ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW
ISSN: 2319-2836
IMPACT FACTOR: 8.071
Vol 13, Issue 06, 2024

ECONOMETRIC MODELING OF INVESTMENT ASSESSMENT ON INVESTMENT CAPACITY DISTRIBUTION BY KEY CAPITAL

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Abstract. The importance of attracting investments into the economy and their effective utilization to ensure the production of new technologies and technologies in the world economy, the role of the international market, the production of competitive and high-quality products. In this regard, the article deals with models of econometric modeling, investment efficiency, exposure and risk assessment models using the theory of uncertain investment in capital investment estimation.
Purpose - Development of theoretical-methodological and practical recommendations and recommendations on improving methodology of econometric modeling of intersectoral distribution of investments in the economy of Uzbekistan.
Design/methodology/approach - The equation models for the assessment of the research used statistical data on the volume and distribution of investment allocated to the economic sectors of the Republic of Uzbekistan.
Findings – An analysis of the allocation of investments based on the theory of unconventional collections and its application in practice leads to the reliability of the decision making.
Originality/value - The relevance of the approaches and methods used in the research is determined by the validity of econometric and mathematical methods, the reliability of statistical data based on the data of the State Statistics Committee of the Republic of Uzbekistan and other officially published data, and the relevant conclusions.
Keywords investment, interest rate, division, theory of indefinite cumulative, chargeability function, econometric model
Paper type Research paper

Introduction

The ultimate goal of the long-term strategic goal of economic development of the Republic of Uzbekistan was to start with the first days of independence. Structural changes aimed at strengthening Uzbekistan's competitiveness and strengthening its position on the world market, as well as the policy of accelerated development of modern industries and industries, based on high technologies, should be the main priority.

It is important to boost the economy, attract investments to build or renovate existing ones, equipped with modern technology and technology. This, in turn, will allow addressing the most important social problems, such as the development of the economy, the employment of the population, the increase in wages and incomes.

Without investing, especially in the key sectors of the economy, it is impossible to implement and modernize structural transformations in the economy, re-equip enterprises with modern techniques,

ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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IMPACT FACTOR: 8.071
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and establish competitive production. Investment in the country's economy will be accelerated by expanding its economic opportunities, securing the country's economic power through the use of internal resources and resources in all sectors, the development of new techniques and technologies, export-oriented products, and their production.

Investing is a major factor in the development of the economy and the investment process is the key to the restructuring of the economy, and research and development is underway to develop and improve the industry.

Investing in each country, including the Republic of Uzbekistan, is primarily through the development and planning of investment projects and their submission to investors. It should be noted that the right decision making in the distribution and redistribution of investments is based on the analysis of the relationship between expected earnings and risks. Therefore, it is important to take into account that the nature of the investments is related to the various risks and expected returns. Investing profitability depends on their sources and their proper distribution and direction. Consequently, there is a constant link between the reliability of capital resources and the proper investment of funds.

Efficient use of investment in the development of the economy is directly related to the efficient organization of investment and economic division of the economy, with the exception of labor productivity, material and technical use and rational use of local raw materials. Nowadays investments are being made taking into account the income gained from more investments. This, in some cases, leads to the limited capacity to fully utilize the production process as a result of unnecessary cost savings or uncertainty about the risks involved in investing.

To eliminate this problem, it is necessary to study deeply the processes of investment and use, to analyze the factors affecting it econometric and economical-mathematical methods, and to analyze the economic division of investments and the correct orientation (it is necessary to create a system of adequate models that can generate more income than other industries.

Literature review

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In the CIS countries R.B.Karasheva (2016) provides a dynamic programming approach in the optimal distribution of investment, the advantages of dynamic programming and optimal allocation of investment, VA Gorin provides the analysis of the capital-labor level in investment in the Russian economy, sources of investment activity, methods, forms, methods of their optimization, conditions for attraction of foreign investments NGGuskova, IK.Kravovskaya, Yu.Yu.Slushkina, V.Makolev

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(2006), There are, of investment projects aimed at economic analysis of problems, the main methods of economic evaluation of the effectiveness of capital investments, financing of investment projects and business risk assessments and practical aspects of Vasyuxin O.V., Pavlova EA (2013).

Improvement of the investment climate in the Republic of Uzbekistan, ways and methods of their effective utilization and modeling of these processes were presented by S.S.G'ulomov (2007), B.Yu.Khodiev (2006), Sh.Shodiev (1998), B.B.Berkinov, (2006), Y. Abdullaev (1987), R.H.Alimov (2014), B.Talimov (1995), N.M.Makhmudov (2012), D.M.Rasulev (2006) as well as in the works of scientists.

The models offered by these scientists do not take into account the uncertainty, risk and risk limits for investment and the modernization conditions of enterprises and companies. The proposed econometric and economic-mathematical modeling model, combined with the abovementioned facts, is a scientifically-practical development of the current state of the national economy and development perspective directions, considering the conditions of modernization and technical and technological re-equipment of enterprises.

Hypotheses

Investing in economic sectors and the need for more efficient use. Efficient use of investment in uncertainty depends primarily on the correct allocation and orientation of the economy to the economy.

Increasing the efficiency of investments is, in a certain sense, based on probabilities. However, if we take into account the probability theory [0, 1] and reduce the extent of coverage, this reduces the accuracy.

H1. As a result, it is desirable to incorporate the theory of indefinite bundles into the investment division process, which, in turn, will result in an inefficient investment or a reduction in deficit as a result of over-investing investments.

The theory of indefinite bundles extends the range [0; 1] in the probability theory. Also, intermediate values are not allowed in the normal set, except for an ambiguous set.

