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SECTION 2. Applied mathematics. Mathematical modeling.

INVERSE MODEL OF MULTIPLE LINEAR REGRESSION ANALYSIS

Abstract: The inverse model of multiple linear regression analysis (IM MLRA) is worked up in the article. Theorem is proved about of n z -variables of multidimensional (IM MLRA)-sample. The values of n z -variables located in the n columns of matrix Z_{mn} . The rank of this matrix is equal to $n-1$. The new inverse problem of multiple linear regression analysis (IP MLRA) is solved with the use of Inverse Model of Principal Component Analysis (IM PCA[4]) statistical modeling of the n correlated z -variables satisfying IM MLRA to all equations and mathematical relations. A new inverse problem of multiple linear regression analysis (IP MLRA) of statistical modeling of n correlated z -variables ($n-1$ independent, 1 dependent) that satisfy all the equations and relations of the IM MLRA is solved. The input parameter of the MZPM is the vector $\beta = (\beta_1, \dots, \beta_{n-1})^T$ of the regression coefficients for $n-1$ independent z -variables. A theorem on n z -variables of a multidimensional sample of IM MLRA is proved with values located in n columns of the matrix Z_{mn} of rank $n-1$. Numerical algorithms have been tested using the example of modeling a multidimensional A -sample of z -variables from OM MLRA (for $n=4$). The known vector $\beta = (\beta_1, \beta_2, \beta_3)^T$ of the regression coefficients from the article [1] is used. The obtained model data are adequate for the values of given statistics of a real multidimensional sample.

Key words: inverse model of multiple linear regression analysis

Language: Russian

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ОБРАТНАЯ МОДЕЛЬ МНОЖЕСТВЕННОГО ЛИНЕЙНОГО РЕГРЕССИОННОГО АНАЛИЗА

Аннотация: В статье разработана обратная модель множественного линейного регрессионного анализа (ОМ МЛРА). С применением равенств из обратной модели главных компонент (ОМ ГК [4]) решена новая обратная задача множественного линейного регрессионного анализа (ОЗ МЛРА) статистического моделирования значений n коррелированных z -переменных, удовлетворяющих всем уравнениям и соотношениям ПМ МЛРА. При наличии разбиения множества z -переменных на 2 части: $n-1$ независимых плюс 1 зависимая z -переменная. Входным параметром ОЗ МЛРА является вектор $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии при $n-1$ независимых z -переменных. Доказана Теорема об n z -переменных многомерной выборки ОМ МЛРА. с значениями, расположенными в n столбцах матрицы Z_{mn} ранга $n-1$. Численные алгоритмы апробированы на примере моделирования многомерной A -выборки z -переменных из ОМ МЛРА (при $n=4$). Использован известный вектор $\beta = (\beta_1, \beta_2, \beta_3)^T$ регрессионных коэффициентов из статьи [1]. Полученные модельные данные адекватны по значениям заданных статистик реальной многомерной выборки.

Ключевые слова: обратная модель множественного линейного регрессионного анализа

Введение

Регрессионные модели из подмножества линейных моделей, являются одними из важных инструментов статистического анализа реальных данных. Рассмотрим регрессионную модель вида $Z_n = \beta_1 Z_1 + \beta_2 Z_2 + \dots + \beta_{n-1} Z_{n-1} + \alpha$, где Z_1, Z_2, \dots, Z_{n-1} - набор

объясняющих (независимых) переменных («регрессоров»), Z_n -переменная отклика (зависимая переменная), $\beta_1, \dots, \beta_{n-1}$ -регрессионные коэффициенты, α -свободный член. Эта модель отражает взаимосвязь между двумя или более объясняющими переменными и одной



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переменной *отклика* путем подгонки вышеприведенного линейного уравнения к стандартизованным значениям z -переменных $z_{ij}=(x^0_{ij}-x^{cp_j})/s_j$. Законы распределения одномерных случайных величин $\xi_1, \xi_2, \dots, \xi_n$, соответствующих z -переменным z_1, z_2, \dots, z_n не известны. Здесь x^0_{ij} - i -ое значение j -го признака реального объекта, $x^{cp_j}=(x^0_{1j}+\dots+x^0_{mj})/m$ - среднее арифметическое, $s^2_j=(x^2_{1j}+\dots+x^2_{mj})/m$ - стандартное отклонение, $x_{ij}=x^0_{ij}-x^{cp_j}$ - отклонение от среднего значения x^{cp_j} . Стандартизованные значения z_n изменяются относительно значений z_1, z_2, \dots, z_{n-1} с одинаковыми стандартными отклонениями, равными 1. В соответствии с этим разбиением z -переменных m значений всех n z -переменных образует 2 подматрицы Z_1, Z_2 матрицы $Z_{mn}=[Z_1 | Z_2]$ для m -на- n матрицы Z_{mn} . Элементы столбцов (с номерами $j=1, \dots, n$) матрицы Z_{mn} центрированы выборочными средними и нормированы стандартными отклонениями: $z_{ij}=(x^0_{ij}-x^{cp_j})/s_j$. Элементы $z_{ij}=(x^0_{ij}-x^{cp_j})/s_j$ матрицы стандартизованных отклонений не имеют размерности, и все ее столбцы имеют одинаковые дисперсии, равные единице. Это - одно из удобств для наших задач. Шаги при моделировании значений $z_{ij}=(x^0_{ij}-x^{cp_j})/s_j$ n z -переменных отделены от шагов при вычислении выборочных средних x^{cp_j} и дисперсий s_j^2 для реальных данных x^0_{ij} $i=1, \dots, m, j=1, \dots, n$. Векторы выборочных средних и дисперсий должны определяться из матрицы реальных данных $X^0_{mn}=\{x^0_{ij}\}$. Моделирование значений z -переменных проводится отдельно, а при преобразовании их в x^0 -переменные $x^0_{ij}=z_{ij}s_j+x^{cp_j}$, $i=1, \dots, m, j=1, \dots, n$, можно использовать любые векторы выборочных средних и стандартных отклонений (дисперсий). При этом в полученной модельной матрице $Z_{mn}=[Z_1 | Z_2]$ можно переставлять местами строки - эти действия не влияют на значения элементов корреляционных матриц, вычисляемых ниже.

Регрессионные модели разработаны в многочисленных вариантах, применялись во многих предметных областях. Многочисленные статьи, монографии на разных языках, программы для ЭВМ общеизвестны, стали повседневным инструментарием.

Однако, в связи с кризисными событиями, например, в финансовой сфере, актуальны задачи управления вычисленными значениями коэффициентов регрессии при $n-1$ независимых z -переменных, линейная комбинация которых влияет на зависимую переменную.

Например, прибыль (зависимая переменная или отклик) в зависимости от прироста ресурсов, вложений (независимых переменных) в прибыльные активные операции. Предварительная фиксация значений коэффициентов регрессии $\beta_1, \dots, \beta_{n-1}$ и

моделирование значений независимых и зависимой переменных позволит иметь ряды матриц $Z_{mn}=[Z_1 | Z_2]$, достигающих по построению такой матрицы $Z_{mn}=[Z_1 | Z_2]$, которая будет иметь заданные целевые значения коэффициентов регрессии $\beta_1, \dots, \beta_{n-1}$. Тогда возможно проектирование рядов векторов значений коэффициентов регрессии $\beta=(\beta_1, \dots, \beta_{n-1})^T$ и соответствующих им рядов матриц $\{Z_{mn}=[Z_1 | Z_2]\}$ с заданными свойствами.

Современные тенденции в теории и практике финансового анализа связаны с проблемой модификации системы финансовых коэффициентов, с приведением этой системы к форме, удобной для принятия адекватных управленческих решений в области финансового менеджмента. В этом направлении существует несколько подходов. Предпочтителен подход, когда выбирают из всех существующих финансовых показателей и коэффициентов незначительное количество тех, которые наиболее полно и всесторонне характеризуют финансовое состояние банка.

Здесь мы остановимся на статистическом подходе к коэффициентному методу финансового анализа. Суть нашего подхода может быть сведена к анализу выборочных коэффициентов корреляции и коэффициентов регрессии. Последние имеют практически важный смысл и интерпретацию: «если банк увеличит на 1 тысячу тенге свои кредитные вложения, то банк потерпит убыток в 347,87 тенге, а если банк увеличит на 1 тысячу тенге свои вложения в ценные бумаги, то банк потерпит убыток в 225,42 тенге. т. е. банку в это время нельзя заниматься традиционными операциями» [1].

Для иллюстрации статистического подхода к финансовому экспресс-анализу нужны модельные данные, адекватные по значениям статистик многомерной выборки. Перечень этих статистик (векторы, матрицы) будет выявлен по мере изложения текста. При этом закон распределения значений 1-мерных переменных для финансовых показателей бывает неопределенным, что достигается применением обратной модели главных компонент (ОМ ГК) [2,3], для 1-мерных z -переменных из R -, Λ -выборки не определены законы распределений.

Модели и задачи

Исходной гипотезой для рассматриваемой ниже обратной задачи множественной линейной регрессии (ОЗ МЛРА) является существование уравнения регрессии вида $z_n=\beta_1z_1+\beta_2z_2+\dots+\beta_{n-1}z_{n-1}$, где, в отличие от прямой задачи множественной линейной регрессии (ПЗ МЛРА) известны значения $\beta_1, \dots, \beta_{n-1}$ вектора $\beta=(\beta_1, \dots, \beta_{n-1})^T$ регрессионных коэффициентов, значение свободного члена α . Модель множественной

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линейной регрессии, где вычисляется единственный вектор $\beta=(\beta_1, \dots, \beta_{n-1})^T$ регрессионных коэффициентов, назовем (при $\alpha=0$) прямой моделью множественной линейной регрессии (ПМ МЛРА) и обозначим так: $Z_{mn}=[Z_1 | Z_2] \Rightarrow (R^{-1}_{11}, R_{12}, \beta)$. В ПМ МЛРА решена ПЗ МЛРА, ее решение β единственно и равно $\beta_R=R^{-1}_{11}R_{12}$. Ранг матрицы R_{11} равен $n-1$. Для каждого значения z_n из реальной выборки и оценки ее значения из ПМ МЛРА разность этих величин не равна нулю. В нашей ОМ МЛРА аналогичная разность равна нулю. В этом состоит преимущество ОМ МЛРА, где модельные значения n z -переменных точно удовлетворяют формуле $z_n=\beta_1 z_1 + \beta_2 z_2 + \dots + \beta_{n-1} z_{n-1}$. Аддитивное случайное приращение $\alpha_i, i=1, \dots, m$, к значениям z_{in} (присущее ПМ МЛРА) в ОМ МЛРА придает вектору-решению $(z_{i1}, z_{i2}, \dots, z_{i(n-1)}, z_{in})^T$ нашей модельной выборки свойство ошибки предсказанного значения. Значениями этих ошибок в ОМ МЛРА можно управлять, что невозможно в ПМ МЛРА. Следовательно теоретическое решение ПМ МЛРА является одним из бесконечного множества теоретических решений ОМ МЛРА. Математического доказательства не приводим.

Трудным местом ПЗ МЛРА $Z_{mn}=[Z_1 | Z_2] \Rightarrow (R^{-1}_{11}, R_{12}, \beta)$ является вычисление обратной матрицы для симметрической корреляционной матрицы «регрессоров» R_{11} , которая может быть неполного ранга – тогда не существует для нее обратной матрицы. Если она «плохо обусловлена», то уменьшение числа обусловленности матрицы показывает насколько матрица близка к матрице неполного ранга (для квадратных матриц - к вырожденности). В работах [2-9] число обусловленности корреляционной матрицы измеряется набором ее f -параметров $f_1(\Lambda_{nn})=\lambda_1+\dots+\lambda_n=n$, $f_2(\Lambda_{nn})=(\lambda_1^2+\dots+\lambda_n^2)$, $f_3(\Lambda_{nn})=\lambda_1/\lambda_n$, $f_4(\Lambda_{nn})=(\lambda_1+\dots+\lambda_n)/n < 1$, $f_5(\Lambda_{nn})=\lambda_1 \times \lambda_2 \times \lambda_3 \times \dots \times \lambda_n$, $f_6(\Lambda_{nn})=\lambda_1/\lambda_2 + \dots + \lambda_{n-1}/\lambda_n$. Значение f -параметра $f_3(\Lambda_{nn})=\lambda_1/\lambda_n$ измеряет значение числа обусловленности, а остальные – близость (удаленность) от вырожденности корреляционной матрицы R_{nn} . Для нахождения значений f -параметров необходимо решить прямую спектральную задачу (ПСЗ): $R_{nn} \Rightarrow (C_{nn}, \Lambda_{nn})$, где квадратная ортонормированная матрица C_{nn} - матрица собственных векторов $c_j=(c_{1j}, c_{2j}, \dots, c_{nj})^T, j=1, \dots, n$. Они образуют ортогональную матрицу $C_{nn}=[c_1 | c_2 | \dots | c_n]$, согласованную с матрицей собственных чисел (со спектром) $\Lambda_{nn}=\text{diag}(\lambda_1, \lambda_2, \dots, \lambda_n), \lambda_1 > \dots > \lambda_n > 0$, таким образом, что выполняются равенства $R_{nn}C_{nn}=C_{nn}\Lambda_{nn}, C_{nn}^T C_{nn}=C_{nn} C_{nn}^T=I_{nn}$, где $\text{diag}(R_{nn})=(1, \dots, 1), \text{tr}(R_{nn})=1+1+1+\dots+1+1=\text{tr}(\Lambda_{nn})=\lambda_1+\dots+\lambda_n=n$. Матрицы C_{nn} и Λ_{nn}

вычисляются одновременно по известной корреляционной матрице R_{nn} . Матрица R_{nn} вычисляется по стандартизированной выборке $Z_{mn}: R_{nn}=(1/m)Z_{mn}^T Z_{mn}$. Элементы спектра $\Lambda_{nn}=\text{diag}(\lambda_1, \dots, \lambda_n), n > 2$, являются вышеприведенными измерителями как степени вырожденности, так и других свойств.

Решаемая ниже ОЗ МЛРА, как показано ниже в «Теореме о z -переменных в ОМ МЛРА», имеет бесконечное множество решений $(R^{(t)}_{11}, R^{(t)}_{12}, Z^{(t)}_{11}, Z^{(t)}_{12})$, где корреляционные матрицы $R^{(t)}_{11}$ модели руются в модели вида: $(n, \varphi_{11}) \Rightarrow (R^{(t)}_{11})$, подматрицы $R^{(t)}_{12}$ вычисляются: $R^{(t)}_{12}=R^{(t)}_{11}\beta$, подматрицы $Z^{(t)}_{11}$ являются решением ОЗ АГК: $R^{(t)}_{11} \Rightarrow (C^{(t)}_{11}, \Lambda^{(t)}_{11}, Y^{(t)}_{m(n-1)}, Z^{(t)}_{m(n-1)})$, подматрица $Z^{(t)}_{12}$ - решением Оптимизационной задачи №5, $t=1, \dots, k_t < \infty, \ell=1, \dots, k_\ell < \infty$.

Выборки $Z^{(t)}_{11}, Z^{(t)}_{12}$ ОМ ГК удовлетворяют соотношениям: $(1/m)Z^{(t)T}_1 Z^{(t)}_1=R^{(t)}_{11}, (1/m)Z^{(t)T}_1 Z^{(t)}_{12}=R^{(t)}_{12}, (1/m)Z^{(t)T}_2 Z^{(t)}_{12}=R_{22}=1$. Матрицы $C^{(t)}_{11}, \Lambda^{(t)}_{11}, Y^{(t)}_{m(n-1)}, Z^{(t)}_{m(n-1)}$ из решаемых задач используются для достижения требуемых равенств, а также удовлетворяют соотношениям ОМ ГК, доказанным в Теореме о Λ -выборках [9].

Обратная модель множественной линейной регрессии

Необходимо иметь данные, демонстрирующие всевозможные динамики рассматриваемых нами агрегированных показателей. Динамики этих показателей покажут оптимистические или неблагоприятные тенденции в периоды времени, наличие которых мы будем определять по значениям показателей, по коэффициентам корреляции, по значениям коэффициентов регрессии $\beta_1, \dots, \beta_{n-1}$, по коэффициентам эластичности переменной z_n по объясняющей переменной z_j с номером j , где j может принимать одно из значений $1, 2, \dots, n-1$.

В данной работе управляемым (входным) параметром модели, генерирующей модельные данные, являются значения коэффициентов регрессии $\beta_1, \dots, \beta_{n-1}$ при переменных z_1, z_2, \dots, z_{n-1} . В общеизвестной ПМ МЛРА $Z_{mn}=[Z_1 | Z_2] \Rightarrow (R^{-1}_{11}, R_{12}, \beta)$ входным объектом является реальная многомерная выборка $Z_{mn}=[Z_1 | Z_2]$, а выходным вектор коэффициентов регрессии $\beta=(\beta_1, \dots, \beta_{n-1})$.

Как показано ниже для единственного вектора коэффициентов регрессии $\beta=(\beta_1, \dots, \beta_{n-1})$ существует бесконечное множество стандартизованных многомерных выборок $Z_{mn}=[Z_1 | Z_2]$, являющиеся многомерными Λ -выборками с свойствами, доказанными в теореме о Λ -выборках [9].

Ниже покажем что Обратная модель множественной линейной регрессии (ОМ МЛРА)



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имеет схематическое изображение вида: $\beta \Rightarrow [R^{(t)}_{11}, R^{(t)}_{12} Z^{(t,1)} | Z^{(t,2)}], t=1, \dots, k_t < \infty, \ell=1, \dots, k_\ell < \infty.$

Обратная задача множественного линейного регрессионного анализа

Пусть нам даны перечень наименований и число $n-1$ независимых переменных, т.е. задано число «регрессоров» $z_{11}, \dots, z_{i,n-1}$ и заданы значения коэффициентов регрессии $\beta_1, \dots, \beta_{n-1}$, функционально определяющих значения зависимой переменной z_n .

Требуется моделировать значения выборочных коэффициентов корреляции между $n-1$ независимыми z -переменными из подматрицы R_{11} коэффициентов корреляций только независимых переменных («регрессоров»). Требуется моделировать значения выборочных коэффициентов корреляции $r_{1n}, \dots, r_{n-1,n}$ между зависимой z -переменной z_n и независимыми z -переменными z_1, \dots, z_{n-1} , объединенных в вектор-столбец $R_{12} = (r_{1n}, \dots, r_{n-1,n})^T$. Требуется моделировать многомерную m^*n -выборку $Z_{mn} = [Z_1 | Z_2]$ значений n z -переменных, удовлетворяющих равенствам из ПМ МЛРА $Z_{mn} = [Z_1 | Z_2] \Rightarrow (R^{-1}_{11}, R_{12}, \beta)$:

$$(1 \setminus m) Z^T Z = R_{nn}, Z_{mn} = [Z_1 | Z_2] = \{(z_{11}, \dots, z_{i,n-1} | z_{in})\}, \\ (1 \setminus m) Z_1^T Z_1 = R_{11}, \\ (1 \setminus m) Z_1^T Z_2 = R_{12}, z_n = z R^{-1}_{11} R_{12} = z \beta, z = (z_1, \dots, z_{n-1}), \\ \beta = R^{-1}_{11} R_{12}.$$

Входным объектом обратной задачи множественной линейной регрессии (ОЗ МЛРА) является вектор $\beta_R = (\beta_1, \dots, \beta_{n-1})$. Выходным объектом ОЗ МЛРА, т.е. решением, является многомерная выборка $Z_{mn} = [Z_1 | Z_2] = \{(z_{11}, \dots, z_{i,n-1} | z_{in})\}$, матрица R_{nn} такие, что выполняются соотношения $\beta_R = R^{-1}_{11} R_{12}$, $(1 \setminus m) Z_1^T Z_1 = R_{11}$, $(1 \setminus m) Z_1^T Z_2 = R_{12}$. Матрица R_{nn} в соответствии с разбиением R -выборки $Z_{mn} = [Z_1 | Z_2]$, где Z_1 – m -на- $(n-1)$ матрица, Z_2 – m -на-1 матрица, матрица R_{nn} разбита на 3 блока: $R_{11}, R_{12}, R_{21} = R^T_{12}$, и элемент $r_{ij}, r_{nn} = 1$.

Схематически данную ОЗ МЛРА изобразим пока так: $(m, n, \varphi_{11}, \beta) \Rightarrow (R_{11}, R_{12}, Z_1, Z_2)$. В процессе ее решения схема будет конкретизироваться.

Подзадачу 1 для ОЗ МЛРА обозначим так: $(n, \varphi_{11}) \Rightarrow (R_{11})$. Решение подзадачи 1 состоит из 2 шагов. Подзадачу 2 изобразим так: $(R_{11}, m) \Rightarrow (C_{11}, \Lambda_{11}, Y^{(t)}_{m(n-1)}, Z^{(t)}_{m(n-1)}), t=1, \dots, k_t < \infty$, а подзадачу 3 $(R_{11}, \beta) \Rightarrow R_{12}$. Результат решений трех подзадач после удаления символов сопутствующих матриц обозначается в виде: $(m, n, \varphi_{11}, \beta) \Rightarrow (R_{11}, R_{12}, Z_1, Z_2)$.

Рассмотрим подзадачу 1.

Шаг 1. При фиксированном значении параметра φ_{11} моделируем спектр $\Lambda_{(n-1)(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$, с значением φ -параметра спектра $\Lambda_{(n-1)(n-1)} \varphi = [(f_2(\Lambda_{(n-1)(n-1)}) - n] / (n-1)^{1/2}$, равного заданному значению φ_{11} . Значение φ_{11} должно принадлежать одному из 5 интервалов

изменения коэффициента корреляции по шкале Чеддока (Chaddock scale). По этой шкале количественная мера тесноты связи: абсолютное значение коэффициента корреляции, принадлежащее интервалу от 0 до 0.3 – качественно интерпретируется как «очень слабая», интервалу от 0.3 до 0.5 – «слабая», умеренная», интервалу от 0.5 до 0.7 – «заметная» (moderate positive), интервалу от 0.7 до 0.9 – «высокая», интервалу от 0.9 до 1 – «очень высокая».

Схему этого Шага 1 обозначим так: $(n-1, \varphi_{11}) \Rightarrow \{\Lambda_{(n-1)(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})\}$. Фигурные скобки $\{\}$ обозначают бесконечность множества таких спектров. При этом элементы $\lambda_1, \dots, \lambda_{n-1}$ спектра $\Lambda_{(n-1)(n-1)}$ неизвестной корреляционной матрицы $R_{(n-1)(n-1)}$ моделируем с применением программы СПЕКТР из ППП «Спектр» [10]. Заметим, что программа СПЕКТР не моделирует матрицу $R_{(n-1)(n-1)}$ (в виде блока R_{11}) а моделирует только спектр $\Lambda_{(n-1)(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$ с заданным значением f -параметра $f_2(\Lambda_{(n-1)(n-1)}) = \lambda^2_1 + \dots + \lambda^2_{n-1} = f_2(R_{(n-1)(n-1)})$. Элементы спектра упорядочены в порядке убывания: $\lambda_1 > \dots > \lambda_{n-1} > 0, \lambda_1 + \dots + \lambda_{n-1} = n-1$, причем матрица $\Lambda_{(n-1)(n-1)}$ может быть как полноранговой, так и, при необходимости, может быть смоделирована с неполным рангом. Тогда число ее положительных элементов равно $k < n-1$. Одна из таблиц значений φ_{11} , принадлежащих 5 интервалам изменения параметра φ , приведена в статье [9, стр.187, Таблица 1]. Приведенные «Модельные значения элементов 20 спектров 20 неизвестных корреляционных матриц, имеющих заданные значения f -параметров спектра» получены при значениях $\varphi_{11} = 0.20, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.70, 0.75, 0.80, 0.80, 0.85, 0.85, 0.90, 0.90, 0.95, 0.98$. Значение φ_{11} ($0 < \varphi_{11} < 1$) не зависит от значения n . Оно позволяет моделировать $n-1$ положительных элементов $\lambda_1, \dots, \lambda_{n-1}$, в сумме равных $n-1$. В подзадаче 1 эти $n-1$ положительных чисел позволяют моделировать $[(n-1)^2 - (n-1)]/2$ чисел r_{ij} , по абсолютной величине не превосходящих 1. Таким образом одно положительное число φ_{11} (и не только оно) позволяет генерировать множество значений коэффициентов корреляции. Значение φ_{11} регулирует интервал значений, в пределах которого изменяются значения генерируемых коэффициентов корреляции. Примеры фиксации интервалов для значений φ_{11} приведены, например, в [9, стр.187].

Спектр $\Lambda_{(n-1)(n-1)}$ может быть получен и по-другому. Если требуется моделировать спектр с заданными значениями его f -параметров f_1, f_2, f_4 , то задача моделирования (f_1, f_2, f_4) -спектров $\Lambda_{(n-1)(n-1)}$ ($f_1 = n-1$) по-разному решены в [4-11]. Все модельные (f_1, f_2, f_4) -спектры из их бесконечного множества имеют заданные значения f -



параметров f_2, f_4 , с заданной погрешностью [1,2] $\|f_2 - f_2(\Lambda_{nn})\| \leq \epsilon_0, \|f_4 - f_4(\Lambda_{nn})\| = 0$.

Шаг 2. Моделирование блока R_{11} корреляционной матрицы R_{nn} . Здесь нам предстоит воспользоваться одним из решений из бесконечного множества решений Обратной спектральной задачи (ОСЗ): $\Lambda_{(n-1)(n-1)} \Rightarrow (C^{(\ell)}_{(n-1)(n-1)}, R^{(\ell)}_{(n-1)(n-1)})$, $\ell=1, \dots, k_\ell < \infty$. Здесь мы будем использовать одну из корреляционных матриц $R^{(\ell)}_{(n-1)(n-1)}$, элементы которой по абсолютным величинам должны удовлетворять нас и соответствовать выбранному значению ϕ_{11} в предыдущем Шаге 1.

Для моделирования бесконечного множества корреляционных матриц $R_{(n-1)(n-1)}$ с одним и тем же спектром $\Lambda_{(n-1)(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$ используем программу CORMAP (CORMAT, СОМА31) из ППП «Спектр» [10]. В нашей ОЗ МЛРА и в других задачах анализа данных, где применяется ОМ ГК [2-5], для модельного спектра $\Lambda_{(n-1)(n-1)}$ существует бесконечное множество корреляционных матриц $R^{(\ell)}_{(n-1)(n-1)}$, $\ell=1, \dots, k_\ell < \infty$ (лемма С.Р.Chalmers [12]). Зафиксируем номер ℓ решения обратной спектральной задачи (ОСЗ) [5], а полученную корреляционную матрицу $R^{(\ell)}_{(n-1)(n-1)}$ обозначим как искомый блок R_{11} матрицы R_{nn} . Подзадача 1: $(n, \phi_{11}) \Rightarrow (R^{(\ell)}_{11})$, $\ell=1, \dots, k_\ell < \infty$ решена.

Рассмотрим Подзадачу 2: $(R^{(\ell)}_{11}, m) \Rightarrow (C^{(\ell)}_{11}, \Lambda_{11}, Y^{(t)}_{m(n-1)}, Z^{(t, \ell)}_{m(n-1)})$, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_\ell < \infty$. Для полученного блока $R_{(n-1)(n-1)}$ корреляционной матрицы размерности $n-1$, располагаемого в первых $n-1$ столбцах корреляционной матрицы размерности n , надо моделировать выборку $Z^{(t, \ell)}_{m(n-1)}$. Она будет выступать в роли m -на- $(n-1)$ подматрицы Z_1 из матрицы $Z_{mn} = [Z_1 | Z_2]$. Подзадача 2 решается за 2 Шага.

