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PARTICIPATORY BUDGETING IN THE CONTEXT OF BEHAVIOURAL FINANCES

ABSTRACT

Analysis results of the processes of the authorities' decentralization and financial autonomy strengthening of the local self-government in Ukraine proved the necessity and expediency of applying the concept of behavioural finance in the study of modern trends in participatory budgeting at the level of territorial communities.

The aim of the research is the development of theoretical and methodological foundations, provisions, practical approaches to participatory budgeting and justification of directions for its development and improvement in the context of behavioural finance.

The main results of the study. The content of participatory budgeting as the essence of management actions and procedures used by subjects of public administration regarding formation, distribution and use of budget resources for the project's implementation initiated by the public is substantiated. The algorithm of the participatory budgeting practice at the level of the territorial community is shown. The factors affecting the number of financial resources aimed at the formation of a participatory budget were identified and the corresponding economic and mathematical model was proposed. The practice of using participatory budgeting in Ukraine at the level of territorial communities was analysed and a number of problems were identified, among which the most important is the choice of distribution directions, the use of participatory budget resources and their optimization criteria. A scientific approach to optimizing participatory budget expenditures using economic-mathematical modelling has been developed. The advantages of participatory budgeting are outlined, problems are identified and approaches to their solution are proposed in the context of behavioural finance, which should be taken into account by public administration bodies when drawing up and implementing a participatory budget.

A theoretical approach to revealing the essence of participatory budgeting has been formed, taking into account various aspects, in particular, the procedures for the formation, distribution and use of funds intended for the project's implementation, initiated by the public. As a result of the factor analysis, three-factor models, which reflect the system of influencing factors on the formation of financial resources directed from local budgets to the participatory budget, were obtained. The problems of participatory budgets functioning at different levels of the budget system are identified and the ways of solving them in the context of behavioural finance are substantiated. A scientific approach to building a participatory budget expenditure optimization model is proposed, on the basis of which it is possible to calculate the optimal set of projects initiated by the public.

Keywords: participatory budget, local government budgets, budgetary resources, public projects, economic-mathematical model, participatory budgeting, behavioural finance, territorial communities, budgeting technologies, factor analysis

JEL Classification: C59, C60, H39, H61, H72, R51, R58

INTRODUCTION

The innovative model of modern society involves the use of the latest technologies for managing various socio-economic processes. Such technologies are especially relevant for the budget process organization as the most important element of economic life. They include new forms, methods and tools of budget planning, budget execution, and

budget control, especially in terms of involving the public in making management decisions. Such involvement is aimed at the democratization of all stages of the budget process and involves a review of approaches to the formation of budget policy, the expansion of the local self-government bodies' accountability, active involvement of a large number of citizens in the development of budget programs, indicators of their effectiveness, the use of the practice of public hearings on budget issues, proper financial analysis of budget indicators. Participatory budgets, formed as a result of the active involvement of citizens in the budget process, characterize the level of democratization in the country. The development of participatory budgeting, especially in the context of behavioural finance, contributes to accelerating the pace of inclusive socio-economic development of territorial communities, improving the quality of public services and the material and cultural living standard of the residents.

Despite the fact that the use of participatory budgeting increases the efficiency of budget resource management, the level of responsibility of local authorities and community residents for the state of public welfare of citizens, the ability of each community to solve important problems of local self-government are unresolved problems in this process organization. Thus, many local self-government bodies underestimate the role of participatory budgets and the involvement of citizens in the development of innovative projects, as a result of which the share of participatory budgets in local budgets is insignificant. The level of financial literacy of the population and the initiative of citizens remains insufficient. The spending priorities of participation budgets often do not correspond to the strategy of socioeconomic development of communities. There is no practice of evaluating the effectiveness of participatory budgets. The interests of the territorial communities' residents, initiators and beneficiaries of investment projects do not coincide. The presence of all the problems and unresolved issues determined the choice of topic and the relevance of scientific research.

LITERATURE REVIEW

Separate problems of participatory budgeting in the context of behavioural finance are considered in domestic and foreign literature. Thus, Aziz H., Shah N. [3] show the content of participatory budgeting based on the ideas of public choice, informatics and microeconomic theory, offer a mathematical model of this budget, pay attention to the issues of identifying preferences, welfare goals, axioms of justice and voter incentives, as well as opportunities for expanding participatory budget research.

Johnson C. [6] examines the results of participatory budgeting, identifies the involvement of democracy as an institutional theory of participatory budgeting, reveals the peculiarities of evaluating the results of expected budgeting mechanisms functioning, examines the impact of this budgeting on the indicators of political culture and behaviour at the time of leadership in society.

Williams D., Calabrese Th., Harju S. [21] consider the historical aspect of participatory budgeting, as well as specific issues related to the theory and practice of participatory budgeting.

Karpinsky B. [7–8] deepened the theory of behavioural finance, outlined the essential content of rationality and irrationality of financial decisions, and systematized the strategy for the development of behavioural finance, the peculiarities of actions when individuals choose a model of financial behaviour and make financial decisions.

Sylodukhin S. and Shaitanova E. [19] show modern approaches to the analysis of the influence of behavioural factors in the management of economic objects and justify the need to take into account the behavioural aspect of management decision-making.

Despite consideration in the economic literature of certain theoretical and practical issues of participatory budgeting in general, most of the actual problems remain unresolved. They concern the organization of budgeting, the choice of forms, methods, tools and levers used in domestic practice, the evaluation of the budget programs' effectiveness, and balancing the economic interests of the participants in the budget process. The results of scientific research evaluation, existing problems and existing practice made it possible to propose recommendations aimed at improving participatory budgeting in the context of behavioural finance.

AIMS AND OBJECTIVES

The purpose of the research is the development of theoretical and methodological foundations, provisions, practical approaches to participatory budgeting and justification of directions for its development and improvement in the context of behavioural finance. In accordance with the goal of the work, the following tasks are set: to substantiate the role and significance of behavioural finance in increasing participation of citizens of the country in the budget process; to develop

a theoretical approach to the interpretation of the essence of participatory budgeting; to obtain factor models that reflect the system of factors affecting the formation of the local budget; to identify the problems of participatory budgets functioning and substantiate the directions of their solution; to propose ways of optimizing participatory budget expenditures.

METHODS

The process of scientific research is based on dialectical, institutional, systemic and functional approaches, according to which the process of participatory budgeting is considered in the direct relationship and cause-and-effect dependence of all its components. Since the dialectical approach is based on the use of laws and categories of dialectics, we consider the budgeting process as the implementation of the objective economic category "budget" in practice. After all, in the process of budgeting, objective distributive relations are materialized, taking into account economic laws and patterns of social development. In turn, the institutional approach provides a combination of formal and informal norms and institutions in the participatory budget development and approval. The systematic approach promotes the use of individual elements of budget revenue and expenditure calculations, optimization of their composition and structure, and their subsequent unification into a single budget. The functional approach ensures the process of subordinating participatory budgeting to the functions of local self-government bodies.

