interdisciplinary courses addressing Industry 4.0.
6. Promoting and financing of studies in specializations: Machine building technology, Machine tools and production systems, Industrial engineering, Mechatronics, Robotics, Instrumentation and data acquisition, Telecommunication networks and software, Computers, Information technology, etc.
7. Motivating the involvement of Moldovan companies in Industry 4.0 Agenda.
8. Involvement of banking institutions in financing the initiatives of enterprises involved in Industry 4.0 program.
9. Accession and active participation in European platforms and agencies whose field of interest is Industry 4.0.

Industry 4.0 provides tremendous opportunities for innovative manufacturers, system vendors and entire regions. However, as in previous developments, Industry 4.0 is also a serious threat to those in difficulty. With the change in business models, economic and qualification requirements, we could see major changes in leadership positions, both at the company level and at the regional and international levels.

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Rezumat

Industria 4.0 reprezintă o provocare politică, economică și socială pentru întreaga lume, al cărei obiectiv este de a absorbi inovațiile digitale în produse, procese și modele de afaceri. Multe țări dezvoltate din Europa, America și Asia au inclus conceptul Industry 4.0 în programele lor de dezvoltare strategică pentru următoarele decenii. Liderii în afaceri și producătorii mondiali acceptă provocările și oportunitățile digitale ca un salt conceptual al noilor realități generate de progresul tehnico-științific. În același timp, criteriile de evaluarea a performanței transformărilor în Industria 4.0 sunt încă puțin studiate, iar implementarea structurată și sistemică a acestor tehnologii în economiile naționale pentru multe țări nu este deplin definitivată. Astfel, în acest studiu, autorii examinează modul în care economiile europene au aderat Strategiei Industriei 4.0 și implementează în practică instrumentele ei, înregistrând performanțe în diverse domenii de activitate. A doua parte a cercetării analizează gradul de pregătire a Republicii Moldova pentru a accepta și aborda provocările epocii digitale în industrie și agricultură în contextul dezvoltării durabile. Drept bază de cercetare au servit rapoartele statistice și documentele de politici internaționale și naționale privind recunoașterea și acceptul noțiunilor de Industrie 4.0 și economie digitală pentru definirea unei trepte noi de dezvoltare a societății.

***Cuvinte-cheie**: Industrie 4.0, economie digitală, inteligența artificială, tehnologii informaționale și comunicaționale*

Аннотация

«Индустрия 4.0» - это политическая, экономическая и социальная проблема для всего мира, цель которой - освоить цифровые инновации в продуктах, процессах и бизнес-моделях. Многие развитые страны Европы, Америки и Азии включили концепцию «Индустрия 4.0» в свои программы стратегического развития на ближайшие десятилетия. Лидеры бизнеса и мировые производители принимают цифровые вызовы и возможности как концептуальный скачок новых реалий, порожденных техническим и научным прогрессом. В то же время критерии оценки эффективности преобразований в «Индустрии 4.0» все еще мало изучены, а структурированное и системное внедрение этих технологий в национальные экономики во многих странах еще не полностью завершено. Таким образом, в этом исследовании авторы изучают, как европейские экономики присоединились к Стратегии «Индустрия 4.0», и реализуют на практике ее инструменты, фиксируя результаты в различных сферах деятельности. Во второй части исследования анализируется степень готовности Республики Молдова принимать и решать проблемы цифрового века в промышленности и сельском хозяйстве в контексте устойчивого развития. Статистические отчеты и международные и национальные программные документы о признании и принятии понятий Индустрия 4.0 и цифровой экономики послужили основой для исследований по определению нового этапа развития общества.

***Ключевые слова**: Индустрия 4.0, информационные технологии, искусственный интеллект, цифровая экономика*

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ROMANIAN PRE-UNIVERSITY SCHOOL POPULATION PROGNOSIS – DECISIONAL GROUNDS FOR EDUCATIONAL MANAGERS

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Abstract

Sustainable development and the quality of life of citizens from all countries are strongly connected with the quality of education carried out in each country, thus, national educational systems having vital importance in the context of major economical, technological and globalization challenges faced in the 21st century. In post-December Romania, due to decreasing birth rate and increasing number of emigrated families, the number of students from pre-university level has registered a dramatic drop. Lack or inefficiency of demographical policies for birth rate stimulation, wonder of foreign countries, inconsistency of economic measures to support small and medium-sized companies, sometimes even erroneous politics in the area of school organization (peaking with the dissolution of professional education at the beginning of the decade), together with a series of other causes have contributed to the alarming decrease in the number of students, more accurately by over 1 million from 1995 to 2018.

If the trend continues likewise, unless there are shortly implemented policies meant to mend the decline, by 2030 there will be less than two million students, by 2040 under one and a half million and by 2050 there will be even less that the symbolic number of one million students in Romanian pre-university education. These are discouraging perspectives if we look back at 1995 when pre-university educational system in Romania registered about 3700000 students.

***Keywords**: education, pre-university level, sustainable development, prognosis, educational politics, demography policy*

1. Introduction

If in normal times the reference to education as a national priority is not appropriately perceived at the operational level, resembling more a slogan with a high degree of abstractisation, then in periods of crisis, not especially this one generated by COVID 19, we realize the importance of education, at all its levels, in humans' lives, in the existence of a people or for the entire humanity. Obviously, when we have to overcome certain crisis situations, this is done with less human and economic costs if the population has a high degree of education and professional training. The resources allocated to different projects are better managed if the human resources involved have a high education and professional level. In the context of the information explosion and communication technologies, increasing work force migration, the mission of education systems is much more important, and graduates

should be able to quickly adapt to working, social and cultural conditions in heterogeneous areas.

If we look at the level of the European Union, then from a political point of view, the majority of countries recognize that education systems have to be a priority, specifically, but this does not always happen, and if it does, it is not the same in all areas.

In Romania, for 30 years, during which there were 6-7 electoral cycles, Romanian political actors have declared education a national priority. When it came to budget allocations, things were not in accordance with political statements; with very few exceptions, the share of expenses for education compared to GDP was around 3.5%. Thus, although in the National Education Law of 2011 the level of expenditures from GDP is 6%, the real level of allocations is far from the declared one.

If in „*Romanian education beyond electoral cycles*" [3, 2019], analyzing the budget allocations over a long period of time we came to the conclusion that *Romanian education – a national priority* is still a valid and strong electoral slogan for future electoral cycles, let's try to see how things look if we refer to the number of students of pre-university education.

2. Degree of problem investigation at present, purpose of research

Along with systemic issues, the reduction in the number of pre-school education in Romania is evident from year to year, not only for educational analysts, educational researchers or those who work in the educational system, but also for the less competent ones. The situation makes us think about what will happen in 10, 20 or 30 years. These concerns are not only correct, but also mandatory, both for school managers at the micro level, as well as for the people responsible for developing educational policies in Romania. Projects related to school infrastructure, school schedules, educational indicators, and educational human resources should all be based on answers regarding the future evolution of the school population.

The UN General Assembly, reunited in New York in 2015 adopted a historical document, the 2030 Agenda for Sustainable Development, which aims for a brighter future for us and, foremost, for our successors. The Agenda was also adopted by the European Union and then it was adapted and contextualised for our country as well, becoming the Romanian National Strategy for Sustainable Development 2030 [5, 2018]. According to these documents, one of the biggest challenges the European Union faces, including Romania, is the demographic changes, especially the aging of population, decrease in the number of young people and a low birth rate. Migration flows are a solution for some areas to increase the number of young people; they only fix it in the short term and do not solve the problem of birth rate and aging.

Obviously, demographic problems find an echo in educational systems. Low birth rate and migration strongly affect the pre-university school population in Romania. Although the number of students is constantly decreasing, "the quality of teaching is far from what we want" [5, 2018]. According to the same document, in rural areas 38% of schools have outdoor toilets, over 25% do not have central heating, 20% do not have a health authorisation, 17% do not have authorised water source and only 60% of schools have their own library [5, 2018].

Educational institutions could increase the effectiveness of their activity and the level of performance by decentralizing the educational system, consolidating their autonomy and the ability to manage financial and human resources [4, 2007]. At the level of educational units, in areas where the offer is diverse, an increase in the number of students and, implicitly, that of classrooms would be associated with the management, which improves the quality of the educational process at the respective entities. From this point of view, we could deal with an increase in the school population at local level due to the so-called "migration" between different regions/units, although overall it is decreasing.

Despite the fact that the preservation or even increase in the school population in an educational unit could be achieved through efficient management, the solutions for a real increase in the number of pre-university school population are not a point of the management plan; they have to be found at the macro level and they consist of demographic, economic and social policies. These policies must be adopted and implemented together. A. Marga thinks that "in Romania today, it is not money, which primarily is missing, but a refrain that delays the sounds of change. First of all, there are not enough new ideas and solutions in the organisation which would lead ahead". The author says that we have to go back to rigorous and innovative thinking and that there is no other solution than a whole change of the system [7, 2019].

An important title in our opinion is *Romania's development strategy for the following 20 years* compiled by the Romanian Academy [1, 2015], which looks at all important areas of Romanian life and which places school and education as top concern. From the highest scientific level of the country, they provide decision makers with seven programs to remedy the problems of Romanian education and to lead to a well performing educational system, adapted to the preoccupation of the human being in the 21st century. Education, teaching, life-long learning are key ingredients for the successful recipe of sustainable development.

The purpose of our research is exactly that of analysing Romanian pre-university school population. Identifying trends in the evolution of the number of students in pre-university education, the causes of these developments, compiling a multi-decade prognosis for the number of students, suggesting solutions to increase the number of students, these are all specific purposes of our research endeavour.

3. Methods and materials applied

In the specialty literature we can find various definitions for research, one of which describes it as "an activity capable of determining comprehension, intuition and knowledge obtained through thorough perception and systemic observation of a subject/theme, with the purpose of the researcher's perception validation" [2, 2011]. Generally speaking, research is seen as "an active and systematic process of discovering, interpreting and revising facts, events, behaviours and theories, or carrying out practical applications of such facts, laws or theories" [2, 2011].

Methodology, as a research system, is the one that teaches us how to use methods, following the rigors of guidelines appropriate to the researched subject [8, 2013]. It is the how-how way through which one can reach the purpose, generally a research purpose, particularly. Research

methodology provides the rules, norms, methods, techniques and practices through which we know "How to do" and "How to apply" something we know or have learnt, how to go from a vague idea, a hypothesis to a solution, a generalisation or a scientific theory [9, 2006].

A necessary condition for this scientific approach is the need to have a picture of pre-university school population and to identify solutions that could lead to an increase in the number of students in the pre-university educational system.

Keeping in mind the domain specificity, the research methodology used was built from identifying, studying and systematising the specialty literature and legislation concerning the organization of pre-university education, starting with accessing and operating the metadata regarding the evolution of the number of students over a long period of time, continuing with the regression modelling of the phenomenon and ending with the compilation of the prognosis and the interpretation of the result.

This research used a variety of strategies, combining inductive methodological strategy, based on qualitative research methods and deductive methodological strategy. Research methods such as documenting, method of document analysis, statistical observation, statistical operation, analogy, regression analysis, prediction method, comparison, analysis, synthesis were used. Documenting was used to provide an overview on how educational institutions are organised and function, as well as on the pre-university education school population. To highlight the value, validity and theoretical and practical importance of the information we turned to statistics, mainly econometric modelling using Eviews application.

Econometrics, similar to all generic names of metric sciences, is the science which quantitatively measures the researched phenomena mainly in terms of quality. Direct study of objective reality can often mean a difficult task due to the emergence of insurmountable obstacles. In practice, there is an indirect research path, simplified and abstract, analysing more accurately the phenomena and objects that resemble those that are the subject of this particular study. This research methodology is called modelling and is an instrument of scientific analysis, which has as object building representations called models, with the help of which a better comprehension and a deeper scientific knowledge are obtained.