Шаг 1. Реализация варианта 2 обратной модели главных компонент (ОМ ГК) с применением программы IMPC2 из ППП «Спектр» []. Здесь решается обратная задача анализа главных компонент (ОЗ АГК, [2-6]), где входным объектом является не диагональная матрица дисперсий главных компонент $\Lambda_{(n-1)(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$, а корреляционная матрица $R^{(\ell)}_{11}$ размерности $(n-1)$ -на- $(n-1)$. Свойства решений ОЗ АГК, а именно свойства Λ_{11} -выборки $Y^{(t)}_{m(n-1)}, Z^{(t, \ell)}_{m(n-1)}$, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_\ell < \infty$, доказаны в [5,67]. Для моделирования Λ_{11} -выборок $Y^{(t)}_{m(n-1)}, Z^{(t, \ell)}_{m(n-1)}$, $\ell=1, \dots, k_\ell < \infty, t=1, \dots, k_t < \infty$, используем программу IMPC2 из ППП «Спектр» [10]. Зафиксируем значение номера t и выберем матрицу $Z_{m(n-1)}$ в качестве подматрицы Z_1 из разбиения n -на- n матрицы $Z_{mn} = [Z^{(t, \ell)}_{11} | Z^{(t, \ell)}_{12}]$. Здесь подматрица $Z^{(t, \ell)}_{12}$ пока неизвестна. Теперь имеем матрицы $R^{(\ell)}_{11}$ и $Z^{(t, \ell)}_{11}$ таковы, что выполняется требуемое равенство $(1/m) Z^{(t, \ell)T}_{11} Z^{(t, \ell)}_{11} = R^{(\ell)}_{11}$.

Шаг 2. В нашей задаче 1 подзадача моделирования бесконечного множества подматриц $R_{12} = (1/m) Z^{(t, \ell)T}_{11} Z_2$ схематично изображена (Шаг 2 подзадачи 2) так: $(R^{(\ell)}_{11}, \beta_R) \Rightarrow R^{(\ell)}_{12}$, $\ell=1, \dots, k_\ell < \infty$. Здесь подматрица $R^{(\ell)}_{12}$ легко вычисляется. Так как ранее нами смоделирована матрица $R^{(\ell)}_{11}$, а вектор коэффициентов регрессии $\beta = (\beta_1, \dots, \beta_{n-1})^T$ задан по условию нашей ОЗ МЛРА, то подматрица $R^{(\ell)}_{12}$ равна $R^{(\ell)}_{12} = R^{(\ell)}_{11} \beta$. Ее схема: $(R^{(\ell)}_{11}, \beta) \Rightarrow Z^{(t, \ell)}_{12}$, $t=1, \dots, k_t < \infty, \ell=1, \dots, k_\ell < \infty$.

Подзадача 3 состоит в моделировании подматрицы $Z^{(t, \ell)T}_2$ из матрицы $Z_{mn} = [Z_1 | Z_2]$. Здесь Z_1 является Λ_{11} -выборкой из их бесконечного множества, обладает свойствами из Теоремы о Λ -выборках [9]. Она смоделирована выше. Задача моделирования элементов подматрицы Z_2 решена в работе [8]. В задаче 4 из работы [8] «матрица $R_{12} = (1/m) Z^{(t, \ell)T}_1 Z_2$, является вектором длины $(n-1)$ и ее элементы $r_{1j}, r_{2n}, r_{3n}, \dots, r_{nn}$ в рамках оптимизационной задачи №4 [8] являются реализациями случайной величины.

В подзадаче 3 моделируем элементы из подматрицы Z_2 из матрицы $Z_{mn} = [Z_1 | Z_2]$. По условию ОЗ МЛРА элементы из подматрицы $R^{(\ell)}_{12} = R^{(\ell)}_{11} \beta$ должны удовлетворять равенству $R^{(\ell)}_{12} = (1/m) Z^{(t, \ell)T}_1 Z_2$. Это матричное уравнение представляет собой систему, состоящую из $n-1$ линейных и одного нелинейного уравнений. Решаем эту систему методом Ньютона, применяя надстройку «Поиск решения» в ЭТ. (процедура Solver).

Разработаем программу-таблицу (Таблица 1) и решаем Оптимизационную задачу №5 (Рисунки 1,2). Нажав на кнопку «Выполнить» найдем элементы подматрицы $Z^{(t, \ell)}_{12}$, зависящую от выборки $Z^{(t, \ell)}_{11}$ и от матрицы $R^{(\ell)}_{12}$. Пара номеров (ℓ, t) у подматрицы $Z^{(t, \ell)}_{12}$ образуется из номера t подматрицы $Z^{(t, \ell)}_{11}$ и номера ℓ подматрицы $R^{(\ell)}_{12}$.

Отличие нашей задачи №5 от задачи №4 из [8] состоит не только в способе задания значений n коэффициентов корреляции $r_{1j}, r_{2j}, r_{3j}, \dots, r_{nj}, \dots, r_{nj}$. Общим местом в задачах №4 и №5 является неизвестность значений j -ой-в задаче 4 и n -ой - в задаче 5 z -переменной: $z_{1n}, z_{2n}, \dots, z_{mn}$. Каждое из этих неизвестных значений, например z_{kj} , умножается на известное значение z_{k1} : $z_{k1} \times z_{kj}$. Сумма таких произведений (если индекс k изменяется от 1 по m), умноженная на постоянную величину $(1/m)$, равна коэффициенту корреляции r_{1j} : $(1/m) \times (z_{11} \times z_{1j} + z_{21} \times z_{2j} + \dots + z_{m1} \times z_{mj})$. Аналогичный вид имеют формулы для коэффициентов корреляции $r_{2j}, r_{13j}, \dots, r_{nj}$, $j=1, \dots, n$.

Оптимизационная задача №5

Пусть в модели многомерного линейного регрессионного анализа (МЛРА) задано

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разбиение множества n z -переменных на независимые - z_1, \dots, z_{n-1} и зависимую - z_n . Предположим, что существует уравнение регрессии вида $z_n = \beta_1 z_1 + \beta_2 z_2 + \dots + \beta_{n-1} z_{n-1}$, где известны значения $\beta_1, \dots, \beta_{n-1}$ вектора $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии.

Рассмотрим задачу моделирования значений z - переменных из подматрицы Z_2 матрицы $Z_{mn} = [Z_1 | Z_2]$ в Шаге 1 решения подзадачи 2 задачи 1 были получены значения элементов подматрицы Z_1 . Эти значения будем использовать в качестве параметров уравнений системы (*).

Если **известны** значения $n-1$ z -переменных, расположенных в $n-1$ столбцах подматрицы Z_1 размерности $m \times (n-1)$ и **известны** значения $\Gamma_{1n}, \Gamma_{2n}, \Gamma_{3n}, \dots, \Gamma_{nn}$ n коэффициентов корреляции (между $n-1$ независимыми z_1, \dots, z_{n-1} и одной зависимой z_n z -переменными) из подматрицы $R_{12} = (1/m)Z_1^T Z_2$, то имеем систему уравнений, состоящую из $n-1$ линейных уравнений и 1 нелинейного уравнения:

$$(1/m) \times (z_{11} \times z_{1n} + z_{21} \times z_{2n} + \dots + z_{k1} \times z_{kn} + \dots + z_{m1} \times z_{mn}) =$$

Γ_{1n}

$$(1/m) \times (z_{21} \times z_{1n} + z_{22} \times z_{2n} + \dots + z_{k2} \times z_{kn} + \dots + z_{m2} \times z_{mn}) =$$

Γ_{2n}

.....

$$(1/m) \times (z_{1n} \times z_{1n} + z_{2n} \times z_{2n} + \dots + z_{kn} \times z_{kn} + \dots + z_{mn} \times z_{mn}) = \Gamma_{nn} \quad (*)$$

Требуется найти m -мерное решение-вектор $Z_2 = (z_{1n}, z_{2n}, \dots, z_{mn})^T$ из матрицы $Z_{mn} = [Z_1 | Z_2]$, удовлетворяющее системе уравнений (*). В этой системе известны значения элементов из подматрицы Z_1 и известны значения коэффициентов корреляции из подматрицы R_{12} , удовлетворяющей равенству $R_{12} = (1/m)Z_1^T Z_2$ (1/m). Не известны значения $z_{1n}, z_{2n}, \dots, z_{mn}$.

Для решения данной системы уравнений разработаем программу-таблицу в ЭТ Excel-2003 с применением процедуры Solver. В окне (Рисунок 1) надстройки «Поиск решения» в $n-1$ ячейках одного столбца на листе Excel Excel поместим n формул левых частей уравнений из системы (*). В правом столбце от этого столбца в ячейках введем значения (числа) коэффициентов $\Gamma_{1n}, \Gamma_{2n}, \Gamma_{3n}, \dots, \Gamma_{nn}$ $\Gamma_{1n}, \Gamma_{2n}, \Gamma_{3n}, \dots, \Gamma_{nn}$. Одну из ячеек с формулами назначим целевой. Описание примера расчетов при $n=4$ моделирования ногомерной Λ -выборки z -переменных в ОМ МЛРА

В правой части системы уравнений (*) нижние индексы известных коэффициентов корреляции имеют вид: $(1, n), (2, n), (3, n), \dots, (n, n-1), (n, n)$. Одна пара индексов (n, n) является индексом дисперсии стандартизованной n -ой z -переменной, равной 1: $\Gamma_{nn} = 1$.

Элементы известной выборки Z_1 размерности $m \times (n-1)$ и элементы известной

корреляционной матрицей $R_{11} = (1/m)Z_1^T Z_1$, размерности $(n-1) \times (n-1)$ используются в качестве постоянных коэффициентов системы уравнений (*). Стандартизованная n -ая z -переменная с неизвестными значениями $z_{1n}, z_{2n}, \dots, z_{mn}$ расположена в n -ом столбце матрицы $Z_{mn} = [Z_1 | Z_2]$, $Z_2 = (z_{1n}, z_{2n}, \dots, z_{mn})^T$. Матрица $R_{12} = (1/m)Z_1^T Z_2$, является вектором длины $(n-1)$ и ее элементы $\Gamma_{1j}, \Gamma_{2j}, \Gamma_{3j}, \dots, \Gamma_{nj}$ в рамках оптимизационной задачи №5 известны тор $R_{12}\beta = R_{11}^{-1}$ является вектором коэффициентов регрессии.

Система (*) из n уравнений с $m > n > 2$ неизвестными $z_{1j}, z_{2j}, \dots, z_{mj}$ при фиксированном номере j z -переменной, где $j \leq n$, является недоопределенной системой: имеются $n(m-1)$ известных значений z -переменных, n известных значений $\Gamma_{1j}, \Gamma_{2j}, \Gamma_{3j}, \dots, \Gamma_{jj}, \dots, \Gamma_{nj}$, $m > n$ неизвестных $z_{1j}, z_{2j}, \dots, z_{mj}$. Имеет бесконечное множество решений $\{z_{1j}, z_{2j}, \dots, z_{mj}\}$. Решение Оптимизационной задачи №5 проведем с применением процедуры Solver. Программа-таблица приведена в Таблице 1, где приведены начальные значения и полученные значения $z_{1j}, z_{2j}, \dots, z_{mj}$ и формулы целевой функции, формул 5 функций ограничений из (*) программы-таблицы для процедуры Solver. Окно процедуры «Поиск решений» в ЭТ Excel с введенными формулами целевой функции оптимизационной задачи №4 ($n=6$) и 5 функций ограничений из системы (*) приведены на Рисунке 2, а настроенные параметры процедуры «Поиск решений» в ЭТ Excel для решения оптимизационной задачи №5-на Рисунке 1.

Теорема. Пусть дана модель множественной линейной регрессии с уравнением регрессии вида $z_n = \beta_1 z_1 + \beta_2 z_2 + \dots + \beta_{n-1} z_{n-1}$, где z_1, z_2, \dots, z_{n-1} - набор объясняющих (независимых) переменных, z_n - переменная отклика (зависимая переменная), заданы значения $\beta_1, \dots, \beta_{n-1}$ вектора $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии. Выборка Z_{mn} из m значений z -переменных разбита на 2 части $Z_{mn} = [Z_1 | Z_2]$. Подматрицы Z_1 - размерности $m \times (n-1)$, Z_2 - размерности $m \times 1$ содержат m значений соответственно $n-1$ независимых и одной независимой z -переменных. Пусть неизвестны элементы подматриц Z_1 и Z_2 и известен вектор $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии, удовлетворяющие равенствам $\beta = R_{11}^{-1} R_{12}$, $R_{11} = (1/m)Z_1^T Z_1$, $R_{12} = (1/m)Z_1^T Z_2$, $Z_2 = Z_1 \beta$.

Тогда существуют бесконечное множество решений $z_1, z_2, \dots, z_{n-1}, z_n$ системы уравнений регрессии $Z^{(l,t)} = Z^{(l)} \beta$, $\beta = R^{(l)}_{11} \beta$, $R^{(l)}_{11} = (1/m)Z^{(l)T} Z^{(l)}$, $R^{(l)}_{12} = R^{(l)}_{11} \beta$, $R^{(l)}_{12} = (1/m)Z^{(l)T} Z^{(l,t)}$, $(R^{(l)}_{11}, R^{(l)}_{12}, Z^{(l)}, Z^{(l,t)})$, где матрицы $R^{(l)}_{11}$ моделируются в модели вида: $(n, \varphi_{11}) \Rightarrow (R^{(l)}_{11})$, подматрицы $R^{(l)}_{12}$ вычисляются: $R^{(l)}_{12} = R^{(l)}_{11} \beta$, подматрицы $Z^{(l,t)}$ являются решениями ОЗ АГК:



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$R^{(\ell)}_{11} \Rightarrow (C^{(\ell)}_{11}, \Lambda^{(\ell)}_{11}, Y^{(\ell)}_{m(n-1)}, Z^{(\ell,t)}_{m(n-1)})$, $\ell=1, \dots, k_t < \infty$, подматрица $Z^{(\ell,t)}_2$ является решением Оптимизационной задачи №5, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$. Выборки $Z^{(\ell)}_1, Z^{(\ell,t)}_2$ ОМ ГК удовлетворяют соотношениям $(1/m)Z^{(\ell,t)T}_1 Z^{(\ell)}_1 = R^{(\ell)}_{11}$, $(1/m)Z^{(\ell,t)T}_1 Z^{(\ell,t)}_2 = R^{(\ell)}_{12}$, $(1/m)Z^{(\ell,t)T}_2 Z^{(\ell,t)}_2 = R_{22} = 1$. Матрицы $C^{(\ell)}_{11}$, $\Lambda^{(\ell)}_{11}$, $Y^{(\ell)}_{m(n-1)}$, $Z^{(\ell,t)}_{m(n-1)}$ из решаемых задач используются для достижения требуемых равенств, удовлетворяют соотношениям как ОМ ГК, так и ОМ МЛРА.

Доказательство. Решение обратной задачи множественной линейной регрессии (ОЗ МЛРА): многомерная выборка $Z_{mn} = [Z_1 | Z_2]$, моделируется при решении задачи 1: $(m, n, \phi_{11}, \beta_R) \Rightarrow (R^{(\ell)}_{11}, R^{(\ell)}_{12}, Z^{(\ell,t)}_1, Z^{(\ell,t)}_2)$. Подматрица R_{11} моделируется при решении подзадачи 1: $(n, \phi_{11}) \Rightarrow (R_{11})$. Для подматрицы R_{11} решается подзадача 2: $R^{(\ell)}_{11} \Rightarrow (C^{(\ell)}_{11}, \Lambda_{11}, Y^{(\ell)}_{m(n-1)}, Z^{(\ell,t)}_{m(n-1)})$, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$, состоящая из двух Шагов. На Шаге 1 Подзадачи 2 моделируем подматрицу $Z_1 = Z^{(\ell,t)}_{m(n-1)}$, на Шаге 2 моделируются (вычисляются) подматрицы $R^{(\ell)}_{12} = R^{(\ell)}_{11} \beta$. Подзадача 3 состоит в численном решении Оптимизационной задачи №5 и в получении модельной подматрицы $Z^{(\ell,t)}_2 = (z_{1n}, z_{2n}, \dots, z_{mn})^{(\ell,t)T}$. Формальная постановка Оптимизационной задачи №5 и процесс ее решения (моделирования подматрицы $Z^{(\ell,t)}_2$, удовлетворяющей равенству $Z^{(\ell,t)}_2 = Z^{(\ell)}_1 \beta$), описан в отдельном разделе данной статьи (ее схема: $(Z^{(\ell,t)}_1, R^{(\ell)}_{12}) \Rightarrow Z^{(\ell,t)}_2$, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$. Получена последовательность $\beta \rightarrow R^{(\ell)}_{11} \rightarrow Z^{(\ell,t)}_1 \rightarrow R^{(\ell)}_{12} \rightarrow Z^{(\ell,t)}_2$. Теорема доказана.

ОЗ МЛРА: $\beta \Rightarrow [Z^{(\ell,t)}_1 | Z^{(\ell,t)}_2]$, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$, решается и ее решения существуют. ОЗ МЛРА имеет бесконечное множество решений с номерами $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$. Выходным объектом ОМ МЛРА является многомерная выборка $Z_{mn} = [Z_1 | Z_2] = \{(z_{i1}, \dots, z_{i,n-1} | z_{in})\}$, Выходным объектом обратной задачи множественной линейной регрессии (ОЗ МЛРА) является вектор $\beta_R = (\beta_1, \dots, \beta_{n-1})$. Выходным объектом ОЗ МЛРА является многомерная выборка $Z_{mn} = [Z_1 | Z_2] = \{(z_{i1}, \dots, z_{i,n-1} | z_{in})\}$.

На шаге 1 подзадачи 1 моделируются матрицы $R^{(\ell)}_{11}$ в модели вида: $(n, \phi_{11}) \Rightarrow (R^{(\ell)}_{11})$, подматрицы $R^{(\ell)}_{12}$ вычисляются: $R^{(\ell)}_{12} = R^{(\ell)}_{11} \beta$, подматрицы $Z^{(\ell,t)}_1$ являются решением ОЗ АГК: $R^{(\ell)}_{11} \Rightarrow (C^{(\ell)}_{11}, \Lambda^{(\ell)}_{11}, Y^{(\ell)}_{m(n-1)}, Z^{(\ell,t)}_{m(n-1)})$, подматрица $Z^{(\ell,t)}_2$ - решением Оптимизационной задачи №5, $t=1, \dots, k_t < \infty$, $\ell=1, \dots, k_t < \infty$. Выборки $Z^{(\ell)}_1, Z^{(\ell,t)}_2$ ОМ ГК удовлетворяют соотношениям $(1/m)Z^{(\ell,t)T}_1 Z^{(\ell)}_1 = R^{(\ell)}_{11}$, $(1/m)Z^{(\ell,t)T}_1 Z^{(\ell,t)}_2 = R^{(\ell)}_{12}$, $(1/m)Z^{(\ell,t)T}_2 Z^{(\ell,t)}_2 = R_{22} = 1$. При этом матрицы $C^{(\ell)}_{11}$, $\Lambda^{(\ell)}_{11}, Y^{(\ell)}_{m(n-1)}, Z^{(\ell,t)}_{m(n-1)}$ из решаемых задач используются для достижения требуемых равенств, удовлетворяют соотношениям ОМ ГК, доказанным в Теореме о Λ -выборках [9].

Стандартизованные значения переменной z_n изменяются относительно значений переменных z_1, z_2, \dots, z_{n-1} с одинаковыми стандартными отклонениями, равными 1. В соответствии с этим разбиением z -переменных совокупность из m значений всех n z -переменных образует 2 подматрицы $[Z_1 | Z_2]$ для m -на- n матрицы $Z_{mn} = [Z_1 | Z_2]$.

Конкретные значения полученного решения $z_{1j}, z_{2j}, \dots, z_{mj}$ системы уравнений (*) зависят от начальных значений, назначаемых пользователем процедуры «Поиск решения» и вводимых в соответствующее поле окна этой процедуры. Ниже в примере мы выбрали любой нормированный вектор $(z_{1j}, z_{2j}, \dots, z_{mj})$ такой, что $1 = (z_{1j}^2 + \dots + z_{mj}^2) / m$, где $n=6$, $m=20$. Этот вектор в паре с другими векторами из столбцов матрицы Z_{mn} не дает желаемых значений коэффициентов корреляции, но процедура «Поиск решения» легко преобразует этот нормированный вектор $(z_{1j}, z_{2j}, \dots, z_{mj})$ в вектор, являющийся решением системы (*). В настоящее время разрабатываются компьютерные программы, интегрирующие процедуру Solver с модулями и библиотеками ППП «Спектр» [10]. Для Единого Цифрового Объекта (ЕЦО) из Виртуальной Базы Данных [13].

Пример многомерной Λ -выборки z -переменных, моделируемых в ОМ МЛРА

Этапы применения программ из ППП «Спектр» [10] для получения многомерной Λ -выборки z -переменных, точно удовлетворяющих соотношениям, уравнениям ОМ МЛРА состоят из следующих 3 шагов. На Шаге 1 моделируем спектр неизвестной корреляционной матрицы $\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$ размерности $n-1$. Это число равно числу объясняющих (независимых) переменных («регрессоров»). На Шаге 2 в соответствии с значением $n-1$ и со значением, характеризующим гипотетические элементы неизвестного спектра $\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$ некоторой корреляционной матрицы размерности $n-1$. В качестве характеристики (параметра) будущей корреляционной матрицы используем параметр ϕ_{11} - среднеквадратичное коэффициентов корреляции матрицы $R_{n-1(n-1)}$, имеющей спектр $\Lambda_{n-1(n-1)}$. Значение параметра ϕ_{11} принадлежит интервалу $(0, 1)$. Схему этого Шага 2 выше мы обозначили так: $(n-1, \phi_{11}) \Rightarrow \{\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})\}$. Значения $\lambda_1, \dots, \lambda_{n-1}$ в рассматриваемом ниже примере не приводим, а 9 значений матрицы $R_{n-1(n-1)}$ приведены в Таблице 1 (выделены желтым цветом). При этом используем программу СПЕКТР из ППП «Спектр» [10] для моделирования спектра $\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$. Заметим, что программа СПЕКТР не моделирует матрицу $R_{n-1(n-1)}$ (в виде

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блока R_{11}) а моделирует только спектр $\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$ с заданным значением f -параметра $f_2(\Lambda_{n-1(n-1)}) = \lambda_1^2 + \dots + \lambda_{n-1}^2 = f_2(R_{n-1(n-1)})$. На Шаге 2 проводится моделирование блока R_{11} корреляционной матрицы R_{nn} с использованием программы IMPC2 [10]. Одно из решений из бесконечного множества решений Обратной спектральной задачи (ОСЗ): $\Lambda_{n-1(n-1)} = \text{diag}(C_{n-1(n-1)}^{(\ell)}, R_{n-1(n-1)}^{(\ell)})$, $\ell = 1, \dots, k_\ell = 1000 < \infty$ при $n-1=3$ имеет вид, приведенный в таблице 1. Здесь мы будем использовать одну из корреляционных матриц $R_{n-1(n-1)}^{(\ell)}$ с одним и тем же спектром $\Lambda_{n-1(n-1)} = \text{diag}(\lambda_1, \dots, \lambda_{n-1})$, элементы которой по абсолютным величинам должны удовлетворять нас и соответствовать выбранному значению ϕ_{11} в предыдущем Шаге 1. Используем программу CORMAP (CORMAT, СОМА31) из ППП «Спектр» [10]. Она генерирует матрицу R_{11} (Таблица 1). Далее моделируем подматрицу Z_1 (Таблица 2, цифры зеленого цвета) из матрицы $Z_{mn} = [Z_1|Z_2]$. Она выбирается из множества

выборки $Z_{m(n-1)}^{(\ell)}, t=1, \dots, k_t < \infty, \ell=1, \dots, k_\ell=1000 < \infty$. Далее на Шаге 3 вычисляем подматрицу $R_{12} = R_{11}\beta$. Здесь вектор коэффициентов регрессии $\beta = (\beta_1, \dots, \beta_{n-1})^T$ задан и при $n=4$ равен $\beta_1 = -0.34787$; $\beta_2 = -0.22542$; $\beta_3 = 0.63790$ [1]. Их значения (компоненты вектора β и элементы подматрицы R_{12}) приведены в Таблице 1.

Теперь у нас имеются все данные для решения Оптимизационной задачи №5 (Рисунки 1,2). В разработанной программе-таблице (Таблица 1) вво дим в ее ячейки значения элементов системы линейных и одного нелинейного уравнений. Решаем эту систему методом Ньютона, применяя надстройку «Поиск решения» в ЭТ. Параметры имеют вид Рисунок 4. нажав на кнопку «Выполнить» найдем элементы подматрицы Z_2 , зависящую от выборки Z_1 и от матрицы R_{12} . (Таблица 1). Многомерная Λ -выборка $Z_{mn} = [Z_1|Z_2]$ (одна из бесконечного множества) z -переменных, полученная нами при решении ОЗ МЛРА имеет вид, приведенный в Таблице 2.

Таблица 1

Модельные значения элементов подматриц коэффициентов корреляции R_{11} , R_{12} , реальные значения коэффициентов регрессии $\beta = (\beta_1, \dots, \beta_3)^T$

1	2	3	4	β
1,0000	0,8963	0,9793	0,7471	-0,347870
0,8963	1,0000	0,9071	0,6797	-0,225420
0,9793	0,9071	1,0000	0,8447	0,637900
0,7471	0,6797	0,8447	1,0000	

Таблица 2

Модельные значения элементов подматриц $Z_1|Z_2$ из матрицы $Z_{mn} = [Z_1|Z_2]$, имеющих заданные корреляционные матрицы $R_{11} | R_{12}$, заданный вектор коэффициентов регрессии $\beta = (\beta_1, \dots, \beta_3)^T$

Values of the z-variables z_1, z_2, z_3, z_4			
1	2	3	4
0,263397	0,448782	-0,069869	-1,445422
-0,070078	-0,316994	-0,155151	0,407357
0,865076	1,593805	0,796831	0,164729
-0,457251	-0,692492	-0,482185	-0,306252
-0,275975	-0,193384	-0,283746	-0,066682
-0,09438	0,153904	0,002336	-0,180427
-0,620163	-0,664282	-0,498737	0,444775
-0,625477	-0,407686	-0,423976	-0,067232
0,143165	-0,72528	-0,444542	-1,334659
-0,83811	-0,837773	-0,607355	0,031216
-0,712725	-0,996483	-0,67148	-0,781625
0,343139	1,434746	0,466601	0,35025
-0,088094	-0,34599	-0,149825	-0,244908

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-0,35595	-0,363648	-0,379696	-0,073036
3,596704	2,812559	3,72064	3,427547
-0,299958	-0,164258	-0,327337	-0,129438
-0,77332	-0,735527	-0,492509	-0,196194
1,000000	1,000000	1,000000	1,000000

Таблица 3

Программа-таблица

Полученное решение			Начальные значения		
1	1	1,00	1	1	1,00
2	0,074801	0,074801	2	12,70094	0,074801
3	0,041463	0,041463	3	11,55418	0,041463
4	0,092738	0,092738	4	14,36062	0,092738
5	1	1	5	1	1

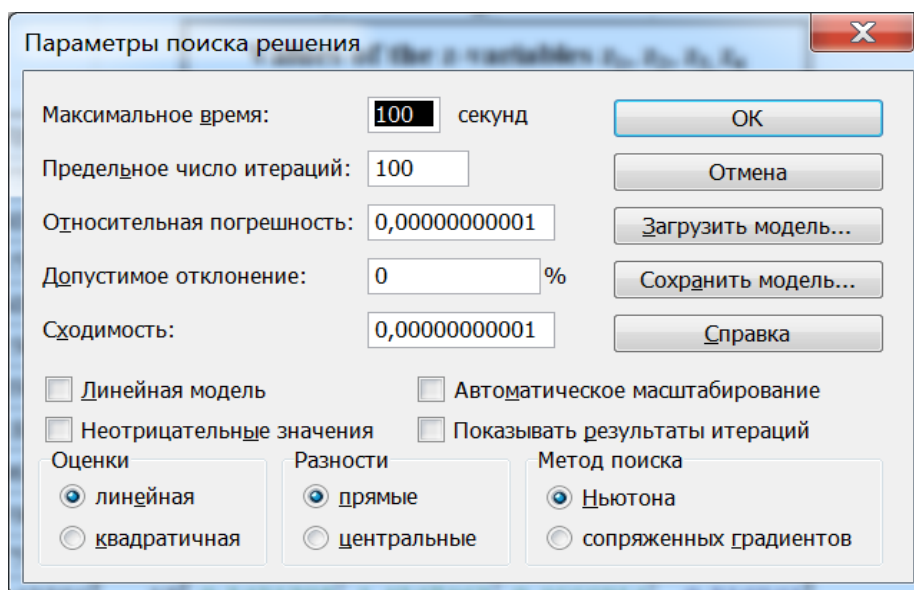


Рисунок 1 Настройки параметров процедуры «Поиск решения» в ЭТ Excel для программы-таблицы в ЭТ Excel с формулами целевой функции оптимизационной задачи №5 (n=4) и 3-х функций ограничений

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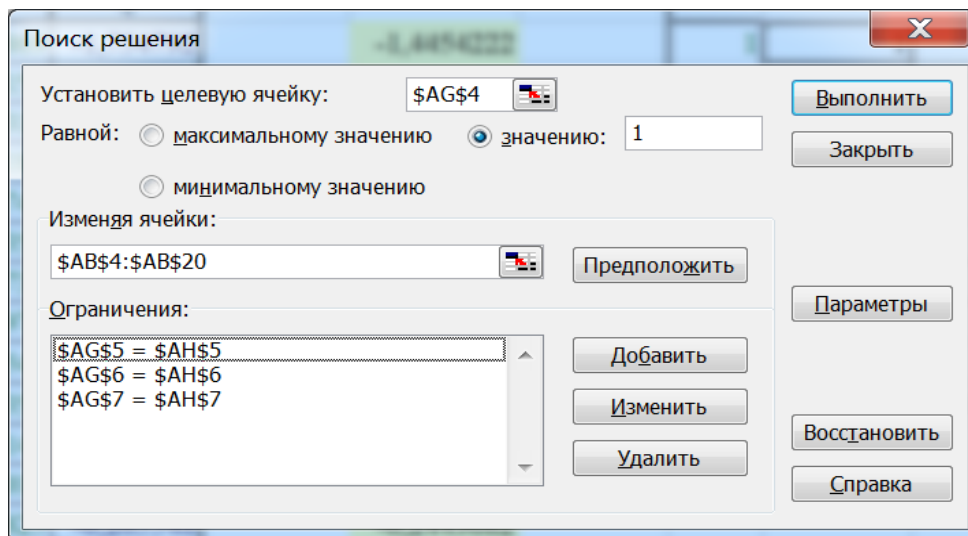


Рисунок 2 Окно процедуры «Поиск решений» в ЭТ Excel с введенными формулами целевой функции оптимизационной задачи №5 ($n=4$) и 3-х функций ограничений

Заключение

В работе решены задачи моделирования динамики n коррелированных показателей, каждый из которых состоит из m значений, т.е. моделируются $m \times n$ -матрицы, интерпретируемые как многомерные выборки объема m . Отличие данного способа моделирования состоит в том, что моделируется не вектор (как принято в методах Монте-Карло), а матрица как единое целое. Второе отличие - многомерная выборка объема m рассматривается как m реализаций n -мерной переменной, при этом для выборки объема m не определен закон распределения генеральной совокупности, из которого извлечена выборка объема m . Зато выборочные средние, выборочные стандартные отклонения, выборочные коэффициенты, выборочные коэффициенты эластичности в точности равны заданным значениям.

