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THEORETICAL FOUNDATIONS OF WASTE MANAGEMENT

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Annotation: *This article aims to implement the creation of a new mechanism based on information and communication technologies and through the creation of necessary products from unnecessary products and the development of innovative projects.*

Basic terms: *software product, software product life cycle, basic processes, ancillary processes. information and communication technologies of the life cycle.*

Key words: *waste, innovation, information technology, purpose, production, financing, innovation at the enterprise.*

It is advisable to develop information and communication technologies based on the principles of identifying factors that encourage and hinder the introduction of new technologies in the waste processing plant.

In conclusion, the long life cycle of innovations leads to economic inequality in the value of costs incurred and the results obtained at different times. This can be solved by the method of quoted value, or discounting, in other words, by bringing costs and results over a period of time.

The basic idea of discounting is that it is easier for an enterprise to get money today than tomorrow, because they can be invested in innovations, and they can make a profit tomorrow. In addition, postponing the withdrawal to the next day is risky: under unfavorable conditions, their income may be less than expected or not at all.

The creation of a whole system of scientific, production and trade will be based on objective laws, as well as determined by scientific and technological progress and the market needs of the enterprise.

There are the following types of innovative research projects: initiative research projects, projects for the development of material and technical base of scientific research, projects for the creation of information systems (IT) and databases (DB), publishing projects, projects for the implementation of expeditions, etc.

The management of research and development takes place under changing conditions. In each case, an unforeseen technical problem may arise, which may result in a delay or suspension of work on the project. The needs and requirements of each customer may change, and the viability of the project will need to be re-evaluated.

The choice of project depends on the search for alternative solutions. Creation of a new mechanism for managing the process of scientific, technical and experimental design work (STEDW) and based on information and communication technologies. Shown in Figure 1.

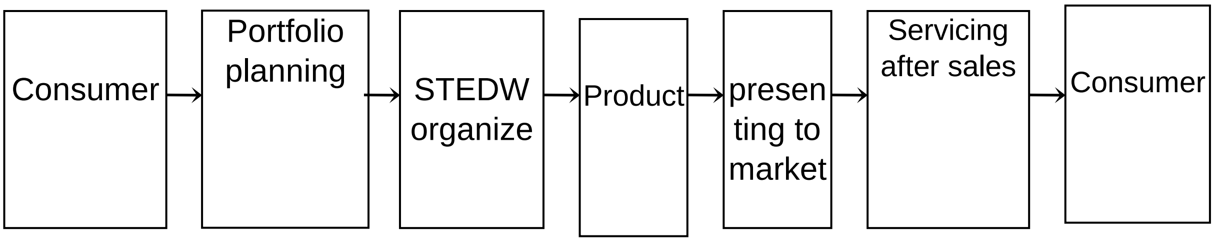

Figure 1. STEDW process management mechanism

The portfolio of STEDW may consist of different projects. However, each project requires limited resources due to its characteristics (complexity, capacity, etc.).

The number of projects in a portfolio over a period of time depends on the size of the projects, which is measured by the total amount of resources required to develop and implement a single project.

The number of projects in the portfolio (n) is derived from the following ratio: n STEDW budget for the period / average cost per project.

A portfolio consisting mainly of large projects has a higher risk than a portfolio whose resources are distributed among smaller projects. The advantage of small projects is that they are easier to adapt to each other in terms of available resources. A large project, on the other hand, requires a large amount of limited resources. When considering the possibility of including a project in the portfolio, it is necessary to take into account the consequences of the quality of management and redistribution of costs to projects.

Let us evaluate two portfolios, each consisting of two projects (Table 1). Both portfolios are small.

Table 1

Evaluating the effectiveness of portfolios

Projects	**A portfolio**			**B portfolio**		
	Expense, currency (Za)	Profit currency (Pa)	Profitability 2 / 1	Expense, currency (Za)	Profit currency (Pa)	Profitability 5 / 4
	1	2	3	4	5	6
1 2	22 000 18 000	41 800 32 400	1,9 1,8	34 000 30 000	59 500 57 000	1,75 1,9
Total assessment of portfolio	40 000	72 400	1,86	64 000	116 500	1,82

The first project in portfolio A is 8.6% (1.9 / 1.75 = 1.086) more profitable than the project in portfolio B, but the second project has a higher profitability in portfolio B (1.8 / 1.9 = 0.947), i.e. the profitability of the second project is 9.5% lower.