Since 1965, the theory of ambiguous collections has been widely used in many fields and in many subjects, including artificial intelligence, computer science, medicine, control technology, decision making, logic, science science, operations research, sampling, robotics, It can be seen that this uncertain collector theory can also be used for the distribution and utilization of investment in economic sectors. In this sense, it is desirable to have full knowledge of the theory of indefinite collections. For this reason, the basic concepts of the theory of indefinite bundles require the following:

An ambiguous kit is a set of elements distinguished by the length of the classification categories. This collection is characterized by the categorization function, and defines the boundaries of each object from scratch (Zadeh, 1965). This, in turn, requires consideration of what the clicable function is. According to him, $Y \subset X$ For a simple set of functions, the following function looks like this:

$$\mu_Y(x) = \begin{cases} 0, & x \in Y \\ 1, & x \notin Y \end{cases} \quad (1)$$

and values only 0 and 1 as values.

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ISSN: 2319-2836
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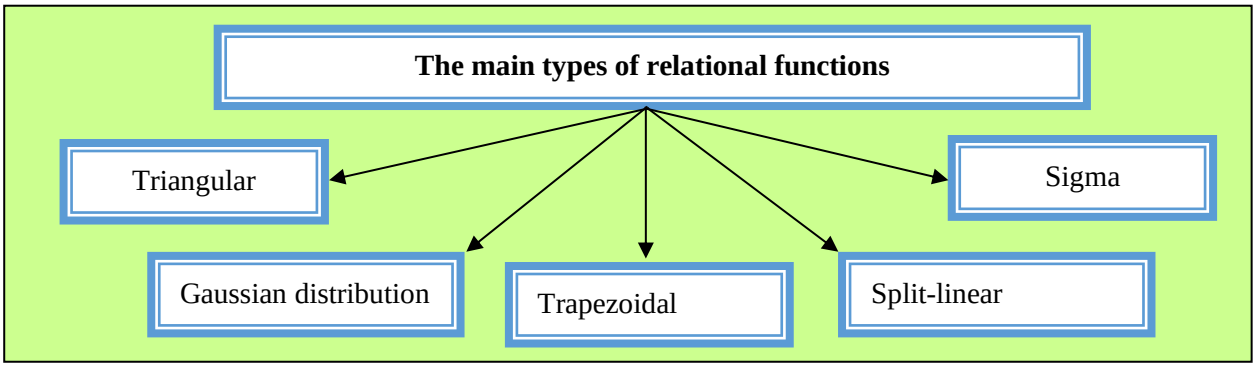
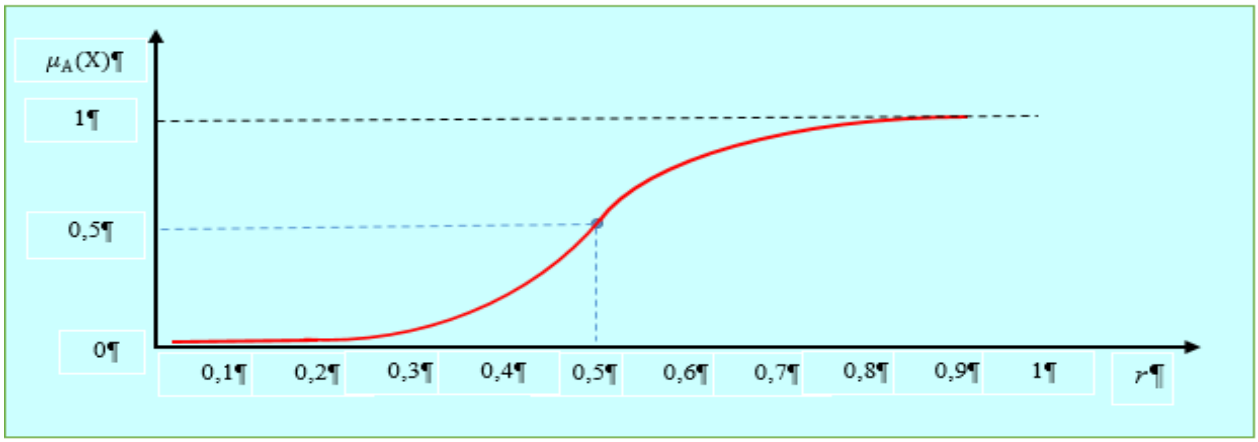
Mathematical function as a function of dependency $\mu_A(X)$ and then the X set of elements belongs to the unknown set A given. The more precisely the argument X matches the uncertain set, $\mu_A(X)$ the value is so large that the value of argument is about 1 (Zadeh, 1965). There are several types of coupling functions (Figure 1).



Picture 1. Basic types of conformity functions

According to the data in Figure 1, there are 5 types of crankcase functions, which focus on the types of triangular and trapezoidal species. For practical calculations it is convenient to work with special types: triangular and trapezoidal numbers.

If we introduce the function of the given chargeability to the investment process, the classic investment function I = I (r) determines the decrease in the interest rate. This, in turn, reflects the high interest rate by the categorization function as shown in Figure 2.



Picture 2. The chargeability function for the "high interest rate" variable

Figure 2 shows the function for the "high interest rate" variable, where the interest rate values for the X-axis of the decart coordinate system are given, and for the Y-axis the corresponding function values for the "high percent" package are given. 16% and higher rates of interest rates are recognized

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by experts as a high interest rate, so the attribute function returns 1, which corresponds to the actual percentage of the percentage of interest "high interest".

The value of the function of the assignment of 0 to 7% (0.07%) (ie, the lower interest rate) of the interest is zero. The range of functions ranging from 7 to 16 percent (0.16) increases monotonous, while increasing the reliability of the aforementioned with a 16 percent yield. Of course, there are specific advantages and disadvantages of investing in introducing the theory of indeterminate collections into inter-sectoral distribution models, as well as some other collections (Table 3).

Table 3

The advantages and disadvantages of using unmatched collections

T/P	Advantages	The disadvantage
1.	Provides an opportunity to evaluate the investment distribution based on the entire set of calculation.	Presence of subjectiveity in the choice of the function of function and formation of rules of uncertainty.
2.	The expected efficiency of the investment is not the point index, but it reflects the range of its expected division value and indicates an uncertain number of functionality.	Insufficient accountability of financial institutions and lack of direct quantitative parameters on investment distribution and lack of information on the method.
3.	Analyze qualitative variables, carry out operations on unaccounted access data, work with linguistic criteria, quickly simulate complex dynamic systems, and compare them at a given level of accuracy.	The absence of special software in the definition of the investment allocation, and the lack of qualified specialists who know how to work with them.