Мы конструировали ОМ МЛРА, обозначили постоянные величины (цели, вещественные) и переменные величины (детерминированные, случайные одномерные), воспользовались известными из ПМ МЛРА уравнениями, равенствами. Неизвестный вектор $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии из ПЗ МЛРА объявили в ОЗ МЛРА известным параметром. Постановки обратных задач (ОЗ АГК, ОЗ МЛРА) являются новыми. Известные популярные задачи многомерной прикладной статистики – анализ главных компонент и множественный линейный регрессионный анализ, мы назвали прямыми задачами, а исследования с их применением: теоремы, задачи, приложения в предметных областях, алгоритмы, компьютерные программы,

результаты расчетов по реальным данным, выводы, цифровые знания, новые ключевые слова, - составляют новому научному направлению в прикладной статистике. В рамках этого направления в данной статье разработана сложная математическая модель: ОМ МЛРА. Предстоит проводить глубокий анализ связанных с ОЗ МЛРА, с ОЗ АГК проблем. Исследовать обнаруженные новые явления, объекты, проявления их свойств и разработать алгоритмические методы работы с ними, выходить на новые знания и технологии - виртуальные базы данных [], виртуальные лаборатории. Чтобы успешно и всесторонне осмыслить существующие в этих моделях объекты, явления, процессы необходимо рассмотреть вопросы при переходе от безразмерных значений z -переменных к значениям x^0 -переменных (исходных переменных). Здесь имеем дело с значениями средних арифметических независимых и одной $n-1$ зависимой переменной $x_{cp} = (x_1^{cp}, \dots, x_{n-1}^{cp}, x_n^{cp})$, с их стандартными отклонениями, с $n-1$ эластичностями переменной x_n по x -переменным x_1, \dots, x_n , $x_{ij} = x_{ij}^0 - x_j$ $i=1, \dots, m, n=1, \dots, n$. Это позволит оценивать приращения значения x_n при заданном приращении одной из независимых x -переменных. Выходить на новые рубежи знаний и технологий.

Выше мы конструировали ОМ МЛРА - обозначили постоянные величины (цели, вещественные) и переменные величины (детерминированные, случайные одномерные), воспользовались известными из ПМ МЛРА уравнениями, равенствами. Неизвестный вектор $\beta = (\beta_1, \dots, \beta_{n-1})^T$ коэффициентов регрессии из ПЗ

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МЛРА объявили в ОЗ МЛРА известным параметром. Постановки обратных задач (ОЗ АГК, ОЗ МЛРА) для известных популярных задач многомерной прикладной статистики – анализ главных компонент и множественный линейный регрессионный анализ -, их задачи мы назвали прямыми задачами, являются новыми, а исследования с их применением: теоремы, задачи, приложения в других предметных областях, алгоритмы, компьютерные программы, результаты расчетов по реальным данным, выводы, цифровые знания, новые ключевые слова, - составляют новое научное направление в современной прикладной статистике. В этом направлении разработанная в данной статье математическая модель ОМ МЛРА найдет свое применение. Предстоит проводить глубокий анализ связанных с ОЗ МЛРА, с ОЗ АГК проблем.

Предыдущий и последующий члены ряда векторов значений коэффициентов регрессии нужно подбирать вручную и в соответствии с реальными производственными, маркетинговыми, административными мероприятиями, обеспечить достижение планируемых финансовых приростов значений ресурсов, вложений. Если нет реального менеджмента в банке по достижению планируемых значений $\beta_1, \dots, \beta_{n-1}$, то нет пользы от модельных значений элементов матрицы $Z_{mn}=[Z_1 | Z_2]$. Матрица $Z_{mn}=[Z_1 | Z_2]$ при известных значениях средних и стандартных отклонений преобразуются в «реальные» значения с

единицами измерения показателей с номерами $j=1, \dots, n$. Каждая цифра в «реальной» матрице адекватна реальному значению, если значения n z -переменных удовлетворяют системе уравнений (*). При этом практические решения по принятию предыдущего значения и последующего значения должны быть подвергнуты всестороннему анализу. Чтобы осмыслить изучаемые в этих моделях объекты, явления, процессы необходимо рассмотреть вопросы при переходе от безразмерных значений z -переменных к значениям x^0 -переменных (исходных переменных) с размерностями. Здесь предстоит нам иметь дело с значениями средних арифметических независимых и одной $n-1$ зависимой переменной $x_{cp}=(x_1^{cp}, \dots, x_{n-1}^{cp}, x_n^{cp})$, с их стандартными отклонениями, с $n-1$ эластичностями переменной x_n по x -переменным x_1, \dots, x_n , $x_{ij}=x_{ij}^0-x_j$ $i=1, \dots, m$, $j=1, \dots, n$. Это позволит оценивать приращение значения x_n^0 при заданном приращении значения одной независимой x^0 -переменной.

Предстоит исследовать обнаруженные новые явления, объекты, проявления их свойств и разработать алгоритмические методы работы с ними, выходить на новые рубежи знаний и технологий- виртуальные базы данных [14], виртуальные лаборатории [13]. Практически важной задачей является исследование связей коэффициентов эластичности $e_j=(x_n^{cp}/x_j^{cp})\beta_j$ с коэффициентами регрессии $\beta_1, \dots, \beta_{n-1}$.

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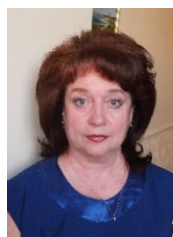
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**SECTION 21. Pedagogy. Psychology. Innovations
in the field of education.**

SOCIAL FORECASTING AS THE TECHNOLOGY OF MANIPULATION BY PUBLIC CONSCIOUSNESS

Abstract: The article discusses the possibility of estimating the phenomenon of forecasting as a socio-psychological technology for manipulating the future, rather than predicting the future. An interpretation of the Duhem-Quine thesis was carried out in the context of a forecast study. It is noted that the forecast itself may be the statement that should not be refuted. This can lead to the activation of a cognitive error, such as a propensity for confirmation. It is asserted that humanity can quite relate to the social forecast, as to psychological manipulation.

Key words: actor-network theory, cognitive errors, public consciousness, forecasting, system approach, Duhem-Quine thesis, binding effect, expectation effect.

Language: Russian

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СОЦИАЛЬНОЕ ПРОГНОЗИРОВАНИЕ КАК ТЕХНОЛОГИЯ МАНИПУЛЯЦИИ ОБЩЕСТВЕННЫМ СОЗНАНИЕМ

Аннотация: В статье освещена возможность оценки феномена прогнозирования как социально-психологической технологии манипулирования будущим, а не предсказания будущего. Осуществлена интерпретация тезиса Дюэма-Куайна в контексте исследования прогнозирования. Отмечено, что прогноз сам по себе может оказаться тем утверждением, которое не следует опровергать. Это может привести к активации такой когнитивной ошибки, как склонность к подтверждению. Утверждается, что человечество вполне может относиться к социальному прогнозу, как к психологической манипуляции.

Ключевые слова: акторно-сетевая теория, когнитивные ошибки, общественное сознание, прогнозирование, системный подход, тезис Дюгема-Куайна, эффект привязки, эффект ожиданий.

Introduction.

Современное развитие технологического прогресса существенно усложняет взаимоотношения в социальных системах, приводит к формированию спонтанных и неуправляемых процессов, результаты которых сложно предсказать в долгосрочной перспективе развития социума. В связи с этим понятие «социальное прогнозирование» последствий тех или иных проектов общественного развития приобретает новую остроту. Это связано с тем фактором, что социальные технологии неизменно затрагивают сферу не только материальных преобразований, но и систему общественного сознания, социальных отношений, сферу ценностей. В связи с этим социально-психологической науке непросто однозначно

ответить на вопрос, чем является сама технология социального прогнозирования: предвидением или манипулятивным навязыванием будущего?

Materials and Methods.

На проблеме социального прогнозирования в целом заостряют свое внимание такие современные исследователи, как П. Тиль, Н. Талеб, Я. Бар-Ям, Г. Гигеренцер, Д. Канеман и др. Так, Питер Тиль отмечает, что прогнозы, которые были сделаны по развитию технологий в годы после II Мировой войны, в значительной мере не оправдались. Причиной этого стало, по мнению ученого, непредсказуемое перераспределение расходов из научной в социальную сферу. Например, в начале XXI века Манхэттенский проект даже не получил бы свое



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начало, потому что политическая система США такова, что не решится сократить бюджет на здравоохранение, чтобы высвободившиеся средства инвестировать в крупные биотехнологические или инженерные проекты [1]. Подход Нассима Талеба сконцентрирован не только на критике прогностической методологии, которой пользуются современные научные и финансовые сообщества, и которая не учитывает устойчивости социальных систем по отношению влияния на них негативных факторов. Данный подход также критикует политическую систему США, которая продолжает поддерживать и создает уязвимые, хрупкие, вследствие наличия негативных факторов, социальные институты, что усиливает неопределенность будущего [15, с. 22, 113]. Подход Н. Талеба частично пересекается с исследованиями Даниэля Канемана и Дэна Ариэля, которые изучают влияние психологических факторов на принятие решений. Среди таких факторов данные исследователи выделяют когнитивные ошибки или когнитивные эвристики, присущие человеку. Под когнитивными ошибками понимаются систематические отклонения в суждениях при определенных обстоятельствах [14]. Например, эффект привязки показывает, что люди вырабатывают суждения, создают оценку, прогноз на основании какой-либо начальной величины или знания. Данный объект или знание могут быть сконструированы либо умышленно, либо неумышленно. Можно в связи с этим вспомнить, что все математики в XIX в. воспринимали постулат Евклида о том, что параллельные прямые не пересекаются как неопровержимое знание, и на основании этого продуцировали свои мысли, пока Гаусс, Лобачевский, Риман и другие не доказали обратного, создавши неевклидовы геометрии, в которых параллельные прямые пересекаются. В данном случае постулат о параллельности прямых представал как привязка. Д. Канеман так иллюстрирует эффект привязки: на вопрос, какой процент африканских стран находится в ООН, исследовательская группа, которая в качестве отправной точки получила число 10, дала средний процент 25%, в то время как исследовательская группа, которая в качестве отправной точки получила число 45, дала средний процент 65% [9, с. 29]. В качестве эффекта привязки могут выступать и результаты прогнозов. В связи с этим психологически прогноз можно рассматривать не только как практику предвидения будущего, но и как практику навязывания будущего. В дополнение к этому, Д. Ариэль, комментируя результаты экспериментов, проведенных для исследования эффекта ожидания, отмечает, что люди, которым заранее сообщают определенную информацию о

предстоящем событии, с большой вероятностью согласятся с предложенным прогнозом не потому, что им так подсказывает собственный опыт, а потому, что они начинают этого ожидать. Однако дело на этом не останавливается, поскольку ожидания начинают формировать стереотипы, которые представляют собой способы категоризации информации, направленной на прогнозирование будущего опыта.

При этом необходимо отметить, что стереотипы «работают», захватывая две стороны. Исследование стереотипов показывает, что не только люди реагируют иначе, имея стереотип по отношению к определенной группе людей, – сама эта группа начинает действовать иначе, если знает, какой ярлык вынуждена носить (в психологии для этого существует особый термин – фиксирование установки, «прайминг»)[8].

Существует возможность оценить вышеуказанные проблемы с точки зрения системного подхода. Данный подход предусматривает рассмотрение явления в контексте, и это делает системный подход одним из инструментов прогнозирования, поскольку контекст можно изменять не только в пространстве, но и во времени. Если в пространстве есть возможность двигаться от подсистем к надсистемам и наоборот, то во времени движение может осуществляться только по схеме прошлое – настоящее – будущее. Будущее в этом случае имеет различную глубину, или последствия разного порядка (последствия 1-го порядка, 2-го порядка, 3-го, n-го порядков). Например, если человек кого-то в какой-либо ситуации одолеет, то следствием 1-го порядка может быть его победа и удовольствие от содеянного, следствием 2-го порядка может быть ситуация, когда побежденный подаст заявление в полицию, и это уже не так приятно победителю, а следствием 3-го порядка будут время и ресурсы, которые необходимо потратить на урегулирование подобной ситуации. Интересно взглянуть на эффект ожиданий в контексте исследований Грегори Бейтсона, где описанный эффект может выглядеть как манипулятивная стратегия образом будущего. В лекции «Кризис в экологии разума. От Версаля до кибернетики» Г. Бейтсон показал, как желание прекратить Первую мировую войну и невыполнение тех обещаний, которые были провозглашены союзниками перед Германией, привели в короткой перспективе к желаемому результату – миру, но в долгосрочной перспективе ввергли человечество во Вторую мировую войну. В данном случае обещания, которые союзники дали Германии, были эффектом ожиданий, но таким эффектом, который был существенно изменен во время Версальского конгресса.



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Г. Бейтсон в связи с этим пишет: «Если вы что-то обещаете своему сыну, а потом отказываетесь от своих слов, и при этом ситуация включена в рамки высоких этических понятий, то вы, вероятно, обнаружите не только то, что он очень зол на вас, но также и то, что его моральные принципы деградируют, пока его чувства оскорблены вашей непорядочностью. Дело не только в том, что Вторая мировая война – естественный ответ нации, с которой обошлись подобным образом, значительно важнее то, что после такого отношения деморализации нации следовало ожидать» [4, с. 317].

Развивая данную мысль, можно признать, что если у кого-либо возникнет желание психологически сломать нацию, то такая технология уже готова. К. Юнг в интервью 1938 года показал, что появление такой фигуры, как Гитлер, было почти закономерным процессом, который «запустили» в 1919 г. при унижении Германии на Версальском конгрессе. К. Юнг настаивает в связи с этим, что для того, чтобы стать диктатором, мало внутрисемейных проблем, для этого необходимы травматические события, которые значительно превосходили бы масштаб одной личности или семьи [16].

Каждое событие имеет причину и последствия, и их нужно просчитывать при принятии решений. Поскольку то, что кажется позитивным в короткой перспективе, может таковым не оказаться в долгосрочной. Примеры, приведенные выше, касаются не только семейного противостояния или военного дела; они затрагивают почти весь спектр человеческой деятельности от межличностных отношений до проблем в образовании, медицине, экономике, технологиях и т. д.

В связи с этим проведем еще один пример, который демонстрирует, к чему приводит нежелание предвидеть будущее. Бурное развитие фармацевтической индустрии привело к тому, что медицина смогла побороть эпидемии (следствие 1-го порядка), но одновременно развитие лекарственной индустрии увеличивает зависимость людей от медикаментов, ослабляет их иммунитет (следствие 2-го порядка). В то же время фармацевтическая индустрия ведет свою «гонку вооружений» с вирусами, которые адаптируются, изменяются и становятся еще сильнее (следствие 3-го порядка). Можно ожидать, что в будущем медицина своими благими намерениями приведет к созданию какого-либо сверхмощного вируса, который будет совсем не просто победить (следствие 4-го порядка).

Современное прогнозирование развития общественного сознания также напрямую увязано с вопросом о порядке результатов. Пример с террористическими атаками в США 11

сентября 2001 может являться иллюстрацией того, как были учтены и спрогнозированы порядки результатов.

Вследствие скоординированных атак, осуществленных Аль-Каидой на Всемирный торговый центр и Пентагон, погибло около 3000 людей. После этого подавляющее большинство американцев пересело за руль автомобилей (следствие 1-го порядка). Рост интенсивности движения на дорогах имел печальные последствия. В сравнении с атакой Аль-Каиды количество дорожных происшествий со смертельным исходом оставалось вблизи среднего значения за предыдущие пять лет с 1996 до 2000 года. Однако в течение 12 месяцев после 11 сентября количество таких дорожных инцидентов в месяц превысило среднее значение за предыдущие пять лет. В целом за год 1600 американцев погибло на дорогах только потому, что приняли решение «не рисковать», то есть не летать на самолетах [7] (следствие 2-го порядка). Террористы 11 сентября 2001 наносят удар дважды; первый удар (сам теракт) видят все, а второй удар (последствия теракта) не замечает никто. Усама бен Ладен однажды с удовольствием отметил, как мало денег он потратил на то, чтобы нанести США такой огромный ущерб: «Аль-Каида» потратила на эту атаку 500 тыс. долларов, а Америка в целом потеряла – по самым низким подсчетам – более 500 млрд. долларов, то есть каждый доллар «Аль-Каиды» нанес ущерб Америке на один миллион долларов» [7]. Но на этом значение теракта не завершилось, так как были еще последствия 3-го и 4-го порядков. Следствием 3-го порядка стало вторжение международной коалиционной армии в 2001 году в Афганистан и в 2003 году в Ирак, что привело к длительным вооруженным конфликтам. Следствием 4-го порядка стала Арабская весна – ряд революций, охвативших страны Ближнего Востока. Причем следствие 4-го порядка можно отнести в определенной степени к социально-психологическим технологиям управления хаосом. В связи с этим нужно отметить, что по словам Манна Стивена, «настоящая ценность теории хаоса находится на высшем уровне – в сфере национальной стратегии. Хаос может изменить метод, с помощью которого мы рассматриваем весь спектр человеческих взаимоотношений, и в котором война занимает лишь особое место. Международная среда является прекрасным примером хаотической системы» [11]. Возможно, что технология управления хаосом была реализована в процессе самих революций в странах Ближнего Востока, которые, в свою очередь, были следствием экономического кризиса 2007 года.



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Исследователь Янир Бар-Ям показал, что тесные взаимоотношения между странами восточного мира привели к тому, что действия одной страны очень быстро распространились на другие, причем самым разрушительным и неожиданным способом. «Когда рынок ипотеки и рынок акций рухнул в 2007 году, деньги из этих рынков пошли на товарный рынок, включая товары сельского хозяйства и пищу, что способствовало росту цен на еду во всем мире» [3], и что вызвало революции в Тунисе и других странах Ближнего Востока в 2010 году, а также привело к длительному конфликту в Сирии.

В отношении новейшего развития общественного сознания Рэй Курцвейл прогнозирует, что технологии «шестого технологического уклада» совершат прорыв во всех сферах человеческой жизни. Более того, ученый видит только положительные изменения и последствия в этой высокотехнологичной революции. В своей статье «Как создать разум» он критикует ограниченность человеческого неокортекса (новых областей [коры](#) головного [мозга](#), которые у низших [млекопитающих](#) только намечены, а [человека](#) составляют основную часть коры. Новая кора располагается в верхнем слое полушарий мозга, имеет толщину 2–4 миллиметра и отвечает за высшие нервные функции – сенсорное восприятие, выполнение моторных команд, осознанное [мышление](#) и речь). Согласно Р. Курцвейлу, неокортекс обязательно должен быть дополнен его искусственным двойником, что даст человечеству возможность все делать гораздо быстрее: думать, фантазировать, учиться и т.д. [2]. По мнению ученого, данный прогноз в конце концов должен выработать в людях положительное отношение к такому высокотехнологичному будущему, которое ожидает человечество в рамках «шестого технологического уклада».

Однако, по нашему мнению, здесь не учтены те изменения в ценностных аспектах, которые будут сопровождать реализацию или возможную реализацию данного прогноза человечеством. Как быть, в частности, с переменами в морально-этических ценностях, как будет меняться рынок труда, как будет меняться законодательство? Первые шаги уже реализуются [6], но достаточно ли их? Кто будет иметь доступ к подобным технологиям – все люди или избранное меньшинство?

В связи с прогнозированием социального сознания необходимо сказать о выработке новейшего научного знания. Мишель Каллон указывает на два подхода, или способа выработки научного знания. Первый подход предполагает взгляд на знание как социально ангажированный продукт. Второй подход является следствием изучения самого объекта социальных наук,

который конструируется в рамках определенных сетей взаимоотношений, формируемых между исследователями и социальной системой [12]. Во время исследований, экспериментов ученые производят знания в виде графиков, моделей, артикулируя сложную сеть взаимоотношений в социальных системах разного типа. Эти сети или другими словами акторно-сетевые структуры, по мнению М. Каллона, могут не только распространять знания, они обладают способностью в определенных местах сетей получать с них определенные выгоды [12]. Бруно Латур идет дальше М. Каллона, показывая, что такими местами, в которых переформируются связи между участникам акторно-сетевых структур, являются лаборатории. В качестве примера он демонстрирует работу Луи Пастера по изучению сибирской язвы [5].

На сегодняшний день такими учреждениями, которые не только открывают новое знание, но и обеспечивают его эффективную циркуляцию и манипуляцию им в социальных системах, кроме лабораторий, являются аналитические центры. Знания, которые они создают, представляют собой совокупность экстраполяций в будущее, компьютерные программы, обеспечивающие прогноз. На деятельность таких аналитических центров интересно взглянуть с точки зрения тезиса Дюэма-Куайна относительно стратегии психологической манипуляции. Согласно этому утверждению, при достаточном воображении любая теория (неважно, состоит она из одного утверждения или из нескольких) всегда может быть спасена от опровержения, если соответствующим образом корректировать контекст знаний, с которым данная теория связана. По словам У. Куайна, «любое утверждение может сохранять свою истинность, если пойти на решительную переработку той системы, в которой это утверждение существует ... И наоборот, по той же причине ни одно утверждение не имеет иммунитета от его возможной переоценки» [10, с. 152].

Тезис Дюэма-Куайна можно рассмотреть в контексте прогнозирования. Предположим, что прогноз является тем утверждением, которое не следует опровергать. Данный прогноз может даже противоречить фактам или имеющейся информации. В таком случае можно так подбирать факты либо информацию, чтобы прогноз соблюл свою прогностическую ценность. В этой ситуации сам прогноз будет побуждать не только аналитиков, которые его создавали, но и тех, кто его будет постигать, склоняться к подтверждению. Склонность к подтверждению – разновидность когнитивной ошибки, которая заключается в том, что информацию, которая не



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подтверждает наши предыдущие концепции, отвергают или не учитывают [13].

Conclusion.

Таким образом, человечество вполне может относиться к прогнозу, как к психологической манипуляции. Сказать наверняка, что в XXI веке имеются прогнозы, очень сложно; при этом их можно оценивать не только как технологию предсказания будущего, но и как технологию манипулирования будущим, что дает возможность широко привлекать к оцениванию прогноза инструментарий по психотерапии и

социальной психологии. Таким инструментом может быть теория когнитивных ошибок, присущих как отдельно взятому человеку, так и огромным группам людей. В этом случае возникает вопрос о способах использования социального прогноза и его роли для формирования новейшего общественного сознания, что будет в конечном итоге определяться морально-этическими представлениями тех, кто создает либо предполагает прогностические ситуации или идеи.

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SECTION 21. Pedagogy. Psychology. Innovations in the field of education

THE THEORY OF INVENTORY PROBLEMS SOLVING IN THE ESP COURSE

Abstract: The article considers one of the most promising innovation technologies in education – the theory of inventory problem solving (TRIZ) applied to teaching English for special purposes (ESP). The study includes a brief review of TRIZ methodology in educational practices with the focus on non-technical university programs. The work reveals didactic potential of TRIZ-based ESP courses which enable students to gain skills to solve open type problems related to the professional linguo-conceptual sphere. The article contains some examples of TRIZ-based assignments aimed at the acquisition of professional vocabulary within an ESP course for fashion designers.

Key words: theory of inventive problem solving, TRIZ, TRIZ-pedagogy, TRIZ based education, innovation technologies in education, English for special purposes, ESP, professional vocabulary.

Language: English

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Introduction

The theory of inventory problems solving (TRIZ, derived from the Russian abbreviation) was elaborated by the Russian inventor G.S. Altshuller to provide an exact scientific algorithm for creative technical decisions [1]. It is based on the philosophy of Systematic Innovation that includes Contradiction (identifying and eliminating contradictions), Resource (using all components of the system to their maximum potential), Functionality (determining the main useful function), Space/Time/Interface (changing the perspective on problems) and Ideality (an ideal final result – benefits without cost and harm to the users) [2]. Altshuller suggested a list of 40 Creative or Inventive Principles which constituted basic methods of TRIZ for engineering problems [3]. Some of them are very specific but others turn out to be quite versatile (preliminary action, preliminary counteraction, periodic action, partial or excessive action, do it in reverse, segmentation, consolidation, extraction, dynamicity, new dimension, feedback, copying, asymmetry, universality, nesting, etc.) [4, 272-275]. Later on Altshuller and his followers developed these generic principles enabling their application in multiple areas of creative thinking [5-8]. Recent investigations on TRIZ also include scientific reflection about the essence of the TRIZ

principles and the ways they are applied to different creative tasks [9-10]. TRIZ obviously helps not only to overcome personal mental inertia but a commonly taught and perceived way of dealing with (un)standard problems. Since the second half of the 20th century TRIZ has been playing a significant role to exclude ‘the predominance of western creativity stereotypes within current scientific discourses’ [11, p. 500].

Today TRIZ has become a cross-disciplinary, generic methodology [12] that is being implemented worldwide in theoretical and applied creative practices such as engineering, design, management and education [13]. Growing interest in the methodological and practical potential of TRIZ resulted in its institutionalization. In 1997 International TRIZ Association (MATRIZ) [14] was founded by G. S. Altshuller in order to coordinate development of the international TRIZ movement. At the present, MATRIZ comprised of 87 regional TRIZ organizations including RATRIZ (The Association of Russian TRIZ developers, teachers and users [15]) is the most recognized union of TRIZ specialists in the world. In 1998 the Altshuller Institute for TRIZ Studies was established in Worcester (Massachusetts, USA), its mission being to grow productivity and innovation with application of TRIZ methods to



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medicine, agriculture, manufacturing and management [16]. The European TRIZ Association, ETRIA, founded in 2000 aims to 'establish a European TRIZ collaborative environment' through developing TRIZ theoretical basis and providing an exchange of knowledge on TRIZ based innovation technologies [17]. The ideas of TRIZ aroused great interest in Eastern academic communities, particularly in Japan where the national TRIZ Society strives for 'enhancing the TRIZ activities in Japan so as to contribute its empowerment of technology development and global competency' [18].