During the research, general scientific methods were used, in particular, analysis and synthesis, induction and deduction – when forming the theoretical foundations of participatory budgeting (the method of analysis was used when dismembering the participatory budget into components of revenue and expenses, and synthesis – to combine these components in a single budget; in the process of applying the method of induction, a general conclusion about participatory budgeting was formed based on the results of the study of the certain types of revenue and expenses, and deduction contributed forming the conclusions about budget revenues and expenditures based on the total amount and purpose of the participatory budget); functional and statistical analysis, analogy, systematization, formalization, measurement, modelling – when evaluating the practice of participatory budgeting (functional analysis was used in the study of budget indicators in accordance with the functions of government bodies, and statistical analysis was used in the analysis of planned and actual budget indicators and identification of the factors affecting deviations; analogy is a method in which the main similarities of the objects in some features of budgets are spread over other features; formalization was used for building abstract models that reveal the essence of budgeting; measurement was used for fixing of quantitative aspects of the qualitative characteristics of the budgets' revenue and expenditure using a certain scale and algorithm of the measurement process; modelling involves the development of economic and mathematical methods and models); generalization, comparison, optimization, argumentation, logical methods – when developing directions for improving participatory budgeting in the context of behavioural finance (the method of generalization was used in formation of general conclusions based on the results of the research; comparison was used when comparing budget revenues and expenditures according to similar properties; optimization – when choosing the optimal solution, the optimal model in the budgeting process; argumentation – when confirming recommendations and conclusions with specific examples of budgeting).

RESULTS

As in today's conditions, the negative consequences of the COVID-19 pandemic impact on economic processes and the full-scale war of the Russian Federation against Ukraine have provoked negative trends in the financial sphere of the country in general and in the sphere of public finances in particular. And the deep uncertainty of clear prospects for recovery of the domestic economy made it impossible to form a reliable financial base for the development of the regions and territorial communities in Ukraine. At the same time, the majority of expert studies and forecasts of international organizations point to the inevitability of changes in the public finance system of Ukraine. Also, in such a situation, territorial communities are forced to overcome modern challenges with already familiar, traditional methods on one hand and on the other hand, they have new opportunities to ensure economic progress with the help of innovative, non-traditional approaches.

The above statement, in our opinion, actualizes the application of the basic principles of behavioural finance (a concept that combines "behavioural and cognitive theories with the traditional approach to finance" [9, p. 16]) to the solution of a brewing problem of regional or local development, since to restore the economic growth of Ukrainian territories with classical methods is becoming more and more difficult. "Behavioural finance themselves are significant to explain in some extent the problem of inconsistency between the theory based on rationality, on one hand, and real practice, on the other one [9, p. 13].

Therefore, impossibility of explaining individual financial phenomena and processes from the point of view of classical theory increasingly prompts scientists to search for relationship between economic science and psychology" [9, p. 17]. Therefore, it is not surprising that "leading companies and specialists increasingly turn to the analysis of irrational behavioural psychological features of both individuals and entire societies" [8, p. 17]. Moreover, "the main achievement of behavioural finance was recognition of the fact that in the field of finance, as in other areas of life, a person makes decisions under the influence of stereotypes formed in society, perception illusions, biased opinions, mistakes during information analysis and, ultimately, ordinary emotions" [11, p. 179]

Undoubtedly, success of any reforms (in particular, power decentralization reform) directly depends on the strategic vector of society development, which is currently based on the principles of people-centrism (and therefore on a clear understanding of the role of an individual as an important "subject of financial decision-making and bearer of individual and public interests" [10, p. 13]) and "preaches the absolute value of an individual, puts the welfare, rights and freedom of a person at the centre of the state activity" [2, p. 3]. Therefore, the statement that financial science should investigate "not abstract categories or impersonal relations, but actors of fiscal and budgetary operations (voters, taxpayers, legislators, civil officers, recipients of social assistance, etc.) as bearers of certain interests, as well as creators of scientific and theoretical ideas and practical knowledge about finance" [1, p. 3], becomes extremely acute and relevant in current domestic realities. And "it is the person who is the important subject of the economic system, who by own active actions affects its development and improvement" [9, p. 7].

It should be noted that in modern financial science, two main approaches to the study of financial processes and phenomena are dominant: positive and normative. And if the goal of the positive approach is to study the existing realities with the help of experiments and econometric methods, then in normative research, most of the argumentation has sociological, moral and ethical character, which is characteristic of behavioural finance in particular. We believe that both positive and normative approaches to the analysis of financial phenomena and processes are equally useful in the process of researching public finances.

In the current conditions of decentralization processes development in Ukraine, a systematic solution to the issue of balanced, optimal distribution of rights and responsibilities is required not only between the local government levels but also between the state and society in general. And since one of the dominant priorities for the local authorities is interaction with the residents of the respective territory by maximally meeting the needs and interests of the members of the local community, the problems associated with the implementation of urgent measures that will make it possible to transform the members of such a community into active participants in the budget process at the local level.

At the same time, it should be emphasized that during the study of the problems of the public finance sphere functioning, "more and more domestic scientists are turning to the assets of the theory of behavioural finance" [9, p. 16], rethinking, in particular, its role in the system of relations between authorities and civil society. We are absolutely convinced that the processes of financial decentralization, which are currently taking place under the slogan of bringing power closer to people, are closely related to the concept of behavioural finance since the behaviour of all participants in the budget process is in the coordinates of political science, psychology, ethics, political science, etc. However, it should be emphasized that the specified direction of scientific research in Ukraine needs active development, taking into account the presence of sufficient prerequisites for the introduction of positive changes in the process of financial decentralization and reform of local self-government thanks to the conceptual provisions of the behavioural finance theory.

Important components of the theory of public finance are those components of financial knowledge that are related to the budget process, the tax system and other financial decision-making procedures, in which, in addition to finance, elements of philosophy, morality, ethics, politics, etc. are closely combined. It is also of no wonder that precisely under the conditions of representative democracy, parliaments often approve such social programs that satisfy certain populist ambitions or correspond to certain political slogans rather than the objective needs of society or real possibilities of the national economy. In this regard, in the scientific work "Limits of Freedom", Nobel laureate J. Buchanan rightly notes that the state is certainly capable of creating public welfare, but under certain conditions, scales and nature of its activity, it can also become a source of anti-welfare, generating such negative externalities such as corruption, bureaucracy, inefficiency, waste, etc.

Effective functioning of the public finance management system, the basic element of which is budgeting technology, is, certainly, an important prerequisite for permanent socio-economic growth. And one of the innovative democratic tools for involving citizens in the distribution and use of budget resources, in the budget process at the local level, is the participatory budget.

