Management of social investment projects for digital transformation in education

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Abstract. The digital transformation of education implies a sequence of carefully crafted changes in the culture, personnel and technology of the education sector, which will be based on new educational and operational models and which in turn will lead to the transformation of institutional operations, strategic directions and value propositions. And here the people who are directly involved in the educational process come to the fore - teachers and the need to prepare them for new working conditions. The main problem is that they will not independently cope with all the problems arising from the digitalization in education. It is obvious that they need support in the form of various projects and it is obvious that these projects, which require large financial investments, should be exclusively social. In the presented work, two types of social projects are considered, and mechanisms for their effective management are proposed, the use of which should become one of the factors in attracting investors, since one should not forget that first of all investors will wait for benefits (especially financial) from their investments.

1. Introduction

According to Alexander Stradze [1], director of the Institute of Natural Science and Sports Technologies, digital transformation is under the influence of so-called drivers and should lead to the creation of new business models; to the emergence of new research opportunities; to create innovation in the field of learning and to improve student learning outcomes. Between these drivers - elements of influence, that is, incentives, and the results of digital transformation listed above, there is a "black box", the elements of which, according to him, are the components of digital transformation, namely technology, personnel, culture.

All these concepts, in one way or another, are associated with a person, in the context of the digital transformation in education with a teacher.

To achieve the goals of digital transformation, “different technologies, different people, different culture are needed. Digital transformation is a series of profound and coordinated changes in culture, people and technology that involve new educational and operational models and lead to the transformation of institutional operations, strategic directions and value propositions” [1].

From all that has been said above, it follows that the role of the teacher is changing. He must organize the learning process in a different way and use new technologies, techniques / means, methods. All this suggests that in order for a teacher to become a modern teacher who meets the requirements of digital transformation, you need training, retraining and you need all those technologies, means, and the like to
improve your skills and meet the changing conditions and forms of education. And often in this situation, teachers are left alone with themselves in conditions of limited finances and time [2].

Here, the so-called issue of “digital inequality” is at the forefront, that is, the stratification of people (subjects), and not just teachers, according to the level of access to information. This is due to various factors: political, economic, technological, subjective and criminogenic [3]. And the most significant factors are economic, technological, since they are due precisely to the solvency of the subject, which is not always sufficient to obtain all the necessary funds for its development.

In this regard, the question arises of the need to help teachers in mastering the necessary modern tools and new competencies that will allow them to participate in the digital transformation in education, and not be left “behind the board” and slow down this process with their failure.

It is worth noting here that these problems cannot be solved without carrying out so-called social projects, which in this case will be aimed at developing the teacher potential for the purpose of a successful digital transformation in education. Funding such projects will require significant investments. And investors, in turn, will need tools to determine the feasibility and effectiveness of such projects.

2. Formulation of the problem
So, the actual problem that needs to be solved is the determination of the priority of financing socially oriented investment projects.

A social investment project (SIP) is a project based on the current legislation, the prevailing market conditions and its own developments, the purpose of which is to increase the living standards of consumers through their involvement in production, trade or financial turnover [4, 5].

Such a side of the definition of SIP as raising the living standards of various sectors of society is important. It is through this mechanism that there will be an inflow of financial resources to investors, whoever it is (government, companies). The most important point that directly affects the way to solve the task, is the separation of the SIPs into the following two types [4].

"Social projects", that is, projects from which no direct income is assumed. Sources of financing here will be budgetary funds or funds of public organizations. And in this case, the project performer only ensures its implementation. His interest here will be expressed in improving the image and the ability to establish close relations with administrations of all levels.

"Social investment projects", that is, those projects that involve the receipt of a certain income, perhaps after a long period of time or not in that volume, if it were a commercial project. Summarizing what has been said above, we can conclude that income generation is planned here by raising the living standards of people as a result of the project implementation [6, 7, 8].

The subject of research in our case is the social effect (SE), this concept is diverse [4], and it is worth noting that in determining the social effect of a particular project, not all of them will be visible at first glance.

2.1. Methods of determining the round of a SIP
Now we turn to the procedure for measuring the social effect. As noted earlier, it depends on the type of SIP.

2.1.1. Construction of a comprehensive assessment of SIP that do not imply a profit. Consider the SIPs, which were conventionally referred to above as “social projects”. Their financing is regulated by the state. And here the main principles are [4]: maintaining social justice; ensuring social and economic efficiency of investments.

To comply with these principles, the state finances the SIPs, stimulates the development of social direction, supports the creation of social products and ensures their even distribution.

In order to fulfill the principles of state financing, it is necessary to offer government agencies a tool for selecting or ranking the SIPs, which will allow to determine the most socially effective projects from
a multitude of equal, that is, to choose a project with the greatest social effect with other things being equal.

To solve the problem for each SIP of the type under consideration, it is proposed to determine a comprehensive assessment of the social effect, and then rank the projects according to these estimates and thus obtain the order of their financing or determine the most socially effective ones [10, 11].