Special scientific events held annually in different countries are devoted to all aspects of TRIZ, thus the general topic of the 20th International Conference TRIZCON2018 (May 2018, Purdue University, West Lafayette, IN) is focused around "Celebrating TRIZ in Education, Industry, and Creativity" [19]. In addition to conferences proceedings, research articles and methodological training AIDS published, there is a monthly issued e-journal entirely dedicated to TRIZ, the TRIZ Journal, which serves as a discussion platform for TRIZ scholars and practitioners [20].

In spite of the fact that 'most of the concepts introduced in TRIZ are fuzzy, and most of the techniques are still heuristic and only partially formalized' [17] they contributed greatly to the General theory of strong thinking and the Theory of creative development of personality [21; 22]. This is especially valuable for developing innovation technologies in education.

Objectives and Methods

TRIZ Pedagogy

Though the theory of inventive problems solving (TRIZ) was originally conceived for industry domains, especially for engineering, manufacturing and design, its principles appeared to be applicable for many other non-technical areas, including politics, management, social systems, interpersonal relations [23, 3; 24], advertising, architecture, art, music, poetry, etc. [25]. In recent years TRIZ has been increasingly used as an innovative technology in educational programs not only in engineering subjects but also in teaching social sciences, humanities and arts [26-31], making it necessary to work out TRIZ-methodology for teaching purposes referred to as TRIZ-pedagogy [32-35]. The TRIZ theory is being applied to various educational modules and topics [36-38] as well as 'to the existing teaching methods and techniques with the main objective of enhancing students' creativity skills' [39, 102]. Nowadays about 50 universities worldwide offer some form of TRIZ education at various levels [40, 269].

The main idea of TRIZ-pedagogy is creativity training which includes formation of creative

imagination, overcoming mental inertia, development of associative and system thinking [40, 269-270]. In TRIZ-based educational courses students gain skills and develop abilities to successfully fulfil open type tasks of the very different kinds [41, 486-492]. TRIZ-methodology becomes critically important in modern conditions when there is a lack of challenge as a crucial component in knowledge acquisition process because educational assignments tend to be made too easy and students are allowed to choose themselves the subjects and topics to learn. Students are not learned to struggle with difficult problems [42]. TRIZ allows 'creativity to be approached systematically, providing the opportunity to teach anyone to be creative and to develop creative ability in any area of human activity' through 'the freedom to work without instruction as to when the work should be done, how, in what order, etc.' [34].

The basic ideas of TRIZ pedagogy include:

- the study of any subject as an evolving system;
- the relationship between various subjects through the patterns of evolution of systems;
- teaching students to consciously apply creative problem-solving methods;
- teaching any subject via demonstration of the solving of creative problems;
- mastering the methods for overcoming psychological inertia [34].

One of the educational fields where TRIZ-based methodology is being adopted relates to higher schools foreign language courses [43, 160-161]. ETRIA-Group in Latvia concentrates on the issues of learning foreign languages, especially English, using TRIZ-tools such as TA (Thinking Approach method) which is presented as a result of the application of TRIZ to language teaching. The TA allows to make teaching mass and individual at the same time (Emphasis on Learner's Individuality), simultaneously put students into active and passive roles (Peer Teaching), present one and the same lesson as both student and teacher centered (Course Dynamics) and so on [44, 92]. The considerable didactic potential of TRIZ [45, 1109-1112] including such procedures as brainstorming, synectics, morphological analysis and others which exposit students' creative thinking can be successfully implemented in an ESP course, for example [46, 52-53].

TRIZ as an educational tool in ESP courses

A non-linguistic university course of English for special purposes (ESP) has a number of specific features related, on the one hand, to a low level of foreign language competency and of self-motivation to learn a foreign language among students, and on the other hand, to a limited number of hours allocated for the corresponding discipline in the



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educational programs of specialized areas of training.

At the same time, the requirements of the Federal Standard for Higher Education for mastering a foreign language in many non-linguistic specialties are quite high even at the bachelor's level. To a large extent these requirements are due to the fact that in modern conditions professional activity in many spheres of science and production is impossible without basic knowledge of a foreign language, without mastering the English-language thesaurus of a particular specialty. Thus, the study of specialized vocabulary is the most important task in any ESP course.

The problem of active knowledge and use of specialized vocabulary by graduates of non-linguistic high schools is among the most critical ones. Existing ways of studying and memorizing special vocabulary are based on the following methods: grammar-translative method, textual-translative, thematic, context-comparative [47, 102].

In essence, the main difference between these methods is in the introduction of special terms prior to working with textual material or after introductory reading; using direct translation into Russian or a glossary in a foreign language; determining the meaning of the word from context or using auxiliary visual or lexical material [48-50]. The success of the application of each of these methods and the didactic techniques based on them depends, first of all, on the initial level of students' knowledge of English.

The complexity of the linguo-conceptual sphere of a number of technical specialties makes it difficult for most students of non-linguistic universities to work with an English-language glossary, so the presence of a vocabulary in the training manual that directly translates new terms into Russian is often not only preferable, but also necessary. However, this does not exclude the possibility of using the remaining methods as auxiliary ones. Moreover, it is possible to integrate these methods in the ESP course when using elements of TRIZ pedagogy.

The didactic possibilities of TRIZ applied to teaching English for special purposes can be illustrated with the use of the associations method and the catalog method in ESP courses for specialties related to creative and technical sectors of the fashion industry.

One of the main tasks in teaching students specialized vocabulary is the formation of an integral semantic field from separate professional terms, a kind of individual thesaurus of the specialty. In such an individual thesaurus, which is constantly expanding as the ESP course is mastered, all terms are not disjointed and isolated, but are connected by some essential relationships: adjacency (*lace – shoe*), similarity (*blouse – shirt*) or symbolic allusions (*shawl collar*). It looks as if they fill the matrix of the professional linguo-conceptual sphere, occupying a suitable 'cell' in it. That's how they should be

remembered – along with actual semantic links that create stable 'routes' of memory in the learner's mental map.

Lexical units can act with respect to each other as substitute words, 'neighbors', antipodes, words-generators of associations, etc., that is, they may enter into a relationship of synonymity, antonymy, oxymoron, etc. For example, in the course of ESP for the 'Costume design' or 'Design of garments' specialties the term *casual* can induce such semantic chains: *casual clothes – casual wear, casual – festive, casual – seasonal, casual black tie costume*.

Effective exercises for memorizing and active use of special terms are based on the method of monolingual associations. In addition to updating passive vocabulary, they contribute to the development of creative thinking among students, and the catalyst is not their native language, but English semantic space where such creative solutions can arise that are impossible in another language reality.

Unlike mnemonic techniques for memorizing foreign words, in the chains of monolingual associations there are no intermediate semantic units from another (native) language and no switch from one language field to another, which later on increases the speed of extracting foreign terms from the long-term memory.

In monolingual associative chains it is possible to use all already known terms from other thematic modules of the ESP course, resulting in a constant transition of the passive vocabulary into the active one. The main requirement is that the associative chain should not go into the semantic space of everyday and general literary language, but it must remain within the framework of the professional linguo-conceptual sphere.

Here is an example of a monolingual associative chain for the ESP course related to design and technology of garments. Let the new term be 'seam'. The monolingual associative chain may look like this: *seam – straight seam – straight skirt – frilled skirt – frilled collar – shawl collar – woolen shawl ...* In the assignment a condition can be imposed on the minimum number of 'links' in the chain or, for example, the associative chain must be looped back. Another variant is to compose a monolingual associative chain with 'unconnected' or even contradictive terms at its beginning and end (*heel – ... – ... – ... – keyboard*).

Students are allowed to use dictionaries, synopses, tutorials and educational aids. Exercises can be performed individually or in groups; according to the results of a collective discussion of the options obtained, the 'most creative solution' can be chosen.

Another TRIZ method referred to as the focal objects method or catalog method consists in the transfer of the attributes of randomly selected

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heterogeneous objects from one to another and subsequent creative interpretation of the resulting (sometimes quite absurd) combinations. Its essence lies in the associative search and use of the heuristic properties of randomness. In the ESP course a dictionary serves as the catalog where the initial words for associative attributes are taken from. These random initial words as well as attributes thought up by the students may not belong to the professional thesaurus but the interpretations must be connected with it in some way. For example, the words from the 'catalog' turned out to be: 'secret', 'merry-go-round' and 'leaf'. Associative attributes related to them may be *top, personal, mission* for 'secret'; *attraction, children, high* for 'merry-go-round'; *fallen, autumn, dry* for 'leaf'. Then there will appear the following word collisions composed by exchanging attributes: merry-go-round mission, high leaf, attraction secret, etc. The task is to apply these

striking word combinations to the objects, issues or ideas correlating with students' speciality and to explain them in a reasonable way.

Conclusion

TRIZ methods applied to in ESP courses not only provide cut-edge techniques of foreign language teaching but also contribute greatly to innovative educational technologies that are aimed at working up skills of creative thinking, overcoming mental inertia and developing imagination necessary for successful professional activity of future graduates. TRIZ techniques implemented in ESP courses enrich students' vocabulary through extending the semantic field of each term in their individual professional thesaurus. In some cases, associative chains and 'catalog' word combinations obtained at an ESP class can become a source of non-standard ideas for students' creative projects directly in their speciality.

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**SECTION 31. Economic research, finance,
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THE ASYMMETRIC AND NONLINEAR EFFECTS OF OUTPUT ON INFLATION FOR AUSTRALIAN ECONOMY

Abstract: The aim of this study is to test the asymmetric effect of output on inflation for the Australian economy, using a nonlinear autoregressive distributed lag (NARDL) model. The data are quarterly and cover the periods of 2000:01-2016:03. All data come from World Bank Databank. Using quarterly data for the period 2000:01-2016:03, we first investigate the nonlinear pass-through effects of output to inflation, using the Almon model. We then go on to employ the recently developed nonlinear autoregressive distributed lag (NARDL) model, to examine the asymmetric effects of output on inflation in the short and long runs. The results of Almon model show that the pass-through impact of output on inflation is nonlinear and negative for Australia economy. The Almon model estimates of the regression coefficients are found to satisfy the inverted U-shaped relationship between inflation and output. In particular, inflation increases (decreases) by 1.17 per cent if output decreases (increases) by 10 per cent, in the short run. On the other hand, inflation increases (decreases) by 0.65 per cent if output decreases (increases) by 10 per cent in the long run. The results of the NARDL model show that the symmetric effect of the output on inflation can be rejected in both the short and long run. These findings indicate that output affects inflation asymmetrically, in both the short run and the long run.

Key words: Almon model, nonlinear autoregressive distributed lag, Australian economy.

Language: English

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1. INTRODUCTION

The theoretical basis for the statistical evidence with regard to both output and inflation is limited. The effect of a permanent inflation shocks on the level of output to be positive, zero, or negative. The relationship between the slope of the short run Phillips curve, which is the inflation-output tradeoff, and the variance of the aggregate demand disturbance has been subject to intensive empirical investigation in recent years. On the theoretical framework within the rational expectations, the pioneering of Lucas (1973) has showed that inflation-output tradeoff parameter is inversely associated with the variance of the aggregate demand disturbances. The Lucas variability hypothesis states that the reaction of real output to changes in aggregate demand depends negatively on the

variance of the changes of aggregate demand (Yamak and Küçükkale, 1997).

The investigation of the presence of nonlinear mechanisms (the Phillips curve) between inflation and output has been an important topic in the recent literature. The presence of nonlinearities in the Phillips curve has relevant implications. The slope of the Phillips curve – measuring the response of inflation to output gap – affects directly the cost of disinflation (Correa and Minella, 2010). Bullard and Keating (1995) tested the relationship between inflation and real output in a large sample of postwar economies. They showed that permanent inflation shocks permanently increase real output growth rates. Stiglitz (1997), Eisner (1997), Laxton et al. (1999), Bean (2000) found evidence that the Phillips curve is nonlinear. Fischer (1991) and De Gregorio (1991) found evidence for a negative link between inflation and growth. Sarel (1995), and Andres and



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Hernando (1997) found a negative effect of inflation on output, not on the growth rate of output. They also found that there exists a nonlinear relationship. Levine and Zervos (1993) and Sala-i-Martin (1997) suggested that inflation was not a robust determinant of economic growth. However, Ericsson et al. (2001) implied that output and inflation are positively related in cointegrating relationships.

The aim of this study is to test the asymmetric effect of output on inflation for the Australian economy, using a nonlinear autoregressive distributed lag (NARDL) model. The data are quarterly and cover the periods of 2000:01-2016:03. In this study, we first investigate the nonlinear pass-through effects of output to inflation, using the Almon model. We then go on to employ the recently developed nonlinear autoregressive distributed lag (NARDL) model, to examine the asymmetric effects of output on inflation in the short and long runs.

This paper is organized as follows. Section 2 reviews data and methodology. In Section 2, the Almon estimation method of distributed lag models and nonlinear autoregressive distributed lags (NARDL) are given as theoretical. Section 3 raises empirical findings. Section 4 presents some conclusions.

2. DATA AND METHODOLOGY

2.1. DATA

The data are quarterly and cover the periods of 2000:01-2016:03 for the Australian economy. All data come from World Bank Databank. Before starting the analysis, consumer price index was seasonally adjusted by using the Census X12 method. The details of all variables are given in Table 1.

Table 1

Symbols Used for Variables

GDP	Gross Domestic Product, Real, Seasonally Adjusted
CPI	Consumer Prices, Seasonally Adjusted
LCPI_t	The logarithm of the consumer price index level at time t
OUTPUT_t	The logarithm of the gross domestic product (GDP) at time t
π_t	Inflation Rate, $\pi_t = LCPI_t - LCPI_{t-1}$

2.2. METHODOLOGY

This paper addresses how the output does asymmetrically pass on to the inflation both the short and long run. In this paper, asymmetric and nonlinear pass-through of the output to the inflation is tested.

The econometric process used is followed in this way:

Firstly, as an empirical enquiry, we deal unit root tests procedures to determine whether output and inflation variables are indeed stationary. We use two different unit root tests to determine whether the output and inflation series are stationary: developed by Dickey and Fuller (1979) (Augmented Dickey-Fuller (ADF)) and by Phillips and Perron (1988) (PP).

Secondly, we determine the nonlinear relationship between output and inflation by employing Almon model¹.

Thirdly, we analyze the recently developed nonlinear autoregressive distributed lags (NARDL) model to examine the asymmetric effect of output into inflation. This approach allows us to simultaneously test the short- and long-run nonlinearities through positive and negative partial sum decompositions of the predetermined explanatory variables.

2.2.1. THE ALMON ESTIMATION METHOD OF DISTRIBUTED LAG MODELS

The Almon estimation method is a procedure for estimating a distributed lag model one that uses polynomial distributed lags to specify the lag structure and the Lagrangian interpolation coefficients to specify the zero constraints in the lag structure (Monroe, 1981: 46).

We consider the distributed lag model.

¹Almon, 1965.

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$$Y_t = \gamma + \beta_0 X_t + \beta_1 X_{t-1} + \dots + \beta_p X_{t-p} + u_t = \gamma + \sum_{i=0}^p \beta_i X_{t-i} + u_t \quad (1)$$

where (u_t) is an uncorrelated random variables with zero mean and constant variance σ^2 and (X_t) is distributed independently of (u_t) .

According to Almon model (1), all coefficients (β_i) are defined by polynomial (2). In polynomial (2), r is the degree of the polynomial.

$$\beta_i = f(i) = \phi_0 + \phi_1 i + \phi_2 i^2 + \dots + \phi_r i^r \quad (2)$$

For example, we have decided on a maximum lag-length ($p = 4$), and we have chosen a degree ($r = 3$) for the approximating polynomial (Köseoğlu ve Yamak, (2015), Erdem and Yamak (2016)), then we can re-write (3 and 4) as:

$$Y_t = \gamma + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \beta_3 X_{t-3} + \beta_4 X_{t-4} + \varepsilon_t \quad (3)$$

$$\beta_i = f(i) = \phi_0 + \phi_1 i + \phi_2 i^2 + \phi_3 i^3 \quad (4)$$

Then, the polynomials are modeled as:

$$\beta_0 = f(0) = \phi_0 \quad (5)$$

$$\beta_1 = f(1) = \phi_0 + \phi_1 + \phi_2 + \phi_3 \quad (6)$$

$$\beta_2 = f(2) = \phi_0 + 2\phi_1 + 4\phi_2 + 8\phi_3 \quad (7)$$

$$\beta_3 = f(3) = \phi_0 + 3\phi_1 + 9\phi_2 + 27\phi_3 \quad (8)$$

$$\beta_4 = f(4) = \phi_0 + 4\phi_1 + 16\phi_2 + 64\phi_3 \quad (9)$$

We place (5-9) into (3), we get as:

$$Y_t = \gamma + \phi_0 W1_t + \phi_1 W2_t + \phi_2 W3_t + \phi_3 W4_t + \varepsilon_t \quad (10)$$

where W series are derived by using X series by following equations:

$$W1_t = X_t + X_{t-1} + X_{t-2} + X_{t-3} + X_{t-4}$$

$$W2_t = X_{t-1} + 2X_{t-2} + 3X_{t-3} + 4X_{t-4}$$

$$W3_t = X_{t-1} + 4X_{t-2} + 9X_{t-3} + 16X_{t-4}$$

$$W4_t = X_{t-1} + 8X_{t-2} + 27X_{t-3} + 64X_{t-4}$$

2.3. NONLINEAR AUTOREGRESSIVE DISTRIBUTED LAGS (NARDL)

The linear ECM specification without asymmetry in short- and long-run dynamics takes the following form

$$\Delta Y_t = \mu + \rho_Y Y_{t-1} + \rho_X X_{t-1} + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{i=0}^{q-1} \beta_i \Delta X_{t-i} + \varepsilon_t \quad (11)$$

The co-integrating NARDL model of Shin et al. (2011) allows for short- and long-run asymmetries.

This model uses the decomposition of the exogenous variable X_t^+ into its positive ΔX_t^+ and negative ΔX_t^- partial sums of increases and decreases such as

$$X_t^+ = \sum_{j=1}^t \Delta X_j^+ = \sum_{j=1}^t \max(\Delta X_j, 0) \text{ and } X_t^- = \sum_{j=1}^t \Delta X_j^- = \sum_{j=1}^t \min(\Delta X_j, 0) \quad (12)$$

When the asymmetries in the short- and long-run dynamics are introduced into the standard ECM, Shin et al. (2011) show that Eq. (11) is extended to obtain a more general co-integration model as follows

$$\Delta Y_t = \mu + \rho_Y Y_{t-1} + \rho_X^+ X_{t-1}^+ + \rho_X^- X_{t-1}^- + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{i=0}^{q-1} (\beta_i^+ \Delta X_{t-i}^+ + \beta_i^- \Delta X_{t-i}^-) + \varepsilon_t \quad (13)$$

The superscripts (+) and (-) in Eq. (13) denote the positive and negative partial sums decomposition defined above, p and q represent the lag orders for the dependent variable and the exogenous variable in distributed lag part, respectively.

The long-run symmetry can be tested by using a Wald test of the null hypothesis $\rho_X^+ = \rho_X^-$. The positive and negative long-run coefficients can then be computed as $\theta^+ = -\rho_X^+ / \rho_Y$ ve $\theta^- = -\rho_X^- / \rho_Y$. The short-run adjustment to a positive and a negative shock in the X is captured by the parameters β_i^+ and β_i^- respectively. The short-run symmetry can equally be tested by using a standard Wald test of the null hypothesis $\beta_i^+ = \beta_i^-$ for all $i=0, \dots, q-1$. The model in Eq. (13) reduces to the traditional ECM if both null hypotheses of short-run and long-run symmetry are not rejected. The non-rejection of either the long-run symmetry or the short-run symmetry will yield the co-integrating NARDL model with short-run asymmetry in Eq. (14) and with long-run asymmetry in Eq. (15), respectively.

$$\Delta Y_t = \mu + \rho_Y Y_{t-1} + \rho_X X_{t-1} + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{i=0}^{q-1} (\beta_i^+ \Delta X_{t-i}^+ + \beta_i^- \Delta X_{t-i}^-) + \varepsilon_t \quad (14)$$

$$\Delta Y_t = \mu + \rho_Y Y_{t-1} + \rho_X^+ X_{t-1}^+ + \rho_X^- X_{t-1}^- + \sum_{i=1}^{p-1} \alpha_i \Delta Y_{t-i} + \sum_{i=0}^{q-1} \beta_i \Delta X_{t-i} + \varepsilon_t \quad (15)$$

When asymmetry is detected in the ARDL model (either in the short run, in the long run or in both), the asymmetric responses to positive and negative shocks (i.e., positive or negative variations of the X oil prices) are respectively captured by the positive and negative dynamic multipliers associated with unit changes in X^+ and X^- as follows

$$h \rightarrow \infty, m_h^+ \rightarrow \theta^+, m_h^- \rightarrow \theta^-$$

$$m_h^+ = \sum_{j=0}^h \frac{\partial Y_{t+j}}{\partial X_t^+} \text{ and } m_h^- = \sum_{j=0}^h \frac{\partial Y_{t+j}}{\partial X_t^-} \quad h=0, 1, 2, \dots$$

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Based on the estimated multipliers, one can observe, following a shock affecting the system, dynamic adjustments from the initial equilibrium to the new equilibrium between the system variables (Atil et al. 2014: 568-569).

3. EMPIRICAL FINDINGS

Before applying the methodology given in Section 2, unit root test procedures were used to

determine the stationary characteristics of output, inflation. The Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) approaches were separately applied to all variables. Table 2 presents the results of the ADF and PP test statistics with and without the inclusion of a trend detecting a unit root in the levels and first differences of the variables. As seen as Table 2, output was to be stationary in its first differences. However, inflation was found to be stationary in its level.

Table 2

Unit-Root Test Results

ADF Unit-Root Test Results				
Variables	Level		First Difference	
	Constant	Constant+ Trend	Constant	Constant + Trend
$OUTPUT_t$	-1.4671	-1.0177	-7.1155 ^a	-7.2748 ^a
π_t	-7.5245 ^a	-8.0944 ^a	-7.0288 ^a	-6.9975 ^a
PP Unit-Root Test Results				
Variables	Level		First Difference	
	Constant	Constant+ Trend	Constant	Constant + Trend
$OUTPUT_t$	-1.6669	-0.9238	-7.0408 ^a	-7.2855 ^a
π_t	-7.5223 ^a	-8.1258 ^a	-19.4979 ^a	-20.3131 ^a

Note: ^a, ^b, and ^c denote significance level of 1%, 5% and 10%, respectively.

3.1. EMPIRICAL FINDINGS: OUTPUT → INFLATION

3.1.1. THE EMPIRICAL FINDINGS OF ALMON MODEL: PASS-THROUGH EFFECT OF OUTPUT TO INFLATION

According to Akaike info criterion, optimal lag is 4. So, the duration of the impact of output on the inflation is one year. As seen as Table 3, In short run, if output 10% ↑, inflation 1.17%↓; in long run, if output 10% ↑, inflation 0.65%↓. The pass-through effect of output to inflation is negative.

Table 3

The Results of Non-linear Distributed Lag Almon Models

$\beta_i = f(i) = \phi_0 + \phi_1 i + \phi_2 i^2$ $\hat{\pi}_t = 0.0452 + 0.1068W1_t + 0.004W2_t - 0.054W3_t$				
R-squared	0.101141			
F-statistic	2.212917			
Prob(F-statistic)	0.096040			
Lag Distribution of OUTPUT	β_i	Coefficient	Std. Error	t-Statistic
* .		-0.11749	0.06952	-1.69003
. *	β_1	0.04873	0.03219	1.51388

The short run effect of output on

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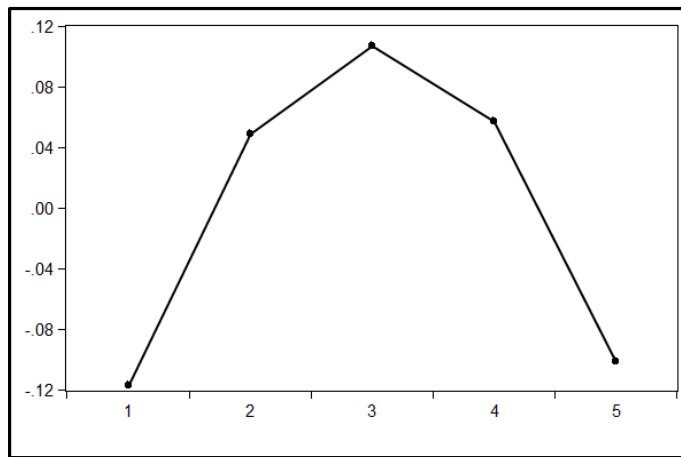
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* . * * .	The long run effect of output on	β_2	0.10682	0.05522	1.93437
		β_3	0.05677	0.03445	1.64778
		β_4	-0.10141	0.06422	-1.57909
		Sum of Lags	-0.00659	0.00352	-1.87308

In Graph 1, the pass-through of the output to the inflation is shown. According to the Graph 1, the pass-through impact of output on the inflation is non-linear in the case of Australia. The Almon model estimates of the regression coefficients are found to

satisfy the inverted U-shaped relationship between inflation and output. Time variation on the regression coefficients and the inverted U-shaped curve is significant.

Graph 1. Output→Inflation



3.1.2. THE EMPIRICAL FINDINGS OF NARDL MODEL: IS PASS-THROUGH EFFECT OF OUTPUT TO INFLATION ASYMMETRIC OR SYMMETRIC?

The obtained results of the NARDL model are reported in Table 4. Wald tests are then conducted to examine the hypotheses of short-run and long-run symmetry. The results from these tests applied to the estimates of the NARDL model with short-run and long-run asymmetries indicate that the long-run and short-run symmetries can be rejected for the output–inflation relationship at the 10% level. Therefore, the

output asymmetrically passes on to the inflation both the short and long run. The results of diagnostic tests on the residuals for serial correlation (LM₁, LM₂, LM₃, and LM₄) and heteroscedasticity (ARCH) are given in Table 4. There is no any model suffering from any autocorrelation problem. The calculated χ^2 is not greater than the critical value. Therefore, the null hypothesis that indicates non-existence of autocorrelation cannot be rejected at any significant level, and the heteroscedasticity does not appear to be a diagnostic problem on residuals.

Table 4

The Results of NARDL with Long run and Short run Asymmetry

Dependent Variable: $\Delta\pi$				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
<i>C</i>	0.011504	0.002526	4.554320	0.0000
$\pi(-1)$	-1.207774	0.270309	-4.468131	0.0000
<i>OUTPUTPOS(-1)</i>	0.006180	0.008411	0.734765	0.4658
<i>OUTPUTNEG(-1)</i>	0.381416	0.200304	1.904182	0.0625
$\Delta\pi(-1)$	0.325499	0.217819	1.494353	0.1412

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$\Delta\pi(-2)$	0.262068	0.185800	1.410486	0.1645
$\Delta\pi(-3)$	0.060010	0.124429	0.482281	0.6317
$\Delta\pi(-4)$	-0.054133	0.085208	-0.635311	0.5281
$\Delta OUTPUTPOS$	-0.273831	0.119583	-2.289876	0.0262
$\Delta OUTPUTNEG$	0.585867	0.424196	1.381125	0.1733
R-squared	0.564170			
Akaike info criterion	-8.527600			
F-statistic	7.335345			
Prob(F-statistic)	0.000001			
LM ₁	0.037350 [0.8468]	LM ₂	2.815540 [0.2447]	
LM ₃	4.028313 [0.2584]	LM ₄	5.744181 [0.2191]	
ARCH	0.042635 [0.8364]			
Wald _{LONG-TERM} Test	3.786396 [0.0572]	Wald _{SHORT-TERM} Test	3.071363 [0.0857]	
LONG-TERM _{OUTPUTPOS}	0.0051168	LONG-TERM _{OUTPUTNEG}	0.3158	

Figures 1-2 present CUSUM and CUSUMSQ of the NARDL model. As can be seen from Figures 1-2, the plots of CUSUM and CUSUMSQ statistics stay within the critical bonds of 5% level of significance.

Thus, the null hypothesis that in the given regression are stable cannot be rejected at the 5% level. Therefore, all coefficients of the given regression are stable.