Econometric models operate with variables, equations, parameters and data series. In our case the endogenous, dependable variable is the number of students in pre-university education, while the exogenous variable is time. The data series are actually chronological series which register the values of school population for each year. The evolution of the number of students is a linear one and, because of that, the equation of the model is a linear regression, the parameters of which will be determined using the method of the smallest squares with Eviews application. Using the model obtained and validated in statistical tests, the prognosis of the number of students is compiled for a few future moments and an interpretation is carried out followed by some suggestions for improving the situation.

Despite the complexity of the research, it cannot exhaust all theoretical – methodological and applicative aspects of the targeted area. Our efforts can be continued, in particular, by including some exogenous variables into the model, such as birth rate and family migration rate. "The most important thing is not to stop researching and asking questions" (Albert Einstein).

4. Results and discussions

4.1. Number of pre-university education students in Romania

4.1.1. Number of students based on residentship areas

After convenient operation of the data obtained by consulting the INS – tempo-online platform, refering to the evolution of the number of students, we obtained the following situation form (Table 1):

Table 1. Number of students based on residentship areas, enrolled in Romanian pre-university education between 1995-2018

Year	Students enrolled in pre-university education		
	TOTAL	Urban	Rural
1995	3.669.248	2.561.602	1.107.646
1996	3.674.597	2.548.658	1.125.939
1997	3.659.208	2.508.423	1.150.785
1998	3.598.666	2.429.672	1.168.994
1999	3.509.449	2.334.899	1.174.550
2000	3.421.091	2.247.487	1.173.604
2001	3.356.231	2.194.355	1.161.876
2002	3.270.786	2.132.560	1.138.226
2003	3.214.999	2.073.428	1.141.571
2004	3.108.634	1.998.348	1.110.286
2005	2.996.029	1.959.876	1.036.153
2006	2.911.213	1.912.951	998.262
2007	2.846.904	1.874.081	972.823
2008	2.781.039	1.828.214	952.825
2009	2.735.424	1.804.326	931.098
2010	2.682.489	1.772.478	910.011
2011	2.610.022	1.737.248	872.774
2012	2.688.590	1.775.345	913.245
2013	2.649.040	1.752.634	896.406
2014	2.615.722	1.741.983	873.739
2015	2.553.861	1.706.729	847.132
2016	2.524.399	1.701.604	822.795
2017	2.497.768	1.699.650	798.118
2018	2.466.269	1.693.555	772.714
Average	3.001.737	1.999.587,75	1.002.148,83

Source: [6, 2020]

The decreasing trends can be more suggestively highlighted in a graphic manner as follows:

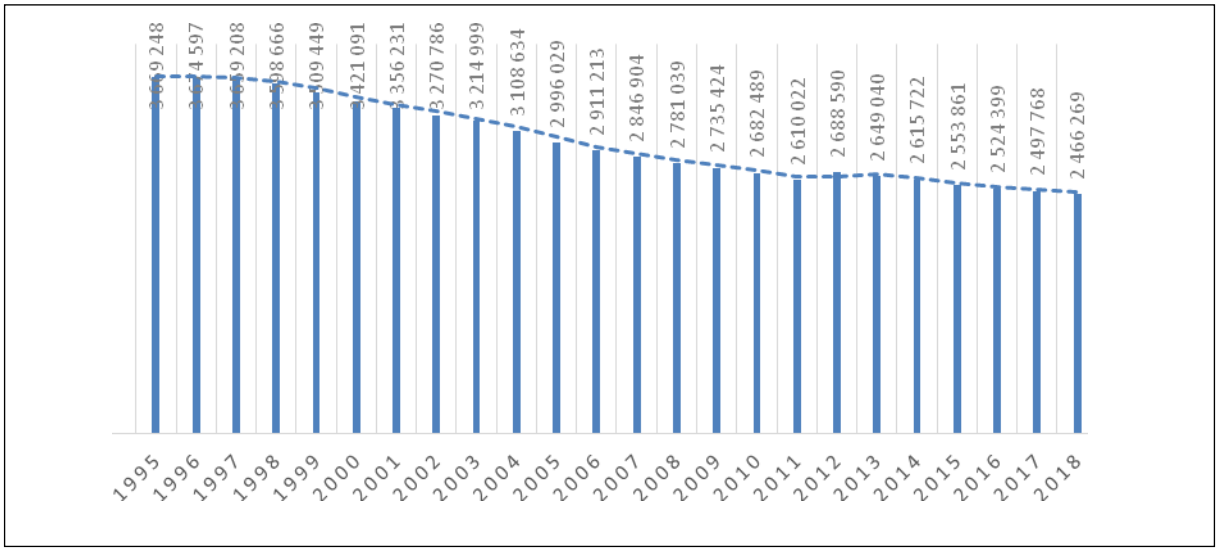

Figure 1. Evolution of the number of students enrolled in Romanian pre-university education in 1995-2018

In the analyzed period of time we notice a continuous decrease in the number of students, less by 1202979 students in 2018 compared to 1995, which means an average annual decrease of about 50124 students.

By residentship areas, the following graphic approach could be relevant:

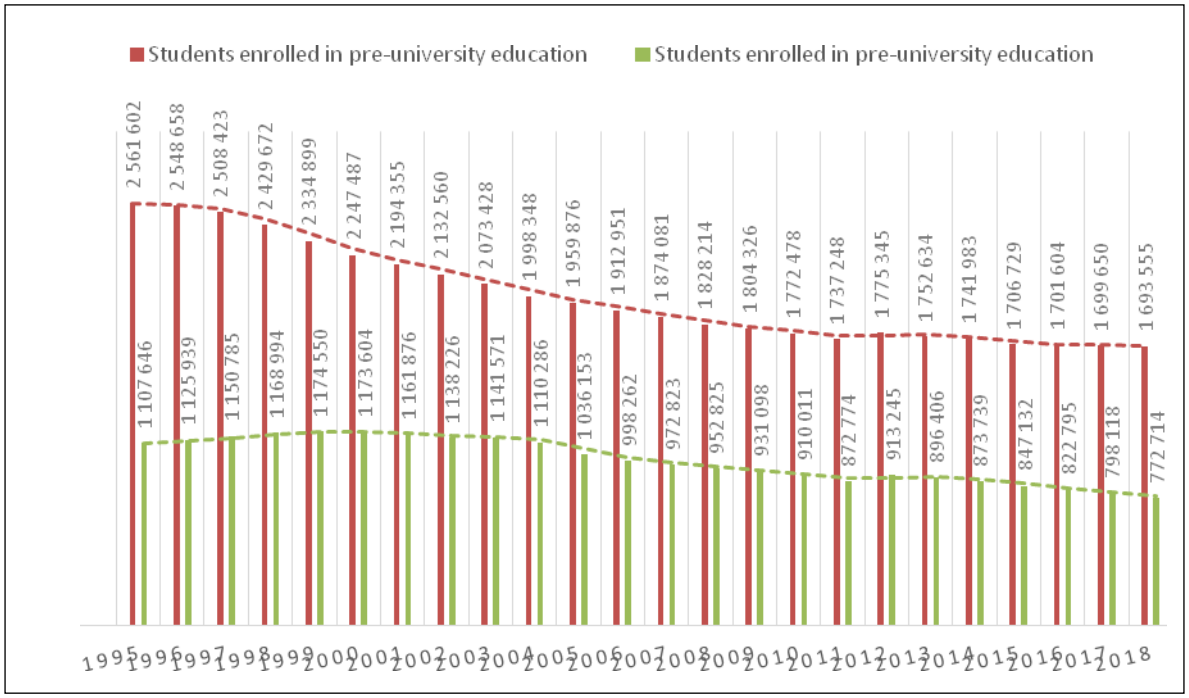

Figure 2. Evolution of the number of students, based on residentship areas, enrolled in Romanian pre-university education in 1995-2018

If we take into account the residentship areas, then the number of urban area students dropped in 2018 compared to 1995 by 868047 students, meaning an average annual decrease of about 36169 students. In rural areas, in 2018 there were 334932 fewer students enrolled than in

1995, an average annual drop for the students enrolled in rural areas being around 13955, which means a 2.5 smaller average annual drop compared to the one from the urban areas. If in urban areas the decreasing trend is obvious, for rural areas there is even a frail increasing tendency between 1995 and 2000. After this the drop is characteristic, without exception, for every year.

After processing the data highlighting the annual decrease rates regarding the number of students, we obtain the following situation:

Table 2. Rate of increase in the number of students, based on residentship, enrolled in Romanian pre-university education in the period 1995-2018

Year	Students enrolled in pre-university education					
	Total		Urban		Rural	
	Annual increase rhythm with fixed basis in 1995	Annual increase rhythm with chain basis	Annual increase rhythm with fixed basis in 1995	Annual increase rhythm with chain basis	Annual increase rhythm with fixed basis in 1995	Annual increase rhythm with chain basis
1	2	3	4	5	6	7
1995						
1996	0,15%	0,15%	-0,51%	-0,51%	1,65%	1,65%
1997	-0,27%	-0,42%	-2,08%	-1,58%	3,89%	2,21%
1998	-1,92%	-1,65%	-5,15%	-3,14%	5,54%	1,58%
1999	-4,36%	-2,48%	-8,85%	-3,90%	6,04%	0,48%
2000	-6,76%	-2,52%	-12,26%	-3,74%	5,95%	-0,08%
2001	-8,53%	-1,90%	-14,34%	-2,36%	4,90%	-1,00%
2002	-10,86%	-2,55%	-16,75%	-2,82%	2,76%	-2,04%
2003	-12,38%	-1,71%	-19,06%	-2,77%	3,06%	0,29%
2004	-15,28%	-3,31%	-21,99%	-3,62%	0,24%	-2,74%
2005	-18,35%	-3,62%	-23,49%	-1,93%	-6,45%	-6,68%
2006	-20,66%	-2,83%	-25,32%	-2,39%	-9,88%	-3,66%
2007	-22,41%	-2,21%	-26,84%	-2,03%	-12,17%	-2,55%
2008	-24,21%	-2,31%	-28,63%	-2,45%	-13,98%	-2,06%
2009	-25,45%	-1,64%	-29,56%	-1,31%	-15,94%	-2,28%
2010	-26,89%	-1,94%	-30,81%	-1,77%	-17,84%	-2,26%
2011	-28,87%	-2,70%	-32,18%	-1,99%	-21,20%	-4,09%
2012	-26,73%	3,01%	-30,69%	2,19%	-17,55%	4,64%
2013	-27,80%	-1,47%	-31,58%	-1,28%	-19,07%	-1,84%
2014	-28,71%	-1,26%	-32,00%	-0,61%	-21,12%	-2,53%

1	2	3	4	5	6	7
2015	-30,40%	-2,36%	-33,37%	-2,02%	-23,52%	-3,05%
2016	-31,20%	-1,15%	-33,57%	-0,30%	-25,72%	-2,87%
2017	-31,93%	-1,05%	-33,65%	-0,11%	-27,94%	-3,00%
2018	-32,79%	-1,26%	-33,89%	-0,36%	-30,24%	-3,18%
Average	-18,98%	-1,70%	-22,89%	-1,77%	-9,94%	-1,52%

Source: own operation depending on the number of students obtained in [6, 2020]

The total number of students dropped by 32.79% in 2018 compared to 1995. One can notice that the total number of enrolled students decreased on average by 18.98% compared to the value in the reference year, while the average decrease percentage was 22.89% in urban areas, and 9.94% in rural areas. Analyzing the values of the chain growth rates we noticed that the number of students from year to year decreases on average by 1.70% at the entire pre-university level, more exactly by 1.77% in urban areas and somewhat smaller, by 1.52%, in rural areas.