The total value of portfolios is given on the basis of average profitability. We define the profitability of portfolios A and B as PrA and PrB.

As can be seen from Table 1, the profitability of individual projects is determined as follows:

PrA = PA / ZA; PrB = PrB / ZB. (1)

The overall profitability of the portfolios

$$\overline{R}_A = \frac{\sum П_А}{\sum З_А}; \qquad \overline{R}_з = \frac{\sum П_з}{\sum З_з} \quad (2)$$

Here: $\overline{R}_A$ and $\overline{R}_з$ - Average return on A and B portfolios.

On the basis of profitability indicators, the priority coefficient can be calculated.

$$\overline{K}_п = \frac{\overline{R}_A}{\overline{R}_з} \quad (3)$$

Here: Cp – priority coefficient.

In our example, the priority coefficient is:

$$C = \frac{1{,}86}{1{,}82} = 1{,}022 \quad or \quad 2{,}2\%$$

However, each project has an individual profitability (Pi) and a certain share () in portfolio formation expenses.

This can be presented in the form of a system of priorities for the average or aggregate priority coefficient (), profitability and expenses structure.

Profitability priority coefficient:

$$K_m = \frac{\sum R_{AI} * d_{,AI}}{\sum R_{зI} * d_{,AI}}. \quad (4)$$

Priority coefficient on expenses structure:

$$K_{d,} = \frac{\sum R_{зI} * d_{,AI}}{\sum R_{зI} * d_{,зI}}. \quad (5)$$

So that:

$$\overline{K}_n = \frac{\sum R_{AI} * d_{,AI}}{\sum R_{зI} * d_{,зI}}, \quad (6)$$

Or

$$\overline{K}_n = \frac{\sum R_{AI} * d_{,AI}}{\sum R_{зI} * d_{,зI}} = \frac{\sum R_{AI} * d_{,AI}}{\sum R_{зI} * d_{,AI}} * \frac{\sum R_{зI} * d_{,AI}}{\sum R_{зI} * d_{,зI}}. \quad (7)$$

The methodology for calculating priority coefficients is given in Table 2. In this example, the profitability priority coefficient

($\overline{K}_n = \frac{\sum R_{AI} * d_{,AI}}{\sum R_{зI} * d_{,зз}}$) 1,22 equal..

It is equal to the size of the average priority coefficient, because the share of projects in the portfolio in terms of expenses structure is almost the same and there is no priority (Cp = 1).

If the manager focuses on the projects included in portfolio A, the additional income of portfolio A is [(+0.04) * 40,000] = 1600 monetary units, taking into account that the profitability of portfolio A is 0.04 points higher.

Table 2

Calculation of priority coefficients

Projects	A Portfolio			B Portfolio			RБI x dзai
	R_{AI}	$d_{,AI}$	RAI x $d_{,AI}$ i	R_{AI}	$d_{,AI}$	RБI x dзбi	
1	1,9	0,55	1,045	1,75	0,53	0,927	0,962
2	1,8	0,45	0,81	1,90	0,47	0,823	0,855
assessting porfolio	$\overline{R}_A = 1{,}86$	1,00	$\overline{R}_A = 1{,}86$	$\overline{R}_A = 1{,}86$	1,00	$\overline{R}_A = 1{,}86$	1,82

To create an order portfolios imply working with potential customers of STEDW results.

Innovative projects offered to investors will be compared and analyzed using a single system of indicators. Comparison of submitted projects is carried out taking into account the following:

– the volume of work carried out using new methods (technology, equipment, etc.);

– quality indicators of innovations;

– time factor;

– price, tariff level, condition of salary paymentю

The long life cycle of innovations leads to economic inequality in the cost of work done at different times and the value of the results obtained. This can be solved by the method of quoted value, or discounting, in other words, by bringing costs and results over a period of time. Such a time interval is, for example, the initial year of innovation.

The main point of discounting is that the present value of any amount expected to be received in the future is relatively small, it is easier for an enterprise to get money today rather than tomorrow because they are invested in innovations, and can generate some income tomorrow. In addition, postponing the withdrawal to the next day is risky: under unfavorable conditions, their income may be less than expected or not at all.

The discount rate is always less than 1, otherwise today's money would be worth less than tomorrow's money.