Figure 1. CUSUM

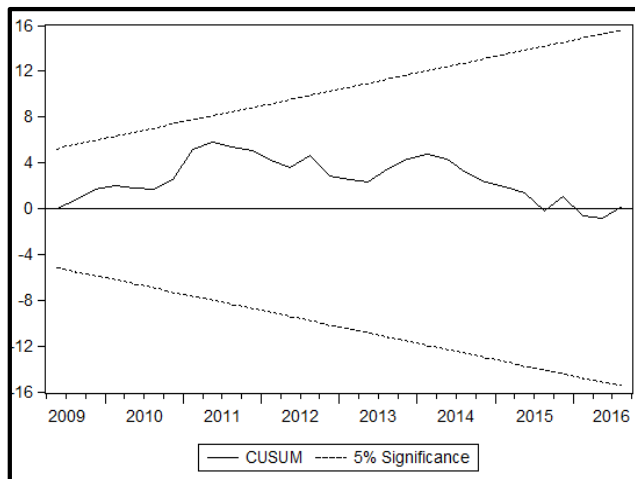
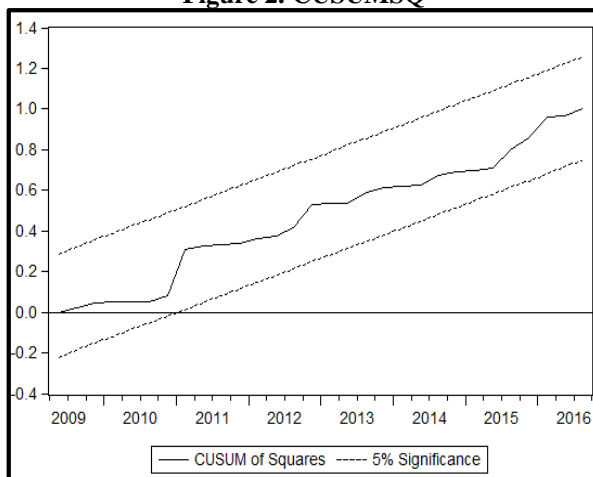


Figure 2. CUSUMSQ



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4. CONCLUSION

The theoretical basis for the statistical evidence with regard to both output and inflation is limited. There is a growing interest in the asymmetric interplay between inflation and output. There is a gap in the literature as none of the previous studies concurrently examined both the size and sign effects of the output on inflation. The purpose of this study is to examine asymmetric effect of output on inflation for the Australian economy, using a nonlinear autoregressive distributed lag (NARDL) model. In this study, the nonlinear pass-through effects of output to inflation were investigated, using

the Almon model. The data are quarterly and cover the periods of 2000:01-2016:03. All data come from World Bank Databank. According to the findings, the output asymmetrically passes on to the inflation both the short and long run. The Almon model estimates of the regression coefficients are found to satisfy the inverted U-shaped relationship between inflation and output. The pass-through impact of output on the inflation is non-linear in the case of Australia. In particular, inflation increases (decreases) by 1.17 per cent if output decreases (increases) by 10 per cent, in the short run. On the other hand, inflation increases (decreases) by 0.65 per cent if output decreases (increases) by 10 per cent in the long run.

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SECTION 29. Literature. Folklore. Translation Studies.

CHANGING TURKESTANI CODES OF BEHAVIOR FROM THE 19TH TO THE 20TH CENTURE REFLECTED IN TWO CLASSIC UZBEK NOVELS THE DAYS OF OLD AND THE NIGHT AND THE DAY

Abstract: This article consider changes in the way of life and morale of Turkestani in the late 19th and the first half of the 20th centuries, reflected in Uzbek classical novels. A comparative analysis of the heroes' behavior in the A. Cholpan and A. Kadiry's novels shows that the writers managed to reflect changes in the value system of that time, characterized by a shift in the emphasis of people's attention from the spiritual to the real world, facilitated by political, economic and cultural changes in the life of society.

Key words: Turkestan, spiritual improvement, Jadids movement, independence, national self-consciousness, responsibility, compassion, justice, development of the nation.

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Introduction

Morality and ethics form specific codes for human behavior and social relations. Changes in people's personal and social lives cause alterations in those codes. One of the ways to learn about them is to explore literary works that reflect important steps in the life of a nation. Two Uzbek Classics *The Days of Old* by A.Kadiry (1994-1938) and *The Night and the Day* by A.Cholpon (1897-1938) give a clear picture of the most important changes occurred in the history of our country in the beginning of the previous century.

The end of the 19th and the beginning of the 20th century changed life in greater Turkestan. It became a part of the Russian Empire in the 1860s, and that change influenced economic and social relations in the region. In 1917, Russia experienced two big revolutions. Likewise, in 1917, in the same spirit of revolution and the struggle for independence, a Turkestan Autonomous State (27.11.1917 – 9.02.1918) was announced in Kokand. However, in three months it was destroyed by the Bolshevik Army. In 1920, the Bolsheviks captured Bukhara (Bukhara Empire 1785-1920), and in 1922, Greater Turkestan became part of the Soviet Union and was

divided into several Soviet Socialistic Republics; Uzbekistan became one of them.

Behind these political events the life of the nation flowed. However, we have to admit that while passing through all those historical periods the nation could not keep its life style as well as its code of behavior unchangeable. Precisely, we have four different images of the country, one for each period:

1. Traditional Turkestan before Russian invasion (up to 1860s)
2. Turkestan as a part of Russian Empire (1860s-1917)
3. Turkestan striving for Independence (1917-1918)
4. Turkestan as a part of Soviet Union (from 1918 to 1924 when Uzbek SSR was formed and further).

The novels we are going to discuss in this article were written in the fourth of the listed periods in 1925 – *The Days of Old* and in 1936 – *The Night and the Day*, however, both of them describe the earlier days. Indeed, A.Kadiry concentrates on the first period (before 1860s), while A.Cholpon writes about the second one (Turkestan as a part of the Russian Empire). Looking back into the past, both of the writers tried to depict “the hero of the epoch”.



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Comparing information about the main characters of the novels we will analyze the changes occurred in the living code of the nation during these two earlier periods of our history.

Code of behavior in *The Days of Old*

Professor Edward A. Allworth defined the first Uzbek realist novel *The Days of Old* (1925) by A.Kadiry as a “beautiful novel” the best among all written in the twenties [4]. The novel remained in the center of scholar attention both in the past [3; 21; 1; 5] and in present [18; 7; 28;]. Every word or a phrase in it cause some deep critical reflections [29; 25] or philosophical interpretations [26]; scholars continuously admire its accuracy in presenting national traditions and local color [16], its mastery in depicting the characters’ personalities in it [12; 13]. Some critics emphasized its relation to the folk epics and to adventurous novels [20, p. 102; 19], others concentrated on the roots of historical events [2, p. 76-78] and national traditions[17, p. 27-29] described in the novel, analyzed peculiarities of the old and new generations in the novel [14, p. 93-99]. Scholars presented new interpretation of the images in the novel [23, p. 159-167; 24] and information about the history of its publication [30, p. 44-48]. They observed linguistic features of the novel [21, p. 31-34; 15, p. 85-87] and even explored the letters included into its text [27, p. 38-45]. We will look at the fiction from a different perspective: to learn the life style and code of behavior of its people.

As it was stated above, the novel visualizes the second part of the 19th century – life in Turkestan before the Russians’ invasion. The fictional time captures a period from 1847 to the 1860s. In the introduction, the writer set as his goal presentation of the story of modern Tahir and Zuhra, Farkhad and Shirin, declaring that the novel is a love story [11, p. 3]. However, he created an expansive picture of the epoch that included the blossoming and decline of Musulmakul’s (executed in 1852) reign and the first steps of Khudoyar-Khan (1829-1886) as a ruler of the country. Inter-ethnic enmity, along with the rulers’ struggle for power, produced tremendous bloodshed. Against the backdrop of these cruel historical events a beautiful love story between Otabek and Kumush develops.

In *The Days of Old* Turkestan is metaphorically presented as Islamabad – the region where Islam is blossoming. B. Karim speaks of “the divine light that permeates the whole novel.” All the best heroes of the *Days of Old* are distinguished by Muslim (humble) obedience to the will of God: “For all the will of God!” (“Hammasi Hudoning taqdiri” [11, p. 323]), and the constant readiness for death, which may come at any moment, when God wills to end the earthly trials of man: “I trust you to God, Kymush, if my death comes, and I die without seeing you, bless me (do not bear me a grudge)” (“Hudoyga topsirdim

Kumush, qazom etib ku’rolmay u’lsam, mendan rozi bu’li!” [11, p. 347]),”With God will, you’ll get well, my child!” (“Hudo shifo berar, bolam” [11, p. 367]. Such expressions in the text are countless. People follow the Islamic code of life in the novel and the writer himself, recreating the real picture of the past of Turkestan, followed the Muslim worldview, reflecting it in the construction of the plot, in understanding the fate, characters’ behavior and even the time measurement. Observing the uniqueness of the time category in the novel, B.Karim noticed that the author set time here in accordance with five daily prayers, obligatory for Muslims: “after the adhan to Fajr was performed...” (“subkh azoni aytilib...”), “at the time when the adhan to Asr was heard...” (“asr azoni eshitilgan vaqtda...”), “after the Maghrib...” (“shomdan su’ng...”), “after praying Isha...” (“khufton namozidan su’ng...”) [9, p. 6-7].

That influences people and form the uniqueness of their code of behavior, which is represented by the main characters of the novel. Yusufbek Hadji and his son Otabek both follow religious traditions and rules in social and political life. However, even those closely related people have some differences in their attitude towards life. To see that, we have to look closely to the father and son separately.

Yusufbek Hadji – well educated, kind hearted and just – represents best qualities of the elder generation in the novel. His image is parallels that of the Biblical character Joseph, son of Jacob, and the Islamic prophet Yusuf. He is an adviser to the Tashkent ruler Azizbek. We can state some specific features of his personality, which affect his behavior code:

Yusufbek Hadji serves God but not earthly rulers. His success and failure he accepts as tests. He prays and returns to God in happy and sad moments. He asks to save and protect his son, but patiently accepts his death as God’s will.

Yusufbek Hadji stands for truth even if it costs him life. As an adviser, he stops Azizbek when he sentenced someone to death. Arguing with the ruler was never safe, but Yusufbek Hadji insisted until Azizbek had to say: “Well, leave this person alone, but take and kill Yusufbek Hadji instead of him”.

Yusufbek Hadji sees his duty in protecting people and their cultural heritage, which here means religion. He warns against possible Russian invasion. He believes that if the Russians come, they will destroy people, their traditions and faith.

Yusufbek Hadji mostly listens and speaks only when truly necessary. He explains the rules of behavior to people, teaches his wife to keep justice toward their daughters-in-law, and teaches his son’s wives to keep peace at home.

Yusufbek Hadji is much respected. A Tashkent revolt against the ruler Azizbek started after Yusufbek Hadji addressed people about new unbearable taxes, which the ruler ordered them to



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pay. As a result, Azizbek was removed, and Nurmuhammad qushbegi started to rule in Tashkent as a regent placed by Kokand's Khan.

Yusufbek Hadji reached one of the highest points on the way to perfection. He does not accept inter-ethnic enmity. After killing Musulmakul, the ruler Khudoyar Khan ordered the extermination of all kipchaks in his kingdom. Yusufbek Hadji helped people escape from the Khan's soldiers. He alone could not do much, so the number of victims was enormous.

His son Otabek follows his example; however, he belongs to a new generation and he has his own specific features, which make him outstanding and unique. The author points out the exceptional character of the hero in the description of his room: "the room is more beautiful than others" ("boshkalarga karaganda ku'rkamroq bir khujra" [11, p. 5]), his appearance: "The owner of this room is also created differently" ("Bu hujraning egasi ham boshchacha yaratilishda" [11, p. 5]), and in the hero's rare ability to love: "Love is the pearl of the heart, which is awarded to extremely rare young men" ("Mukhabbat juda oz yigitlarga muyassar bludagan yurak javharidir" [11, p. 25]). His dignity is confirmed not only by his close ones: in Margilan he was immediately appreciated (Mirzakarim Kutidor: "Allah comprehensively gifted the boy from many sides" ("Hudo har narsadan bergan yigit ekan", Akrom Hozhi: "I would elect Atabek as Khan" ("Khon qilib Otabekni ku'tarar edim!" [11, p. 18]).

Otabek is exceptionally decent and worthy of his noble father. He is as unchangeably honest and brave as his father in every situation is. Before sentencing him to death, Musulmankul says, "Such a brave heart you have, boy! Unfortunately your guilt has been proved".

Otabek is different from many young people around. He is very handsome, but his true beauty is in his heart. He is an obedient son who never hurts anyone's feeling. He cherishes love as a treasure. Even if he does not love his second wife, he is just in his relationships with both his wives, as well as with everyone else.

Otabek is ready to fight for and protect his love. Possessing strong spiritual power, after losing Kumush, he abandons life to strive for perfection.

However, as a representative of the new generation, Otabek combines traditional worldview with the trends of a new era. It makes his code of behavior different from that of his father.

Otabek cares for the future of his nation but realistically sees negative traits in people. Unlike his father, Otabek admires the Russians' ability to organize work and trade. He wants his people to do the same, but he knows they will not accept this idea.

Otabek is also not as perfect as his father is. He revolts against family traditions and evil. He also cannot forgive: he divorces his second wife (who

poisoned Kumush out of jealousy), and leaves his parents, blaming them for the happening.

Despite of those differences, Otabek remains a representative of the old traditional Turkestan, which accepted Russians as inevitable enemies. Otabek dies in 1852 trying to protect his country and its traditional values in the battle against the Russians in Oq-Maschit – the northwest fort of Turkestan (the present-day city of Kyzylorda in Kazakhstan).

Writing this novel A. Kadiry looked back more than 60 years. He bravely idealized the past and openly regretted it. With his novel *The Night and the Day* A. Cholpon took a different approach in observing the ways for the national development. He analyzed the recent past (around 20 years back in time) and told about the Jadids movement.

Jadids movement and the code of behavior in *The Night and the Day*

Initially, the democratic movement of the Enlightenment, and later the form of the struggle for the national independence – the Jadids movement arose in the late XIX – early XX centuries. It was founded by Ismoil Gasprinsky, who began publishing the newspaper *Tarjimon* in Bakhchisaray in 1883. In two years, 200 copies of this edition were distributed in Turkestan [10]. At the same time, the first schools of Jadids (Jadid – "new" in *Arabic*), and their first societies began to appear here. Although the movement ceased to exist in the late 20's - early 30's, the flourishing of the Jadids literature falls on the second decade of the twentieth century, when the most significant works of this direction were created. Jadids essentially renewed Uzbek literature, modified it using new ways of versification, and enriched by new genres: a drama in theatre and a novel in literature. Starting at the beginning of the 20th century the Jadids movement enhanced educational development in the region. However, in the Soviet Union it was destroyed due to its nationalistic nature. By the time A. Cholpon wrote his novel, all jadids were either killed or imprisoned. However, A. Cholpon presented the movement as if it was the only hope Turkestan had for its development. He permitted the protagonist of the novel, Miryakub, to become a follower of the movement. Miryakub chose a path to serve his nation, to contribute to its cultural and economic development, making a "new" national "hero of the time". However, analyzing Miryakub's behavior and understanding of life, we see how greatly his morals and ethics differ from those of his predecessors.

Miryakub does not care that Russians are ruling in the country, and he successfully collaborates with them. As a businessperson, he knows how to solve problems and defend his own interests even if they are not pure and justifiable. He is flexible, but this also means he is dishonest. He behaves differently in different situations.



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Miryakub is able to destroy other people's lives if it helps him to win the case. In order to save mingboshi from scandal he badmouths good people and wins. He arranges mingboshi's last marriage to Zebi, so her life is wrecked.

Miryakub does not care about "purity" in his personal life, too. He is the "respectable" visitor of a brothel. He spends a night with the wife of a Russian regent *naib* and tries to prove that it was in order to develop his business.

Miryakub is skeptical about soul perfection and measures everything by the money he makes. In his inner dialogue with the "supreme judges" he proves that he lives as most rich people live in his time. He knows everything about faith, but he never prays.

Difference between Miryakub and his predecessors, however, is not only in his brutal personality. A.Cholpan begins his novel where A.Kadiri finishes it. *The Days of Old* is a novel about the complex path of man's spiritual perfection, his path to Light. A. Cholpan, apparently, believes that the road built by A. Kadiri in his novel leads nowhere, and that longing for only spiritual improvement in the modern world is far from sufficient. Moreover, the world A.Cholpon describes in his novel is far from "Islamabad" in A.Kadiry's novel. In the text of *The Night and the Day*, it seems that God does not exist at all. There is an old bribe taker - ishan - the source of all Zebi's troubles, and the young libertine - a mullah from Kumaryk. A few strong phrases of protest, voiced by the younger generation to the Creator, practically drain the entire religious theme of the novel. So, Onakhon - Zebi's close friend - in response to her mother's words that "the poor are the beloved creations of Allah", blasphemes: "And is this the position of the beloved?" ("...shumi suygan bandaning holi?" [8, p. 31]), complaining that she has not enough money to treat her friends-guests, as she would like. As well as the young people of the village say getting indignant about the power of the Mingbashi: "Why does God always give only such bastards? Why He doesn't give us at least a bit (of fortune)?" ("Hudo hadeb shunaqa insofsizlarga berar ekan-da! Biz bechoralarga ham bir narsa uzatsa-chi!"). Consequently, the old people raise their sticks on them for their blasphemous words, and the young evade the blows, but continue the same joke, "Why are you running away? See, God gives you. Get your share!" ("Nimaga qochasan? Hudo senga ham berayotir, olmaysanmi?" [8, p. 54]). The only person in the novel, who sincerely and relentlessly seeking God, but does not find, is Razzaq-sufi - the unfortunate father of Zebi, deceived by his money-loving mentor - ishan.

In his book *Human All Too Human* [22], Nietzsche described features that both of these novels demonstrate in detail. In accordance with the great philosopher, people of new era have:

- No responsibility. In *The Days of Old* Zaynab poisoned her rival Kumush and ran mad after understanding the harm she brought. However, in *The Night and The Day* Poshshakhnon tried to poison her rival but instead killed mingboshi and felt no guilt. Zebi was exiled instead of her.

- No compassion. In *The Days of Old* friendship, understanding, respect, love, and compassion - all have great meaning, while in *The Night and the Day* people do not care about each other. Zaynab is not taken to court when her madness was proved, but nobody feels sorry about Zebi and her parents even if she is innocent.

- No justice. In *The Days of Old* evil is punished and the suffering of the main characters is accepted as another step on their way to perfection. In *The Night and The Day* whoever tries to keep justice - loses: mingboshi lost his job, Zebi lost her freedom.

A. Cholpon published only the first part of his novel. The second part - *The Day*, even if it was started, disappeared after Cholpon's death. However, the whole logic of the novel *The Night* brings us to the opinion that *The Day* will not come.

Analyzing the negative features of the Renaissance, Russian scholar N.Berdyayev emphasized that it released people from God and started all disasters of future centuries [6]. It would be easy to claim that people in *The Night and The Day* in comparison with the *The Days of Old* forgot about God and started to act badly. However, there were more reasons for their behavior, and the most important is the changes in real life. By the beginning of the 20th century in Turkestan there were:

New economic relations caused by its annexation to the Russian Empire.

The rapid development of transportation, trade, and business.

The need for education and the knowledge of the real world instead of the spiritual world and the world of the hereafter.

A new understanding of national "self" and the demand for national development.

Here the reason why A.Cholpon made Miryakub a protagonist of the novel rests. According to the writer, only the way of Miryakub - an active life for the benefit of the nation - can lead to success. He really is an adventurer, able to find a way out of any situation, but A.Cholpon admires him for his creativeness. People nicknamed Myryakub a "dodger" ("epaq [8, p. 56]) and for reason. In the village, according to the author's testimony, there are only five outlets (two grocers, one butcher's shop and two canteens), four of which are operated by Miriakub ("Miryoqubning kuchi bilan aylanganini su'zlashadilir" [8, 56]). Miryakub's activities include

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his affairs in the bank, and his participation in the "problems" of the Mingbashi, from which they always come out victorious, thanks to the ineradicable agility of Miryakub. Granting his protagonist with a Jadid mentor, A.Cholpon gives him an opportunity to join the movements for a nation development, brings him out of the country to see the world, to strive for progress. In the image on Miryakub A.Cholpon displayed his dream about prosperous future of his motherland build by its devoted people. It is natural that change in life conditions develops exact alterations in people's personality, too. Consequently, A.Cholpon emphasizes that his Miryakub is far away from a traditional ideal hero in every aspect. However, due to the conditions of the new era, the nation needs exactly practical "doers" even if they have so many flaws in their personality.

Conclusion

The Days of Old and *The Night and the Day* are separated by only 10 years of real time and around

50 years of fictional time. They maintain a dialogue with each other by putting the characters into similar situations. Different outcomes from similar situation reflect new attitudes towards life brought by the new century. During a considerably short period, there were so many changes in the living code of Turkestan. It had people make a tremendous shift of their attention's focus from spiritual world into the real life problems.

Through contradicting themselves, confronting their consciences, and sometimes suffering from the difference between what they learned and what they had to do, people in Turkestan stepped into a new era. It amended their understanding of morals and ethics and made them change their Code for living. Almost a century later we have a chance to observe those struggles thanks to the records of living codes preserved in A.Kadiry and A.Cholpon's great novels.

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SECTION 21. Pedagogy. Psychology. Innovation in Education

SYSTEMIC PROBLEMS ELECTROMAGNETIC OSCILLATIONS OF APPLIED PHYSICS MARITIME FLOT OF PEDAGOGOMETRIC ANALYSIS

Abstract: The basic principles of the system of problems electromagnetic oscillations in applied physics Navy pedagogometric analysis of the formation of mathematical models of learning activities about the nature of achieving the criteria of life, cycling, systemsness and phasing, which form a basic cell of the educational space, as well as prima nenie twelve pointed star Erzgammy relatively presentation ertsgammy principle which determines the foundations pedagogometric through forming substantive methods of hyper-space professional life, psychological and educational activity theory, psycho-pedagogical system analysis and the theory of the formation of mental actions.

Key words: pedagogometric, vital activity, cyclicity, system, phase, star Erzgammy, electromagnetic oscillations, applied physics, marine fleet.

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УДК 372.851

СИСТЕМНЫЕ ЗАДАЧИ ЭЛЕКТРОМАГНИТНЫХ КОЛЕБАНИЙ ПРИКЛАДНОЙ ФИЗИКИ МОРСКОГО ФЛОТА ПЕДАГОГОМЕТРИЧЕСКОГО АНАЛИЗА

Аннотация: рассмотрены основные принципы построения системных задач электромагнитных колебаний прикладной физики морского флота педагогометрического анализа при формировании математических моделей учебной деятельности относительно характера достижения критериев жизнедеятельности, цикличности, системности и этапности, которые образуют базисную ячейку образовательного пространства, а также применение двенадцати конечной звезды Эрцгаммы относительно представления принципа эрцгаммности, который определит основы педагогометрики через формообразование предметными методами гиперпространства профессиональной жизнедеятельности, психолого-педагогической теории деятельности, психолого-педагогического системного анализа и теории формирования умственных действий.

Ключевые слова: педагогометрика, жизнедеятельность, цикличность, системность, этапность, звезда Эрцгаммы, электромагнитные колебания, прикладная физика, морской флот.

Introduction

Представление системных задач электромагнитных колебаний прикладной физики морского флота педагогометрического анализа связывается с решением проблемы формирования математических моделей учебной деятельности относительно характера достижения критериев жизнедеятельности, цикличности, системности и

этапности, которые образуют базисную ячейку образовательного пространства, а также применение двенадцати конечной звезды Эрцгаммы относительно представления принципа эрцгаммности, который определит основы педагогометрики через формообразование предметными методами гиперпространства профессиональной жизнедеятельности,



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психолого-педагогической теории деятельности, психолого-педагогического системного анализа и теории формирования умственных действий.

Это проявляется в совершенствовании базы данных прикладных профессиональных задач выделенной профессиональной деятельности на морском флоте. Построенные одновременно математические модели учебно-профессиональной деятельности связываются с: базисной звездой Эрцгаммы гиперпространства жизнедеятельности (E1); базисным целостно-системным циклом жизнедеятельности (E2); базисной звездой Эрцгаммы системного анализа (E3); базисным проявлением двенадцати этапов и форм познавательного гиперпространства жизнедеятельности относительно образовательного процесса (E4).

Совершенствование заданой базы данных педагогических моделей эрцгаммного анализа образовательных объектов с признаком базисно-нормативной эрцгаммности, независимо от целевого назначения, выполняет собственную функцию психолого-математического представления

Materials and Methods

Системные задачи электромагнитных колебаний прикладной физики морского флота отражают целостно-системное моделирование основных элементов транспортных объектов. При этом возникает ориентация на единство базисных характеристик предметных и исполнительных условий относительно предмета содержания и способа его реализации. Рассматриваются определение рабочей длины волны, диапазон длин волн, индуктивности, диэлектрической проницаемости среды, уравнение изменения разности потенциалов на обкладках конденсатора, максимальные энергии магнитного и электрического поля, логарифмический декремент затухания колебаний колебательного контура судовой радиоэлектронной системы на морском флоте.

В процессе решения системных задач электромагнитных колебаний прикладной физики морского флота необходимо применять основные положения теории деятельности, системного анализа и теории формирования интеллекта.

Системный анализ предполагает выполнение последовательности системных аналитических действий: выделить объект анализа – задачу электромагнитных колебаний прикладной физики морского флота (ЗЭМКПФМФ) как систему; установить порождающую среду ЗЭМКПФМФ; определить уровни анализа ЗЭМКПФМФ; представить целостные свойства ЗЭМКПФМФ относительно пространственных, и временных характеристик и их комбинаций; выделить

структуру уровня анализа ЗЭМКПФМФ; установить структурные элементы уровня анализа ЗЭМКПФМФ; определить системообразующие связи данного уровня анализа ЗЭМКПФМФ; представить межуровневые связи анализа ЗЭМКПФМФ; выделить форму организации ЗЭМКПФМФ; установить системные свойства и поведение ЗЭМКПФМФ.

Задача 1

В судовой радиоэлектронной системе колебательный контур состоит из конденсатора электрической ёмкостью $C=888$ пФ и катушки с индуктивностью $L=2$ мГн. Определить рабочую длину волны λ колебательного контура судовой радиоэлектронной системы.

Ответ: $\lambda = 2500$ м.

Задача 2

В судовой радиоэлектронной системе колебательный контур имеет индуктивность $L=2$ мГн, а ёмкость изменяется в интервале от $C_1=69$ пФ до $C_2=533$ пФ. Определить рабочий диапазон длин волн $[\lambda_1; \lambda_2]$ изменения настройки колебательного контура судовой радиоэлектронной системы.

Ответ: от $\lambda_1 = 700$ м до $\lambda_2 = 1950$ м.

Задача 3

В судовой радиоэлектронной системе колебательный контур базисного генератора при электрической ёмкости $C=2$ мкФ имеет частоту излучения $\nu=1000$ Гц. Определить индуктивность L колебательного контура базисного генератора судовой радиоэлектронной системы.

Ответ: $L = 12,7$ мГн.

Задача 4

В колебательном контуре судовой радиоэлектронной системы катушка с индуктивностью $L=30$ мкГн соединяется с плоским конденсатором, площадь пластин которого $S=0,01$ м² и расстояние между ними $d=0,1$ мм. Определить диэлектрическую проницаемость ϵ среды, заполняющей пространство между пластинами конденсатора судовой радиоэлектронной системы, если контур настроен на длину волны $\lambda=750$ м.

Ответ: $\epsilon = 6$.

Задача 5

В судовой радиоэлектронной системе колебательный контур состоит из базисного конденсатора ёмкостью $C=25$ нФ и катушки с индуктивностью $L=1,015$ Гн. Обкладки судового базисного конденсатора имеют заряд $q=2,5$ мкКл. Записать уравнение (с числовыми коэффициентами) изменения разности

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потенциалов U на обкладках конденсатора и тока I в цепи. Определить разность потенциалов на обкладках конденсатора и ток в цепи судовой радиоэлектронной системы в моменты времени $T/8$, $T/4$ и $T/2$. Построить графики этих зависимостей в пределах одного периода.

Ответ: $U=100\cos(2\pi\cdot 103t)$ В,
 $I=-15,7\sin(2\pi\cdot 10^3t)$ мА;
 $U_1=70,7$ В, $I_1=-11,1$ мА;
 $U_2=0$, $I_2=-15,7$ мА;
 $U_3=-100$ В, $I_3=0$.

Задача 6

В судовой радиоэлектронной системе уравнение изменения со временем разности потенциалов на обкладках базисного конденсатора в колебательном контуре имеет вид $U=50\cos 10^4\pi t$ В. Ёмкость конденсатора $C=0,1$ мкФ. Определить период T колебаний, индуктивность L контура, закон изменения со временем t силы тока I в цепи и длину волны электромагнитного излучения λ , соответствующую этому контуру в цепи судовой радиоэлектронной системы.