First of all, let's note that a "participatory budget is a tool of direct democracy, with the help of which every resident of the territorial community can participate in the budget process, understand its principles and influence decisions regarding the expenditure part of the local budget. The action of such a mechanism consists in the distribution of a part of the local budget by residents through the development and submission of projects aimed at increasing the comfort of living in the city and open voting for these projects by other residents by them" [15].

In the economic literature, the terms "participatory budget", "public budget" are used as synonyms for the concept of "participatory budget", and the term "participatory budgeting" is used to define the budgeting technology based on the use of a participatory budget.

Researchers Aziz H. and Shah N., emphasizing the democratic form of this management technology, define this concept as follows: "Participatory budgeting is a democratic approach to deciding the funding of public projects, which has been adopted in many cities across the world. ... Participatory budgeting is a paradigm which empowers residents to directly decide how a portion of the public budget is spent. Specifically, residents deliberate over spending priorities and vote over how the budget should be allocated to different public projects" [3].

Sintomer Y., Herzberg C. and Röcke A., considering participatory budgeting as a process that "allows the participation of non-elected citizens in the conception and/or allocation of public finances" [18, p. 168], do not attach due importance to the role of public administration bodies, which directly coordinate the actions of citizens and determine certain restrictions on the scope and directions of budgetary resources use.

The most comprehensive approach to the definition of this concept can be found in the work of Shah A. "Participatory budgeting represents a direct-democracy approach to budgeting. It offers citizens at large an opportunity to learn about government operations and to deliberate, debate, and influence the allocation of public resources. It is a tool for educating, engaging, and empowering citizens and strengthening the demand for good governance. The enhanced transparency and accountability that participatory budgeting creates can help reduce government inefficiency and curb clientelism, patronage, and corruption. Participatory budgeting also strengthens inclusive governance by giving marginalized and excluded groups the opportunity to have their voices heard and to influence public decision-making vital to their interests. Done right, it has the potential to make governments more responsive to citizens' needs and preferences and more accountable to them for performance in resource allocation and service delivery. In doing so, participatory budgeting can improve government performance and enhance the quality of democratic participation" [17, p.1]. We also agree with Williams D., Calabrese Th. and Harju S., who note that "this last characteristic is particularly relevant because it implies that one benefit of PB is a change (immediate or gradual) in where public money is spent because of a change in where significant budgetary decisions are made (residents versus public officials)" [21, p. 6].

Thus, we can state that the set of management procedures used by public administration entities regarding the formation, distribution and use of budget resources, intended for the implementation of projects initiated by the public, is called participatory budgeting technology. This budgeting technology is characterized by partial transfer of the right to make decisions regarding the implementation of investment projects, distribution and use of part of the local budget expenditures from the local self-government bodies, and local state executive bodies to the citizens. Its main advantages are laid in increasing transparency of spending budgetary resources, the efficiency of public service provision, an initiative of citizens and democratic principles of the territorial community (region) functioning.

It should be noted that participatory budgeting was started in 1989 in the Brazilian city Porto Alegre with the aim of reducing the level of corruption and solving social problems, and over time it became actively spread throughout the world.

"Its characteristic features as innovative management techniques are the following: determination of the part of the administrative-territorial unit budget, overspending of which will be discussed by citizens at the relevant period; possibility for citizens to submit projects according to the established requirements for consideration by the committee and subject to confirmation of compliance with the requirements – for voting; obligation to comply with decisions made by residents during voting; the ability of residents of the administrative territory to vote for projects (ideas), implementation of which will meet the needs of the local community; implementation of investment projects exclusively within the jurisdiction of the relevant local government body; an opportunity to strengthen the community by creating conditions for its members to debate, discuss major issues, and make joint decisions" [13, p. 467].

Participatory budgeting has been used in Ukraine since 2015 in order to increase public activity and establish a proper partnership with authorities and improve the quality of public services. Depending on the level of the budget system, the sources of budget resources formation, and the problems they are solving, the term of implementation of initiatives initiated by the public investment projects can be distinguished:

- participatory budgets, known as public budgets (launched in 2015), which are formed at the level of territorial communities, are component of their budgets, and resources are spent on projects aimed, as a rule, at increasing the comfort of residents of these territorial communities or solving other problems of local importance. The term of implementation of such investment projects should not exceed one year;
- participatory budget, known as the all-Ukrainian public budget (launched in 2019), which includes budgetary resources formed at the expense of the State Regional Development Fund, created as a part of the State Budget of Ukraine, and the local budget (the amount of co-financing from the local budget of the local self-government body, on the territory of which implementation of the investment project of regional development is planned, must make at least 10% of the residual value of the project, taking into account the costs incurred at the time of submitting the project to participate in the tender) of the relevant local government body, at the territory of which implementation of the investment project of regional development is planned. Funds are spent on projects aimed, as a rule, at solving problems of regional importance in accordance with the regional development strategy, and the term of their implementation can vary from one to three years. In addition, the subject, for the financing of which the resources of the state regional development fund under the project of the all-Ukrainian public budget are involved, must maintain such an object at the expense of the local budget or its own financial resources.

Undoubtedly, with the help of the fundamental principles and effects formed by the concept of behavioural finance, it is possible to explain and activate the participation of the members of territorial communities in participatory budgeting. And since behaviour is primarily understood as "visible manifestations of actions (a conscious set of actions, reflections, reactions to the environment – a certain coordinated and consistently manifest response to stimuli that affect the interests of other people, society in general), which can be observed" [8, p. 284], we can assert that it is the citizens of certain territories – important subjects of public finance – with their personal needs and interests that are the core of behavioural economics in general and behavioural finance in particular.

First of all, we should note that the factor of trust plays an important role in increasing the involvement of citizens in the budget process, since trust is gradually moving from the social to the economic category, and the level of trust of the community residents in the local government is increasingly measured not by some abstract concepts, but by special financial indicators. Therefore, we are convinced that a significant result of the financial decentralization process in Ukraine should be the formation of the so-called "climate of trust" between the community and local authorities.

In this process, we believe, the personal qualities of local managers and political leaders play a significant role, because they are the ones who make the most important decisions in the field of public finance. And precisely ethical principles are actively taken into account by domestic and foreign economists today. In particular, the well-known "Kant's ethical imperative" (according to which all participants in the sphere of public finance must behave in such a way that their behaviour can serve as a clear moral rule for others) became an important component of J. Buchanan's theory of public choice.

In our opinion, the trust factor is quite clearly manifested in particular when the residents of a territorial community pay taxes to the local budget since the not entirely honest behaviour of officials of self-governing bodies (which manifests itself primarily in the illegal enrichment of such persons) and rather high inertia of the majority of Ukrainian society in relation to the above facts produce negative behavioural effects when certain communities of people try to defend and implement their own interests to the detriment of the interests of others. In addition, from the standpoint of behavioural finance, in the process of financial decentralization, there is a high probability of the influence of so-called "opinion leaders" or "choice architects" from among local government officials or local business elites, who can manipulate community opinion and make financial decisions, not always profitable for it, but definitely profitable for them. Conversely, if the local government works for the welfare of its community, and the residents of the community are aware of this, then they will be more responsible for paying taxes to the local budget (which B. Karpinsky rightly considers to be "a quantitative measure of the nation's actual state-building patriotism" [8, p. 286]), understanding their own responsibility for the volume and quality of financing local goods and thus demonstrating their state-building patriotism.