One might find it interesting to observe the graphic representation of the chain (mobile) increase rates:

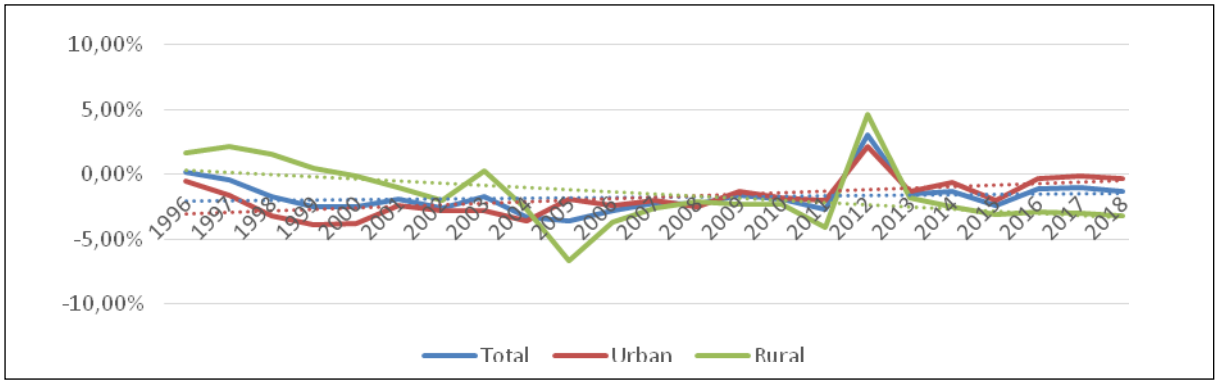

Figure 3. Annual chain increase rate of the number of students enrolled in Romanian pre-university education, based on residentship areas, in the period 1995-2018

Regarding the total number of students, the increase level is practically negative, with the exception of 1996 and 2012. In 2012 it is not only positive, but the same for both residentship areas. The explanation for this 2012 exclusion can be found in the introduction of the preparatory class to the primary school program for the 2012-2013 study year. Practically, a large number of students were transferred from pre-school to primary school level.

For the urban area, with the exception of 2012, the increase rate is negative for all analyzed years, compared to the rural area where this rate was positive between 1996 and 1999. For this period, it could be explained by the fact that some Romanians moved together with their families in the countryside, possibly due to difficult living conditions, since in those years Romania experienced an accelerated inflation.

Analyzing the trends of these three linear cases, we noticed that in terms of the total number there is a slow increase: the line for urban areas having a bigger slope, but continuing to be

under 0. This means that the rates drop, in absolute value, thus the number of students enrolled overall and in urban area has a tendency to decrease from year to year, but by smaller values. Whereas, for the rural area, the linear trend indicates an accentuated decrease, the values being under 0, which means that the number of students in rural areas increasingly drops each year. In other words, in rural area, the annual decrease trend is faster than in urban area or overall. This became more obvious after 2012.

4.1.2. The number of students by levels of education

The National Education Law of 2011 defines the levels of the national system of pre-university education as follows: early education with ante-preschool and preschool levels; primary school; secondary school including inferior secondary school or gimnasium; superior secondary school, including high school, vocational school; non-university tertiary school, which involves post high school education.

Next, we examined the number of students in pre-university education, ante preschool and preschool were not included. After processing the data from the same INS-Tempo online platform, our aim was to analyze the number of students by education levels, as presented in Table 3 and Figure 4.

Table 3. Number of students enrolled in Romanian pre-university education in the period 1995-2018, by levels

Year	Total	Primary	Secondary	High school	Vocational school	Post high school and craftsmen
1	2	3	4	5	6	7
1995	3.669.248	1.391.951	1.149.994	787.211	285.450	54.642
1996	3.674.597	1.405.308	1.140.923	792.788	262.057	73.521
1997	3.659.208	1.373.079	1.186.687	765.903	247.239	86.300
1998	3.598.666	1.284.507	1.272.423	718.017	227.585	96.134
1999	3.509.449	1.189.058	1.309.081	694.376	222.234	94.700
2000	3.421.091	1.090.172	1.321.333	687.919	239.550	82.117
2001	3.356.231	1.028.697	1.291.839	710.663	252.347	72.685
2002	3.270.786	990.807	1.207.505	740.404	270.215	61.855
2003	3.214.999	1.005.533	1.116.693	758.917	279.124	54.732
2004	3.108.634	970.295	1.026.309	773.843	289.494	48.693
2005	2.996.029	939.330	961.231	767.439	284.412	43.617
2006	2.911.213	919.439	922.769	780.925	250.383	37.697
2007	2.846.904	865.175	924.518	791.348	220.335	45.528
2008	2.781.039	859.169	893.166	784.361	189.254	55.089
2009	2.735.424	845.679	873.997	837.728	115.445	62.575

1	2	3	4	5	6	7
2010	2.682.489	828.853	862.588	866.543	54.538	69.967
2011	2.610.022	810.126	819.280	888.768	12.382	79.466
2012	2.688.590	931.951	812.241	831.810	19.734	92.854
2013	2.649.040	942.747	800.507	776.616	26.493	102.677
2014	2.615.722	947.205	785.100	727.072	50.788	105.557
2015	2.553.861	939.147	772.941	673.615	68.682	99.476
2016	2.524.399	928.245	767.216	650.832	84.390	93.716
2017	2.497.768	947.931	730.037	637.706	90.205	91.889
2018	2.466.269	931.419	722.269	629.755	90.451	92.375
Average	3.001.737	1.015.243	986.277	753.107	172.199	74.910,92

Source: [6, 2020]

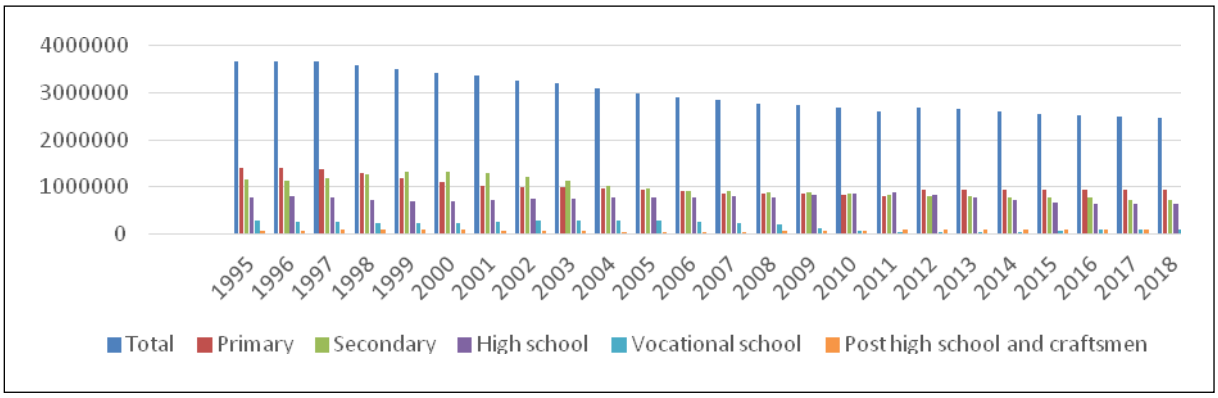

Figure 4. Number of students enrolled in Romanian pre-university education in the period 1995 - 2018, by levels

Special attention should be given to highlighting the collapse in the number of students in vocational schools. Since 2005, the number of students at this education level has been steadily decreasing, and in 2011 this indicator almost became insignificant when an absolute minimum of 12,382 students was registered. These students were practically in their final years, without elementary classes for further vocational training. Since 2012 (with the harm already done) there was a new increase in the number of students, due to the re-introduction of vocational classes in school organisational plans. At the same time, due to the use of surveillance cameras, both for the National Evaluation and for the Baccalaureate Exam, there was a drop in the number of students admitted to the ninth grade in high school, as well as a significant reduction in the number of high school graduates who managed to pass the „maturity exam". In this context, the foundation was laid for enhancing vocational education, although its collapse was due to some inexplicable school organisational plans. Obviously, this collapse led to a significant reduction in the number of qualified teachers from vocational schools, most of whom left the system, and a small part was absorbed by technological high schools. We do not know if anyone quantified the impact of the mentioned collapse on the national economy, but there were catastrophic consequences for teachers which are still felt.

4.2. Multi-decade prognosis of the number of students

To determine, using Eviews, the estimation equation for the number of students, we have used instead of the year series the values corresponding to the deviation from the base year, 1995:

Table 4. Year series and the number of students enrolled in Romanian pre-university education in the period 1995-2018

Years (t_i)	No_students (y_i)	Years (t_i)	No_students (y_i)
0	3.669.248	12	2.846.904
1	3.674.597	13	2.781.039
2	3.659.208	14	2.735.424
3	3.598.666	15	2.682.489
4	3.509.449	16	2.610.022
5	3.421.091	17	2.688.590
6	3.356.231	18	2.649.040
7	3.270.786	19	2.615.722
8	3.214.999	20	2.553.861
9	3.108.634	21	2.524.399
10	2.996.029	22	2.497.768
11	2.911.213	23	2.466.269

Source: [6, 2020]

Creating a group between two series will lead us to the following scatter diagram:

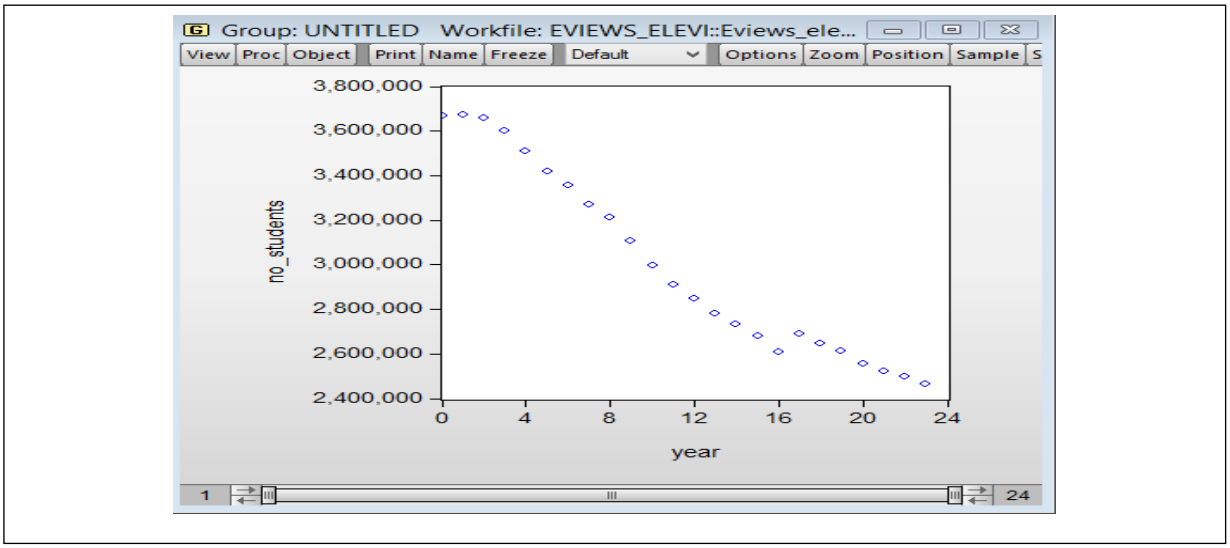

Figure 5. Scatter diagram in Eviews regarding the evolution of the number of students enrolled in Romanian pre-university education in the period 1995-2018

According to the chart, we can assume that, annually, we have a linear regression of the number of students, in compliance with the model:

$$\widehat{Y_t} = a + bt \quad (1)$$

We estimated the parameters of the above regression, meaning we determine the $\mathbf{a_1}$ estimations for **a** and $\mathbf{b_1}$ for **b.**