Ответ: $T=0,2$ мс;
 $L=10,15$ мГн;
 $I=-157\sin(10^4\pi t)$ мА;
 $\lambda=60$ км.

Задача 7

В судовой радиоэлектронной системе уравнение изменения со временем тока в базисном колебательном контуре имеет вид $I=-0,02\sin 400\pi t$ А. Индуктивность базисного колебательного контура $L=1$ Гн. Определить период T колебаний, электрическую ёмкость C контура, максимальную энергию W_M магнитного поля и максимальную энергию $W_{ЭЛ}$ электрического поля в цепи судовой радиоэлектронной системы.

Ответ: $T=5$ мс;
 $C=0,63$ мкФ;
 $U=25,2$ В;
 $W_M=0,2$ мДж;
 $W_{ЭЛ}=0,2$ мДж.

Задача 8

В судовой радиоэлектронной системе определить отношение энергии $W_M / W_{ЭЛ}$ магнитного поля базисного колебательного контура к энергии его электрического поля для момента времени $T/8$.

Ответ: $W_M / W_{ЭЛ} = \sin 2\omega t / \cos 2\omega t = 1$.

Задача 9

В судовой радиоэлектронной системе базисный колебательный контур состоит из конденсатора ёмкостью $C=7$ мкФ и катушки с индуктивностью $L=0,23$ Гн и сопротивлением

$R=40$ Ом. Обкладки конденсатора имеют заряд $q=0,56$ мКл. Определить период T колебаний контура и логарифмический декремент затухания χ колебаний. Представить уравнение изменения со временем t разности потенциалов U на обкладках конденсатора. Определить разность потенциалов в моменты времени, равные: $T/2$, $3T/2$ и $2T$. Построить график $U=f(t)$ в пределах двух периодов.

Ответ: $T=8$ мс;
 $\chi=80e-87t\cos 250\pi t$ В;
 $U_1=-56,5$ В;
 $U_2=40$ В;
 $U_3=-28$ В;
 $U_4=20$ В.

Задача 10

В судовой радиоэлектронной системе колебательный базисный контур состоит из конденсатора ёмкостью $C=0,2$ мкФ и катушки с индуктивностью $L=5,07$ мГн. При каком логарифмическом декременте затухания χ разность потенциалов на обкладках конденсатора за время $t=1$ мс уменьшится в три раза? Определить электрическое сопротивление R контура в цепи судовой радиоэлектронной системы.

Ответ: $\chi=0,22$, $R=11,1$ Ом.

Задача 11

В судовой радиоэлектронной системе колебательный контур состоит из конденсатора ёмкостью $C=405$ нФ, катушки с индуктивностью $L=10$ мГн и сопротивления $R=2$ Ом. Во сколько раз уменьшится разность потенциалов на обкладках конденсатора за один период колебаний в цепи судовой радиоэлектронной системы.

Ответ: в 1,04 раза.

Conclusion

Представленный метод формирования широкопрофильного профессионального мышления связывается с многозначным проявлением педагогической эрцгамности. Представление системных задач электромагнитных колебаний прикладной физики морского флота педагогического анализа отражает основные направления развития и совершенствования базы данных педагогических моделей образовательных объектов относительно педагогического математического моделирования учебного процесса.

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Психолого-педагогический системный анализ устанавливает базисную методологию и задаёт условия формирования специалиста широкого профиля – цель существования целостно-системного учебного процесса. Дальнейшим базисным действием психолого-педагогического системного анализа является действие по выделению структурных элементов уровня системы электромагнитных колебаний прикладной физики морского флота.

Структурные элементы уровня системы электромагнитных колебаний прикладной физики морского флота имеют двойственную структуру. С одной стороны, они являются предметными носителями целостно-системного цикла жизнедеятельности (ЦСЦЖ), одновременно они могут выполнять роль системообразующих связей, если являются различными формами деятельности. При этом реализуется их первичное значение структурных элементов – предметность элементов ЦСЦЖ электромагнитных колебаний прикладной физики морского флота.

Структурный элемент уровня системы есть результат реализации общей функции системного объекта, который реализует заданную целостность на выбранном этапе развития. Структурный элемент электромагнитных колебаний прикладной физики морского флота задаётся соответствующим уровнем анализа и в дальнейшем при переходе на более элементарные иерархии устанавливает дальнейшую схему микроанализа. Формирование функции структурного элемента электромагнитных колебаний прикладной физики морского флота задаётся последующим функциональным состоянием. Поэтому сам элемент несёт двойной образ предметно-действия, с последующим переходом из предметных состояний в новые средства жизнедеятельности, которые в последующем переходят в субъектные образы и характеристики электромагнитных колебаний прикладной физики морского флота.

Структурные элементы электромагнитных колебаний прикладной физики морского флота имеют соответствующие порождающие качества среды. Их неслучайное появление в общем случае определяется базисными, фундаментальными, широкопрофильными, педагогическими условиями состояния ЦСЦЖ. Структурные элементы электромагнитных колебаний прикладной физики морского флота определяются соответствующими целостными характеристиками относительно пространственных, временных, гравитационных, силовых и энергетических характеристик. Поэтому их различные сочетания порождают новые структурные элементы электромагнитных

колебаний прикладной физики морского флота, которые формируют и соответствующие системообразующие связи, относительно предметно-деятельных условий.

В целом, структурные элементы электромагнитных колебаний прикладной физики морского флота имеют многомерные структуры. Можно выделить три основных направления формирования структурных элементов: 1) направление собственной структуры ЦСЦЖ; 2) структурный анализ формирования этапа существования знания-образа и 3) деятельностная форма системного анализа относительно представленной целостности. Учитывая деятельностную форму данного действия педагогического системного анализа, необходимо чётко разделить три основные части данного действия: ориентировочную, исполнительную и контрольную. При этом каждый структурный элемент электромагнитных колебаний прикладной физики морского флота сразу получает эти три дополнительные характеристики.

На уровне ЦСЦЖ структурными элементами являются: начальный субъект, всеобщая деятельность, средства деятельности, технологическая деятельность, предмет деятельности, контрольная деятельность, продукт деятельности, ритуальная деятельность, опредмеченная потребность, восходящая деятельность, компаунд-субъект, деятельность развития и супер-субъект. Все данные структурные элементы отражают целостно-системный цикл жизнедеятельности широкопрофильного специалиста в конкретной деятельности относительно полного жизненного цикла предмета профессионального содержания в различных формах смыслообразования на примере нормативной творческой деятельности при анализе электромагнитных колебаний прикладной физики морского флота.

Структурные элементы относительно собственного системного педагогического анализа в качестве предметных условий электромагнитных колебаний прикладной физики морского флота: устанавливают структурный элемент как систему, представляют всю порождающую среду, определяют целостные свойства, выделяют уровни анализа, устанавливают собственные структурные элементы, представляют системообразующие внутриуровневые связи, определяют системообразующие межуровневые связи, устанавливают форму организации, представляют системные свойства, определяют поведение и выделяют прогноз развития структурных элементов. Вся схема системного анализа направлена на формирование относительной системной целостности в рамках



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широкопрофильной деятельности по представлению образа Мира.

Структурные элементы электромагнитных колебаний прикладной физики морского флота относительно поэтапности формирования широкопрофильной профессиональной деятельности принимают различные формы в случаях: ориентационного этапа, мотивационного этапа, визуального этапа, акустического этапа, калориметрического этапа, термодинамического этапа, обонятельного этапа, материального этапа, рецепторного этапа, речевого этапа, письменного этапа, внутреннего этапа. Общая поэтапность формирования структурных элементов электромагнитных колебаний прикладной физики морского флота отражает целостные механизмы процесса интериоризации общего цикла жизнедеятельности широкопрофильного специалиста в направлении воспитания целостно-системной личности.

Структурные элементы электромагнитных колебаний прикладной физики морского флота также отражают различные формы гиперпространств целостно-системных циклов жизнедеятельности. Элементарные бинарные пространства ЦСЦЖ формируются при установлении связи «учитель-ученик», связи

«учитель-внешняя среда», связи «ученик-внешняя среда». При этом все структурные элементы электромагнитных колебаний прикладной физики морского флота отражают все три выделенные состояния представлений общих характеристик. Таким образом формируется генетический образ многомерного структурного элемента относительно всех характеристик специалиста широкого профиля относительно нормативного формирования целостно-системной личности в многомерном пространстве смыслообразования заданной системной целостности.

Это связывается с процессами совершенствования программируемых математических моделей учебной деятельности относительно характера представления критериев жизнедеятельности, цикличности, системности и этапности, которые образуют базисную ячейку образовательного пространства, определяют условия развития абсолютного образовательного цикла, отражающего специфическую структуру подготовки широкопрофильных специалистов при реализации международных образовательных стандартов алигорамного содержания эвнометрической формы.

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SECTION 21. Pedagogy. Psychology. Innovation in
Education

PEDAGOGICAL TECHNOLOGIES - THE BASIS OF INCREASING QUALITY OF EDUCATION

Abstract: Theoretical approaches to the definition of the concept of teaching technology are presented, structural elements and didactic characteristics of pedagogical technologies are revealed. Types of educational activity are distinguished. The technological level of training and the actions that it provides are considered. Psychological and pedagogical conditions for improving the quality of preschool education are presented. The specifics of the preparation of children in pre-school educational institutions are outlined. Improving the quality of the educational process is associated with the use of innovative pedagogical technologies.

Key words: quality of education, teaching technologies, complete system, structural elements, pedagogical management, didactic characteristics, types of educational activity, pre-school education.

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ПЕДАГОГИЧЕСКИЕ ТЕХНОЛОГИИ - ОСНОВА ПОВЫШЕНИЯ КАЧЕСТВА ОБРАЗОВАНИЯ

Аннотация: представлены теоретические подходы к определению понятия технологии обучения, раскрыты структурные элементы и дидактические характеристики педагогических технологий. Выделены типы учебной деятельности. Рассмотрен технологический уровень обучения и действия, которые он предусматривает. Представлены психолого-педагогические условия повышения качества дошкольного образования. Выделены особенности подготовки детей в дошкольных образовательных учреждениях. Повышение качества образовательного процесса связывается с использованием инновационных педагогических технологий.

Ключевые слова: качество образования, технологии обучения, целостная система, структурные элементы, педагогическое управление, дидактические характеристики, типы учебной деятельности, дошкольное образование.

Introduction

Одной из актуальных задач реформирования системы образования в целом, осуществляемое в нашей стране на современном этапе, является разработка инновационных технологий обучения с целью повышения качества как высшего и среднего, так и дошкольного образования.

В традиционной педагогике понятие «технология обучения» не является общепринятым. В материалах ЮНЕСКО технология обучения трактуется как системный метод создания, применения и определения всего

процесса преподавания и усвоения знаний с учетом технических и человеческих ресурсов и их взаимодействия.

Materials and Methods

В научной литературе существуют различные подходы к определению сущности педагогических технологий.

Одни авторы рассматривают педагогическую технологию как средство достижения целей обучения. При этом подчеркивают, что педагогическая технология всегда существует в любом процессе обучения и



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воспитания, и в этом смысле она развивает классическую дидактику, дополняя ее принципами структурной и содержательной целостности технологии, ее диагностической направленности, завершенности, социо- и природосообразности, интенсивности всех процессов [1].

Другие специалисты рассматривают технологии обучения как способ реализации содержания обучения, предусмотренного учебными программами, представляющий собой систему форм, методов и средств обучения, реализующих наиболее эффективное достижение целей обучения [2].

Существует мнение, согласно которому под технологией обучения понимается целостная совокупность процедур (дидактических, общепедагогических, психологических и др.), обусловленная соответствующими целями и содержанием обучения и воспитания [3].

Педагогическую технологию определяют также как совокупность психолого-педагогических установок, определяющих специальный набор и компоновку форм, методов, способов, приемов обучения, воспитательных средств, то есть педагогическая технология представляет собой инструментарий педагогического процесса [4].

В отдельных работах применяют термины «педагогические информационные технологии» или «новые информационные технологии обучения», имея в виду педагогические технологии, базирующиеся на использовании компьютеров, различных электронных средств аудио- и видеотехники и систем коммуникации [5]. Однако отождествлять данные понятия с такими, как «педагогическая технология», «технология обучения» не стоит, поскольку эти понятия, на наш взгляд, разные. Нам представляется, что педагогические технологии прежде всего определяют проект всего процесса формирования личности обучаемого.

С позиций комплексного подхода технологию обучения можно представить как целостную систему, структурными элементами которой являются:

- цели обучения;
- содержание обучения;
- средства педагогического взаимодействия;
- организация учебного процесса;
- обучаемый, преподаватель;
- результат деятельности.

Технология обучения – это теоретический проект педагогического управления учебной деятельностью и система необходимых средств для обеспечения функционирования педагогической системы согласно заданным целям образования и развития обучаемых [6,7].

Дидактические характеристики педагогических технологий складываются из следующих особенностей учебно-педагогического процесса:

- задачного построения и проблемной структуры учебной информации;
- вариативности в расчете на индивидуальные и возрастные возможности обучаемых;
- дифференцированного управления учебной деятельностью.

При реализации технологий обучения создаются необходимые условия для развития учебной деятельности, формирования активности обучаемых, осознания ими познавательных действий, усвоения содержания учебного материала и формирования целостной системы знаний.

Технологии могут предполагать один из двух типов учебной деятельности: репродуктивную или продуктивную, между которыми возможны многочисленные переходы.

Первый способ заключается в следующем: субъект предполагает осуществить поиск информации, необходимой и достаточной для подготовки решения с помощью нормативных правил и указаний.

Второй способ допускает реализацию решения в сложных и временных условиях, допускающих вероятностное решение с использованием как нормативных, так и эвристических и статистических правил.

Третий способ позволяет искать решение в условиях неполной информации и заключается в установлении инвариантных ситуаций деятельности, однозначно определяющих конкретную программу действий.

В технологиях обучения фиксируется нормативная деятельность педагога, обеспечивающая наиболее эффективные способы познавательной деятельности обучаемых.

Технологический уровень обучения предусматривает следующие действия:

- конкретизация задач обучения согласно поставленным целям;
- проектировка результативных характеристик, формируемых в процессе обучения;
- анализ имеющихся средств обучения;
- разработка алгоритма управления учебной деятельностью посредством составления обучающих программ;
- выбор технологических процедур управления учебной деятельностью;
- проектировка пооперационного состава действий;
- проектировка коррекционных средств управления;



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- разработка диагностического аппарата для контроля и коррекции процесса усвоения учебного материала.

Назначение технологий обучения состоит в регулировании учебного процесса с образовательным и развивающим эффектом. При этом каждое звено в сложной цепочке взаимодействий конкретных структур педагогической системы требует выработки специфических педагогических механизмов и методов управления познавательной деятельностью обучаемых [8,9].

Реформа высшей школы, средних учебных заведений и дошкольных образовательных учреждений требует модернизации технологий и программ обучения, что тесно связано с превращением обучения и воспитания в творческий процесс [10]. Однако следует заметить, что в настоящее время из-за низкого уровня финансирования качество традиционно сложившегося школьного и дошкольного образования постепенно ухудшается. Выход из создавшейся ситуации мы видим в организации и финансировании масштабных научно-педагогических исследований, повышения эффективности подготовки педагогических кадров, широкой реализации инновационных технологий на всех уровнях обучения, в том числе, и в сфере дошкольного образования.

Учитывая в современных условиях важность дошкольного образования для последующей успешной познавательной деятельности обучаемых на этапах школьного и высшего образования, остановимся кратко на условиях повышения качества именно этого уровня образования.

Исследователи выделяют ряд психолого-педагогических условий, обеспечивающих качество дошкольного образования [11, 12]:

- личностно-ориентированный подход к дошкольникам, включающий индивидуализацию и дифференциацию воспитательного и образовательного процессов;

- высокий уровень качества технологий обучения, образовательных программ, дидактических средств, учитывающих физические и психические особенности дошкольников;

- обогащение предметно-пространственной среды, расширяющей возможности ребенка для саморазвития;

- обеспечение психологического комфорта личности учащегося в дошкольном учреждении в целях исключения излишних нагрузок на ребенка, подрывающих его здоровье;

- широкое использование игровой деятельности, сюрпризных ситуаций с применением средств искусства (музыки, литературы, живописи).

Conclusion

В настоящее время педагогическая наука подходит к работе с детьми дошкольного возраста как к образовательной деятельности с опорой на выделенные выше психолого-педагогические условия и делает акцент на развитии интеллектуальных способностей ребенка.

В заключение отметим, что обогащение традиционного обучения современными педагогическими технологиями способствует интенсификации образовательного процесса, рефлексивности учебной деятельности, повышению качества образования в дошкольных, школьных и высших учебных заведениях.

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**SECTION 31. Economic research, finance,
innovation, risk management**

METHOD OF DIAGNOSTICS OF THE ENTERPRISE IN THE SYSTEM OF ANTI-CRISIS MANAGEMENT

Abstract: This article discusses the prevention of crises in enterprises. The article used methods such as scientific knowledge, systematics, analysis and synthesis. The theoretical aspects of the analysis are analyzed. As a result of the research, the author presented proposals on methods and methods of diagnosis. The author also describes the positive aspects of the diagnosis.

Key words: analysis, crisis management, diagnostics, diagnostic methods, approach, indicators, system.

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МЕТОДИКА ДИАГНОСТИКИ ПРЕДПРИЯТИЯ В СИСТЕМЕ АНТИКРИЗИСНОГО УПРАВЛЕНИЯ

Аннотация: В данной статье рассмотрены вопросы диагностики кризиса на предприятиях. В статье использованы такие методы, как научные знания, систематика, анализ и синтез. Проанализированы теоретические аспекты диагностики. В результате исследований, автор представила предложения о способах и методах диагностики. Автор также описывает положительные аспекты диагностики.

Ключевые слова: анализ, антикризисное управление, диагностика, методы диагностики, подход, показатели, система, способы диагностики.

Introduction

Известно, что кризис может представить серьезную угрозу даже, если он находится на краткосрочном и локальном уровне. Для того, чтобы предотвратить такие отрицательные ситуации, необходимо разработать и реализовать эффективную систему управления, которая включает в себя методы диагностики кризиса.

Антикризисное управление – система мер по диагностике на всех уровнях экономики, предотвращению и устранению кризисных ситуаций и ее причин. Поэтому все направления, влияющие на экономику, связаны с антикризисным управлением. Обеспечение экономической стабильности, получение разных доходов, меры по обеспечению конкурентоспособности – так же считаются методами антикризисного управления.

Антикризисное управление так же охватывает сферу социальной психологии, социологии, педагогики и математики. Т.к. все осуществляемые работы основаны на знаниях и опыте данных предметов.

Materials and Methods

Изучив различные подходы, можно увидеть, что антикризисное управление включает в себя четыре этапа:

- профилактические меры – предупреждение о кризисе;
- мероприятия по диагностике и оценке кризиса;
- мероприятия по прекращению кризиса;
- искоренение кризиса.

Понятие диагностики (греч. diagnostikos) означает «способность распознать. Диагноз



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(“diagnosis”) с греческого переводится как «определение существа и особенностей болезни на основе всестороннего исследования больного» [7, с. 240].

Диагностика – оценка финансовых счетов и отчетностей по стабильности финансово-экономического положения. Процесс диагностики кризисных ситуаций отвечает на следующие вопросы:

- Пересматривается финансовое состояние предприятия для выявления
- признаков неплатежеспособности.
- Определяется уровень кризисной ситуации предприятия.
- Изучаются факторы, способствующие наступлению кризисной ситуации.

Н.В. Бакша, исходя из целей и методов диагностики банкротства предприятия, подразделяет на основные системы:

1. Система экспресс - диагностики банкротства.
2. Система фундаментальной диагностики банкротства [4, с. 169].

Система экспресс – диагностики банкротства представляет собой систему непрерывной оценки параметров кризиса в финансовом развитии предприятия и основана на финансовой отчетности на основе стандартных алгоритмов анализа. Ее основная цель – раннее выявление и первоначальная оценка кризисных ситуаций предприятия.

Система фундаментальной диагностики банкротства предприятия представляет собой оценку параметров развития кризиса на предприятии на основе методов факторного анализа и прогнозирования. Ее основная цель – прогнозирование, негативно влияющих и приводящих к кризису предприятия, факторов и прогнозирование долгосрочных перспектив.

В процессе диагностики анализ проводится в следующих направлениях:

- всесторонний анализ отрасли;
- финансовое состояние;
- маркетинг;
- производственная деятельность;
- кадры;
- система управления;
- общая производительность предприятия.

Цель диагностики – диагностировать исследуемый объект и дать заключение о его будущем состоянии. Экономическая диагностика требует четкого диагноза. Т.к. на ее основе определяется финансовый статус предприятия и вывод о том, что диагностический процесс используется во всей системе или управлении.

По мнению А.П.Добровинского, диагностические методы можно классифицировать следующим образом [5, с. 123]:

- Аналитический метод основан на операциях, связанных со статистической информацией.

- Метод экспертной диагностики основан на полной оценке и информации о диагнозе с помощью проведения специального экспертного опроса. Этот метод использует различные виды экспертной оценки.

- Линейное программирование – это математический метод использования оптимальных ресурсов и действий для достижения желаемого результата. С его помощью можно оптимизировать тот или иной процесс, увеличить прибыль и эффективно использовать ресурсы и время.

- Динамическое программирование - это вычислительный метод для решения задач управления определенной структуре. Этот метод применяется в трех этапах: построение математической модели, решение управленческой задачи, анализ полученной информации.

О.Ю.Патласов и О.В.Сергиенко считают, что диагностика по направлениям исследования делится на следующие виды:

1. Экономическая диагностика;
2. Функциональная диагностика, в которую

входит:

- диагностика маркетинга;
- производственная диагностика;
- диагностика функции снабжения;
- финансовая диагностика;
- диагностика менеджмента;
- диагностика персонал-менеджмента (социальная диагностика).

3. Диагностика внешней среды;

4. Стратегическая диагностика [7, с. 242].

Е.А.Бабушкина утверждает, отличительной чертой диагностики кризиса является то, что ведется анализ не статистического состояния объекта, а его динамики во времени [3, с.38].

В качестве объекта диагностики можно взять внутреннюю среду предприятия (функции производства, структура управления) и определенные виды ресурсов и даже прибыль

Для правильной оценки состояния диагностируемого объекта необходима система критериев, отражающая факторы, влияющие в определенном периоде времени. Данная система критериев состоит из базовых показателей для оценки состояния объекта, разработок качественных и количественных характеристик, характеристик и шкал измерения показателей.

В.А.Подсорин считает, что проведение диагностических исследований необходимо во всех структурах и на всех уровнях управления [8, с. 42].

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Методы диагностики кризисного состояния предприятия представлены на следующем

рисунке (Рисунок 1).



Рисунок 1. Методы диагностики кризисной ситуации
(Разработан автором на основе проведенных исследований.)

Горизонтальный (тренд) анализ – определение тенденций динамики будущих показателей при помощи сравнения отчетов за прошлые периоды.

Вертикальный (структурный) анализ – определение систему конечных финансовых показателей и влияние каждой ситуации на общий результат.

Анализ показателей (коэффициентов) – расчет отношений и связей между отдельными элементами отчетов различных форматов.

Факторный анализ – исследование влияния отдельных факторов на конечный результат с помощью статистических методов.

Сравнительный анализ – способ сравнения показателей других предприятий с показателями итоговых данных.

Для объективной оценки состояния предприятия и неудобных ситуаций необходимо регулярное проведение диагностики его финансового положения. Финансовые показатели классифицируют эффективность деятельности предприятия во всех направлениях. При анализе финансовых показателей необходимо учесть изменение каждого показателя, появление факторов, влияющих на изменение прибыли и количественную оценку.

Для оценки финансового состояния предприятия источником информации служат следующие документы бухгалтерской отчетности:

- Форма номер - 1 - “Бухгалтерский баланс”;
- Форма номер - 2 - “Отчет о финансовых результатах”;

- Форма номер - 3 - “Отчет о движении капитала”;
- Форма номер - 4 - “Отчет о денежных потоках”;
- Форма номер - 5 - “Приложения для бухгалтерского баланса”.

Диагностика финансового состояния разрабатывает комплексные предложения, направленные на улучшение финансового состояния предприятия в условиях антикризисного управления на основе экономической стратегии предприятия.

В диагностике кризиса можно использовать такие инструменты, как статистика, моделирование, экспертиза, маркетинговое исследование и другие. При этом учитываются тип кризиса и причины его возникновения. Системный анализ предоставляет информацию об изменениях, рисках и возможностях предприятия. Следующие методы так же эффективны при диагностике кризиса:

- Анализ внешней среды.
- Аудит финансового состояния.
- Анализ кредитной политики по задолженностям предприятия.
- Оценка степени риска (идентификация).
- Оценка финансового состояния предприятия.

Оценка финансового состояния предприятия основывается на двух подходах:

1. Качественный подход
2. Количественный подход

В зарубежных литературах приведены ряд методов, касающихся количественного подхода.

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В частности, У. Бивер предложил пятифакторную систему для диагностики банкротства и оценки финансового состояния предприятия. Он был первым финансовым аналитиком, который с

помощью статистических методов, использовал финансовые коэффициенты для диагностики вероятности банкротства. Ниже приведена система показателей У. Бивера.

Таблица 1

Система показателей У. Бивера [1, с. 60]

Показатели	Значение показателей для различных групп фирм		
	Для благополучных фирм	Для фирм за пять лет до банкротства	Для фирм за год до банкротства
Коэффициент Бивера	>0,4	0,17	до -0,15
Рентабельность активов %	6-8	5-2	от 1 до -22
Финансовый леверидж	≤0,35	0,4-0,5	≥0,8
Коэффициент покрытия активов чистым оборотным капиталом	≥0,4	0,3-0,1	≤1
Коэффициент покрытия	2,0-3,2	1,0-2,0	≤1

Как видно в таблице, в успешных фирмах средний показатель коэффициентов доходит до 0,45. Для фирм, которым до банкротства пять лет – 0,2. Для фирм, которым до банкротства один год – уменьшился до 0,18.

А так же, одно из наиболее широко используемых моделей для выявления рисков банкротства является модель Э. Альтмана. Э. Альтман в своей модели для оценки уровня коммерческого риска использовал метод дискриминантного анализа. Его методология основана на количественных показателях. При создании индекса профессор Э. Альтман проанализировал 66 предприятий, ставших банкротами в период 1946-1965 гг. и проанализировал аналитических коэффициента, которые могли быть полезны для прогнозирования возможного банкротства. С этими показателями построил многофакторное регрессионное уравнение. Таким образом, индекс Альтмана представляет собой функцию от некоторых показателей, характеризующих экономический потенциал предприятия и результаты его работы за истекший период [1, с. 61-62].

Данная модель выглядит следующим образом:

(Z-счет) вид индекса кредитоспособности для компаний, акции которых котируются на бирже:

$$Z = 1,2X_1 + 1,4X_2 + 3,3X_3 + 0,6X_4 + 0,999X_5 \quad (1)$$

Для компаний, акции которых не котируются, приведена следующая формула:

$$Z = 0,717X_1 + 0,847X_2 + 3,107X_3 + 0,42X_4 + 0,999X_5 \quad (2)$$

Здесь: X_1 – отношение оборотного капитала к сумме активов;

X_2 – отношение нераспределенной прибыли к сумме активов;

X_3 – отношение операционной прибыли к сумме активов;

X_4 – отношение рыночной стоимости акций к задолженности (для компаний, акции которых котируются на бирже);

X_5 – отношение балансовой стоимости собственного капитала к привлеченному капиталу (для компаний, акции которых не котируются на бирже);

X_5 – отношение прибыли к сумме активов. Согласно результатам Э.Альтман установил 3 интервала.

Для компаний, акции которых котируются на бирже:

$Z < 1,23$ – высокая вероятность банкротства;

$Z = 1,81 - 2,9$ – зона неопределенности;

$Z > 3,0$ – финансово устойчивое предприятие.

Для компаний, акции которых не котируются на бирже :

$Z < 1,23$ – высокая вероятность банкротства;

$Z = 1,23 - 2,90$ – зона неопределенности;

$Z > 2,9$ – финансово устойчивое предприятие.