Likewise, it is certainly possible to gain the trust of community members in local government structures only under the condition of transparent and rational distribution of local budget resources, targeted and transparent use of taxes and mandatory payments by the residents of the respective community. Only under such conditions, civil society begins to treat the actions of local authorities with respect and, most importantly, with trust and understanding in relation to the increase in expenditures and growth of tax revenues to the local self-government budget.

We should also note that the practice of financial decentralization in Ukraine revealed a problem related to the unwillingness of the leadership of territorial communities to master significant amounts of financial resources that began to flow into the local budgets, primarily due to fear or reluctance to assume full responsibility for the formation and implementation of development programs territory. From the point of view of behavioural finance, this situation in Ukraine can be partially

explained by the fact that such an important source of filling local budgets, such as personal income tax, is paid at the place of registration, and not at the place of actual residence of the taxpayer, as well as by the fact that active migration processes caused by an intensification of hostilities in the East and South of the country led to the concentration of internally displaced persons – numerous recipients of social benefits and privileges – in large cities.

It should be emphasized that from the point of view of behavioural finance in unfavourable economic and political conditions, as well as in the absence of reliable and objective information about the activities of the authorities, the financial behaviour of the territorial community members will probably not always be rational. In this aspect, the so-called “framing effect” has a significant influence on public participation in the budget process, according to which the way of presenting information, in particular financial information, plays a significant role in making various kinds of decisions. That is, the very context in which this information is presented has a great influence on the adoption of any decision (for example, whether it is presented in a positive or negative context, or as a loss or a win, etc.). We are convinced that the specified effect is quite important in the context of administrative activities organization directly at the territorial communities of Ukraine, as it contributes to ensuring positive results of interaction between the local authorities and the residents of the respective territory. Therefore, the reliability of information operated by the community, as well as the transparency of activities and accountability of local authorities to their voters and an appropriate level of financial literacy of population, whose opinion or emotions are more difficult for the authorities to manipulate, are gaining more and more importance in the modern conditions of the Ukrainian society development. We are absolutely convinced that the effectiveness of the budget process directly depends on the level of financial (in particular, tax) culture of residents and their conscious financial behaviour in the context of active involvement in the formation of relevant decisions in the budget area.

To our mind, from the standpoint of behavioural finance, the use of the “social influence effect” is very important in the development of participatory budgeting, according to which information about the financial decisions or financial behaviour of one social group influences the adoption of similar decisions or formation of similar behaviour in another social group. For example, the above-mentioned effect can be effectively applied to the promotion of successful projects or decisions of neighbouring territorial communities by analysing their own budget indicators with any territorial community and proposing vectors for increasing the financial capacity of their community.

The growth of the level of financial (or rather budgetary) culture of citizens from the point of view of behavioural finance will also be facilitated by the so-called “nudge effect”, formulated by the 2017 Nobel Prize laureates R. Thaler in collaboration with K. Sunstein [20], the essence of which is that with the help of positive support and indirect instructions, it is possible in a certain way to influence the process of making group or individual decisions, including financial ones. In other words, “by insignificantly changing the wording of the requirement, it is possible to influence human behaviour, that is, by applying the means of “pushing”, one can adjust human behaviour in the right direction, and, therefore, achieve the desired result. If state institutions use such technologies for their own purposes, then this phenomenon is usually interpreted as “libertarian paternalism” – recognition of the legal influence of “choice architects” on people’s behaviour in such a way as not to limit their freedom in decision-making, but at the same time direct their actions in the right direction” [5, p. 88].

Certainly, every person, although trying to behave rationally, does not always demonstrate such rationality due to the unreliability of information received or any other factors. Therefore, knowing “the main reasons for the irrational behaviour of economic agents, such situations can be predicted and controlled, and therefore, negative consequences of such behaviour can be avoided” [19, p. 129].

That is why we are convinced that the active use of findings of the behavioural finance concept during the study of the budget process at the local level in the context of participatory budgeting is not only appropriate but also extremely necessary and timely in the current domestic realities. This is due to the fact that “firstly, management of any object of the regional economy is carried out by a person with the factor of subjectivism present in it. Even if the subject of decision-making is a professional in their own field, it is natural to make mistakes. Secondly, an organization, an enterprise, a government body is a team consisting of people, and these people have completely different motives for action. Thirdly, from the point of view of the economic system in general, the region can be considered as a whole “organism”, and therefore its behaviour can be tracked down” [5, p. 89].

In addition, the main effects and theories of behavioural finance make it possible, taking into account a number of psychological aspects, to more realistically analyse the behaviour of citizens as important subjects of the “state-building patriotism of the nation” [7] (that is, conscious taxpayers to local budgets) and active participants in the budget process at the local level.

Thus, based on the analysis of the domestic practice of participatory budgeting Figure 1 shows the algorithm for its implementation at the territorial community level.