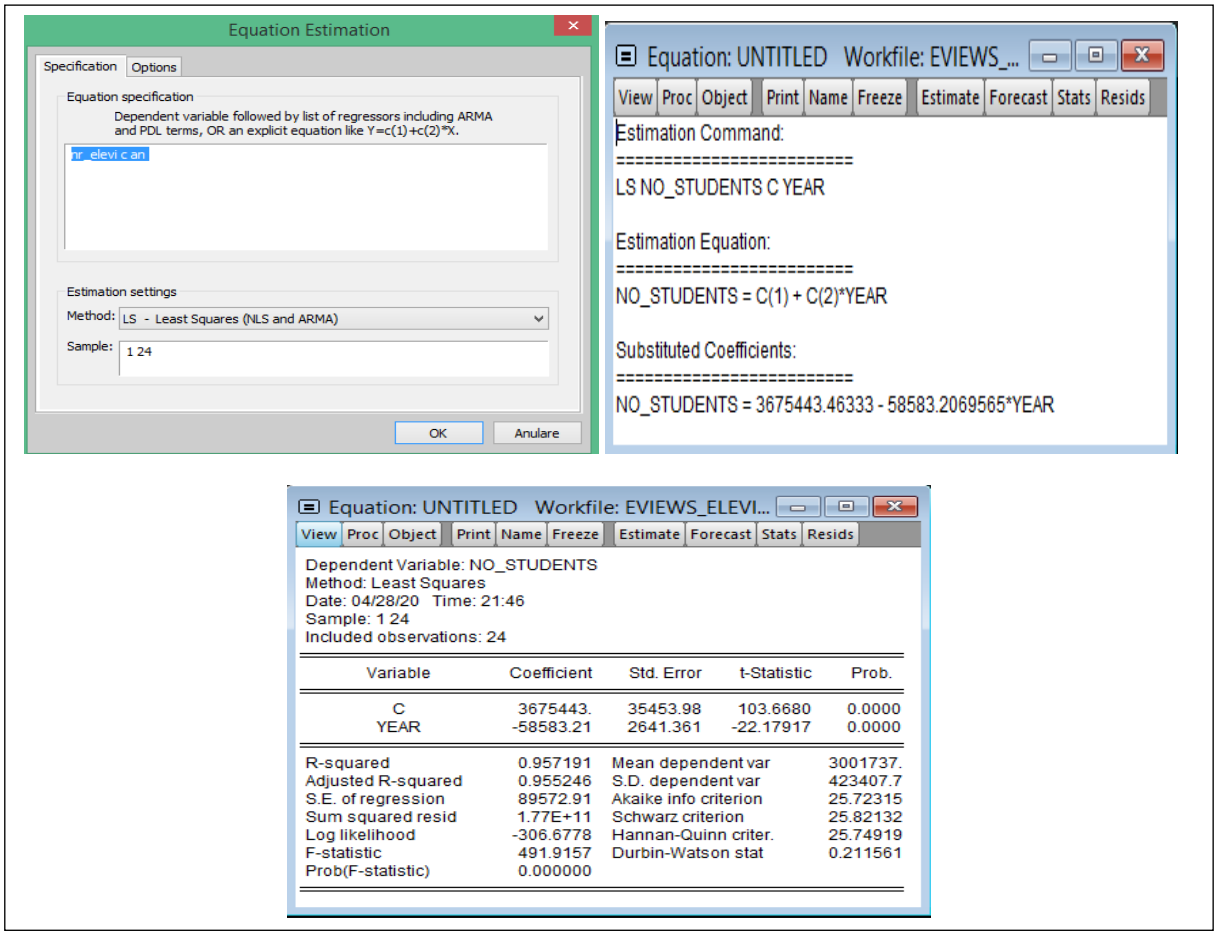

Figure 6. Linear regression based on time regarding the evolution of the number of students enrolled in Romanian pre-university education in the period 1995-2018

Thus, the estimated values are a_1=3675443.46 and b_1= - 58583.21. Therefore, the number of students from time t would be:

$$\hat{Y}_t = 3675443{,}46 - 58583{,}21 \times t \quad (2)$$

We estimated reliability intervals for regression coefficients and also we analyzed the most favorable and most unfavorable case.

The way according to which the reliance level of an estimator is determined is known:

$$\beta \in \left[b_{calculated} - St_{(\alpha;n-k)} \mathbf{x}\, err_{standard}\, , b_{calculated} + St_{(\alpha;n-k)} \times err_{standard} \right] \quad (3)$$

which means that β partains to the probability interval of 1-α.

To determine the critical distribution value tStudent, we used the T.INV.2T(0,05;22) Excel function; we obtained the value 2.073873068 at a level of significance 0.05.

Replacing in **(**3**)**, we obtained:

Table 5. Reliability intervals for the estimators of the regression model

Calculated value for a1	Standard error for a1	Calculated value for b1	Standard error for b1	Inferior reliability limit	Superior reliability limit
3675443,46	35453,98	-58583,21	2641,36		
			Estimation β1	3601916,41	3748970,51
			Estimation β2	-64061,06	-53105,36

We can state that with a 95% probability $a \in [3601916,41; 3748970,51]$ and $b \in [-64061,06; -53105,36]$.

Thus, for the most favorable case, we can take into account the equation:

$$\hat{Y}_t = 3748970,51 - 53105,36 \times t \quad (4)$$

The regression for the most pessimistic case, the most unfavorable, has the form:

$$\hat{Y}_t = 3601916,41 - 64061,06 \times t \quad (5)$$

If we group the results obtained from models (2), (4) and (5) we get the following table:

Table 6. Multi-decade prognosis of the number of students enrolled in Romanian pre-university education

Year	Deviation from 1995 (t)	Prognosis of the number of students in pre-university education ($\hat{Y}_t$)		
		Moderate case – Model (2)	Optimistic case – Model (4)	Pessimistic case – Model (5)
2030	35	1.625.031	1.890.283	1.359.779
2040	45	1.039.199	1.359.229	719.169
2050	55	453.367	828.176	78.558

Thus, taking into account the results obtained in the moderate case, in 2030 the number of students in Romanian pre-university education is likely to be less than 2000000, by 2040 it will be slightly lower than 1000000, and by 2050 it will be much lower than the symbolic threshold of 1000000. Even for the optimistic case, the statements from the previous sentence remain valid, while in the pessimistic case the situation would be entirely catastrophic.

5. Conclusions

According to this study, we found that at least for vocational school education, it never was a priority for the high level responsible officials, but also that there are certain imbalances both at the education system level and at the Romanian economy level, which will be difficult to surpass.

After modeling the current study, we found that the number of students decreases by about half a million every ten years and that by 2050 there will be fewer than 1000000 students or even fewer than 500000 according to a pessimistic scenario, while in 1995 there were about 3700000 students in pre-university education. We emphasize the fact that these must be seen in the context in which, starting with 2012 a new class has been introduced in primary school; more exactly, due to the introduction of the preparatory class in primary school, about 100000 children were transferred from preschool institutions.

In our opinion, a more detailed and thorough analysis would imply by adding to the model other factors such as birth rate, migration of families rate, early abandonment rate etc. Certainly, these factors are significant for the number of students enrolled in pre-university education.

The alarming decline in the number of students, illustrated by the fact that the estimates for 2050 is a 5-7 times decrease compared to the number of students in 1995, can only be stopped by high-level policies in the demographic, economic and social areas.

We believe that responsible factors could radicalize these policies, which means that by encouraging the calibration of children's allowances, as well as through active measures to support families returning from abroad (installation bonuses, non-refundable amounts for creating family businesses etc.) could have immediate consequences. These measures as well as measures to create a healthy competitive economic environment and support small and medium sized companies can also lead to the prevention of emigration phenomenon.

At the same time, it is necessary to find solutions to increase the attractiveness of teaching career, so that a part of valuable graduates would be attracted to this field. Romania has its own model to follow, that of pedagogical high schools between the 50s-80s of the last century, whose graduates performed state modernization, mainly by raising population literacy in rural areas.

Due to the fact that we are dealing with an extensive, high inertia complex system, we believe that it is mandatory to develop a set of measures to stop the accelerated decrease of the number of students and then to impose an increasing trend, so this set should be regulated and implemented as soon as possible. If this happens, the slogan "education is a national priority" *will surely lead to real accomplishments. If not, then it will simply remain a slogan valid during confrontations in future electoral cycles, and Romanian population will be equally vulnerable, disoriented and incapable of action in future crises it will encounter.*

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Rezumat

Dezvoltarea durabilă, sustenabilă, calitatea vieții cetățenilor oricărei țări sunt în strânsă dependență cu calitatea învățământului ce se desfășoară în țara respectivă, sistemele naționale de învățământ căpătând astfel importanțe vitale în contextul marilor provocări economice, tehnologice și de globalizare ale secolului XXI. În România post-decembristă, din cauza reducerii natalității și a creșterii emigrației familiilor, numărul elevilor din învățământul preuniversitar cunoaște o scădere dramatică. Lipsa sau ineficiența politicilor demografice de stimulare a natalității, mirajul străinătății, inconsecvența măsurilor economice pentru sprijinirea firmelor mici și mijlocii, uneori politici eronate în domeniul planurilor de școlarizare, culminând cu desființarea învățământului profesional la începutul deceniului, cumulate cu o serie de alte cauze, au contribuit la scăderea alarmantă a numărului de elevi, respectiv cu peste 1 milion din 1995 până în 2018.

Dacă tendințele se vor păstra, dacă nu vor fi implementate în scurt timp politici menite să contracareze declinul, atunci în 2030 vom avea sub 2.000.000 de elevi, în 2040 sub 1.500.000 iar în 2050 vom fi scăzut, poate cu mult, sub numărul simbolic de 1.000.000 de elevi în învățământul preuniversitar din România. Perspective descurajante, mai ales dacă le raportăm la anul 1995, când sistemul de învățământ preuniversitar din România număra cca 3.700.000 elevi.

***Cuvinte-cheie**: educație, învățământ preuniversitar, dezvoltare sustenabilă, prognoză, politici educaționale, politici demografice*

Аннотация

Устойчивое развитие, качество жизни граждан любой страны зависят от уровня образования страны. Соответственно, национальные системы образования, в контексте значимых экономических, технологических и глобализационных вызовов XXI века, приобретают глобальное значение. По причинам снижения рождаемости и увеличения эмиграций семей в пост-декабрьской Румынии наблюдается драматическое сокращение количества учеников в доуниверситетском образовании. Отсутствие или неэффективность демографической политики, направленной на стимулирование рождаемости; мираж иностранных земель; несостоятельность экономических мер по поддержанию малого и среднего бизнеса; иногда ошибочная политика в области школьного планирования, которая привела к отмене профессионального образования в начале десятилетия, в сочетании с рядом других причин, поспособствовали тревожному сокращению числа учеников, более чем на 1 миллион в период с 1995 по 2018 годы.

Если эти тенденции сохранятся, если в ближайшее время не будет внедрена соответствующая политика по противодействию снижению, то к 2030 году у нас будет менее 2000000 учеников, к 2040 году - менее 1500000, а к 2050 году в доуниверситетском образовании Румынии возможен значительный спад количества ниже символического числа в 1000000 учеников. Обескураживающие перспективы, особенно если провести сравнение с 1995 годом, когда система довузовского образования в Румынии насчитывала около 3700000 учеников.