В зарубежных странах для прогнозирования банкротства в большинстве случаев используются факторные модели. Одной из таких моделей является четырехфакторная модель. Британские ученые Р.Тафлер и Г.Тишоу

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предложили четырехфакторную модель Z-счета [2, с. 137]:

$$Z_4 = 0,53X_1 + 0,13X_2 + 0,18X_3 + 0,16X_4 \quad (3)$$

X_1 - прибыль от реализации / краткосрочные обязательства;

X_2 - оборотные активы / сумма обязательства;

X_3 - краткосрочные обязательства / всего активов;

X_4 - выручка от реализации / всего активов.

В этой формуле пороговое значение Z-счета равен – 0,2.

Если показатель Z-счета больше 0,3, то долгосрочная перспектива фирмы не плохая, а если меньше 0,3 – имеется вероятность банкротства.

Используя эти модели, можно оценить уровень финансовой стабильности, рентабельности и ликвидности предприятия.

По нашему мнению, из-за того, что эти модели были разработаны в результате исследования предприятий западных стран, то при их реализации в условиях Узбекистана, необходимо обратить внимание на особенности экономики нашей страны.

В зарубежной практике широко используются экспресс-анализ (экспертная оценка) и прогнозирование кризисной ситуации. Проведение экспресс-анализа способствует выявлению причин кризиса и принятию оперативных управленческих решений. Главное условие проведения экспертной оценки – обеспечение достоверности и точности информации.

Экспресс-анализ включает в себя последние три года финансовой документации, отчеты, бизнес-планы, контракты, информацию о покупателях и поставщиков и т.д. срок экспресс-анализа зависит от сложности и масштаба экономической деятельности.

В результате диагностики выявляются факторы, угрожающие деятельности предприятия и передаются в процесс принятия управленческих решений [6, с. 63].

По нашему мнению, на основе диагностики предкризисной ситуации, решаются следующие задачи:

- Бдительность в мониторинге внутренней и внешней среды позволяет раннее выявление признаков кризисной ситуации;

- Появляется возможность уловить слабые сигналы опасности кризиса и оценки отклоненных от норм ситуаций;

- Возможность прогнозирования выявляет факторы, приводящие к кризису; размер ущерба и уровень распространенности кризиса;

- Возможность организации обратной связи по устранению кризисных ситуаций.

Результаты диагностики должны быть записаны в виде ссылок, рекомендаций и напоминаний.

Таким образом, диагностика дает возможность оценить финансовое состояние предприятия, разработать формы и методы его финансовой реабилитации и прогнозировать следующую тенденцию развития.

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ARCHAEOLOGICAL RESEARCH AND MUSEIFICATION OF THE HISTORICAL AND CULTURAL MONUMENTS OF THE FERGANA VALLEY

Abstract: This article demonstrates the museification of archaeological objects in Fergana Valley. The stages of their identification, research, conservation, restoration, exposition interpretation and further use as objects of the museum display are noted.

Key words: museification, archaeology, monument, restoration, conservation, museum, exposition.

Language: English

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АРХЕОЛОГИЧЕСКИЕ ИССЛЕДОВАНИЯ И МУЗЕИФИКАЦИЯ ИСТОРИЧЕСКИХ И КУЛЬТУРНЫХ ПАМЯТНИКОВ ФЕРГАНСКОЙ ДОЛИНЫ

Аннотация: В статье рассматриваются вопросы музеефикации археологических объектов в Ферганской долины. Отмечены этапы их выявления, исследования, консервации, реставрации, экспозиционной интерпретации и дальнейшего использования в качестве объектов музейного показа.

Ключевые слова: музеефикация, археология, памятник, реставрация, консервация, музей, экспозиция.

Introduction

In the Fergana valley have been preserved ruins of many ancient cities and towns, graves and dwellings. They are divided depending on their tasks towns, villages, temples, cemeteries, separate houses, defense structures, and fortresses in every historical period. Among them are archeological monuments, which have a special place in the world civilization. Selengur Cave near the Sokh area of Fergana region, the Kuva Buddha monument, the Kuva town hall (I-XII centuries), the ruins of the Dalvarzin city of Andijan region (XII-VII centuries BC), ruins of Eilatton (VI-IV centuries BC), the ruins of the city of Mingtepa (third millennium BC), the ancient part of city of Andijan (6 th centuries BC – XV centuries), Akhsikent in the Namangan region (I-XIII centuries), Balandtepa (I- XIII centuries), Munchoktepa (I-VIII centuries), Mugtepa (I-VIII centuries). The preservation of these monuments and to make museological tasks are one of the challenges facing specialists. Some of them were established museums. Pop archaeology museum, Museum of Kuva

shahristan, Museum of history urban development of Andijan[1].

Materials and Methods

As a result of the research on the peculiarities of the study of historical and cultural monuments of the Fergana valley on the museum aspect, the archeological study of this region was begun in the late XIX th century. Russian scientists A.Fedchenko, N.S.Severtsov and A.Middendorf have collected some data in the process of research in this territory.

The first research of this area was begun by the orientalist and archaeologist N.I.Veselovsky (1848-1918) the docent of Saint-Petersburg University, who arrival to Central Asia, definitely to the Fergana valley. During 1884-1885 the scientist drew attention to the study of Islamic periodicals and Kosonsoy (Mugh), Akhsikent, and Uzgan. In particular, N.I.Veselovsky studied about 30 stone forts in ancient cemeteries in northern Fergana. These works were first carried out in Fergana archeology[2].



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The next work was begun in 1930. In the same year, the Leningrad State Hermitage Department staff conducted archeological observations in connection with the construction of Uchkurgan Power Station. In contrast to previous researchers, he concentrated on studying Latinin monuments of Islam. He has discovered many unknown memorials. These are the Fergana-based red-brown clay and pottery, which include the flower and birds. These findings later became important in the valley archeology. Another great service of the scientist began studying the history of irrigation in Fergana valley, the first in Central Asia, and emphasized the importance of this sector in the future.

In the period from 1939 till 1940 in Uzbekistan has made a mount of a huge construction works. Particularly building of waterworks and canals, among them archaeological observations, which are carried out during the construction of the Great Fergana canal, differ in their size. The 270 km long excavation took place with archeologists. Numerous information about the ancient history of the valley was obtained[3].

Later, in 1940, T.G.Obolduyeva constructed the North Fergana canal and V.D.Zhukov undertook such archeological observations in the South Fergana construction. From 1943 till 1944 V.D. Gaidukevich made a scientific search for the construction of the Farhad Power Station. As a result of the archaeological work during the period of the above-mentioned large constructions, hundreds of monuments were collected from the original materials. This has been an important factor in increasing Fergana's history with scientifically-motivated materials[4].

Since 1946, the largest scientists of the Moscow Institute of Ethnography and Archeology have participated in joint research with local history museums in the Fergana valley. In particular, in the Andijan local history museum, V.Kozenkova, Fergana N.G.Gorbunova, B.Z.Gamburg, Yu.G.Chulanov in Namangan, Yu.D.Baruzdin and A.I.Poshko in Osh conducted active archeological investigations in the valley[5].

The discovery of the Selenghur cave in Fergana was a new invention for that period. The stone weapon age in this area is a million year-old. The preliminary data on the fergantrop, created on the basis of the remains of a rare man, found in the same place, dating back 800 thousand years ago, was obtained. According to the head of this expedition, academician O'.Islomov, these findings indicate that Fergana was one of the oldest place for people and in the early stone period people made the valley. It has also been discovered that the Palaeolithic period (from 20-10 thousand years ago) in the Fergana Valley. In medieval Fergana, Obishir, and Toshko'mir were found monuments of mesolite (middle stone period - 7-6 thousand years ago) and

neolithic period (new stone period - 4-3 thousand years ago). All of these are important discoveries in the history of mankind[6].

The findings of the research revealed that the monuments of Fergana's history after the Neolithic era were not found at all. For example, eneolith, the first bronze period problems are "white spots" in the valley arc. At the time of the Neolithic era, however, A. Bernshtam (1910-1956) worked on the findings. The researcher united the scientific potential of Uzbekistan, Kyrgyzstan, and Tajikistan, and carried out extensive work. For this purpose, the Pamir-Fergana complex archaeological expedition was organized in 1950-1952, and ancient farmers, cattle-breeders, urban and rural ruins were studied on a uniform basis. N.I.Veselovsky conducted research on the monuments of the medieval monuments, and B.A.Latinin, to muslimism. A.Bernshtam's research area is extensive, from the Stone Age to the XVIII-XIX centuries. He carried out scientific research in Eylatan, Mingtepa, Koson, Axsikent, Kuva, and Uzgan, the largest archeological monuments of the Fergana valley. By comparing written sources data with the digging results, the scientist made important conclusions. One of these conclusions is that the ancient Fergana culture has two dimensions (farming and livestock breeding) and their interaction. According to this, ancient times in the valley were the cultivation and nomadic culture of the nomadic herd. In mountainous regions, where peanuts and rivers flowed, the mountainous regions inhabited the nomadic livestock. This historic process is still going on. The basis of the A.N.Bernshtam's conclusion is that further archaeological excavations prove the accuracy of this conclusion[7].

Archaeological study of the Ferghana Valley has risen to a new level in the 50-60th years of the 20th century. By that time, scientific centers under the Academy of Sciences of the Central Asian republics launched a large-scale scientific research on their territory. There were also monuments found in the Fergana valley. These include the Hok treasure, discovered in 1894 (the first half of the 2nd millennium BC), the Platonic treasure, discovered in 1924 (about two thousand years BC), and the stone found in the Sokh village of Fergana 2 thousand years). According to the researchers of the Neolithic period, especially Timofeev, the chronologically endangered stone weaponry falls in the middle of the Sarijuga Scepter of Central Fergana[8].

In the second half of the 2nd millennium BC, the tribes of the Bronze Age were found in Kairalukum at the end of the 2 millennium BC 1,000 years ago, great work has been done to study the history of farming (Chust culture). Basically Yu.A.Zadneprovskiy, V.Sprishevsky, BKMAtboboyev have done a great deal to study these monuments. Zadneprovskiy, in particular, identified more than 80 Chust period monuments from the



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valley and showed their role and importance of Fergana history[9].

The first Iron Age (6th-4th centuries BC) or Eylatan's monuments were widely studied by NGGorbunova, the ancient tombs left by them. Very valuable information was received from the tombs, such as Oktam, Sufan, Kunung, and Walik. Certain work has also been done in Eylatan, the ruins of a single city in this era, but most of the monument was demolished.

Many findings of Yu. A. Zadneprovskiy's monuments of Shurabashot culture, connected with the peasant tribes, were erected after Eylatan culture. Until recently Shurabashat monuments were considered as unique to the eastern regions of the valley. However, recent searches of scientific findings have elaborated on these ideas: monuments of ancient culture The Yalpoktepa monument was found in the area between the rivers of the Karadarya River and the Norin River (80km from the newly discovered monument). The materials belonging to Shurabashot culture have also been found near Andijan. Hence, owners of this culture lived in the vicinity of the vast 4-1 centuries. Senior researcher of the Institute of Archeology of Shurabashat culture B.H.Matbabaev in 1993 conducted excavation works in the Kyrgyz Republic[10].

In the 60-70th years of the 20th century Yu.A.Baruzdin studied our land, located in the Batken district of the Osh region, in the Karabulak cemetery, dating to the 2nd and 4th centuries. The remains of mummified corpses and pieces of wood were found in the woods.

In our opinion, when speaking of the history of the valley, it is necessary to point out the scientific research carried out in the medieval written sources such as Akhsiket, Pop, Kuva. In Akhsiket, A.Anarbaev and I.Akhrarov conducted extensive work. As a result of the works of V.Bulatova, D. Varkhatova, the famous Buddhist temple was opened in the ruins of Kuva. In 1987-1992, the study of ancient Pop city was carried out. In particular, the role of the city, its developmental attributes were studied. According to the author of the excerpts, B. Matbabaev believes Pop is one of the oldest cities in the valley. Munchograd found the underground grave in 1988. The parchment was full of clothes, food, and weapons. In addition, in many places of the Fergana valley was carried out scientific research. Gurmyron mausoleum in Kosonsay district (B.Matbabaev), Tashkurgan mausoleum near Chust (S.Baratov), ruins of Eylatan (S.Kudratov) [11].

From 1985 to 1986, the researcher of the Institute of Archeology B.Matbabaev, in collaboration with the Saint Petersburg Archeology Institute, conducted research in Mingtepa (Ershi), the capital of the kingdom of Davan (Ferghana). Another medieval city of Andijan, B.Abdulgazieva, an employee of the Institute of Archeology, Professor of

Andijan State University S.Jalilov conducted a research.

During the years of independence, our country has created a perfect legal framework for the protection of cultural heritage[12]. Based on programs designed to store, study, gradually repaired and restore historic cities, architectural monuments and historical monuments.

In the early 1990s, partnership relations with prominent international organizations began to be established not only within the framework of the jubilee, but also with a number of scientific and practical significance and economic effectiveness, and accumulated relevant experience. On December 3, 1993, representatives of the United Nations Development Program, UNESCO and World Trade Organization visited for the first time independent Uzbekistan and got acquainted with the work on protection, restoration and use of cultural heritage and the development of tourism in the future. At the same time, they have given their suggestions on cooperation in the above-mentioned sectors [13].

In addition, within the UN-funded project, UNESCO experts conducted technical researches in 1995 to develop a comprehensive conservation and tourism development of four ancient cities of the Republic, Samarkand, Bukhara, Khiva and Kokand. It was backed up and supported by the work on the restoration, strengthening and the purposeful use of historical monuments.

The research finds that the international cooperation in the field of preservation, protection and preservation of all ancient monuments, historical and architectural monuments in Uzbekistan is yielding positive results. In a short period of time most of the historical and architectural objects in the country have been repaired, reconstructed and conserved. Uzbekistan has become one of the largest tourism centre in the world.

Conclusion

Over the years of independence, Uzbekistan has done extensive work in the field of preservation, restoration and restoration of historical and architectural monuments of cultural heritage as well as in all spheres. This is especially evident in the Fergana valley, one of the cradles of ancient civilizations in Uzbekistan. In the course of the theme research, we have come to the following conclusions:

Firstly, Uzbekistan is one of the rich country with historical and cultural monuments in the world. In this area ancient culture of urban development, as well as the traditions of building, large architectural constructions have been developed and have gone through several stages;

Secondly, to learning more about the past history, historical-scientific development, idea about organizing museums of ancient places which, gives a



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proud feeling, to preserving them for future generation – are the main aim of our country since its Independence has established.

However, the physical (material) depreciation, alteration and erosion of monuments resulted from the effects of time and natural-climatic environment and human activity (weather and temperature changes, earthquakes that affected for centuries). Particularly from the 19th to the 20th centuries,

technogenic processes emerging from the development of the society (urban expansion, increase in construction areas, multi-storey houses, building growth, etc.) also resulted. Therefore, the task of protecting museums, museums of historical and cultural monuments has been put on the importance and the essence of the issue has become actual problem.

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ABOUT LIFE AND CREATIVITY OF THE SUFI POET AND THINKER HUWAYDO

Abstract: The article explores the life and work of the Central Asia Sufi poet and thinker of the XVIIIth century Huwaydo. There are defined peculiarities of his Sufi views; place and role of his creativity in the formation of a harmonious developed personality.

Key words: Huwaydo, Naqshbandia, God, prophet, harmonious developed personality, the Sufi literature.

Language: Russian

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О ЖИЗНИ И ТВОРЧЕСТВЕ СУФИЙСКОГО ПОЭТА И МЫСЛИТЕЛЯ ХУВАЙДО

Аннотация: В статье исследуется жизнь и творчество суфийского поэта-мыслителя XVIII века Центральной Азии Хувайдо; определены особенности его суфийских взглядов; место и роль его творчества в формировании гармонично-развитой личности.

Ключевые слова: Хувайдо, накшбандия, Бог, пророк, гармонично развитая личность, суфийская литература.

Introduction

Хожамназар сын Гойибназара Хувайдо (1704-1780) занимает особое место в истории суфийской литературы и философии XVIII века после Боборахима Машраба и Суфи Оллохёра.

В духовной жизни наших предков, жаждущих знаний и просветительства, в последние 300 лет, несомненно, литературно-философское наследие, одобренное софийским духом великого Хувайдо, занимает важное место. «Хувайдо» псевдоним поэта (арабский слова «Хувайдо» означает «явное», «открытое»)

Наряду с опубликованными в XIX в «Баёз»ах (сборниках стихотворений) великих поэтов Абдурахмана Джамии, Алишера Навои, Бедия, Фузули, Машраба, особое место занимают газели Хувайдо, которые исполняются классическими певцами на протяжении веков, не прерываются традиционные чтения Хувайдо, что свидетельствует о богатом наследии Хувайдо и необходимости его полного и тщательного изучения.

В условиях бывшей советской системы возможности изучения наследия Хувайдо

представлено не было. Только некоторые газели поэта были включены в научный сборник.

Только с обретением независимости мы получили возможность полностью изучить наследие поэта, опубликовать его произведения и обнародовать их. В частности, в 1990 г. Издательством «Фергана» под редакцией доктора филологических наук, профессора Исмадуллоха Хожи Абдуллаева были опубликованы избранные произведения Хувайдо «Хувайдо килди ишк», а в 2005 г. В издательстве «Янги аср авлоди» в Ташкенте вышел из печати диван Хувайдо.

Materials and Methods

В нашей республике объявлен ряд научных исследований по творчеству Хувайдо.

Одним из объективных требований нашего национального прогресса стало воспитание гармоничное развитие личности с положительными качествами, научно-просветительским богатством. В этом случае, изучение философских взглядов Хувайдо на научной основе, внедрение его передовых идей в сердце и сознание молодёжи, усиление роста



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духовного потенциала нашего народа стало приоритетным направлением государственной политики.

Являясь не только сыном своего времени Хувайдо занимает в истории нашей национальной духовности как великий мыслитель всего мусульманского Востока. Его произведения были посвящены устранению пережитков социально-политических, духовно-нравственных проблем, возникших в самые трудные времена в истории нашего народа в XVIII в.

Как утверждает руководитель нашего государства Ислам Каримов: «Государство, которое мы строим, должно быть основано на менталитете нашего народа, для которого характерна высокая духовность, стремление к просвещенности, образованности, справедливости. Во многом эти черты сформировались под воздействием философии Востока, философии просвещенного ислама, в развитии которых узбекский народ внес неоценимый, всеми признанный вклад» [1, 6].

По утверждению многих исследователей, история народов Туркестана XVIII в характеризуется обесцениванием прогрессивных идей, бессилием религиозных утверждений, усилением несправедливости и тяготением жизни. В творчестве Хувайдо нашли своё отражение именно эти особенности исторического периода, а также важные последствия кризиса религии и убеждений.

Хувайдо весь свой талант, знания и мастерство посвятил сохранению религиозных ценностей, внедрению в жизнь своеобразной концепции формирования гармонично развитой личности, пропаганде среди населения таких величественных человеческих качеств, как честность, правдивость, трудолюбие, милосердие, щедрость, благородство, сочувствие, а также развитие и формирование у современников принципы социальной справедливости и гуманизма.

Он считал своим долгом и смыслом жизни совершение хороших поступков, поиск духовного совершенства, чтобы оставить после себя доброе имя. На этом пути он не отступил под влиянием нездоровых идей и догм.

По утверждению академика Вохида Захидова «своим пером и творчеством Хувайдо стремился шире объять жизнь, выразить своё отношение по любому вопросу, и этим быть поэтом своего времени. В самом деле, его произведения можно считать художественным обобщением определенных этапов в истории узбекского народа и его страны. В его творчестве отражены передовые тенденции и проблемы начиная от самых высоких благородных качеств человека и всего народа до противоречий и

действий различных дикарей в обличье человека» [2, 138].

По имеющимся сведениям из исторических источников, Хувайдо родился приблизительно в 1704 году в кишлаке Чимён, отдаленном от столицы Кокандского ханства, в семье священнослужителя Гойибназара. По сведениям из произведения Хокий (правнука Хувайдо) «Насабномаи Хувайдо куддиси саррихул азиз» Гайибназар ишан происходил из семьи ошских суфиев. После приобретения прочных религиозных знаний в семье, в целях изучения суфизма он обращается к известному кашгарскому суфию Офок Хожа (ум.1693 г.). Прослужив ему тридцать лет и получив необходимые знания по суфизму, по разрешению Офок Хожи он прибывает в Маргилан, к сыну Офок Хожа – Хожа Хасан Мухйиддин. Один из чимёнских жителей отдаёт ему свою дочь в жёны. Таким образом, Гойибназар создал семью в Чимионе; там он построил мечеть и стал пропагандировать идеи суфизма [3, 250-252].

Из истории суфизма известно, что появление на свет известных шейхов было предсказано заранее. Эта участь не обошли и Хувайдо. В опубликованном в 1907 г. ошским правнуком Салохиддином Сокибом в Ташкенте литографии В. М. Ильина «Китоб эшон Хувайдойи Чимёний маа Рохати дил фий ал-хошия» диване на страницах 174-175 так описывается рождение Хувайдо и придание ему имени. Офок Хожа к своему мюриду (Гойибназару) сказал: У тебя рождается сын и дай ему имя «Хожамназар», мои взоры обращены к нему».

Хувайдо продолжил идеи братства накшбанди: жил скромной жизнью на трудовые доходы; занимался ремеслом и школоведением (преподавать начальные религиозные знания). Овладел основами исламской религии и знаниями суфизма, получая их от отца и Хожа Хасан Мухйиддина (в народе был известен под именем Хожам Пошшо).

На формирование мировоззрения поэта, несомненно, повлияли противоречия социальной жизни, социальная несправедливость, а также трагическая судьба его современника Боборахима Машраба, активно борющегося против насилия и несправедливости. По этой причине Хувайдо принимает решение бороться с гнётом, насилием и несправедливостью исключительно просветительскими методами.

Поэт начинает понимать, что гнёт и несправедливость, в конечном итоге, связаны с жадностью, бессовестностью и низостью стоящих над народом ходжей, мулл, шейхов. Поэт считает необходимым пропаганду среди населения исламского просвещения и идей суфизма для борьбы и освобождения народа от безграмотности, зла и несправедливости.



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Хувайдо не жалуется на современные неурядицы, а напротив, обнажает лживое обличье хождей и мулл, стремящихся показать народу верный путь и руководить народом:

Ду руза иззати дунё учун, эй хожау мулло,
Укуб илминнга килмасанг амал, монанди
шайтонсан [4, 255].

(Перевод: Если ходжи и муллы стремятся наслаждаться светскими благами, не соответствуя своим знаниям, то они становятся чертями).

Хувайдо не создал новое братство в суфизме, но пытался усовершенствовать передовые идеи сформированные накшбанди, освободить народ от тяготы духовно-нравственного кризиса, найти новые грани формирования человеческой личности. В его творчестве особое место занимают идеи знаменитых личностей: Имом Газзали, Абдухалика Гиждувони, Ахмада Яссави, Бахоуддина Накшбанди, Нажмиддина Кубро, Абдурахмана Жами, Алишера Навои, Боборахима Машраба, Фузули, Суфи Оллоёра. В их произведениях совершенствовались передовые идеи суфизма, как символизм, художественность, человеколюбие, гуманизм, просвещенность и справедливость.

Хувайдо призывал людей, ответственных за духовную жизнь общества и судьбу народа (религиозных, просвещенных и наделенных властью деятелей) не отступить на пути справедливости и добра. Он считал мир не верным и невечным, вечно только духовные начала, оно бессмертно; настоящее человеческое счастье – очищение сердца, любовь к Аллаху, служение народу, оставить после себя доброе имя.

В пропаганде суфийских идей Хувайдо уместно использовал идеи ордена маломатия, и этим ушёл далеко вперёд своих соратников: недостатки, грехи и несправедливые действия своих современников он разоблачил как свои собственные личные недостатки. Именно в это время он стремился совершенствовать суннитские исламские знания среди народа, пропагандировать путём образцовых религиозных преданий, рассказов и хадисов, повышать уровень религиозных знаний, излагать указания шариата простым и доступным языком, совершенствовать взаимоотношения людей.

В пропаганде идей гуманизма, милосердия, сочувствия и просветительства Хувайдо умело использовал возможности искусства слова, символизм и другие традиционные художественные средства.

По утверждению его ученика Насеха Чимёни, для Хувайдо поэзия не была основной целью, а являлась средством распространения суфийских идей, освещения сердца человека

огнём знаний, разбудить людей непробудного сна, это «умному намёк, а глупому урок» считал мыслитель.

Включенные в диван Хувайдо стихи разных форм были предназначены в основном для грамотного, просвещенного слоя населения, а дастан (поэма) «Рохати дил» и повесть «Иброхим Адхам» - для слоя населения, далёкого от науки.

В дастане «Рохати дил» в главе «Сабаби назми китоб» поэт на турецком (староузбекском) языке излагает поучительные рассказы и предания для населения Чимиона, бесталанного в таджикском языке, о восторге современников от исламского просвещения и о памятнике, который он хочет оставить после себя.

По традиции, следующие главы дастана Хувайдо начинает с возвеличивания Аллаха, его пророка Мухаммеда и его соратников-единоверцев. Всемогущество Аллаха, сочувствия его созданным, описывает милосердие, больше материнскую заботу, больше отцовской своим созданным, просит жалости послабления грехов наших, больше чем песка в пустыне.

В конце каждого рассказа и предания, поэт призывает читателя задуматься в своих грехах, быть достойным созданием Аллаха.

Самая главная и самая тонкая особенность формирования убеждения и его укрепления – это уверовать людей в правильности и верности религиозных идей и возможность человека выбрать один из этих путей.

Путь, выбранным каждым, бывает ценнее. В людях нельзя формировать прочного убеждения путём насилия, пристыживания при людях, ставить в неловкое положение и т.д.

Вопросу свободу совести в некоторых сурах и аятах Корана придаётся особое значение. Исходя из священных правил Корана, Хувайдо показывает все преимущества исламской религии и доказывает это на образцовых жизненных примерах; каждому придется ответить на том свете за свои грехи и получить наказание, или награду за хорошие дела. Аллах милосердный, но за грехи возмездие неотвратимо. В главах «Киёматнома» дастана на основе хадисов и преданий изложено наказание в аду за вешизм, злость к людям, ростовщичество, извращенное содержание хадисов, взяточничество, ябедничество, клевета и т.д.

Также изложено просто и содержательно отношения мужа и жены, родителей и детей, отношения соседей, их права и обязанности. Поэт считает возможным совершенствование социальных отношений путём широкой пропаганды правил шариата.

Хувайдо исходит из того, что наука и просвещение является единственным путем устранения таких изъянов общества, как отсталость, нищета, несправедливость и

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обращает внимание на то, что у ребенка перед родителями есть четыре правовых пункта: выбор хорошего имени, совершение обрезания, женитьба (замужество) и обучение в школе.

По утверждению мыслителя, человек является важным фактором духовного совершенства в том случае, когда убеждение построено на научном просвещении.

При этом особо отмечает необходимость и религиозного, и светского научного развития. Для обоснования этой идеи приводит примеры и рассказы.

В дастане Хувайдо утверждает о единственности Аллаха, о человеке как великом чуде Аллаха, о человеколюбии, о необходимости почтения к человеку, о том, что порадовать человека лучше, чем посещение Каабы.

В творчестве Хувайдо описание благородных человеческих качеств Иброхима Адхам, его личности занимает особое место. Поэт всю свою жизнь, как и Иброхим Адхам, стремился быть честным, щедрым, правдивым и богоугодным. Об этом писал его ученик Носех Чимёний.

Иброхим Адхам, являясь исторической личностью, родился в семье царя. Получив хорошие знания, увлекся суфийскими знаниями, отказался от трона и стал известным суфием-дервишем. В истории суфизма это было редким явлением, о котором потом родилось много преданий и рассказов. Алишер Навои в своем произведении «Насоймул мухаббат» говорит о необходимости написать книги о таких суфиях.

Иброхим Адхам был самым любимым героем Хувайдо, был его талисманом самоотверженности. Свою повесть «Иброхим Адхам» он посвятил жизни суфия, божественной и человеческой любви, общечеловеческим и непреходящим ценностям, их взаимоотношениям. Он возвеличил правдивость, чистоту, скромность, сочувствие, щедрость, милосердие как общечеловеческие моральные ценности.

Поэт выразил передовые суфийские взгляды с высоким художественным мастерством. Изображая жизнь и образцовую деятельность суфиев, оставивших глубокий след в истории суфизма, Хувайдо призывает своих современников брать с них пример.