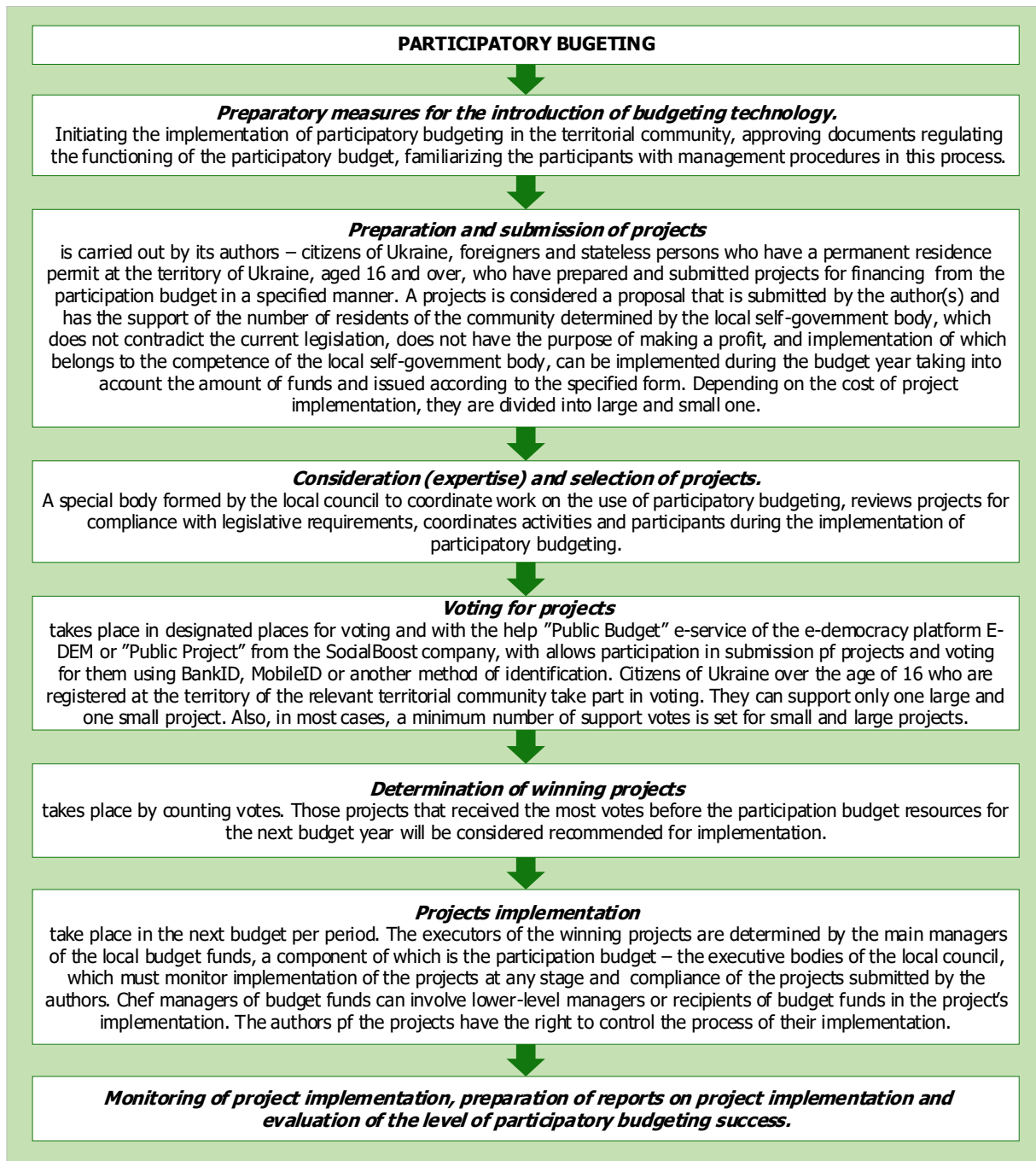


Figure 1. Algorithm of participatory budgeting at the territorial community level. (Source: prepared by the authors on the base [12; 15])

The volume of financial resources, which are directed from local self-government budgets to the formation of the participatory budget, is influenced by:

- the volume of own revenues of local budgets, which include tax revenues, non-tax revenues of local budgets and revenues from capital transactions. The amount of tax revenues to local budgets depends on the types of taxes and fees that are included in the specified budgets, the standards for their inclusion in the budgets of different levels, the tax base (income of individuals, profit, income of economic entities, area of residential and non-residential real estate objects, normative monetary valuation of the land plot, etc.), tax rates, tax benefits, tax culture of taxpayers and other factors. The amount of non-tax revenues received by the local budgets is affected by the following amounts:

fees for the provision of various administrative services, state duties, rents, part of the net profit (income) of communal enterprises allocated to the budget, fees for the placement of temporarily free funds, interest rates for the use of budget credit, own revenues of municipally owned budget institutions (including paid services), etc. The amount of income from capital transactions depends on the normative monetary valuation of non-agricultural land plots that are implemented by the local self-government bodies, the amount of income from the capital sale, etc. Along with the listed factors, the local budgets incomes are also affected by inflation, GDP, the interaction of local self-government bodies with representatives of business structures that carry out their activities on their territory, etc.;

- the share of own revenues of local budgets, determined by the local self-government body, which will be directed to financing the winning projects initiated by the public. In different territorial communities of Ukraine, this indicator ranges from 0.2% to 1%.

In the formalized record, the model of the amount of the financial resources that are directed from local budgets to the formation of the participatory budget (Y) is presented in the form of the formula (1):

$$Y = F(\text{PodNad}, \text{NPodNad}, \text{Dkap}, \text{PodBorg}, \text{GDP}, \text{Bezr}, \text{CPI}, \text{Zarp}, \text{Dnas}, \text{PrEnt}) \quad (1)$$

where *PodNad* – tax revenues, million hryvnias; *NPodNad* – non-tax revenues, million hryvnias; *Dkap* – income from capital transactions, million hryvnias; *PodBorg* – tax debt (at the end of the reporting year), million hryvnias; *GDP* – GDP, million hryvnias; *Bezr* – unemployment rate, %; *CPI* – inflation (consumer price index), %; *Zarp* – average monthly salary, hryvnias; *Dnas* – income of the population, million hryvnias; *PrEnt* – profit of enterprises before taxation, million hryvnias.

Since the statistical data on the volume of financial resources that are directed from local budgets to the formation of participatory budget are not yet sufficient to build an econometric model, we will find out the main factors influencing the formation of financial resources that are directed from the local budgets to the participatory budget from the above indicators.

Our goal is to use factor analysis (method of principal components) to combine indicators that influence the formation of financial resources directed from the local budgets to the participatory budget into a smaller number of artificially constructed factors. The resulting factors system will describe the sample data no worse than the initial one and will be more convenient for meaningful interpretation.

To implement the task, we applied the STATISTICA package and used statistical data for 2004-2021, taken from the official websites of the State Statistics Service of Ukraine [4] and the Ministry of Finance of Ukraine [16].

Visual evaluation of the selection of the factors using the “rocky embankment criterion” is presented in Figure 2, which demonstrates that the eigenvalues of the factors decrease rapidly, and only the first three are greater than one. Therefore, in our opinion, it is enough to single out these three factors.

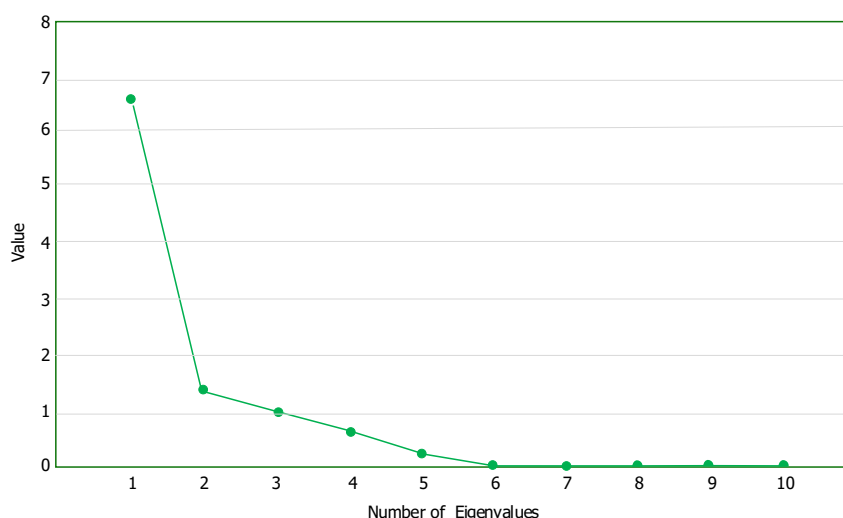


Figure 2. Graph of eigenvalues. (Source: prepared by the authors with the help of the STATISTICA package).