***Ключевые слова**: образование, довузовское образование, устойчивое развитие, прогноз, образовательная политика, демографическая политика*

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SOCIAL EXCLUSION OF THE ELDERLY PEOPLE FROM THE LABOR MARKET OF THE REPUBLIC OF MOLDOVA: SUMMARY OF SURVEY RESULTS

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Abstract

The issue of social exclusion of the elderly people has become relevant not only for the Republic of Moldova, but also for a number of European countries. The purpose of the article is to identify factors that determine the social exclusion of elderly people in the field of social and labor relations and the real difficulties they face in the labor market of the Republic of Moldova. In this article we intend to introduce in the scientific circuit a synthesis of the results of an opinion survey on the social exclusion of elderly people in the labor market of the Republic of Moldova, who, even after reaching the retirement age, are employed according to the current legislation. According to empirical studies, the most important factors regarding the exclusion of the elderly people from the social sphere and work field are presented: age, level of education, place of residence, professional status before retirement age, self-assessment of health and standard of living, etc. The obtained results have contributed to the development of recommendations on the social inclusion of this category of people in the labor market.

Keywords*: exclusion, elderly people, labor market, working pensioners*

1. Introduction

Currently, the topic of increasing the retirement age and labor demands for older workers in the labor market is particularly relevant. With an increase in the number of elderly people (according to the World Population Ageing Report 2019, there were 703 million people aged 65 years and over in the world in 2019. According to forecasts, the number of older persons will double to 1.5 billion in 2050 [8, p. 1]. However, given the current situation with COVID-19, in which the elderly people are the most vulnerable, this figure may vary; it is necessary to pursue a sound social policy in places where human resources are used in the labor market. However, elderly people who want to continue their work activity are facing many obstacles, such as social exclusion, open and latent discrimination, inadequate working environment for the needs of older workers, both healthy and, in particular, people with health problems. On the other hand, the governments of many countries support raising the retirement age as the most effective measure to combat labor shortage caused by the aging of population.

The set of problems that older people face in everyday life (high costs for communal services, high prices for food, medicine, etc.) allows us to conclude that, in current conditions, pension is a synonym for poverty and social exclusion, due to the low level of pensions and the need

for most elderly people in the Republic of Moldova to remain in the labor market even after reaching retirement age in accordance with the legislation in force.

Thus, in this article we will focus on studying the phenomenon of social exclusion of the elderly people in the labor market of the Republic of Moldova and the most important factors that determine it. Finally, some recommendations for reducing the social exclusion of this category of people in the labor market of the Republic of Moldova are presented.

2. Degree of investigation of the problem at present, aim of the research

The origins of the theory of social exclusion of the elderly people can be found in the works of Hippocrates, Plato, Epicurus, Aristotle, Seneca, Cicero and others.
Today, the issue of exclusion is actively discussed in the field of economic, sociological and psychological sciences.

As a manifestation of economic factors, social exclusion, was investigated by S. Paugam, A. Power, F.M. Borodkin; dissatisfaction of personal needs - by P. Abrahamson, Ia. Gouf; the violation of legal norms related to social exclusion was investigated by Borodkin; such aspects as impossibility or inability to benefit from the rights to social exclusion were investigated by A.A. Demyanov; and social exclusion as disintegration of social relations was investigated by N.E. Tihonova.

A regional approach to this phenomenon was developed by A. Power; research on psychological aspects of social exclusion was carried out by F.M. Borodkin, P. Abrahamson, Ia. Gouf.

A. Power, F.M. Borodkin, A.A. Demyanov, N.E. Tihonova, P. Abrahamson were concerned with social exclusion as a complex phenomenon, which combines the actions of several factors.

In their works the authors analyze the concept of “social exclusion”; they highlight the most significant characteristics of social exclusion in society as a process and as a state, as well they substantiate the relationship of social exclusion with such phenomena as poverty and inequality; and discuss research approaches to this issue.

Russian authors note that a significant layer of “socially excluded” is identified in the social structure of Russian society; this layer differs qualitatively from the group of “poor” people. V. Schmidt studied the research methodology for social exclusion.

But the origin of the notion “social exclusion” is found in France in the seventh decade of the last century due to vague references in public discourses about “the excluded” (Lenoir, 1974) [3, p. 16].

At the European level, the term “social exclusion” appeared in the late 1980s and early 1990s during the Delors Commission. Since 1975, the Community institutions have initiated and implemented a number of poverty alleviation programs. The third program, informally known as “Poverty III”, run from 1989 to 1994 and funded the establishment of the Observatory on National Policies to Combat Social Exclusion. In the early 1990s, social exclusion and inclusion were integrated into all European Union policies, starting with the Maastricht Treaty

and its annexed protocols, reform of the objectives of the European Social Fund, European Parliament documents and the Commission's Social Action Programs [2, p. 27].

Currently the concept of social exclusion is understood and used by specialists in different ways. For some, exclusion is primarily a result of poverty. Others see this in a broader sense, as multiple deprivation, and equate it to insufficient and inadequate social participation, social non-integration and, in some cases, the inability of a person or category of people to act without receiving help.

The key element of exclusion consists in the inability to participate in various aspects of social life, such as activation in the labor market, access to public services and political life, various forms of discrimination, which leads to physical isolation from peers. The second point of view considers that social exclusion is nothing more than a fashionable term to discuss poverty. Following the takeover of exclusion in the national policies of the EU and Member States, the first opinion becomes more widespread [4, p. 20].

David Byrne mentions that, in the "weak" sense, exclusion is understood as a personal deficit that can be remedied by correcting this personal deficit. According to him, the "strong" meaning is given by the fact that exclusion is not a specific feature of individuals or social spaces, but a "necessary and inherent feature of a post-industrial capitalism based on a flexible labor market and a systematic constraint of power in organizing employees as collective actors – the excluded are excluded by the system" [1, p. 173].

Among the national researchers we can mention Maria Vremiș, Viorica Craievschi-Toartă, Anatolii Rojco, Diana Cheianu-Andrei with the paper "Approaches to social exclusion in the Republic of Moldova. Methodological and analytical aspects" [3]. In this paper, the elderly people are considered as one of the main groups vulnerable to social exclusion due to their age peculiarities.

A study of the literature reflecting the social exclusion of elderly people showed that no in-depth research has been previously conducted on the social exclusion of the elderly people from the labor market.

Research conducted by the author of this article focuses on the social exclusion of elderly people, and especially on the exclusion of elderly people in the labor market of the Republic of Moldova.

Aim of research. In this article we intend to introduce in the scientific circuit the results of a sociological survey on the exclusion of elderly people in the labor market of the Republic of Moldova, conducted in 2017-2018. Thanks to the conducted survey, we will be able to identify real difficulties faced by working pensioners.

3. Methods and materials applied

The following empirical methods of data collection and analysis were used in the research process: opinion survey (questionnaires), quantitative and qualitative analysis of statistical data. Comparative analysis, the correlation method, the synthesis method, induction and deduction, the graphical method, etc. were also used.

Information base of the article: data of a public opinion survey on elderly population and data of official statistics of the Republic of Moldova.

Within this research, it is proposed to examine the situation of the elderly people in the labor market of the Republic of Moldova from all points of view.

The questionnaire, which targets working pensioners, aims to identify the problems they face at the workplace, what determines them to continue their work, and so on.

Objectives of the survey: The survey on social exclusion of the elderly people has as main objective the production of detailed statistical data that can be used to characterize social exclusion of the elderly population in the labor market. This is done by collecting information on different aspects of older people life: health status, financial condition before retirement and during retirement, job satisfaction, employment arrangements after retirement, reasons for retirees to continue work activity, assessment by elderly people of their lives, etc.

Scope of questionnaire. The scope of the investigation includes all persons with a fixed place of residence in the selected research centers (urban and rural). The subject of registration is working pensioners, namely: women aged 58 to 75+ years, men aged 63 to 75+ years.

Research sample. The opinion survey on the social exclusion of elderly people was conducted on a sample of 160 people, of whom only 22.5% are working pensioners, which is a representative sample (thus, according to statistics, for example, in 2017 the share of economically active elderly people (aged 60 and over) was 19.2% of the total population in the same age group) [5].

In the conducted study the population survey was carried out by involving people from different localities of the Republic of Moldova (Figure 1). Thus, the questionnaire was compiled in the profile of a certain city / village. For a broader picture, we sought to interview respondents from all regions of the country (North, Center and South). So we can mention that we conducted the survey in:

- Lipcani town, Briceni district in the northern part of the republic;
- Gordinesti village, Edinet district in the northern part of the republic;
- Romanesti village, Straseni district in the center of the country;
- the municipality of Chisinau, the capital of the republic;
- Carahasani village, Stefan Voda district in the South-eastern part of the republic.

Figure 1. Geographic presentation of the conducted sociological survey

Source: author's own development

4. Obtained results and discussion

The purpose of the developed questionnaire is to identify factors that determine elderly people to continue the work activity even after reaching retirement age in accordance with the current legislation.

Most of the elderly persons, continuing to work, live in the cities (94.4%), and only a very small part in the villages (5.6%) (see Figure 2). This is due to the fact that the majority of pensioners in villages used to work in the agricultural sector, and, having reached the retirement age in accordance with the current legislation, they can no longer continue their work in this area due to poor health.

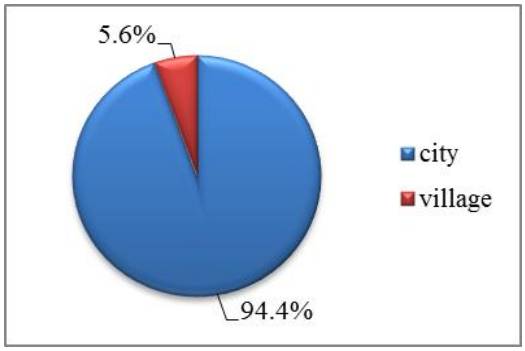
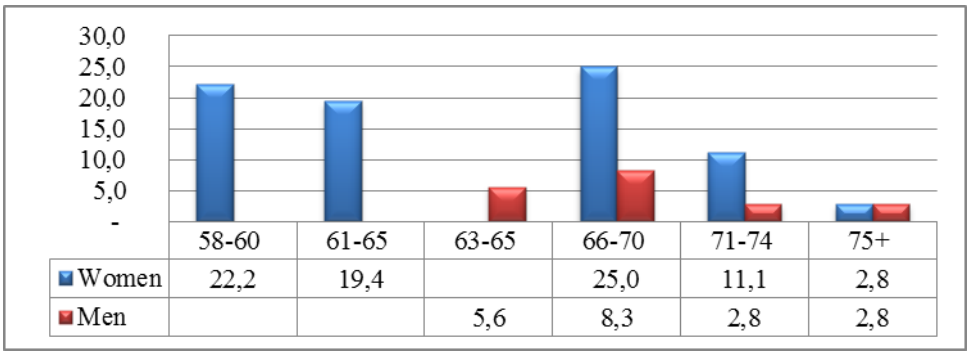


Figure 2. Share of working respondents by areas, %

Source: author's own development

Out of the total number of employed respondents, women represent the largest share, constituting 80.6%, and men only 19.4% (Figure 3). The high proportion of women, having jobs after reaching retirement age in accordance with the current legislation, is also confirmed by the official statistical data for 2017-2018. However, in 2019 men predominate among the beneficiaries of pensions, who have a job, with a share of 14.4% of the total population aged 15 and over [7].



	58-60	61-65	63-65	66-70	71-74	75+
Women	22,2	19,4		25,0	11,1	2,8
Men			5,6	8,3	2,8	2,8

Figure 3. Distribution of respondents by age and gender, %

Source: author's own development

Based on the fact that women in the Republic of Moldova have a longer life expectancy than men and according to statistical data for 2018 for people aged 60 or older, the ratio between men and women is 67 men per 100 women [6]; it is not surprising that more of survey respondents are women. The most important age groups for women working after retirement are: 58-60 years – 22.2% of the total number of respondents, 61-65 years – 19.4% of the total

number of respondents, 66-70 years – 25.0% of the total number of respondents. Most men who work after retirement are representatives of two age groups: 63-65 years – 5.6% of the total number of respondents, 66-70 years – 8.3% of the total number of respondents. The smallest number of respondents is from the 75+ age group (only 2.8% for both men and women). One of the reasons could be health deterioration, which prevents people of this age category from continuing to work.