For example, if today we are investing $ 1 billion in innovation with the goal of earning 10%. After 1 year, the value of our investments will reach 1.1 billion soums. This is the future value of our investment, and its current value is 1.0 billion soums. soums.

Discount coefficients can be calculated using a complex interest formula: $\alpha_t = (1+i)^{t_p}$ (8)

Here: i – is the interest rate expressed as a decimal fraction (discount rate);

tp – the year in which the expenses and results are presented (accounting year);

t – the year in which expenses and results are shown.

If the year of commencement of innovations is taken as the accounting year, then tp = 0 and so on

$$\alpha_t = \frac{1}{(1+i)^t} \quad (9)$$

In the case of a positive interest rate on capital, the discount rate i is always less than 1. For example, 20 billion to be paid in 4 years. It is necessary to determine the modern value of the soum. During this period, a compound interest rate of 8% per annum was added to the initial amount. In this case, the modern value is equal to: $20 * (1+0{,}08)^{-4} = 20 * 0{,}7350 = 14{,}7$.

The magnitude of the discounted interest rate and the present value are inversely related, meaning that the higher the interest rate, the smaller the present value. The smaller the interest rate and the shorter the time period (t), the higher the discount rate for future earnings.

Thus, the net present value of the project is determined using discounting. Let's look at an example of a project selection mechanism. The initial investment in the project is $ 480 million. som The annual cash flow for 3 years is 160 crore. som The interest rate is 10% (i).

In this example, the discount coefficients are:

For the first year – $\frac{1}{(1+0,1)^1} = 0,909$;

For the second year – $\frac{1}{(1+0,1)^2} = 0,826$;

For the third year – $\frac{1}{(1+0,1)^3} = 0,751$.

So, during the years of the project implementation, the net present value is: (160 * 0.909) + (160 * 0.826) + (160 * 0.751) = 398 mln. soum.

In order to decide whether it is appropriate to invest in a project, it is necessary to find the difference between the net present value and the initial amount of investment. The project we are considering is not profitable, because the income is smaller than the initial investment: (398 - 480) = -82 mln. som Net present value is also called “net present value” (W).

It should be noted that there are standard tables of discount multipliers to facilitate the discounting process and project selection. The following is a part of the table of discount multipliers for practical developments (Table 3).

If there is inflation, there will be a difference between nominal and real interest rates.

Table 3

Years	1%	10%	15%	20%	25%	30%	35%	40%
1	0,990	0,909	0,870	0,833	0,800	0,769	0,741	0,714
2	0,980	0,826	0,756	0,694	0,640	0,592	0,549	0,510
3	0,971	0,751	0,658	0,579	0,512	0,455	0,406	0,364
4	0,961	0,683	0,552	0,482	0,410	0,350	0,301	0,260
5	0,951	0,621	0,497	0,402	0,328	0,269	0,223	0,186
6	0,942	0,564	0,432	0,335	0,262	0,207	0,165	0,133
7	0,933	0,513	0,376	0,279	0,210	0,159	0,122	0,095
8	0,923	0,467	0,327	0,233	0,168	0,123	0,091	0,068
9	0,914	0,424	0,284	0,194	0,134	0,094	0,067	0,048
10	0,905	0,386	0,247	0,162	0,107	0,073	0,050	0,035
13	0,879	0,290	0,163	0,093	0,055	0,033	0,020	0,013

For example, the nominal annual rate is 9%, the expected inflation rate is 5% per annum, so the real rate is 4%. Payback period (Pp) for the selection of innovative projects in addition to net present income; coverage period (Sp); internal rate of return (Ir); indicators such as profitability (P) are also used.

Figure 2 shows the performance indicators that need to be considered for an innovative project.

Calculating the efficiency coefficient according to the following expressions, the innovative project is common to all efficiency indicators:

$E = \frac{Э}{З}$ (correct indicator)

$E = \frac{З}{Э}$ (reverse indicator) (10)

Here: E – the effect of project implementation (results);

Z – project implementation expenses.