Apart from the information provided in this table, it also provides an opportunity to apply the theory of indefinite bundles to models of inter-sectoral distribution of investments, to eliminate deficiencies and limitations of existing methods. "Despite the shortcomings and limitations of this method, this method has been recognized as a promising method for most of the major companies (Motorola, General Electric, Otis Elevator, Pacific Gas & Electric, Ford) (Chan, 1996) The method of ambiguous summons leads to the fact that it does not refuse to use statistical methods and that it is an effective method of analysis when other methods are not available.

It is recommended to use experts in the evaluation of linguistic indicators in the theory of incomplete collections. "Linguistic indicators are the words or sentences of natural or artificial language." (Zade, 1976). From this definition, it is possible to say that mathematical variables are indistinguishable from the language, which means that they are difficult to give a precise objective estimation (Fig 4).

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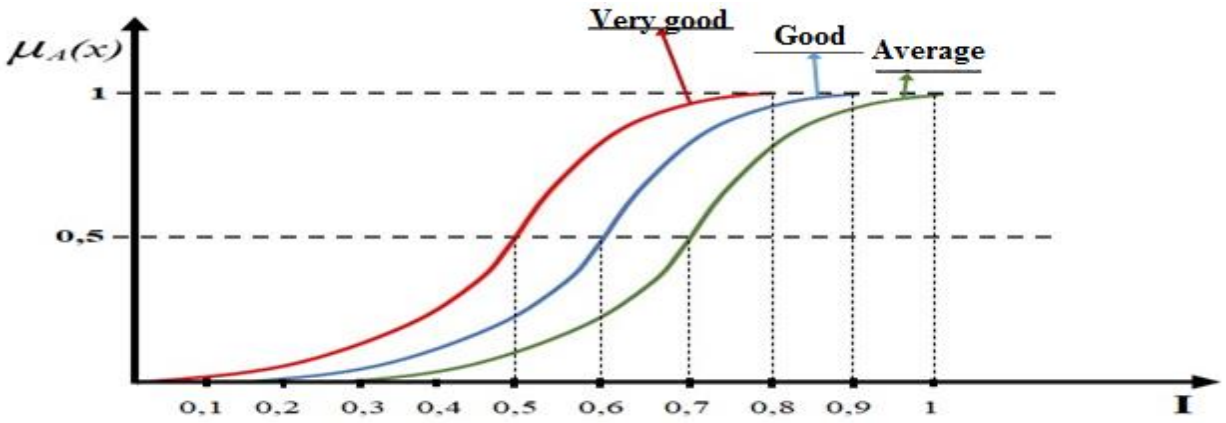

Fig 4. The inherent function of the distribution of investment distribution

Based on the topic of the research, it is envisaged to use the theory of indefinite collections to study and investigate the cases of "Very bad", "Bad", "Average", "Good" and "Very good" in the intersectoral distribution of investments. .

Each of these values is an ambiguous variable. If X is an ambiguous variable, then the constraint associated with that name can be interpreted as meaning X. Thus, if the boundary arising from the indefinite variables is "very good," then the unclear set of the set U = [0, 1], then this ambiguous set may be considered linguistic. An important aspect of the changing concept of linguistic is that the variable variable of this variable is higher than the ambiguous variable, because linguistic change is variable.

If we continue to work on both sides of the "Very good", "Good," and "Average" positions in Figure 4, there are trapezoidal and rectangular unbalanced bundles in the respective types of responsibilities (Fig 5).

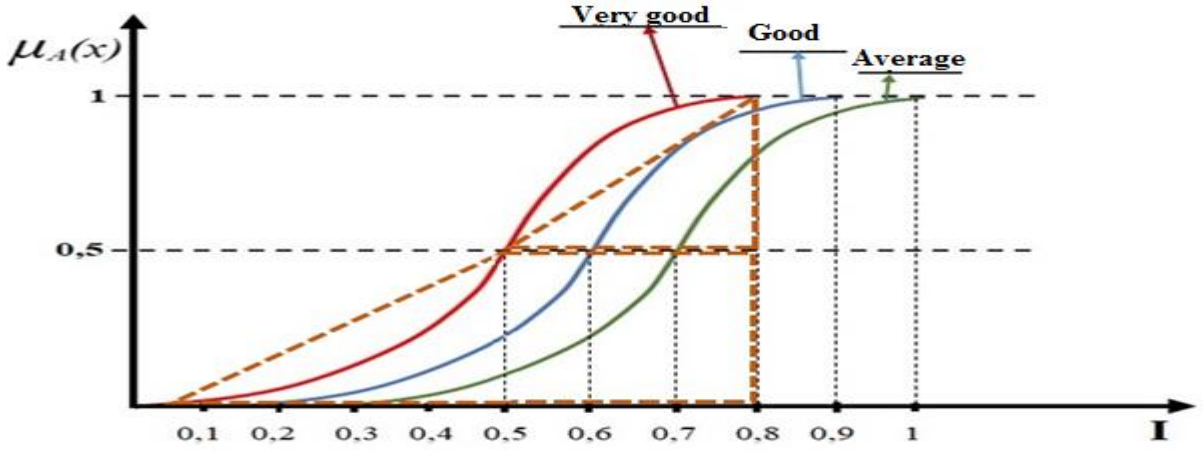

Fig 5. Trapezoidal and triangular numbers

4 and 5 summarize the images. If we look at it, the shape of the triangle and trapezoid is formed. It should be noted that the surfaces of these geometric shapes represent the state of the investment division. Of course, it is necessary to calculate the differences between the curves and the trapezoid

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and the triangle. Then the surface is fully reflected and the result is clear. This surface is determined by the following formula:

$$S_{Cases} = \int_a^b \frac{(1+\left(\frac{I_i - I_{i+1}}{0.1}\right)^{-2})^{-1}}{I_i}, \quad i \in U, \tag{2}$$

Here: S_{Cases}- a unit of surface defined in each case;
a, b, lower and upper boundaries;
I_i *and* I_{i+1}- $i \in U$ unknown numbers.