We use the following approach for constructing a comprehensive assessment based on several criteria, which is based on the use of a model for constructing an integrated assessment using the Kemeny median.

Let $i$ be the serial number of the SIP ($i = 1, n$). Let us form a set of criteria by which the social efficiency of each of them will be assessed.

Suppose we have $m$ evaluated criteria. The criteria are specific indicators of social effect, which were mentioned above. Each $j$-th private criterion gives its vector of preferences $P_j = (P_{i1}, P_{i2}, ..., P_{in})$, $j = 1, m$ where $P_{ij}$ – is the sequence number of the SIP, which occupies the $i$-th place in the ranking by the $j$-th criterion. In each $P_j$ SIPs the values of their social effect are arranged in decreasing order, i.e. 1st place is the SIP with the greatest social effect (that is, the most preferred) and then in descending order. Then we assign to each vector $P_j$ the vector $\pi_j = (\pi_{j1}, \pi_{j2}, ..., \pi_{jn})$ formed according to the rule: the coordinate $\pi_{j1}$ is the number of SIPs, which according to the $j$-th criterion are more preferable than SIP having sequence number $i$.

Next, we search for the group vector, in which the individual preferences will be best presented. The Kemeny median is considered as such (1):

$$\pi^* = \min \sum_{j=1}^{m} d(\pi, \pi_j),$$

where $d(\pi, \pi_j)$ – distance between two vectors, calculated by (2)

$$d(\pi, \pi_j) = \sum_{i=1}^{n} |\pi_i - \pi_{ij}|.$$  

The stages of searching for the Kemeny median are shown in figures 1, 2. Therefore, the order in which the SIP should be financed will be determined by their sequence in the $\pi^*$ vector. And the SIP, which is in the $\pi^*$ vector in the first place, will be most preferable for financing in terms of the size of the social effect it creates.

![Stage 1](image)

**Figure 1.** Stage 1 of finding the Kemeny median.
2.1.2. The method of determining the sequence of SIPs, involving profit. Consider now the SIPs, which assume the receipt of certain income, and are funded by private companies and / or the state.

In assessing the effectiveness of such projects, it is advisable to take into account not only the social effect, but also the financial effect [12, 13].

To solve this problem, it is proposed for each project to determine the magnitude of the increased net present value of the project, taking into account the social effect (8) and to streamline all projects by not decreasing these values.

\[ \text{NPV}_{\text{SOC}} = \text{ES} \times \text{NPV}, \]  

where NPV – net present value of the project; ES – a complex indicator of social efficiency of the project, which is determined by the formula (9):

\[ \text{ES} = \text{C}_{\text{SE}} \times \text{C}_{\text{RU}}. \]  

where \( \text{C}_{\text{SE}} \) – social efficiency coefficient, which is calculated as the sum of the product of the social project indicator as a percentage by weight (value of the indicator) as a percentage. Both of these values are determined by experts.

A \( C_{RU} = \sum_{r=1}^{n} p_r \) – the coefficient of regional utility, where \( p_r \) the indicators shown in figure 3.

| Ratio (RF to region): | levels of service availability provided during the implementation of the project, per capita; |
|-----------------------|------------------------------------------------------------------------------------------|
|                       | levels investment availability in fixed capital per capita;                              |
|                       | average annual price levels for services rendered during the project implementation, per 1 service. |

3. Results and Discussion

An important result of the article is the development of methods for evaluating the economic category so important today as the effectiveness of SIP. Which are quite relevant in the context of the digital
transformation in education. It is worth noting that methods of effectiveness evaluating of various types of investment projects with different degrees of social orientation are proposed here. So, we formulate two main results of the work and describe their distinctive features.

A model that allows you to select or rank SIPs that do not involve direct income. Its distinctive feature is that it is completely unrelated to the financial side of the project, since its effectiveness cannot be determined by financial indicators. The model affects the quality side of SIP, which in this case is most appropriate.

A model for determining the effectiveness of SIP, involving profit. The purpose of this model is not just to determine the effectiveness of SIPs, but also to build a sequence of their implementation, upon which the investor will receive the maximum possible profit by the time the entire sequence is completed. It is worth noting that this model can be supplemented by a mechanism for determining the sequence of projects, which at the time of its completion gives the maximum income, which are imposed organizational-technological limitations.

4. Conclusion
In conclusion, it should be noted that in the context of the digital transformation in education, issues related to the support of teachers, which are its fundamental tool, should not be ignored. Since the development of their knowledge and skills directly depends on the availability of funds and programs to improve their skills [15]. And since most of the subjects under consideration do not have sufficient resources for their development, the state and commercial organizations (consumers of education services) need to seriously think about investing enough in this area of digital transformation to achieve the required results. And here, of course, one should not forget that investments must return to their owner, therefore, the proposed tools for assessing the SE, the choice of SIPs are relevant.

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