Eigenvalues of the factors selected are given in table 1. The contribution of the first factor to the total variance of indicators is 65.72%, of the second one is 13.43%, of the third one is 10.23, and together – 89.37%, which indicates a high degree of factorization.

Table 1. Eigenvalues of the selected factors. (Source: calculated and prepared by the authors with the help of the STATISTICA package).

Value	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative, %
1	6.571867	65.71867	6.571867	65.71867
2	1.342628	13.42628	7.914495	79.14495
3	1.022823	10.22823	8.937318	89.37318

An assessment of loadings (the measure of its contribution to the selected factor) of each initial variable was carried out (Table 2). Factor loadings are the correlation coefficients of the variables with each factor. Thus, tax revenues, non-tax revenues, tax debt (at the end of the current year), GDP, average monthly wages, household incomes, and pre-tax profits of enterprises are most closely related to the first factor. The second factor was most affected by income from capital transactions, and the third was by inflation (consumer price index). Therefore, the selected factors can be interpreted as the income factor of business entities and taxation (factor 1), the income factor from capital (factor 2), and the inflation factor (factor 3).

Table 2. Factor loads. (Source: calculated and prepared by the authors with the help of the STATISTICA package).

Variable	Factor 1	Factor 2	Factor 3
<i>PodNad</i>	0.981469	-0.070032	-0.090820
<i>NPodNad</i>	0.944170	0.141146	0.047108
<i>Dkap</i>	0.108644	-0.968302	0.038381
<i>PodBorg</i>	0.978870	0.021891	0.011037
<i>GDP</i>	0.707924	0.181476	-0.152853
<i>Bezr</i>	0.563740	0.516175	0.378834
<i>CPI</i>	-0.099233	-0.014460	0.964621
<i>Zarp</i>	0.977279	-0.070038	-0.064972
<i>Dnas</i>	0.981251	-0.030303	-0.077204
<i>PrEnt</i>	0.988439	0.023812	0.018479
<i>Expl.Var</i>	6.548476	1.268883	1.119958
<i>Prp.Totl</i>	0.654848	0.126888	0.111996

As a result of the conducted analysis, the following factor model was obtained (formulas 2-4):

$$F1 = 0,98 \cdot PodNad + 0,94 \cdot NPodNad + 0,98 \cdot PodBorg + 0,71 \cdot GDP + 0,98 \cdot Zarp + 0,98 \cdot Dnas + 0,99 \cdot PrEnt \quad (2)$$

$$F2 = -0,97 \cdot Dkap \quad (3)$$

$$F3 = 0,96 \cdot CPI \quad (4)$$

The results of the conducted factor analysis indicate the existence of a real relationship between the main indicators of influence on the formation of financial resources, which are directed from the local budgets to the participatory budget.

Thus, the main tasks of the factor analysis of financial resources, which are directed from the local budgets to the formation of the participatory budget, have been fulfilled. In particular, there was a reduction in the dimensionality of the feature space, because we obtained three generalized factors. Secondly, the generalized factors were formed in such a way that they can be interpreted as factors of revenue of economic entities and taxation; capital revenue; inflation.

As a result of the practice analysis of using participatory budgeting in Ukraine at the level of territorial communities (which is currently, unfortunately, somewhat complicated by the lack of official statistical data), it was found the following:

- implementation of participatory budgeting increases the level of: the responsibility of local self-government bodies and residents of territorial communities for the formation of community welfare; trust of the population to local authorities; the ability of communities to solve problems of local importance; the resource capacity of local self-government bodies to provide affordable and high-quality public services;
- despite the active implementation, starting in 2017, of participatory budgeting in the practice of local self-government bodies (in particular, an increase in number and cost of the projects proposed by the public, which are financed from participatory budgets), since 2022, the use of this management technology has been suspended, mostly in rural and settlement communities. "This can be partly explained by the impact of the 2020 crisis due to the coronavirus epidemic and the slow recovery of the economy in 2021 when the main financial resources of communities were spent mainly on current consumption expenditures. However, taking into account the small share of public budgets in the total expenditures of community budgets, more important reasons should be considered a decrease in the attention of the local authorities to this mechanism due to underestimation or misunderstanding of its importance, distortion or discrediting of the idea of public budgeting due to a conflict of interests" [14]. In 2022, as a result of the intensification of Russian armed aggression, the introduction of martial law in Ukraine and, in connection with this, the need to prioritize budget expenditures of all levels for national defence, financing of projects from participatory budgets has been suspended in some territorial communities;
- the lack of unification of participatory budgeting procedures in Ukraine are determined by legal norms, which increases independence of the local self-government bodies, flexibility of decision-making regarding the order of formation, distribution and use of budget resources, which are directed to the implementation of projects initiated by the public, taking into account territorial features, priorities of socio-economic development and needs of the territorial communities residents;
- the share of local self-government budgets, the component of which is the participatory budget, in the total number of local budgets is low;
- the level of financial literacy and initiative of residents of individual territorial communities is low, and their level of awareness of participatory budgeting procedures is also insufficient;
- the level of information transparency regarding the use of budget funds for the participation of individual territorial communities of Ukraine and the state of financing of the projects initiated by the public is low;
- there is a discrepancy between the priorities of spending the funds of participatory budgets and the strategic goals of socio-economic development of the territorial communities;
- there is no practice of evaluating the effectiveness of spending the funds of the participatory budget by the local self-government body and publicizing the results of its implementation in Ukraine. An important problem of participatory budgeting at the level of territorial communities remains the choice of directions for distribution and participatory budget resources use (directions for the implementation of the public project) and criteria for their optimization, which is determined by the different social status of the community residents, their field of activity, place of residence, age, gender, and the state of health;
- there is a significant difference in the needs and interests of citizens who initiate projects; needs and interests of project beneficiaries; as well as the needs and interests of the territorial communities' residents who vote for the projects.

According to domestic practice, the majority of budget resources (about 70-80%) are directed to the implementation of large projects, and about 20-30% of all funds are spent on the implementation of small projects. However, the functional allocation of participatory budget expenditures always causes lively discussion among representatives of local self-government bodies and the public. For example, people of retirement age vote less actively for projects whose beneficiaries will be children of school or preschool age, as well as for projects related to youth entertainment, etc. At the same time, pensioners, as well as people of non-retirement age, but with health problems, are more willing to support medical projects related to improving the healthcare facilities infrastructure in which such categories of the population constantly receive medical services with their votes. Citizens-dwellers of big cities, first of all, initiate and support those projects that concern the improvement of living conditions in their own neighbourhood. Citizens who have children of school or preschool age, students, are more likely to initiate creation and vote for educational projects, implementation of which concerns the premises or territories of schools, preschool educational institutions, sports schools for children and youth, institutions for children, youth clubs, primary specialized art educational institutions, institutions of professional and technical education, higher educational institutions.