This is the result of the calculations made in accordance with (2) $S_{\text{Very good}} = 0{,}47$; $S_{\text{Good}} = 0{,}57$ *and* $S_{\text{Average}} = 0{,}69$ the surface was equal to the unit.

H2. If the unit defined in the investment division is $S_{surface} \leq 1$, the distribution is so good.

Method

Based on the above-mentioned theories of inaccuracies, it is necessary to distinguish the distribution according to certain conditions on the basis of the intersectoral distribution of investments. It should be noted that the expertise of investment projects based on unclear collections is recommended by experts. However, based on the results of research, it can be said that the linguistic variables can be expressed in quantitative values by using statistical information in the inter-sectoral distribution of investments.

In order to assess the distribution of investments into sectors of the economy, it is necessary to first determine the trend of the investment in the sectors of the economy and the change in the volume of GDP of the country.

In the characteristic dynamics of the change in the volume of investment and gross domestic product, it is possible to level the dynamic range of their value to determine the average annual increment of their value and study their theoretical level. In practice, the most common methods for statistical study of trends are: expansion of interval range; slippery mean; analytical leveling.

It is necessary to calculate moving (slippery) meanings of experimental (initial) data before determining the general tendency in the phenomenon and processes using the dynamics line grinding method. It is possible to straighten out the dynamic line of investment in the sectors of economy and changes in the volume of GDP of the country, using the records. Here, we use a three-member sliding scale.

$$\overline{y_i} = \frac{y_{i-1} + y_i + y_{i+1}}{3} \tag{3}$$

One of the most important ways to identify trends in dynamics is the analytical classification. The main purpose of this approach is the developmental trend ($\overline{Y_t}$) function. Theoretical provisions (Y_{t1}) Calculations are made on the basis of mathematical functions. Selecting the appropriate function is done using the least squares method. The essence of this method is that of the actual level (Y) flattened ($\overline{Y_t}$) even if the range is at least $(\overline{Y_t} - Y) = min$ should be different. The essence of the model is that it is used as a criterion for assessing the theoretical and realistic conformity of the trend.

One of the most challenging and important things to do in the analytical classification is to choose the kind of mathematical function that calculates the trend levels. The conclusions about the

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laws and phenomena investigated depend on how the function is selected. One of the conditions to apply the analytical method of validation is to know the types of events and processes and their main distinguishing features. For this purpose it is necessary to select higher equations (adequately representing the process), since the linear, in most cases, the linear equation is more likely to be more precise than other equations such as quadratic equations or other equations.

Based on the models developed, the probability of a continuous random variable of X is obtained by zero (Gmurman, 1979) using the calculated values (calculated investment and GDP volumes) and actual differences between the volume of investments into the economy and the gross domestic product of the country they should be grouped on the same basis as in Table 6.

Table 6

Grouping of investment division based on ambiguous bundles

T/P	Gross Domestic Product	Investment in fixed capital	Setting by status
1	$GDP_{\text{ҳис}} - GDP_{\text{ҳақ}} < 0$	$I_{\text{ҳис}} - I_{\text{ҳақ}} > 0$	Y- very bad
2.	$GDP_{\text{ҳис}} - GDP_{\text{ҳақ}} < 0$	$I_{\text{ҳис}} - I_{\text{ҳақ}} < 0$	M- bad
3.	$GDP_{\text{ҳис}} - GDP_{\text{ҳақ}} > 0$	$I_{\text{ҳис}} - I_{\text{ҳақ}} = 0$	N- average
4.	$GDP_{\text{ҳис}} - GDP_{\text{ҳақ}} > 0$	$I_{\text{ҳис}} - I_{\text{ҳақ}} > 0$	Z- good
5.	$GDP_{\text{ҳис}} - GDP_{\text{ҳақ}} > 0$	$I_{\text{ҳис}} - I_{\text{ҳақ}} < 0$	X- very good

If the figures presented in the table are to be explained, $GDP_{\text{ҳис}}$ – gross domestic product, calculated on the basis of the model, $GDP_{\text{ҳақ}}$- genuine gross domestic product. $I_{\text{ҳис}}$- the volume of investment calculated on the basis of the model defined and $I_{\text{ҳақ}}$- actually represents the amount of investment in fixed capital. This distribution is distributed according to the feature of the division 3. According to him, "If the probable values of a random quantity (a, b) belong to the interval, then: 1) $x \le a$ too $F(x)=0$; 2) $x \ge b$ too $F(x)=1$.

Proof: 1) $x \le a$ 1 let it be. In that case $X<x_1$ an event that is not possible (because, in fact, X does not accept values smaller than x1), hence, its probability is zero.

2) $x_2 \ge b_2$ let it be. In that case $X<x_2$ the event is inevitable (because all the possible values of X) x_2 less than), that is, its probability is equal (Gmurman, 1979). The distribution of the investment is distributed to the groups referred to in Table 6 by the [0; 1] interval. It is necessary to define a 5-point scale of good quality assessment of these values distribution (Table 7).

Table 7

5-point scale of qualitative valuation of investment processes

Ball	Very bad	Bad	Average	Good	Very good
Rating	(0,1; 0,29)	(0,3; 0,49)	(0,5; 0,69)	(0,7; 0,89)	(0,9; 1,0)

Quality assurance of investment processes “Very bad”, “Bad”, “Average”, “Good”, “Very good” is calculated by matching each of the points on the 5-point scale by matching each trapezoidal and triangular uncertainty as in the table below (Figure 8).