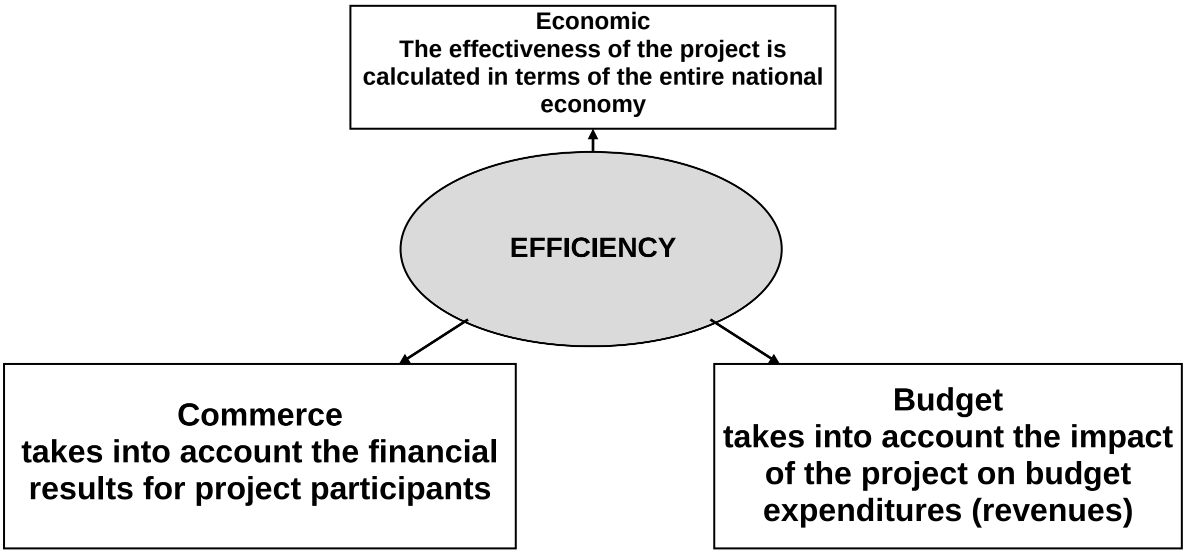

Figure 2. The effectiveness of an innovative project indicators

The minimum expens for their implementation can serve as a criterion for the selection of projects.

When choosing innovative projects, it is important to pay attention to ways to reduce risk.

When more than one option is available, the most expens-effective option is chosen based on the minimum expens.

$Zi = Si + Eн+i = min$, (11)

Here: Zi- is presented the expenses of each option;

Si – production expenses for this option (original price);

Eн – capital investment efficiency criteria;

Ki – investments in this option.

In a planned economy, Yen's criteria was set in a centralized manner. In a market economy, each enterprise sets this standard at the level of interest rate i, or at the level of profibilty on investment Pn. Based on this, the costs can be described as follows:

Zi = Si + i * +i = min (12)

or

Zi = Si + Rн * Кi = min. (13)

The payback period for additional investment in innovation, the additional investment costs incurred for the more expensive option of innovation, is the payback period due to the economic results achieved as a result of the innovation.

To select an option, the calculated value of the payback period Tp is compared with its normative magnitude Tн = 1/E.

It is advisable to make additional investments in innovations, provided that the payback period is not higher than the normative value. If Tr<Tn, the most efficient option is selected.

The magnitude of the inverse of the payback period is the coefficient of efficiency of additional investment in innovations or the coefficient of comparative efficiency – Er.

$$Er = \frac{\Delta C}{\Delta K}. \quad (14)$$

Er The calculated value of the efficiency ratio is compared with the normative size of En, which corresponds to the norm of capital return that satisfies the investor. If Er >En it is also effective in investing in innovations and, consequently, in high-capacity options.

Using the cost method, we select the most efficient option for the proposed new projects according to the following formula:

S + EnК, (15)

Here: S - annual production costs of the product;

К – investments;

En – the coefficient of economic efficiency is equal to 0.1.

1 variant – (13600 * 700) + 0,1 * 22500 = 11770 mln. soum.

2 variant – (14700 * 1100) + 0,1 * 27600 = 18930 mln. soum.

3 variant – (13700 * 2500) + 0,1 * 19700 = 36220 mln. soum.

Conclusion: The most efficient option of the proposed projects is option 1st variant the lowest expenses presented.

Table 4

Information needed to select innovative technologies

Indicators	Variants		
	1	2	3
Investments, mln. soum	22500	27600	19700
Production costs for one product are one thousand soum.	13600	14700	13700
Annual production capacity, thousand units	700	1100	2500

Particular attention is paid to the description of the expected results and the assessment of the scientific potential of the executors. The form in which they are presented should provide for the examination of the results.