In view of the above, we can state that selection of priorities for spending funds of participatory budgets, and therefore the establishment of appropriate restrictions for the authors-initiators of public projects regarding the category of the

project (infrastructural, educational, medical, ecological, social, other) is a difficult task. When solving it, one should, first of all, take into account the compliance of the chosen priority direction of spending funds of the participatory budget with the strategic goals of the territorial community's socio-economic development. If there are several such priorities, then, in our opinion, it is appropriate to set the shares of participatory budget expenditures for certain goal fulfilment.

Regardless of the territorial communities' uniqueness (geographic features, level of socio-economic development, mentality, the public activity of residents, etc.) in which participatory budgeting is implemented, in the conditions of limited budgetary resources and the need for their effective use, it is advisable to develop a scientific approach to optimizing the expenditures of the participatory budget with the use of economic and mathematical modelling.

For example, there is a set of voters $N = \{1, 2, \dots, n\}$, and there is also a set $P = \{P1, P2, \dots, Pm\}$ of publicly initiated projects with a cost of $p1, p2, \dots, pm$, respectively. The maximum number of projects that each voter can vote for is known. The limits of budgetary resources, which are planned to be spent from the participatory budget for the implementation of the project, are also known.

Therefore, we will build a model of selection from a set of P projects based on voters' preferences. Voter preferences will be presented in the form of utility functions.

To build an economic-mathematical model, we will introduce the notation:

i – voter index, $i = \overline{1, n}$; j – project type index, $j = \overline{1, m}$; x_j – degree of completion of the j -type project; V and W – respectively, the lower and upper limit of the allocated expenses of participatory budget; r – the maximum number of projects for which each voter can vote; u_{ij} is the utility for the i -voter from the j -type project, $u_{ij} \in \{0; 1\}$ – voter's decision: does not approve or approve the project.

Having u_{ij} , one can calculate $U_j = \sum_{i=1}^n u_{ij}$ – utility of the j -type project.

Taking into account the entered notations, the mathematical model of the participatory budget optimization expenditures will have the form (formulas (5–10)):

find a set of projects $\{x_j\}$, which will provide

$$Z = \sum_{j=1}^m U_j x_j \rightarrow \max \quad (5)$$

upon fulfilment of the terms:

1) by the degree of the project completion:

$$0 \leq x_j \leq 1, j = \overline{1, m} - \text{the project can be implemented partially} \quad (6)$$

or

$$x_j \in \{0; 1\}, j = \overline{1, m} - \text{the project must be completed in full or not at all;} \quad (7)$$

2) according to the cost of the projects, taking into account available budgetary resources:

$$V \leq \sum_{j=1}^m p_j x_j \leq W \quad (8)$$

3) due to impossibility of financing all projects:

$$\sum_{j=1}^m p_j > W \quad (9)$$

4) according to the maximum number of projects that each voter can vote for:

$$\sum_{j=1}^m u_{ij} \leq r \quad (10)$$

One of the problems of participatory budgeting in urban territorial communities, which include micro-districts, is the uneven implementation of public projects in different micro-districts. The reasons for this are the following: differences in the needs and interests of the residents who initiate projects, beneficiaries of projects and residents who vote for them, as

well as different numbers of residents and the activity of participants in the said process in different districts of the city, etc. Therefore, in the context of ensuring the inclusive development of territorial communities, it is advisable to set limits on participatory budget expenditures by region and, accordingly, separately count the voting results for public projects of each micro-district. This approach will contribute to increasing the level of participation of residents of all territorial community micro-districts in participatory budgeting procedures, as well as contribute to the even distribution of participatory budget expenditures for projects initiated by the public between micro-districts.

Regarding the development of the all-Ukrainian public budget, we note that it contributes to the involvement of the public in the allocation of part of the funds from the State Budget of Ukraine (State Regional Development Fund) for regional needs, and "is another mechanism of financial decentralization, an attempt to strengthen trust between the authorities and citizens through the joint development of projects of the regional importance" [14]. However, given the unresolved problems of project financing, the shortage of budgetary resources in connection with the coronavirus crisis, and differences and contradictions in the procedures for selecting winning projects that will be financed from the funds of the State Regional Development Fund, from 2021 this type of participatory budget is not used.

Therefore, the outlined advantages of participatory budgeting identified problems and proposed approaches to their solution should be taken into account by public administration bodies during the development of measures to further intensify the use of the specified management technology in domestic practice.

DISCUSSION

The results obtained in the process of scientific research are aimed at the development of certain aspects of financial science related to participatory budgeting modernization in the context of behavioural finance. They are based on the results of previous studies evaluating theoretical approaches and practical foundations of this budgeting and identified shortcomings and problems related to the involvement of citizens in the budget process.

A number of debatable issues regarding the theory and practice of participatory budgeting in the context of behavioural finance were discussed in the section "Results". It was in the process of discussion that positive and controversial aspects of the research were determined and our own position was formed.

In the process of such discussion, own recommendations developed by the authors were substantiated. Thus, in particular, Karpinskyi B. in his work "Behavioural Finance as an Effective Basis for Reflecting the Rationality and Irrationality of Financial Decisions in the System of Nation-Building Patriotism" [8] rightly emphasized the feasibility of developing the strategic capabilities of behavioural finance. Its essential filling of rationality and irrationality in making financial decisions, especially those related to the deviant behaviour of taxpayers, is noteworthy. However, he does not consider the peculiarities of financial behaviour when making decisions related to budgeting. The studies of Solodukhin S. and Shaitanova Ye. "Modern Approaches to the Analysis of the Influence of Behavioural Factors in the Management of Economic Objects" [19], which substantiated the need for mandatory consideration of behavioural aspects when making managerial decisions is quite interesting. However, they do not consider the specifics of these decisions in the field of public finance. Using the experience gained by these authors and taking into account the omissions related to budgeting, we formed our own position. The results of the study indicate the expediency of using elements of behavioural finance to activate the participation of the country's citizens at all stages of the budget process. Application of the basic foundations of behavioural finance will enable local self-government bodies with the involvement of the public to make effective financial decisions on issues of social and economic development of territorial communities, improving the material and cultural development of the population, the quality of public services, while avoiding conflict situations at various levels of public administration.