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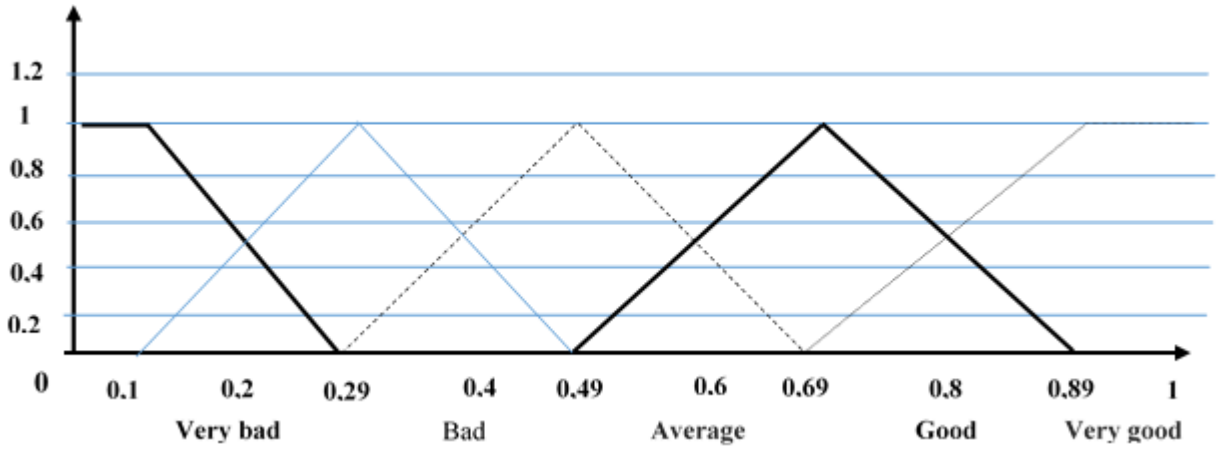

Figure 8. Scale functionality of points scale

The picture shows that the numbers are interconnected. This shows that the difference between neighborhood values is almost reduced, and the boundary of evaluation is clearly separated from one score system to another. Of course, it is impossible to fully evaluate the process by grouping the inter-sectoral division of investments into these cases. Therefore, you must create a datasheet. For this purpose, an empirical body is formed, based on the set of scores:

$$F = \begin{cases} 0{,}1 \le x \le 0{,}29 \; when, & Y \\ 0{,}3 \le x \le 0{,}49 \; when, & M \\ 0{,}5 \le x \le 0{,}69 \; when, & N \\ 0{,}7 \le x \le 0{,}89 \; when, & Z \\ 0{,}9 \le x \le 1 \; when, & X \end{cases} \quad (4)$$

By means of an empirical function it is necessary to use the conditional features and calculate the share of the total set in each case from the ambiguous set (Y, M, N, Z, X ∈U).

Common method bias test The theory of ambiguous collections is a new approach to expressing business processes in which there is uncertainty, even denying and compelling certain quantitative methods and approaches. In this sense, it is possible to predict the linguistic variables in the analysis process as the major differences in the theory of an ambiguous collection.

The parameters of an investment process $X_1, X_2, ..., X_n$ weighted values or probability values, which are evaluated by uncertain numbers - $P_1, P_2, ..., P_n$, $P_i \ge 0$, $\sum_{i=1}^{n} P_i = 1$ overall investment effectiveness $q_i = \sum_{i=1}^{n} P_i \cdot X_i$ of the mineral. The values of the indicators $X_i = (x_{i1}, x_{i2}, x_{i3}, x_{i4})$, $i = 1,2,...,n$ If trapezoidal numbers are indefinite, then the effectiveness of investment in economic sectors - E, тpredicament - R and risk – I, The following are

$$E = Ya_1 + 2Ma_2 + 2Za_3 + Xa_4 \quad (5)$$

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$$R = \frac{(X-Y)^2+2(X-Y)(Z-M)^2+3(Z-X)^2}{Ya_1+2Ma_2+2Za_3+Xa_4} \quad (6)$$

$$I = \frac{1}{4}\sqrt{R\frac{(X-Y)^2+2(X-Y)(Z-M)^2+3(Z-X)^2}{Ya_1+2Ma_2+2Za_3+Xa_4}} \quad (7)$$

can be determined by the formula system.

Here: Y-very bad, M-bad, Z-good and X-very good circumstances;

a_1, a_2, a_3 *and* a_4 The values of the unclear set are case sensitive.

The use of trapezoidal numbers is due to the four cases in the study, ie, the distribution of investments in very bad, bad, good and very good. If the ultimate expected effectiveness of a joint investment fund is determined, it is projected as the sum of the expected average of efficiency expected from investment in production from each sector of the economy. This, in turn, plays an important role in the utilization of uncertain collections from investment allocations, which, if proved to be an explicit value of the lower and upper limits, and the consideration of interim quantities, is scientifically justified in making decisions.

The intersectoral distribution of investments was made using linear and logarithmic normal distribution in order to achieve accuracy in the research. Under normal distribution law (partially or "officially distributed"), $X_1, X_2, \ldots, X_n$ a system of random variable that is arranged; is a linear function of random variables,

$$Y = \sum_{i=1}^{n} a_i X_i + b \quad (8)$$

Y- linear function of the normal distribution function. Indeed, given the fact that several random variables, which are normally distributed, have a normal distribution value, Y is a sum of linear functions and is normally distributed X dependent on the argument and, as mentioned above, such a linear function is normally distributed.

Y- we will continue to find the linear function parameters. For this purpose, the distribution center is the standard of deviation and standard deviation (mean square difference) according to the theorem on mathematical representation and linear function dispersion.:

$$m_y = \sum_{i=1}^{n} a_i\, m_{x_i} + b, \quad (9)$$

$$\sigma_y^2 = \sum_{i=1}^{n} a_i^2 \sigma_{x_i}^2 + 2\sum_{i<j} a_i a_j r_{ij} \sigma_{x_i} \sigma_{x_j}\,, \quad (10)$$

Here: $r_{ij} - X_i$ and X_j correlation of values.

If $X_1, X_2, \ldots, X_n$ If the values are not related (regardless of the normal distribution law), the formula (2.10) is as follows:

$$\sigma_y^2 = \sum_{i=1}^{n} a_i^2 \sigma_{x_i}^2 \quad (11)$$

The mean square (square brackets) of the formula (10) and (11) can be changed proportionally to the probability.