Completion of project work is formalized by a termination act (interim, annual stage, etc.).

The submitted projects will be subjected to a multi-stage independent examination, which will result in a decision on the amount of funding for the project.

The analysis of this formula requires that the factors of feedback between its various elements, as well as the duration of the FR –O cycle, which can last more than 10 years, be ignored. However, each of the phases shown (FR -AT; L-Q) is sufficiently independent.

FR (theoretical research) serves as the initial stage of the innovation process, and this is related to the concept of scientific activity. Of course, each individual element of the cycle (FR, AT, I, L, Q, O and SI) is filled with FR -related scientific activity.

From FR till SI It is desirable that the amount of new information and information decreases. Research activities are often replaced by skills, experience, and standard methods.

When considering FR in terms of the end product, only research activities aimed at obtaining and processing new, original, validated data and information relevant to the problem area should be distinguished.

Theoretical (FR) research is not directly related to solving specific practical problems. However, it is the foundation of the innovation process. However, the need for theoretical research may also be highlighted by a synthesis of practical needs and initial knowledge of the subject.

Fundamental research usually finds its proof in applied research, but it doesn't happen all at once. Development can be done as follows (Figure 3):

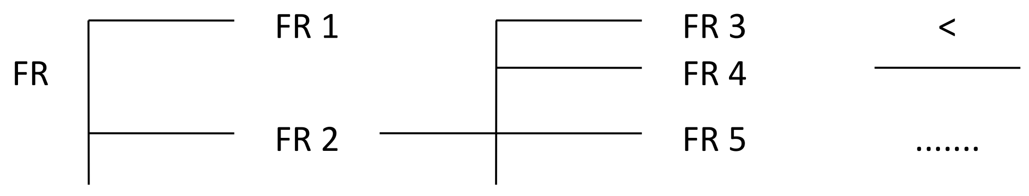

Figure 3 The development of FR

Only some of the fundamental research turns to AT – I – L and so on. Approximately 90 percent of fundamental studies have a negative outcome, and not all of the remaining 10 percent have a positive outcome. The goal of fundamental research is to understand and develop the process. Applied research (AR) has a completely different direction. It is the "packing of knowledge", the transfer of new products, technological schemes, etc. As a result of the development, new machine and equipment structures are created, which gradually move to the design (P), construction (C), development (D) and industrial production (IP) phases. (M - S) phases are related to the commercial implementation of the results of the innovation process.

The following are descriptive for innovation management (Figure 4)

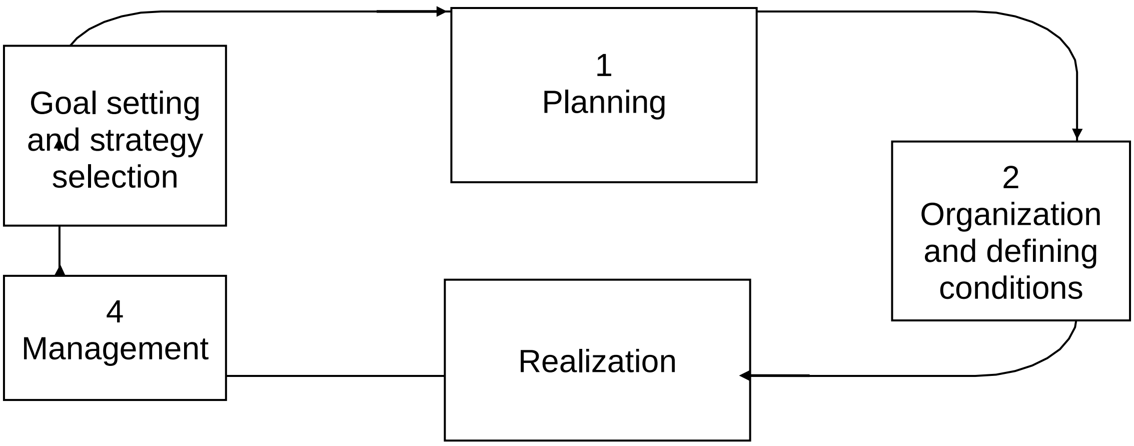

Figure 4. Innovative management structure

Innovation management is a relatively new concept for the Uzbek scientific community and business community. Right now, Uzbekistan is in dire need of innovation. In this context, it is advisable to encourage all business entities, from government agencies to individual entrepreneurs, to engage in innovative activities.

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