Elderly people with higher education are most in demand on the labor market; their share in the total number of respondents in the questionnaire is 55.6% (Figure 4). This is probably due to the fact that older people with higher education work more on intellectual rather than physical work, maintaining a good state of health. Among the respondents who continued working after retirement there were no people who didn't have the level of pre-school or primary education, who had primary school, and incomplete/secondary school education.

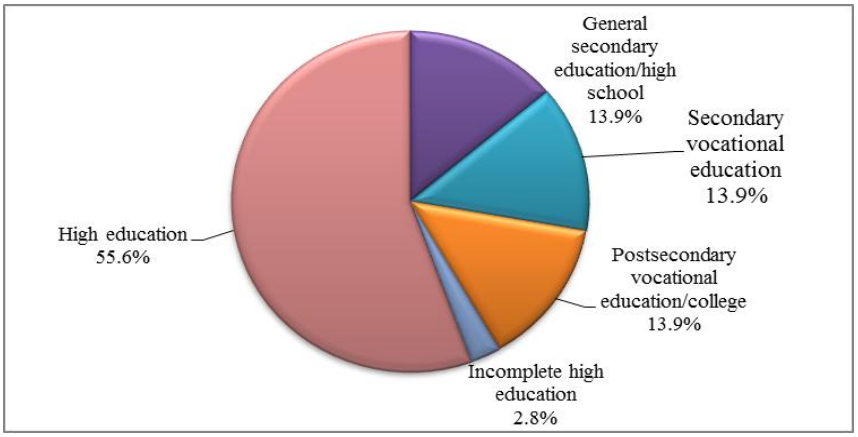


Figure 4. Distribution of respondents by level of education, %

Source: author's own development

Most of those who continue to work even after reaching the retirement age, according to the current legislation, work at the same job (58.3% of the total number of respondents). Only 25% of the respondents took steps to independently create a type of activity (Figure 5). Enrollment in private employment agencies is not popular among retirees looking for a job (only 2.8% of respondents used the services of recruitment agencies). An employment opportunity that should not be missed is an appeal to friends, relatives, colleagues in search for a job. Of the total of interviewees, 8.3% took this opportunity to become employed. The respondent who chose the "Other" option specified that there was a staff reduction, but the management, recognizing that he was a valuable person for the enterprise, transferred him to another job within the enterprise. Another way that older people try to find a job is through direct contact with the employer and the officials responsible for employment. But only 2.8% of respondents turned to this opportunity.

It is regrettable that older people are not able to join the National Agency for Employment. In our opinion, this is dictated by the realities of life in the Republic of Moldova, as the elderly are not much demanded on the labor market, with the exception of some activities.

According to the majority of respondents, pensioners need to work where they want and have the skills for this (50%). And the most frequently mentioned way of employing retirees is to maintain the previous jobs (38.9%).

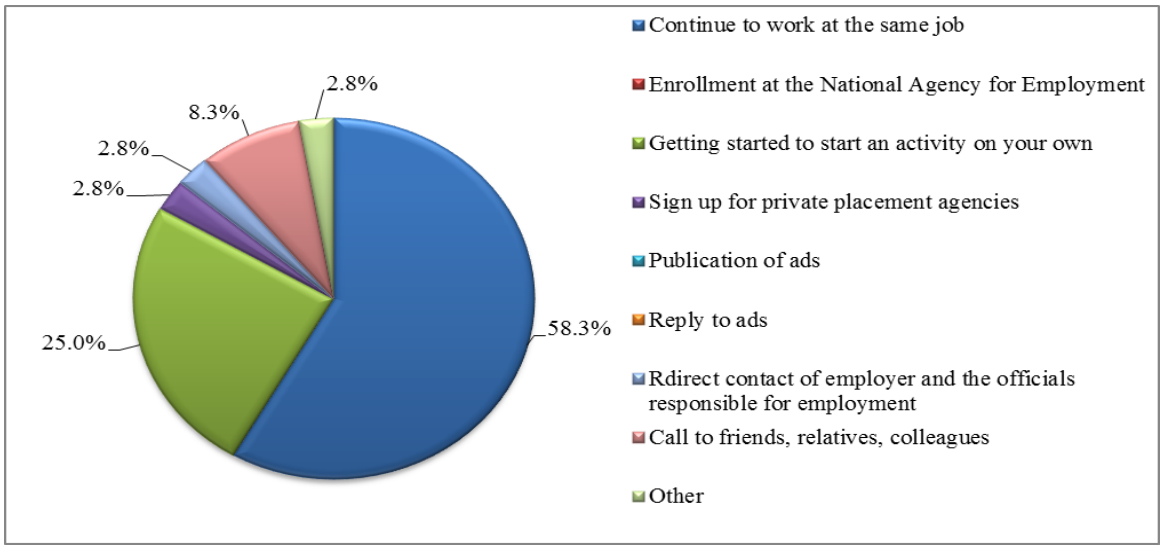


Figure 5. How did you get your job being already retired?

Source: author's own development

Before retirement, almost 28% of the total number of respondents worked in the field of Education, science and culture (Table 1). The field of Health care, physical education and sports, and social assistance was represented by 22.2% of respondents. Other areas of activity were poorly represented, especially Trade and Agriculture, by 5.6% of respondents. Analyzing the results of the survey, we can see that a significant part of the respondents preferred to change their field of activity after retirement, preferring Trade and Services to Agriculture, Industry, and Education, science, culture, Health care, physical education and sports, social assistance. The majority of respondents (61%) continue to work in their specialty even after reaching retirement age according to the legislation in force.

Table 1. Respondents' field of activity, %

Field of activity	Before retirement	At present
Agriculture	5.6	0.0
Industry	8.3	5.6
Construction, transport, communications	8.3	11.1
Trade	5.6	19.4
Services	13.9	25.0
Education, science, culture	27.8	16.7
Health care, physical education and sports, social assistance	22.2	16.7
Other	8.3	5.6

Source: author's own development

A large number of respondents stated that their salary before retirement was less than 3000 MDL (66.7%), respectively, they currently have small pensions (Figure 6). 61.1% of respondents indicated that the amount of their pension is less than 1500 MDL.

Thus, the precarious financial condition has become the main reason why pensioners continued to work so far. And only 2.8% receive a pension higher than 5000 MDL (Figure 7), having as a reason for continuing their activity, interest in work and desire to work.

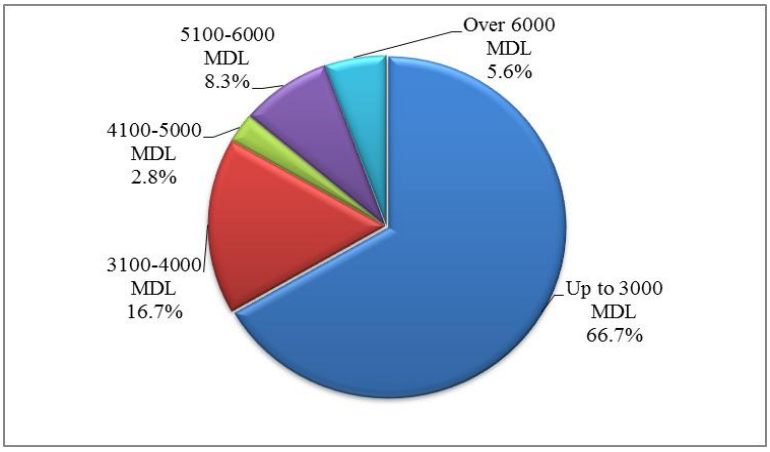


Figure 6. Average monthly income of the respondents before the retirement

Source: author's own development

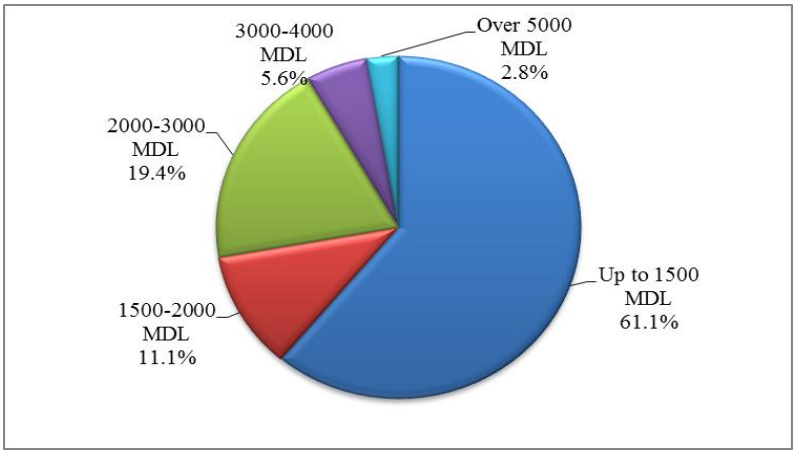


Figure 7. Size of respondents' pension

Source: author's own development

Although the material situation of most respondents is currently considered satisfactory or rather satisfactory (~58%), however, some respondents who receive both pension and salary indicate that their financial situation is rather unsatisfactory (16.7%), while others usually encounter an acute need for money (22.2%). Only one person indicated that he was completely satisfied.

Another aspect regarding employment of older people that we are worried about in our study is the number of hours worked per week, based on a 40-hour work week. Analyzing the results of the survey, we found that 69.4% of respondents are employed full-time. And the remaining 30.6% of respondents work part-time. However, 63.9% of respondents expressed their willingness to work longer for a proper payment.

The reasons that encourage people to work after retirement are numerous, often combining precarious financial condition and the desire to feel like a full member of society. The desire to financially help their children and grandchildren is another no less important reason, encouraging older people to continue working. Among other reasons, we can indicate the noble cause: the desire to help people (Figure 8).

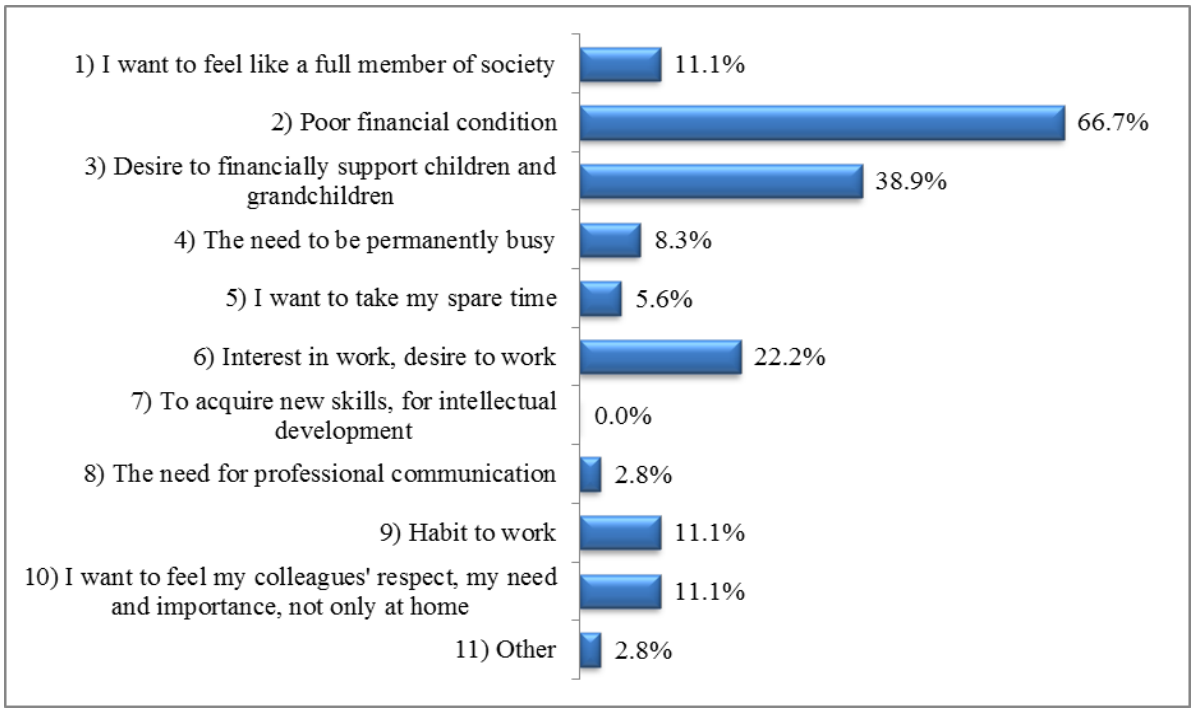


Figure 8. The main reason that causes the pensioners to work after reaching retirement age according to the legislation in force

Source: author's own development

A large number of respondents (86%) consider that their physical condition allow them to work even further, so they are feeling capable of doing productive work in their field of activity as well as having an active lifestyle.