Generally, distribution laws of the random variable introduced into formula (8) are not well known, but their quantitative characteristics are known, namely, mathematical representation and dispersion. If $X_1, X_2, \ldots, X_n$ As a rule, the value is greater than one at a time and the number is large enough, X_i - regardless of the form of quantitative distribution laws Y - the linear function approaches the normal distribution law.

ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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Generally, there is a requirement of 5 to 10 in the form (8) to obtain the law of distribution which is normally acceptable in practice. It should be noted that one of the indicators of the formula (8) does not apply when the disaster is greater than others, but it is assumed that random numbers in formula (8) have approximately the same order. If these conditions (9) and (10) are fulfilled for the normal amount of laws with the variables defined by the formula, the assumption is accepted. This, in turn, implies that this linear function is subordinate to the normal distribution law and that when all the above statements are true according to the divisional law, this function is not linear, but linear.

The logarithmic distribution of the random variable with the normal distribution is normally distributed according to the law. This distribution means the distribution of positive values compared to traditional distribution. This law is important to describe the inter-sectoral allocation of investments.

The logarithmic conventional distribution is very useful for the uncertain set of variables, as the traditional allocation is the sum of the random variables, and the uncertain collection is a large number of variables. The logarithmic conventional distribution is a two-parameter distribution with a density of distribution. If the distribution x is represented by an indefinite value then the distribution density is expressed in the formula:

$$f_U(x) = \frac{e^{\frac{-(lnx-\mu)^2}{2\sigma^2}}}{x\sigma\sqrt{2\pi}} \tag{12}$$

Here: x>0, s>0, m∈U

This means that *x* is a logarithmic normal distribution with the parameters *m* and *s*. It should be noted that, given the importance of the time interval in the allocation of investments, it is desirable to sum up the logarithmic normal distribution moment formula. The logic of the *k*-moment formula of the variable normal variable *x* is as follows::

$$M[x^k] = e^{k\mu+\frac{k^2\sigma^2}{2}}, \qquad k \in N \tag{13}$$

The formula for computing mathematical calculus and dispersion in the logarithmic normal distribution using the above arguments and considerations and formulas is as follows:

$$E[x] = e^{\mu+\frac{\sigma^2}{2}} \tag{14}$$

$$D[x] = \left(e^{\sigma^2} - 1\right) \cdot e^{2\mu+\sigma^2} \tag{15}$$

N- the average momentum of the normal logarithmic normal distribution can be determined by the following simple formula::

$$a_n = e^{(\mu,n)+\frac{1}{2}(n,\sum m)}, \tag{16}$$

here m and Σ - multidimensional common distribution parameters;

n vector of momentum components. (For example, n=(2,0) - the second centralized moment of the first two-dimensional component, n=(1,1)[1] - mixed second moment.

In the same sense, based on the requirements of econometric modeling of division laws, it is necessary to take a mathematical-statistical approach to analyze the distribution of investment in the country's economic sectors, taking into account that the number of observations can not be less than 30 (based on the central limit theorem).

[1] Brackets represent a scalar index.

ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
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For this purpose, first of all, because of the fact that in the same period, the real value added to the sectors was recorded and they are multidimensional, at the same time the distribution of sectors at the same time is very bad, bad, medium and good, very good (hereinafter referred to as defined) the average arithmetic for years was calculated as follows:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad (17)$$

The next step is to calculate the average square deviation (standard deviation) according to which the standard deviation is a classical indicator characterizing statistical variables. This tool will help you see how the display value changes over time. The average quadratic differences (disadvantages) representing a change in the number of signals considered are as follows:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}} \qquad (18)$$

It should be noted that when the number of observations is n <30, the calculation is performed with n, if n> 30 is carried out in n-1. Variation coefficient on the average square value using the calculated value:

$$V_\sigma = \frac{\sigma}{\bar{x}} \cdot 100\% . \qquad (19)$$

is determined. The variation coefficient, in contrast to the difference and standard deviation, is a relative measure and therefore allows comparing the risk and returns of investments into two or more networks that can be significantly differentiable. In other words, this indicator attaches to the expected return on investment yields, which allows identifying the risks and reimbursement rates in relative comparable conditions.

Variation - X (investment volumes in the research period). Option $x_1, x_2, ..., x_n$ the actual expression of the variable amount and the variation coefficient (V)-X is a relative indicator representing the change in the sign, expressed in percentages.

Variable range for determining optimal width of linear spaces $x_1, x_2, ..., x_n$ (R), ie the difference in extreme values is determined by the ratio of optimal interval values:

$$i = \frac{X_{max} - X_{min}}{n} \text{ бу ерда } n = 1 + 3{,}22 * lgN \approx 1 + 5{,}31 \approx 6{,}31 \qquad (20)$$

which represents the value of the Sterjess (Sturges, 1926). Stercess rule is the rule of thumb for determining the optimal number of intervals. This is an empirical rule to determine the optimal number of intervals, and the intensity of its distribution determines the observable intervals of the random variable when creating the histogram.

For example, based on the statistical data included in the fixed capital of the Republic of Uzbekistan for 2000-2017, the implementation of calculations based on the selected mathematical-statistical models yielded the following results:

$$X_{max} = 60719{,}2;\ X_{min} = 745{,}0; i = \frac{60719{,}2 - 745{,}0}{5} = 1512{,}6$$

Case 1: $171{,}4 - 2707$ Includes 9 compartments in the range;

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ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
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Case 2: $2707 - 5241$ Includes 3 compartments in the range;
Case 3: $5241 - 7775$ Includes 2 compartments in the range;
Case 4: $7775 - 10309$ Includes 3 compartments in the range;
Case 5: $10309 - 12843$ Includes 1 compartments in the range;

It should be noted that, based on the calculation of the distribution of the investment, it is necessary to define a group of interval intervals by the frequency of oscillations to achieve the desired objective of the research, which is calculated by the following formula:

$$V = \frac{\sum_{i=1}^{n} x_n}{N} * 100 \quad (21)$$

According to him,
Case 1 is 2000-2008 - 50,0%;
Case 2. 2009-2011 - 16.7%;
Case 3 2012-2013 - 11.1%;
Case 4 2014-2016 - 16.7%;
5th position in 2017 - 5.6%.