The approaches of many scientists to the essence of participatory budgeting in the context of behavioural finance are debatable. Thus, Williams D., Calabrese Th., Harju, S. in the article "A Theory of Participatory Budgeting Decision Making as a Form of Empowerment" [21], analyzing the scientific literature on this budgeting, came to the conclusion that participatory budgeting is an element of transfer decision-making from the executive or legislative power to citizens and characterizes the manifestation of democracy. Thus, considering various theories of budgeting and theories of participatory budgeting, the authors take as a basis practical issues that are solved by making managerial decisions. In our opinion, such an approach is debatable, since it is not known what criteria the authorities are guided by when developing and implementing such solutions. We believe that such criteria can be objective distributive relations, which relate to the formation and implementation of the participatory budget, taking into account the economic interests of all subjects of the budget process. Without this, financial decisions will have an exclusively subjective nature and will provoke conflicts. Recommended theoretical approach to the interpretation of the essence and content of participatory budgeting makes it possible to consider this budgeting as an integral innovative component of the budget process, which covers the set of

management procedures and functions used by the state authorities and the local self-government bodies during formation, distribution and use of public financial resources aimed at the practical implementation of investment projects initiated by the public.

Scientific research by Aziz H., Shah N. "Participatory Budgeting: Models and Approaches. Pathways Between Social Science and Computational Social Science" [3], who formed their ideas on the basis of developments on computational social choice, the ideas of which are based on the postulates of informatics and macroeconomic theory are important for the research. A mathematical model of participatory budgeting with the use of various approaches deserves attention. However, in our opinion, such research needs to be supplemented by factor analysis using a factor model. The choice of such factors depends on the specifics of budgeting. In the process of developing proposals for solving this problem, we chose our scientific direction. Developing practical approaches to the modernization of participatory budgeting, three-factor models have been formed that make it possible to evaluate the system of factors influencing participatory budget formation.

Analyzing Johnson C. research "Engaging Democracy: An Institutional Theory of Participatory Budgeting" [6], in our opinion, the author reasonably focused on the fact that participatory budgeting is one of the examples of democratic innovations. She described the current practice of budgeting and its individual advantages. Paying more attention to the advantages of this budgeting, she, however, missed a number of its shortcomings. We consider it appropriate to supplement this study with our own recommendations. Based on the analysis of the available theoretical and practical material, the advantages of participatory budgeting in the budgeting process, the problems and shortcomings of the participatory budget funds formation and use are shown, on the basis of which the main directions of their solution are proposed.

Noting the positive aspects of scientific research by Aziz H., Shah N. in the work "Participatory Budgeting: Models and Approaches. Pathways between Social Science and Computational Social Science" [3] regarding the modelling of the participatory budget, we observe insufficient attention to the problems of optimizing its expenditure part in conditions of limited financial resources. We consider it expedient to supplement the developmental results of the specified scientists with the modelling of the optimal composition and structure of participatory budget expenditures we have developed, taking into account the economic interests of the participants in the budget process. The recommended model for optimizing participatory budget expenditures makes it possible to optimize the list of citizen-initiated investment projects, ensuring the maximum benefit from their implementation, taking into account these budget funds' limitation.

CONCLUSIONS

Therefore, the research conducted proved that by using the effects of behavioural finance it is possible to significantly activate public participation in the formation, execution and control over the execution of local budgets in Ukraine. Therefore, understanding the basic principles of behavioural finance helps both local governments and citizens to make informed choices and make informed financial decisions at points. And thanks to balancing the interests of local authorities and residents of the respective territory, many conflicts can be avoided both at the local level in particular and at the state level in general.

A theoretical approach to revealing the essence of participatory budgeting is proposed, taking into account various aspects of this multifaceted concept, in particular – as a set of management procedures used by public administration subjects regarding the formation, distribution and use of budget resources intended for the implementation of projects initiated by public.

With the help of factor analysis (principal components method), three-factor models were obtained, which reflect the system of influencing factors on the formation of financial resources, which are directed from local to the participatory budget. The STATISTICA 10 software product, which is a universal statistical analysis package that implements the basic mathematical methods of data analysis, was used for the factor analysis.

Based on the results of the evaluation of the participatory budgeting domestic practice, the main advantages of this budgeting technology are argued, the problems of the participatory budgets functioning at different levels of the budget system of Ukraine are identified, and the vectors of their solution are substantiated.

A scientific approach to participatory budget expenditures optimization using economic-mathematical modelling has been developed, which involves building a model for participatory budget expenditures optimization. With its help, it is possible to calculate the optimal set of projects initiated by the public, which ensures the maximum utility from the result of their implementation for the territorial community residents and takes into account the limitation of the participatory budget expenditures volume. The model belongs to the class of linear programming problems, which consists of an objective function and constraints system of a linear form.

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ПАРТИЦИПАТОРНЕ БЮДЖЕТУВАННЯ В КОНТЕКСТІ ПОВЕДІНКОВИХ ФІНАНСІВ

Результат аналізу процесів децентралізації влади та посилення фінансової автономії місцевого самоврядування в Україні довів необхідність та доцільність застосування концепції поведінкових фінансів при дослідженні сучасних трендів партиципаторного бюджетування на рівні територіальних громад.

Метою дослідження є розвиток теоретико-методологічних засад, положень, практичних підходів до партиципаторного бюджетування та обґрунтування напрямів його розвитку й удосконалення в контексті поведінкових фінансів.

Основні результати дослідження. Обґрунтовано зміст партиципаторного бюджетування як сутності управлінських дій та процедур, що використовують суб'єкти публічного управління стосовно формування, розподілу та використання бюджетних ресурсів на реалізацію проєктів, ініційованих громадськістю. Розкрито алгоритм практики партиципаторного бюджетування на рівні територіальної громади. Виявлено чинники, які впливають на обсяг фінансових ресурсів, спрямованих на формування бюджету участі та запропоновано відповідну економіко-математичну модель. Проаналізовано практику використання партиципаторного бюджетування в Україні на рівні територіальних громад та виявлено низку проблем, серед яких найважливішою є вибір напрямів розподілу, використання ресурсів бюджету участі й критеріїв їх оптимізації. Сформовано науковий підхід до оптимізації видатків бюджету участі з використанням економіко-математичного моделювання. Окреслено переваги партиципаторного бюджетування, виявлено проблеми та запропоновано підходи до їх вирішення в контексті поведінкових фінансів, які доцільно враховувати органам публічного управління під час складання та виконання бюджету участі.

Сформовано теоретичний підхід до розкриття сутності партиципаторного бюджетування з урахуванням різних аспектів, зокрема процедур формування, розподілу й використання коштів, призначених на реалізацію ініційованих громадськістю проєктів. У результаті проведеного факторного аналізу отримано три факторні моделі, які відображають систему чинників впливу на формування фінансових ресурсів, спрямованих із місцевих бюджетів до бюджету участі. Виявлено проблеми функціонування бюджетів участі на різних рівнях бюджетної системи та обґрунтовано шляхи їх вирішення в контексті поведінкових фінансів. Запропоновано науковий підхід до побудови моделі оптимізації видатків партиципаторного бюджету, на основі якої можна розраховувати оптимальний набір ініційованих громадськістю проєктів.

Ключові слова: бюджет участі, бюджети місцевого самоврядування, бюджетні ресурси, громадські проекти, економіко-математична модель, партиципаторне бюджетування, поведінкові фінанси, територіальні громади, технології бюджетування, факторний аналіз

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