According to current legislation, employment after reaching retirement age provides a certain pension surplus or even represents a large part of the income of older people. Only 5.6% of respondents had the lowest salary amount of up to 1000 MDL (Figure 9). Most respondents indicated that their income as a result of work activity is ranging between 2000-3000 MDL (22.2%). An identical number of respondents (16.7%) had salaries ranging between 1000-1500 MDL, 3000-4000 MDL and 4000-5000 MDL. 13.9% of respondents had a salary in the amount of 1500-2000 MDL. Only 8.3% of respondents indicated that their salary exceeded 5000 MDL.

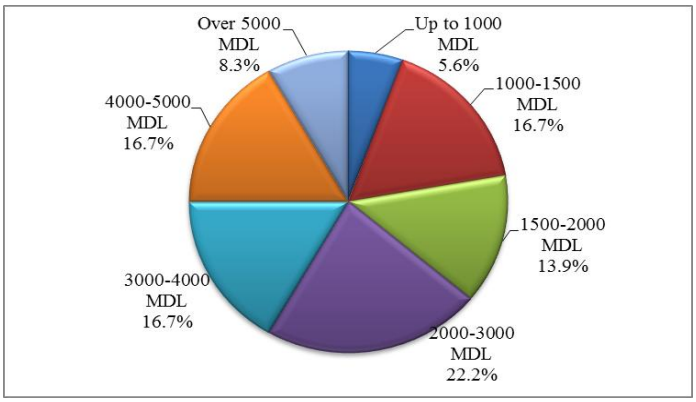


Figure 9. Employment income

Source: author's own development

Although many respondents are either completely satisfied (33.3%) or somewhat satisfied with their current workplace (22.2%), there are still respondents not satisfied with their work to some extent (38.9% per total) – Figure 10. People stating "Other" option have specified that the salary is low or they simply have no other way, so this is why they continue to work.

Figure 10. Satisfaction at workplace and Workplace appraisal

Source: author's own development

It has to be emphasized that almost all respondents rated their appreciation of workplace as positive. The life and work experience of the elderly must be harnessed by the next generations.

In spite of the fact that older people taking part in the survey rated their assessment of the workplace only positively, 3/4 of respondents believe that there is a high probability of losing their job (Figure 11). Only 8.3% are confident of their future in the workplace, while 16.7% of respondents found it difficult to respond.

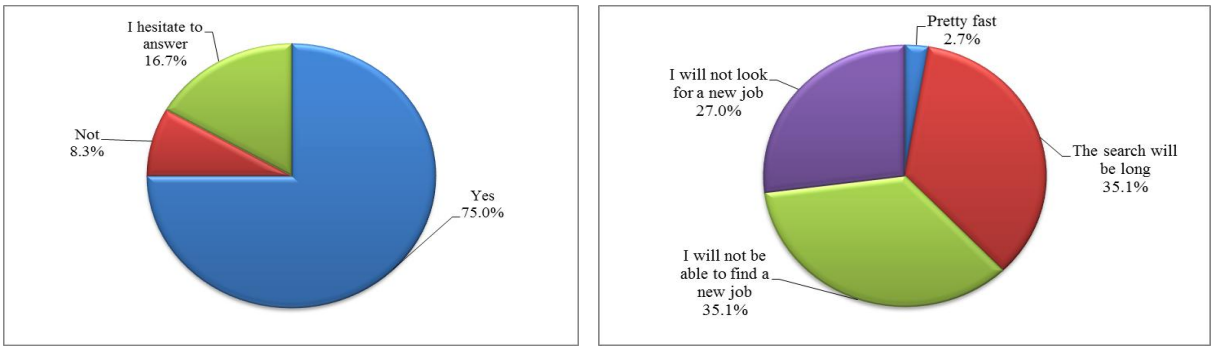


Figure 11. Possibility of losing workplace and finding a new job

Source: author's own development

As for the opportunity to find a job, in case of losing the current one, just one person believes that he will find another job quite quickly, while 27.8% of respondents wouldn't even take any efforts to search. 35.1% think they will not be able to find a new job and also 35.1% say that the search will be long.

According to respondents, working pensioners face a number of difficulties among which most often they insist on the impossibility of finding a job after their basic profession or specialty. Under "Other" option, poor health is mentioned (Figure 12).

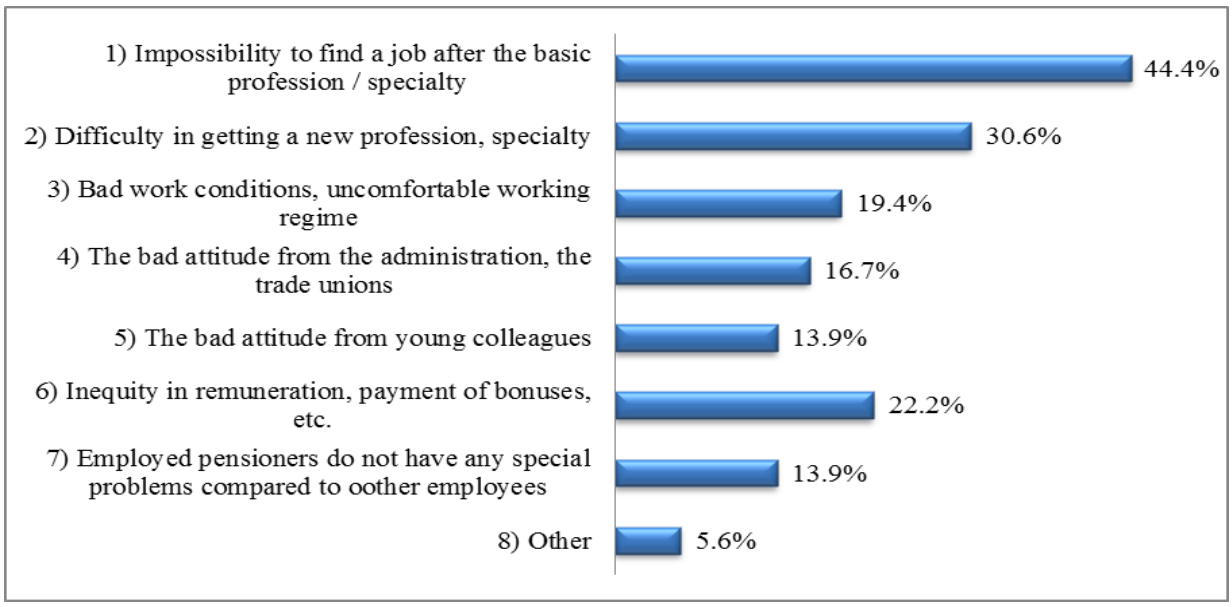


Figure 12. Difficulties faced by working pensioners

Source: author's own development

Many respondents (61.1%) believe that if older people express the desire to continue their work, no one should forbid them. Although some people regret that elderly people are forced to work at an old age (16.7% of respondents), others (16.7% of respondents) support the view that working after retirement has both positive and negative aspects. 2.8% of respondents believe that elderly people should continue to work also at an old age. The same number of respondents believes that pensioners should give way to the younger generation.

On the positive side, we can mention receiving pension together with the salary. In the opinion of a large number of respondents (92%) it is natural to keep both a pension and a salary. Only one respondent considers that the total monthly income of the working pensioner should not exceed a certain level. And 5.6% believe that if the salary is high, then there is no need for a pension, which is small in any case.

Although 81% of respondents appreciated their health condition as satisfactory or even good, however, among the possible reasons for renouncing to work activity is health (72.2%), taking account of its worsening with the passage of the years (Figure 13).

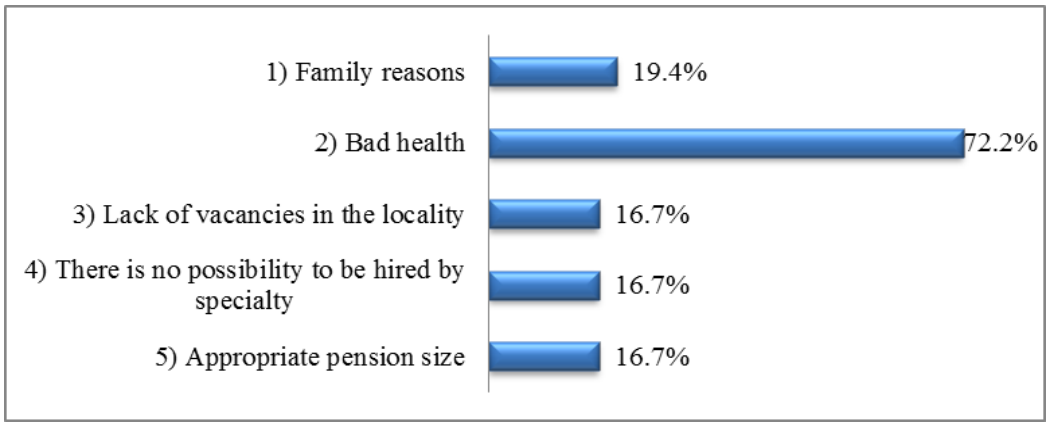


Figure 13. Possible reasons for quitting work (multiple responses)

Source: author's own development

Of particular interest is the fact that, according to respondents, the size of pension is sufficient to cover the needs of the elderly people, so that they no longer continue working after reaching retirement age according to the existing legislation. 78% of respondents believe that this amount should be more than 4000 MDL. Only a small part of respondents believes that an amount of 2000-3000 MDL would be enough. That can be explained by the area of residence. People living in cities need higher incomes to pay for community services, public transport expenses etc.

In terms of daily difficulties faced by elderly people, health problems are most often mentioned (Figure 14), as well as lack of money for basic needs. Other difficulties are not so relevant, although they also affect the living standards of the elderly people.

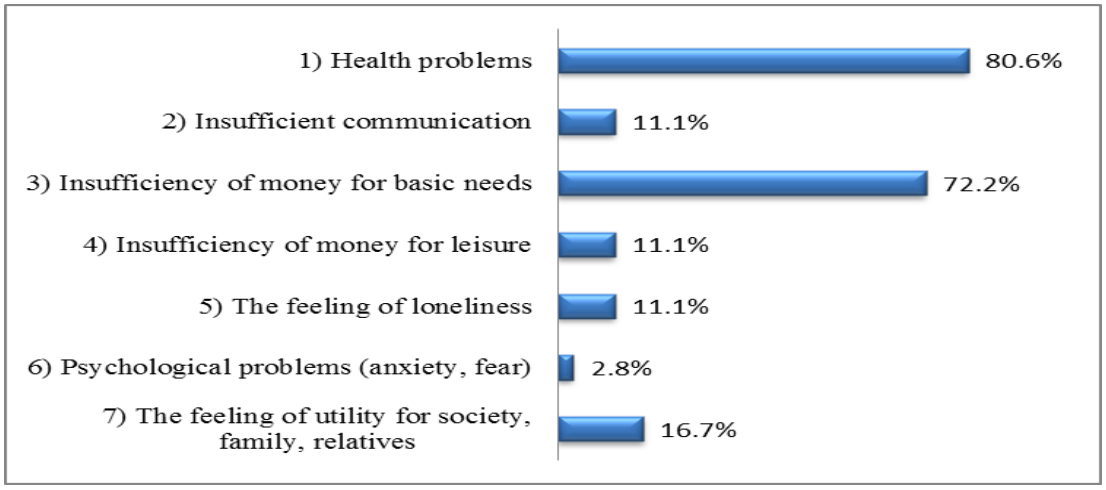


Figure 14. Difficulties faced by elderly people

Source: author's own development

Difficulties that older people face daily make them skeptical regarding the support from the state and make them rely solely on themselves (36.1%). However, 36.1% of respondents still affirm that government assistance is also necessary (Figure 15).