These calculations show that investment in the main capitals of the Republic of Uzbekistan is characterized by the highest level of investment in 2000-2008, ie as of the 1st case. The remaining 50% of the investment can be divided into 2-5 cases. However, this information does not allow conclusion on the outcome and make the right decision on scientific basis. Therefore, it is necessary to define the norms of investment allocation, which should be individually determined by these circumstances.

An algorithmic program for the analysis of the sectoral distribution of investment in the EXSEL program of computer technology has been developed using mathematical and statistical models to improve productivity and operational accuracy. In order to use the developed algorithmic program, first of all, the statistical indices of the objects selected during the same period are determined and placed in the EXSEL program and determined on the last column of the average arithmetic.

Results

Using the above-mentioned method, it is possible to estimate the state of investment in fixed capital of the Republic of Uzbekistan. For this purpose, first of all, the dynamics of investment in fixed capital during 2000-2017 and its changes: R^2=0.9657, when

$$Y_{\text{Асос.кап.инв.}} = 0{,}0311x^4 + 7{,}3082x^3 + 39{,}909x^2 - 114{,}47x + 1096{,}5; \quad (22)$$

Here: $Y_{\text{Асос.кап.инв.}}$-investment in fixed capital;
x- time.

calculated by the regression equation and their differences are similar to that of the Republic of Uzbekistan, which reflects the actual volume of gross domestic product (GDP) 2000-2017 R^2=0.9748, when

$$Y_{\text{ЯИМ}} = 31{,}511x^3 + 152{,}52x^2 - 119{,}88x + 4427{,}9 \quad (23);$$

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ISSN: 2319-2836
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Here: $Y_{ЯИМ}$ - total gross domestic product;

x- time.

the calculated values of the model are taken into account and grouped according to the limit values using the calculated mean values. It's set to your destination

$$\begin{cases} E > 0,\ H < 0 \text{ if, } X \\ E < 0,\ H < 0 \text{ if, } M \\ E > 0,\ H > 0 \text{ if, } Z \\ E > 0,\ H = 0 \text{ if, } N \\ E < 0,\ H > 0 \text{ if, } Y \end{cases}$$ - on terms and conditions.

Here Y-very bad, M-bad, N-avarege, Z-good and X-very good states. In order to ensure the accuracy of calculations for each of the specified models and models and the added econometric models' addictiveness, activities were implemented at EXCEL at the same time. Under the above conditions

IF(AND(D3-C3)>0; F3-E3<0); “X”; IF(AND(D3-C3>0; F3-E3=0); “N”; IF(AND(D3-C3<0; F3-E3>0); “Y”; IF(AND(D3-C3>0; F3-E3>0); “Z”; IF(AND(D3-C3<0; F3-E3<0; “M”; “ERROR)))))

Using the model algorithm, it allows scientifically-based quality indicators to be quantitative without expert conclusions. as well as a general data map for each case with a column of 10 columns. An investment dividend general card consists of calculated values using the following algorithmic software:

1 indicates the five cases defined by the quality characteristics Y-very bad, M-bad, N-avarege, Z-good and X-very good states.

Column 2 indicates the number of years (number of surveys), allowing you to switch to quantity indicators based on the quality criteria. It is calculated by the algorithm [= SCHYOTESLI ($ G $ 3: $ G $ 22; H7)], and the values of each case (the number of observed observations) are determined.

It is important to understand that the main purpose of econometric analysis is to examine quantitative intergenital endogenous and exogenous links, quantitative laws, and trends in quantitative terms. It should be noted that the quality indicators within the scope of the subject are usually expressed in the form of points that can be made by one or more experts. Subsequently, the score will be transferred to the digital scale. The numbers obtained by different project parameters will then be combined into a single digit, which will be used for overall project design.

This research allows you to easily switch from quality to index based on scientific results, not expert opinions.

Column 3:[= $\frac{СЧЁТЕСЛИ(\$G\$3:\$G\$22;H7)}{СУММ(J7:J11)}$] the algorithm for each case is determined by the percentage of total observations and the growth rate in column 4.

Column 5 is a summary of the sum of the GHG emissions for the selected year-by-year situation with the following algorithm: [= G $ 3 G $ 3: $ G $ 22; H7; $ C $ 3: $ C $ 23] Determines the size of the product.

Column 6 [= $\frac{СУММЕСЛИ(\$G\$3:\$G\$22;H7;C3:C23)}{СУММ(M7:M11)}$] algorithm, and percentage increase in column 7.

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ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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Column 8 calculates the sum of the equity investments divided by the sum of the [= SUMMESLI ($G$3:$G$23;H7;E3:E23)] alignment, and column 9 determines the percentage of each state.

10 Determine the Effectiveness of Using Direct Investments. It should be noted that the high level of capacity does not indicate the high probability of the event, but if it does not happen, then it is unlikely. Therefore, in the framework of the theory of probability, the exact number of 0 through 1 in each E $Pos(E)$ – the possibility of an event is compared. Opportunities Theory provides tools for evaluating uncertain boundary conditions.

Another advantage of the developed algorithmic program is that it simultaneously reflects not only the distribution of inputs (9th column), but also the percentages of the product output (6th column). This, in turn, plays an important role in the development of investment programs and conclusions on investment division and investment efficiency. Using the algorithmic program, the table below shows the investment allocation table included in the fixed capital of the Republic of Uzbekistan.

Source: author's work on the basis of the data from the State Statistics Committee of the Republic of Uzbekistan.

Table 9 sets out the cost values based on the economics of GDP and the econometric model of the volumes of investment in the economy. Secondly, the differences between the model values determined by the actual values are determined. Thirdly, the value of each of the two products, ie production volumes and the amount of invested inputs, is calculated on the basis of the five cases, and on the basis of the above conditions, they will consider the project on a 5-point scale.