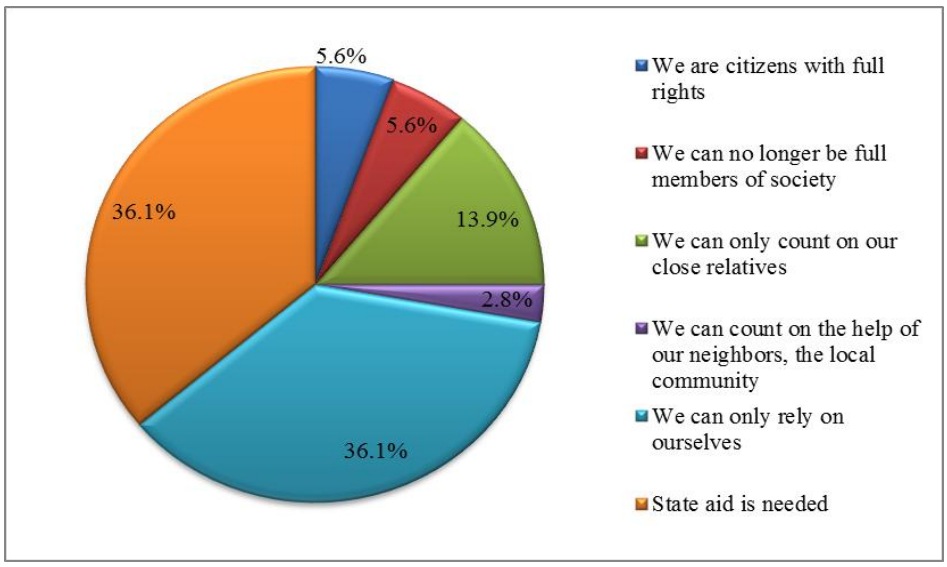


Figure 15. Elderly people assessment of their life in our society

Source: author's own development

At the end of the questionnaire, respondents were asked to give their opinion on how to solve the problems that older people face. Most respondents insisted on government assistance to improve the material and social conditions of older people (Figure 16), such as provision of various medical benefits and other services.

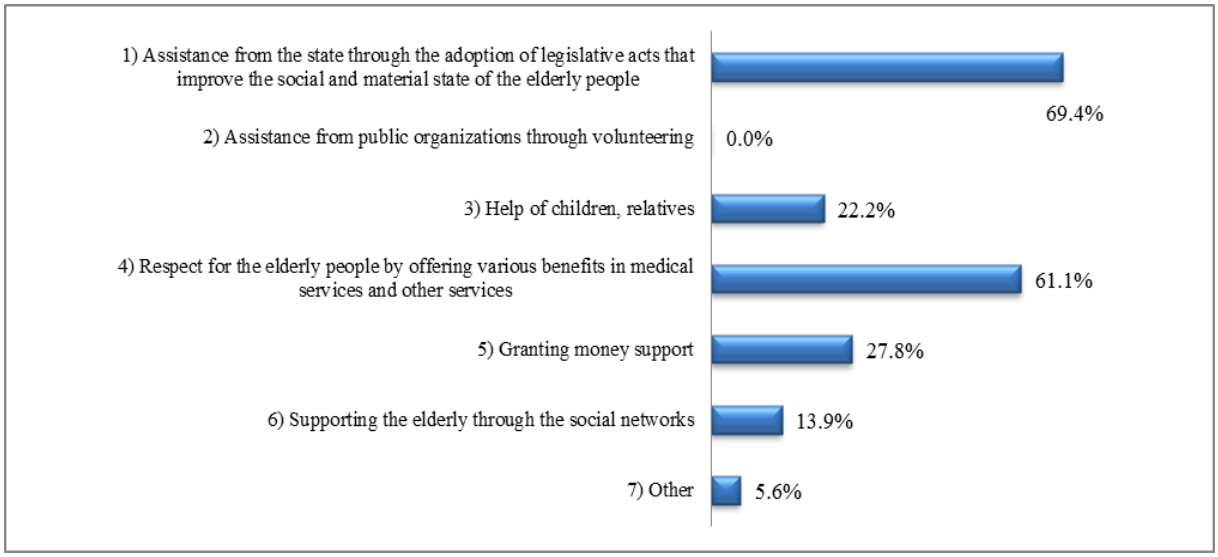


Figure 16. Ways of solving the problems of the elderly people in our society

Notes: *1) Assistance from the government through the adoption of legislative acts that improve the social and material conditions of elderly people
Source: author's own development

5. Recommendations on reducing the exclusion of the elderly people from the labor market of the Republic of Moldova

Reaching retirement age is traditionally regarded as a "delicate" barrier that does not mean mandatory termination of work activity, but which indicates certain changes in the professional status and competitiveness of elderly people on the labor market. The legislation treats and protects the occupational status of pensioners in a special way. For the State, a pensioner is primarily a subject of social policy, financially protected by a pension. The professional status of an elderly person and the measures necessary to protect this status are secondary.

Older people are not competitive on the labor market. Without making efforts to improve the labor market situation and maintain unchanged the professional status of the pensioner, the State actually transfers the responsibility for protecting the occupational status of the pensioner on the employer.

Having an older employee, the employer may face a number of problems due to the complexity of the professional status of the pensioner. On the one hand, aspects such as length of service, professionalism, and company loyalty can add value to the employee. On the other hand, a modern enterprise exists, as a rule, in a competitive environment where the manager's goal is to develop staff and increase work efficiency. The age of a pensioner significantly reduces his / her prospects and ability to fully meet the employer's requirements. Current legislation does not allow the separation of abilities of an older employee based on

his/her age needs. Often, an employer has to come up with semi-formal strategies to keep older employees as staff members.

The official positions of teachers, mentors, and consultants could help solve such difficulties, make the position of pensioners more legitimate and more justified, and could contribute to the formation of a common positive image of an employed elderly person.

Analysis of data from the conducted study highlighted the main problems encountered by elderly people, which will be described below.

Thus, based on respondents' opinion, they need state assistance in order to maintain a decent standard of living for elderly people. This can be expressed not only in the form of allowances. It is necessary to use innovative methods for including older people in the structure of the labor market.

For elderly people who have reached retirement age not to be dismissed from workplaces, to be placed in the workplace further on, it is necessary to take certain measures to solve the problem of pensioners' employment.

The units of the National Employment Agency have limited opportunities for providing real assistance in finding a job for retired pensioners, referring to the refusal of employers regarding these applicants by age and health condition. In order to increase the number of employed elderly people, the state needs to create special employment services that will exclusively deal with the problems of hiring elderly people, namely: help them at hiring, monitor their health condition, if there are inconsistencies associated with their abilities and/or health condition to assist in finding new jobs.

The problem of State financing of programs and measures to ensure the employment of pensioners (both at the republican and regional levels) requires study.

State assistance for the employment of pensioners involves:

- support for businesses and organizations that create new jobs for pensioners;
- creation of permanent jobs;
- development of an infrastructure of institutions' and enterprises for the employment of pensioners.

A special retirement program could help employed pensioners to generate the income they need for a well-deserved rest after finishing their work activity.

Thus, in our opinion, the State should change the concept of legislation on the pension system, giving pensioners the possibility to work after retirement:

- Pensioners do not need to occupy jobs of interest to young people. This is explained by the policy pursued in recent years by our State, namely the promotion of young workers.
- Employed pensioners, in addition to salary, should receive 70% of the pension, and the rest is accumulated as long as they work, and after completing their work, they receive the entire amount of pension.
- An increase in the size of pensions for employed pensioners in the post-retirement age.

We believe that these innovations could play an important role in improving the position of pensioners.

The measures proposed to reduce the social exclusion of elderly people from the labor market of the Republic of Moldova will allow not only improve the financial position of pensioners and increase their social status, but also use the accumulated experience and knowledge of this category of citizens in order to develop social and other areas of society.

6. Conclusions

Overall, after conducted research and detailed analysis of the questionnaires, we can say that practically all respondents participating in the opinion survey continue their work, because their financial situation is precarious due to a small pension that cannot cover even basic needs. However, despite all measures to reduce the social exclusion of the elderly people, measures proposed by the author and those actually undertaken by the State, it should be noted that many elderly people have expressed the desire that the state get more involved, offering both financial support, in the form of an increase in the amount of pension, and social assistance (by guaranteeing free and quality medical services, etc.). Thus, guaranteeing a decent lifestyle for elderly people, they will not be forced to continue working after reaching retirement age (according to the existing legislation), only if for their own pleasure.

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Rezumat

Problema excluziunii sociale a persoanelor vârstnice a devenit actuală nu doar pentru Republica Moldova, dar și pentru un șir de țări europene. Scopul articolului este de a depista factorii care determină excluziunea socială a persoanelor vârstnice în domeniul relațiilor sociale și de muncă și dificultățile reale cu care aceştia se confruntă pe piața forței de muncă din Republica Moldova. În cadrul articolului dat ne-am propus să introducem în circuitul științific sinteza rezultatelor sondajului de opinie privind excluziunea socială a persoanelor vârstnice de pe piața forței de muncă din Republica Moldova, care și după atingerea vârstei de pensionare conform legislației în vigoare, sunt ocupați în câmpul muncii. Conform datelor studiilor empirice, sunt prezentați cei mai importanți factori ai excluziunii persoanelor vârstnice în domeniul social și de muncă: vârsta, nivelul de educație, mediul de reședință, statutul profesional până la atingerea vârstei de pensionare, autoevaluarea sănătății și a nivelului de trai, etc. Rezultatele obținute au contribuit la elaborarea unor recomandări privind incluziunea socială a acestei categorii de persoane pe piața forței de muncă.

***Cuvinte-cheie**: excluziune, persoane vârstnice, piață a forței de muncă, pensionari ocupați în câmpul muncii*

Аннотация

Проблема социальной исключенности пожилых людей стала актуальной не только для Республики Молдова, но и для ряда европейских стран. Целью статьи является выявление факторов, определяющих социальную исключенность пожилых людей в сфере социально-трудовых отношений и реальных трудностей, с которыми они сталкиваются на рынке труда Республики Молдова. В статье мы намерены ввести в научный оборот синтез результатов опроса общественного мнения о социальной исключенности пожилых людей на рынке труда Республики Молдова, которые, даже после достижения пенсионного возраста, трудоустроены в соответствии с действующим законодательством. Согласно эмпирическим исследованиям, представлены наиболее важные факторы исключенности пожилых людей в социально-трудовой сфере: возраст, уровень образования, место жительства, профессиональный статус до достижения пенсионного возраста, самооценка здоровья и уровня жизни и т. д. Полученные результаты способствовали разработке рекомендаций по социальной включенности этой категории людей на рынке труда.

***Ключевые слова:** исключенность, пожилые люди, рынок труда, работающие пенсионеры*

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