Fourth, it is necessary to draw up a general information card, which should be analyzed on the basis of the conditions set in the GDP and investment allocation, the number of years of inspections, and the results, which is illustrated in Table 10.

Table 10

Shared Sharing Card

Analysis mode	Number of years of investigation			Summary of results					
	Total	%	growth %	Total, product	%	growth %	Total, I	%	Efficiency
1	2	3	4	5	6	7	8	9	10
Too bad, Y	5	28	28	385110,8	29	29	88694,3	28	4,34
It's bad, M	9	50	78	637691,7	48	78	154190,2	49	4,14
Medium, N	0	0	0	0,0	0	0	0,0	0	Not available
Good, Z	2	11	11	31445,6	2	2	6648,5	2	4,73
Very good, X	2	11	22	261713,4	20	22	64815,5	21	4,04
Total	**18**	**100**		1315961,5	**100**		314348,5	100	

Source: author's work on the basis of the data from the State Statistics Committee of the Republic of Uzbekistan.

ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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According to the data presented in the table, the volume of gross domestic product (GDP) of the Republic of Uzbekistan in 2000-2017 is worse than 5 years (2005, 2006, 2011, 2012, and 2015) compared to 29% of the total investment period. In this case, the investment in total capital over the selected period was 28%, at that time 385.1 billion soums. The gross domestic product was produced at the sum of UZS 1 billion. In the worst case scenario, the average efficiency of investment in the sector was 4.34 percent.

Nine years (2000-2001, 2001, 2002, 2003, 2004, 2008, 2009, 2013, 2014, and 2017) in 2000-2017 show that there is a poor distribution of investments, ie 50% of total investment in 2000-2017. As a result, the gross domestic product has a 48% increase in gross domestic product, with an efficiency score of 4.14%. It is noteworthy that there was no distribution across the selected periods.

Investments in fixed capital in the Republic of Uzbekistan were well-distributed in 2000 and 2007, accounting for 11% of the total number of years the surplus, while the gross domestic product made up 3,1445.6 bn. This is only 2% of the total gross domestic product. Investments in good status made up 6648.5 bn. At the same time, 2% of total investments in fixed capital over the years were observed. In this case, the effectiveness of the identified investment was 4.73%.

Very good situation was identified in 2010 and 2016. According to him, the gross domestic product made 261713.4 billion soums. It can be seen that 22% of the total GDP produced in 2000-2017 grew by 18%, or 18% respectively. In 2010 and 2016 the volume of investments into fixed capital will reach 64815.5 billion soums. At the same time, 21% of the total investment in the fixed capital was compared to 4.04%.

Using the results of the above research C_{GDP} – productivity of gross domestic product, T_{GDP} – the level of risk that may arise in increasing the investment effectiveness in the production of gross domestic product, X_{GDP} – the following calculations are made by defining standard deviation or risk level of investment efficiency included in the production of gross domestic product:

$$C_{GDP} = 4{,}34 * 0{,}1 + 2 * 4{,}16 * 0{,}2 + 2 * 4{,}73 * 0{,}3 + 4{,}04 * 0{,}4 = 6{,}5$$

$$X_{GDP} = (4{,}04 - 4{,}34)^2 + 2 * (4{,}04 - 4{,}34) * (4{,}73 - 4.16)^2 + 3 * (4{,}73 - 4{,}04)^2 / (4{,}34 * 0{,}1 + 2 * 4{,}16 * 0{,}2 + 2 * 4{,}73 * 0{,}3 + 4{,}04 * 0{,}4) = 0{,}18$$

$$T_{GDP} = \frac{1}{4}\sqrt{\sum_{i=1}^{4}(x - \bar{x})^2} = 0{,}11$$

According to the results, the overall effectiveness of investment utilization in the years 2000-2017 was 17.3%, but the overall results from the allocation of cases (without a middle ranking): investment efficiency - 6.5%, average risk level for investment in the country - 11 and the level of risk - 18%.

Discussion

It should be noted that the most important thing to do in investing is its efficiency and nobody invests in the absence of income. Investing is dependent on income and can not be done without risk. Risk is the potential deviation from expected earnings. Thus, the risk factors for investment in the

ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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country's economy are primarily related to raw materials, energy resources, climate and logistics. Factors affecting the level of risk include laws, decrees, resolutions and regulations, which should be assessed on the basis of the current situation, as it can have a material advancement and impact on people.

Analyzing the theory of uncertain collections by investing in the investment division, as well as normalizing the value of the present value, as well as the current demand, leads to a decrease in errors and results. This will help to avoid investment deficits and inefficient stagnation.

Theoretical implications

Investigating and utilizing the process, analyzing the factors influencing it on econometric and economic-mathematical methods, comparing the results of analysis with the inter-sectoral allocation of investments and the right direction (the investment oriented towards a particular sector can generate more income than other sectors) Creation of the system may result in unnecessary stagnation or the risk of investment. x tarlilik lower levels of the production process, the opportunity to work with full force.

Any econometric model developed under the conditions of globalization has a high degree of reliability in a given time and space, and can be restored with the time and the time it takes to alter its parameters. Therefore, the achievement of long-term targets will lead to a high level of effectiveness of the process of controlling short-term strategic plans.

Practical implications

The models based on the theory of indeterminate collections of proposed investments allow for the elimination of deficiencies and limitations of the available methods of estimation of qualitative indicators without quantitative indicators of experts, carrying out operations on unaccounted access data, modeling of complex dynamic systems and their accuracy, comparison of risks of investment processes . This, in turn, ensures the development of effective investment programs in the light of the current situation.

Also, improving the methodology for econometric modeling of intersectoral investment in research has identified the risks and threats to the effective use of distributed investments, the sustainable growth of the sector's operations, the achievement of global competitiveness, and the deep and comprehensive analysis of factors affecting investment efficiency, to determine the

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ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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ISSN 2319-2836 (online), Published by
ASIA PACIFIC JOURNAL OF MARKETING & MANAGEMENT REVIEW.,
under Volume: 13 Issue: 06 in June-2024
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under Volume: 13 Issue: 06 in June-2024
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