Conclusion

В творчестве Хувайдо вопросы духовности занимают особое место. Следуя по пути Имама Газзали, он считает, что человеческая истина не в теле, а в душе, в его человеческом настроении.

Суфизм Хувайдо имеет религиозно-антропологический характер по своей сути и содержанию. Суфий-поэт придает большое значение воспитанию морально гармоничного человека, а также пропаганде и развитию религиозных и суфийских идей. Он считает, что с ростом духовного развития человека, с укреплением в сознании людей убеждений можно правильно решить сложные социально-политические проблемы общества.

Социально-моральные и правовые взгляды Хувайдо опираются на своеобразную концепцию сформировавшейся личности. По учению Хувайдо, человек схож с пустынной. Для благоустройства пустыни и превращения её в цветник, человек должен переродиться, покаяться в своих прегрешениях.

Значит, человек должен стремиться к совершенству, духовному росту, к добру и честному труду. Только в этом случае, человек, сравниваемый с простым созданием, превращается в бесценное сокровище.

Итак, литературная, религиозная и суфийская деятельность Хувайдо была направлена на усиление духовности человека, на решение проблем путём широкой пропаганды суфийских идей, беззаветному служению Родине и человечеству, а также является важным фактором гармоничного совершенствования личности в нашей стране.

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STRATEGY OF DEVELOPING PRODUCTION AND EXPORT OF FRUIT AND VEGETABLE INDUSTRY IN UZBEKISTAN

Abstract: *In Uzbekistan fruits especially tasty and healthy. Since in our country does not use GMOs and we have more than 300 sunny days a year, as result our fruits are sweet as honey. For example, the sugar content of grape varieties Uzbekistan reaches 30%, which is significantly higher than many manufacturers of similar products.*

Traditionally, in high demand in foreign markets are fresh and dried grapes, pomegranates, melons and water melons, apricots and peaches, plums and apples, as well as many other kinds of fruit and vegetables grown in the fertile land of Uzbekistan.

Improving production and export capacities of fruit and vegetable industry of Uzbekistan is very important for inside and outside of the country. In this article given some statistical and analytical information and some possible solutions on production and export capacities of fruit and vegetable industry development in the region.

Key words: *Vegetable and fruit production, labor resources, price formation, import and export activities.*

Language: *English*

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Introduction

Over the past 20 years, world consumption of fruits and vegetables has grown by an average of 5-7% per year. Uzbekistan not only meets the needs of its population, but also exports agricultural products and has great potential in this area.

In Uzbekistan, more than 19 million tons of fruit and vegetable produce are produced annually, of which about 700,000 tons are exported. Currently, over 160,000 farms operate in the country, which provide domestic and foreign markets with quality fruits and vegetables. The total volume of storage facilities in the country is 975 thousand tons of products, including modern refrigerating chambers for 502 thousand tons. This facilitates the uninterrupted supply of basic agricultural products to the population, and the expansion of its exports. The transport infrastructure is developing dynamically, at the same time the work is being carried out to ensure the interconnected logistics networks, the foreign trade relations that ensure the growth of the export potential of the sector are expanding.

The development of the fruit and vegetable sector is not only the provision of food security, but also the formation of new sectors around it, the creation of new jobs that will improve the living standards of the people.

The government adopted the Program for the Development of Agriculture for 2016-2020. has determined the main directions for the continuation of structural transformations in agricultural production, the introduction of advanced agricultural technologies, the integrated mechanization of agriculture and the deepening of the processing of raw materials. It provides for step-by-step optimization of cotton areas by the withdrawal of low-yielding land with subsequent placement of fruit and vegetable crops, potatoes and other crops on the released area, as well as the organization of intensive gardens, further development of selection and seed production. [1]

The implementation of these and other measures in the agrarian sphere will ensure further strengthening of the food security and self-



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sufficiency of the republic with the main types of food products, as well as a significant growth in exports of this product, demanded on foreign markets.

The key problem of fruit and vegetable exports is currently its non-diversification (limited by a narrow list of importing countries and an entrenched structure). This situation carries a number of challenges. Firstly, the worsening economic situation and the reduced demand for fruit and vegetable products in the main importing countries can cause serious problems for the entire industry. Secondly, the monopsony power of importing countries can lead to the creation of a situation where import buyers have the opportunity to dictate prices for Uzbek products.

In turn, the markets of developed countries (EU, Japan, Korea, China), in the case of diversification of supply of quality products that meet their standards, are interesting in terms of greater purchasing power. Uzbek producers can and should expand the geography of exports of fruit and vegetable products, in particular, through increasing supplies to the EU, East Asia (China, Japan, Korea) and other regions of the world, while simultaneously diversifying the commodity structure of fruit and vegetable products.

However, for the implementation of these installations, there is a need for purposeful work to improve the institutional and regulatory framework in the production, procurement, storage and export of fruit and vegetable products.

Problems of developing production and export of fruit and vegetable in different countries was investigated by scientists as A. N. Austriyevsky [4], Berezin, I.S.[5], Gel'fand, S. Yu [6], Okhorskina, Yu. O. [7].

The article analyzes the existing problems and legal gaps that reduce the effectiveness of the implementation of government decisions in this area. Recommendations are developed aimed at improving the regulatory framework and the activities of institutions responsible for implementing policies in this field.

Factors affecting the development of the fruit and vegetable sector in Uzbekistan

The soil-climatic conditions of Uzbekistan are favorable for the production of a wide range of vegetable and melon crops, which substantially surpass similar products from other countries in terms of quality, the content of such important trace elements as sugar, fructose, ascorbic acid and a number of other biologically valuable substances that ensure a balanced diet.

Along with excellent taste parameters, the agricultural products produced in Uzbekistan are of low cost. For example, in the USA, which are at the same time one of the largest importers and producers

of agricultural products, the cost price of potatoes, carrots, cabbage, melons averages 5-6 times, and tomatoes are almost ten times higher than in Uzbekistan. At the same time, Uzbekistan has a serious additional potential to reduce the relative cost price by increasing yields for all major fruit and vegetable crops. [2]

At the new stage of implementing a coherent strategy for the development of the agrarian sector in the country, the key objectives are to further strengthen food security based on own production of food resources, increase the productive potential of agriculture with efficient use of land and water resources. The social effect of the implementation of such a program is the growth of employment, income of the rural population and the quality of food consumed by the entire population of the country.

However, at present, there are a number of factors that adversely affect the development of the fruit and vegetable sector and its export potential.

Limited land and water resources.

In the conditions of limited land and water resources and taking into account the constant growth of the population of the republic, traditional methods of farming require new approaches. For the accelerated development of the fruit of vegetable growing and viticulture, new approaches and mechanisms are required, a change in the structure of agricultural production as a whole, and the introduction of innovative and resource-saving technologies.

In the structure of agricultural production, the share of fruit and vegetable production is more than 40%. However, the share of acreage allocated for fruit and vegetable crops does not exceed 20% of the total sown area.

Taking into account the objective limitations of land and water resources, optimizing the location and improving the structure of sown areas, taking into account the soil quality score, the choice for crops of the most productive and popular crops in the domestic and foreign markets will achieve a significant increase in the efficiency of land and water resources use and increase at this based on the volume of production of other crops.

This is evidenced by the results achieved in previous years. Thus, the share of grain crops in the total agricultural acreage increased from 25.7% in 1991. up to 45.2% (1.67 million hectares) in 2016, potatoes and vegetables - from 7.0% to 9.5% (350.6 thousand ha), while the share of industrial crops decreased from 41, 9% to 34.2% (1.27 million hectares). [10]

Currently, more than 21% of all irrigated agricultural lands are used for growing fruit and vegetable products. The share of the industry in the total production of agricultural products is more than

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45%, and in the export of agricultural products - 43.4%.

Along with optimization of sowing areas, work is needed to accelerate the introduction of modern technologies and innovations in cultivation in the field of fruit and vegetable growing and viticulture, the creation of new intensive gardens and vineyards, the removal of water-saving, salt-tolerant and resistant to biological pests varieties of vegetable crops.

Since 2009, there has also been a process of increasing the area of gardens, primarily through the creation of new high-performance intensive dwarf plantations. For 2009-2016 years, more than 60 percent of the gardens and 50 percent of the vineyards are renewed by creating 36.8 thousand hectares of new gardens and 40.5 thousand hectares of new vineyards, the reconstruction of 63.7 thousand hectares of gardens and 40.8 thousand hectares of vineyards.

Also, on the basis of advanced foreign experience, more than 31.4 thousand hectares (12% of the total area of gardens) of high-yielding dwarf and semi-dwarf intensive gardens have been created and are functioning with the use of modern technologies of drip irrigation and other innovations.

To increase the production of fruit and vegetables, create new jobs, increase incomes and the level of well-being of the population, over 55.6 thousand greenhouses have been created on the area of 3.2 thousand hectares over the period 2009-2016, of which 1044 hectares of greenhouses account for 51.6 thousand household plots of the population. [8]

Beginning with the harvest in 2016, the production of raw cotton under contracting contracts will be reduced by 386 thousand tons, and accordingly, a decrease in acreage under cotton for 185.5 thousand hectares is planned. Starting from the harvest of 2017, it is planned to reduce the acreage for cereals by 50,000 hectares.[3]

Potatoes (36.0 thousand ha), vegetable (101 thousand hectares), fodder (50.9 thousand ha) and oil crops (15.2 thousand ha), new intensive ones will be gradually placed on the released low-yield and low-yielding lands, gardens (20.8 thousand hectares) and other crops (12 thousand hectares).

Calculations show that the phased reduction of cotton plantations on lands where its yield does not exceed 1 tons per hectare, grain-crops with yields below 2 tons per hectare on a total area of 220.5 thousand hectares and placement of other food crops on them, will increase the production of fruit and vegetable production of 4,856 thousand tons, fodder crops for 1670 thousand tons and oilseeds for 62 thousand tons. This will give an opportunity to get in these areas annually instead of losses in the amount of more than 270 billion soums.3 additional income of more than 490 billion soums, as well as increase

the employment of the population by 175 thousand people.

A phased replacement of existing old orchards and vineyards with intensive ones, as well as creation of new intensive orchards and planting of fruits and vegetables on the liberated lands with the use of high-tech agrotechnical measures will allow due to the growing number of plantings and the share of high-yield intensive gardens from 12% or 28 thousand hectares, in 2015 to 28.3%, or 78 thousand hectares, in 2020 to increase the yield of gardens at least 3-4 times.

2. Disadvantages in the system of zoning and seed production

The sowing of fruit and vegetable products, melons and legumes are carried out, mainly, in small and scattered areas, where fruit and vegetable and bean products of different types, types and species are produced. All this creates problems when exporting, not meeting the requirements of grade, size and appearance for overseas buyers.

Currently, more than 40 types of vegetable, melon and potato crops and more than 32,500 varieties of fruit and 955 varieties of grapes are cultivated in Uzbekistan. At the same time, more than 100 tons of various types of vegetable seeds are imported annually. For example, in 2015, more than 179 tons of seeds were imported for \$ 4.9 million. [10]

The task of modern breeding is to create ecologically pure varieties that are capable of adapting to unfavorable growth conditions. It is necessary to carry out selection work with vegetable crops to create various productive varieties: canteens, for processing and for export. Each group of these varieties should have a certain set of characteristics and properties in combination with high yields.

Potato plays an important role in ensuring the food security of any country. Over 110 thousand hectares of land are allocated for planting potatoes in our republic. To provide this area, seed material requires 334,000 tons of seed potatoes. At the same time, the need for seed potatoes of the "elite" class is 18.0-20.0 thousand tons.

To date, the seed fund of potato of elite varieties has not been fully formed in the republic, which makes it possible to supply potato seeds on an industrial scale. In 2015, the volume of imports of seed potatoes of the "elite" class was 16.8 thousand tons.

Mass supply of seedlings for intensive gardening is carried out, mainly, since 2010, and to date more than 80 varieties of seedlings have been imported.

According to the Order of Variety Testing, a sample of new varieties of seedlings is tested for 3 years and, as a result, is included in the Register. However, up to the present time only 4 varieties of seedlings and only apple trees are included in the Register,

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although starting from 2010, according to the order of the Cabinet of Ministers, seedlings of peaches (nectarines), apricots, plums and sweet cherries were also imported.

At present, new varieties of dwarf and semi-dwarf trees are being created in the world with high rates of yield and early maturity, as well as taste qualities.

However, due to the lack of these varieties in the State Register, farmers and other agricultural producers are not able to import and sow.

As a result, the republic's potential in the production of export-oriented fruit products is not fully utilized.

3. The degree of processing of fruits and vegetables

Export of fruit and vegetable products has a serious potential for growth through deep processing and expansion of the range and increase in production volumes. The development of exports of the fruit and vegetable sector should be based on: i) the accelerated development of the raw materials base; ii) construction of new and modernization of existing production facilities with attraction of foreign investments for deeper processing of agricultural raw materials; iii) the creation of modern trade and logistics centers and refrigeration facilities. So, for the period 2016-2020 gg. provides for:

- increase in the level of industrial processing and production of finished products with high added value by creating 370 enterprises for processing agricultural raw materials in the regions, including 138 enterprises for processing 99.1 thousand tons of fruit and vegetable products, as well as implementing 180 investment projects for construction of new, reconstruction and modernization of existing agricultural processing and semi-finished products and finished food products enterprises for a total amount of \$ 585.9 million, and which 85 projects valued at \$ 197.8 million for the development of fruit and vegetable sector;

- creation of trade and logistics centers in each region for harvesting, primary processing, packaging, storage, transportation and export of fruit and vegetable products with a total capacity of 36.5 thousand tons of refrigerated storage;

- development and strengthening of the material and technical base of storage facilities equipped with modern refrigerating equipment, construction of new modern refrigerating chambers for storage of fruit and vegetable products with a capacity of 325,000 tons.

An important link in the agro-industrial complex is the system of harvesting of agricultural products, designed to take, store and bring agricultural products to the consumer in a timely manner. However, due to the imperfection of the procurement system, significant volumes of fruit and

vegetable produce do not reach the consumer every year. The reasons for this situation are the following:

A) Gaps in the existing system of purchasing / harvesting fruit and vegetables.

More than 50 percent of the produced fruit and vegetable products fall on dekhkan farms and personal part-time farms of the population. However, the share of dekhkan farms with the formation of a legal entity is less than 10%. At the same time, the mechanism for concluding contracts for contracting and making mutual settlements with dekhkan farms without the formation of a legal entity is absent. This is caused by the problem of the lack of opportunity for procuring organizations to pay cash (primarily for working with dekhkan farms).

It is necessary to develop a mechanism for concluding contracting contracts and making mutual settlements with dekhkan farms without forming a legal entity. [9]

Increasing the efficiency of the production system, harvesting and export of horticultural products.

To increase efficiency in the production of fruit and vegetable products, it is necessary to implement a number of measures in this area.

To increase the volume of export-oriented fruit and vegetable products, it is necessary to divide the production of fruit and vegetable products by specializing in 3-4 districts in each region to produce exclusively fruit and vegetable products of one type and variety that is in high demand in the domestic and foreign markets.

This will allow increasing the volumes of export-oriented fruit and vegetable products, supplying to the foreign markets of high-quality fruit and vegetable products of one type, quality, grade, caliber and taste in accordance with the requirements of foreign buyers.

In order to develop an intensive method of gardening, to create new types of modern intensive gardens and to increase the volume of production of export-oriented fruit products in demand in export markets, it is necessary to take measures to accelerate the work on strain testing and include in the State Register new varieties of fruit and vegetable products that are in demand on export markets.

For the broader application of the drip irrigation system, in order to create favorable conditions for the development of intensive horticulture and increase the possibilities for storing fruit and vegetable products, it is necessary to adopt the procedure for granting the possibility for farmers to build basins, large displacement tanks directly at agricultural production sites. This event will ensure the rational and effective use of land, the development of intensive gardening methods, the increase in the area of fruit crops with the use of a drip irrigation system.



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Measures to increase exports of fruits and vegetables

To solve the problem of increasing the volume of exports of fruit and vegetable products, ensuring its geographical diversification, increasing the volume of new products in demand on the markets, the following measures are necessary.

1. Formation of a modern logistics system through the creation of multimodal trade and logistics centers, geographically close to the main production centers for fruit and vegetable products. It can be geographically favorably located settlements, in particular, the city of Pap in the Namangan region, Shurchi in the Surkhandarya region, Chingeldi in the Tashkent region, Khozarsp in the Khorezm region. In these trade and logistics centers, the whole complex of technological operations for the storage and handling of goods (freight forwarding services, maintenance of vehicles and containers, as well as cargo cleaning and related services - information, financial, insurance, etc.) should be performed.

2. Diversification of the nomenclature of export fruit and vegetable products through an increase in production volumes where Uzbek producers have competitive advantages, such as the ripening season (different from competitors), taste qualities, etc., as well as the production of new types of products, including new varieties, having a higher productivity and other characteristics (color, caliber, etc.), which will reduce the cost of production and compete more successfully in foreign markets.

Thus, the share of five export products (cherry, apricot, peach, grapes and persimmon) in Russian imports is less than 10%. This means that with increasing production volumes of these types of products (subject to the production of demanded varieties), it is possible to increase the share of Uzbek products in Russian imports by several times.

In Uzbekistan, traditionally large volumes of certain types and varieties of products are grown, which, in such volumes or during the maturation period, are not in demand on foreign markets. For example, along with traditional dill and parsley, it is necessary to increase the production of such types of greens as lettuce, arugula, tarragon and others. Instead of a large and not demanded melon variety "Mirzachel" to increase the production of such varieties as "cantaloupe" or "honeydew."

Another direction is to increase the share in the export of legumes by expanding the range of products. Annually Uzbekistan exports about 200 thousand tons of wheat. The only markets for several years remain Afghanistan and Iran. At present, the cost of Uzbek wheat is \$ 170-180 / ton on delivery terms to points of origin, while the price of legumes (mung beans, chickpeas and beans) ranges from \$ 500 to \$ 800 per ton, depending on the product.

Conclusion

The development of the fruit and vegetable sector, the increase in the production of vegetables and fruits and the provision of a sharp increase in exports of these products, diversified by geography and assortment, are important components of the policy of export-oriented development of Uzbekistan.

In the conditions of slowing the growth of the world economy, aggravation of environmental problems, as well as the limited land and water resources, the structural policy in the agrarian sphere of the republic should be further directed at speeding up the processes of modernization and technological renewal, introducing modern methods of agriculture, deepening the processing of agricultural raw materials, improving the quality of life of the rural population.

The most important directions of work in this direction are the following.

1. Provision of changes in the structure of sown areas aimed at increasing the area under horticultural crops. At the same time, it seems necessary to provide specialization / zoning of crops of fruits and vegetables based on climatic, soil, and demographic features.

2. It seems expedient to move to more market approaches in the system of purchasing / harvesting fruit and vegetable products that provide incentives for agricultural producers and reduce the monopoly of processing enterprises.

3. Improvement of the institutional environment in the sphere of production and harvesting of fruits and vegetables, with emphasis on the formation of large multi-profile farms, while providing conditions for the development of specialized small farms, depending on the specifics of each region / territory (land supply, irrigation water, climatic conditions for growth of certain kinds of fruit and vegetable products). Another way to improve the institutional environment is to stimulate the processes of voluntary entry of farmers into production and distribution cooperatives, which, combining the resources of individual producers, can provide conditions for the production of demanded and quality products, its storage, processing and marketing.

4. Diversification of fruit and vegetable exports as a prerequisite for ensuring the growth of export volumes requires a deliberate effort to create a modern logistics system through the creation of multimodal trade and logistics centers and a new system of certification and standardization of fruit and vegetable products, the expansion of the range of products exported for export, marketing policy to promote domestic fruit and vegetable products to new promising markets.

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**SECTION 31. Economic research, finance,
innovation, risk management.**

INCREASING OF ECONOMIC EFFICIENCY AT INDUSTRIAL ENTERPRISES AS A FACTOR OF GROWTH EMPLOYEES' SOCIAL LEVEL

Abstract: This article examines the issues of increasing the economic efficiency of industrial enterprises. The author has revealed that industry is precisely the high potential of innovations and new combinations of knowledge in industry in comparison with other sectors of the economy. This leads to labor productivity and increased production, which leads to an economic increase in the economic efficiency of industrial enterprises is a key factor in the growth of the social level of workers. Although improving the profitability of industrial enterprises is seen as a source of improving living standards, the author has studied other ways to improve the living standards of workers. The author formed the theoretical grounds and target setting of the research - the development of new approaches to the study of factors affecting the increase in the social level of workers. Through econometric analyzes, the process associated with raising the standard of living of the population based on the economic efficiency of industrial enterprises has been studied. Factors were chosen: factors of efficiency of industrial enterprises, changes in operating income due to changes in the productivity of industrial enterprises, changes in the efficiency of the government by changing the efficiency of industrial enterprises and changing the standard of living by changing the incomes of employees.

Key words: standard of living, labor efficiency, labor costs, labor incentives, resources, labor productivity.

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Introduction

The economies of countries are the main industries that provide growth, with a high degree of ability to use a new combination of innovation and knowledge relative to other sectors of the economy. This ensures the productivity of the industry and the accelerated development of production.

Today, the transition from the industrial economy to the knowledge economy in developed countries is a tendency for many to shift the capitals and labor-intensive industries into the developing countries of the world. In developing countries, the main factor of the industrial production is labor. This implies the need to study the effectiveness of industrial enterprises in relation to their working standards and living standards.

Literature review

Economic research indicates that the most important driving force for industrial and economic

growth [1]. These views in the research are explained by the high potential of innovations and new combinations of knowledge in industry, compared to other sectors of the economy. This leads to labor productivity and increased production, resulting in economic growth [2].

The industrial sector plays an important role in creating jobs. In particular, the creation of a single workplace in the processing industry leads to the creation of two or three jobs in other industries [3].

According to research, the increase in the level of wages is directly linked to the structural changes in the path of industrialization, which greatly contributes to the growth of the population's income [4].

In low-income countries, low-tech industry-driven industrial sectors (clothing, textile manufacturing) support sustainable growth of employment, leading to increased incomes of the population. In medium-income countries, the



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development of medium-sized industrial sectors (non-ferrous metallurgy and metal products) does not create a large number of jobs, but ensures high labor productivity [5].

Improving the quality of life of the industry and the development of technology used in it affects the knowledge and knowledge of the population. The fact that the processing of industrial enterprises from the center of the country to the remote regions accelerates the localization of production and increases the incomes of the population living in remote areas of the country [6].

The dynamics of the industrial sector also have a significant impact on the development of other industries and sectors. In particular, the development of industry's food and light industry sectors will stimulate the development of agriculture, forestry and fisheries.

Economic efficiency is an objective law of industrial sector development. Increasing the efficiency of industrial enterprises requires increasing the production volumes, improving the quality, saving resources, reducing additional costs and increasing production.

Increasing the efficiency of industrial production is a sign of the law of increasing productivity. The law of increasing the efficiency of production is a law that reflects the increasing influence of factors contributing to the growth of labor productivity in society as a whole [7].

Russian scientist N.L. Zaitsev describes productivity as a ratio of the results of economic activity of industrial enterprises to living and working labor cost, and indicates that the efficiency of production is expressed through both individual and common indicators. It incorporates indicators such as labor productivity, labor productivity, and individual performance indicators [8].

"Efficiency is characterized by its effectiveness, which is reflected in the wellbeing of the people of the country. Productivity can be determined by optimal use of resources compared to the needs of society." [9]

It is important to examine the linkages between labor productivity and wage in improving the living standard of employers based on the efficiency of industrial enterprises. Theories on the relation between labor productivity and wages in industrial enterprises have been studied by many scientists [10].

One of the industries that contributed to the development of the Uzbek economy was industry. This sector of the economy has a high potential, which produces the necessary products to meet the needs of the population, creating a great many new jobs in the industry, and a great potential for improving the livelihoods of the population [11].

Economist from Uzbekistan A.T. According to Yusupov, "the economic performance can be

characterized by the following indicators:" Increased productivity due to increased labor productivity, increased productivity, progressive structural shifts, regional coefficient and others "[12].

In I.I.Iskandandarov's opinion, in determining the effectiveness of industrial production it is necessary to use "a final, finalized system of indicators that performs the function of generalizing the whole reality" [13].

Q.X. Abdurakhmanov said, "It is necessary to study the level of livelihood and how to deal with consumer relations" [14].

Research Methodology

While increasing the cost-effectiveness of industrial enterprises is seen as a source of increased living standards, it has been studied ways to improve the living standard of the employer. [14].

The process, related to the improvement of the living standards of the population based on the cost-effectiveness of industrial enterprises, has been studied in four main areas: mathematically defined:

Line 1 - factors of effectiveness of industrial enterprises (this is determined by y_1).

Line 2 - Changes in operating income due to changes in productivity of industrial enterprises (y_2).

Route 3 - Change in effectiveness of the government by the change in the efficiency of industrial enterprises (y_3).

Route 4 - Changes in living standards by changing employee income (y_4).

This process will continue to rotate continuously. As you know, these directions have an interconnected relationship and can be expressed in the form of a multifunctional function:

$$Y = F(x_1, x_2, x_3, x_4, \dots); \quad (1)$$

Taking into account that many variables are involved and implemented in the above directions, the total Y function is represented as a sum of four functions:

$$Y = y_1 + y_2 + y_3 + y_4; \quad (2)$$

here: Y- the function of changing the standard of living on the basis of economic efficiency of industrial enterprises;

y_1 - Functional change in labor productivity at industrial enterprises;

y_2 - salary change function in industrial enterprises;

y_3 - the effect of the government's ability to change as a result of the change in the efficiency of industrial enterprises;

y_4 - functional changeover function.

Changes in the labor productivity in the 1st direction of improving the living standards of industrial workers on the basis of cost-effectiveness can be summarized as (y_1):

$$y_1 = \frac{\Delta Q}{\Delta L}; \quad (3)$$

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here:

y_1 - Functional change in labor productivity at industrial enterprises;

ΔQ - change in industrial production output;

ΔL - Changes in the number of industrial enterprises.

Changes in labor productivity in industrial enterprises have an impact on wages, and the functional change in industrial enterprises (y_2) is characterized by the following:

$$y_2 = k_1 \cdot \Delta W ; \quad (4)$$

here:

y_2 - function of salary change in industrial enterprises;

k_1 - the ratio of wages to labor productivity.

ΔW - wage change;

k_1 The coefficient is determined by the following formula:

$$\Delta W = k_1 \frac{\Delta Q}{\Delta L_1} ;$$

from here:

$$k_1 = \Delta W \frac{\Delta L}{\Delta Q} ; \quad (5)$$

Changes in productivity, productivity and wage rates of industrial enterprises also have a bearing upon the benefits that the state can take. That is, as stated earlier, after the change in the total volume of industrial enterprises (y_3), the state will change the tax on production of industrial enterprises. Also, as a result of labor productivity and wage change, the state's income taxes on physical entities also change. Let us describe this by using the (y_3) function:

$$y_3 = k_2 \Delta Q + k_3 \Delta W ; \quad (6)$$

here:

y_3 - Effect of change in effectiveness of the state due to changes in the efficiency of industrial enterprises;

k_2 - the tax ratio depends on the volume of production;

k_3 - the ratio of wages to tax evasion.

k_2 The coefficient is calculated as follows:

$$k_2 = \frac{S^M}{Q} \quad (7)$$

here:

S^M - tax on production of industrial enterprises;

k_3 The coefficient is calculated as follows:

$$k_3 = \frac{S^u}{W} \quad (8)$$

here:

S^u - wages of workers in industrial enterprises;

With the change in economic efficiency in industrial enterprises, we have examined the salaries of employees and the various taxes levied by the state. As a result, the general public incomes of the population will change, on the one hand, the change in wages will have a direct impact on the change in the general incomes of the population, on the other hand, as a result of changes in the state budget, the amount of social contributions paid by the state will also change, which will have an indirect effect on the change in the general incomes of the population. This process is represented by the function y_4 :

$$y_4 = \kappa_4 \cdot (k_2 \Delta Q + k_3 \Delta W) + \kappa_5 \cdot \Delta T \quad (9)$$

here:

y_4 - population income change function;

κ_4 - ratio of incomes of the population to business activity;

κ_5 - the ratio of incomes of the population to transfer pay;

ΔT - change in transfer fees.

κ_4 The coefficient is calculated as follows:

$$k_4 = \frac{W}{DI} \quad (10)$$

here:

DI - total incomes of the population.

κ_5 - The coefficient is calculated as follows:

$$k_5 = \frac{T}{DI} \quad (11)$$

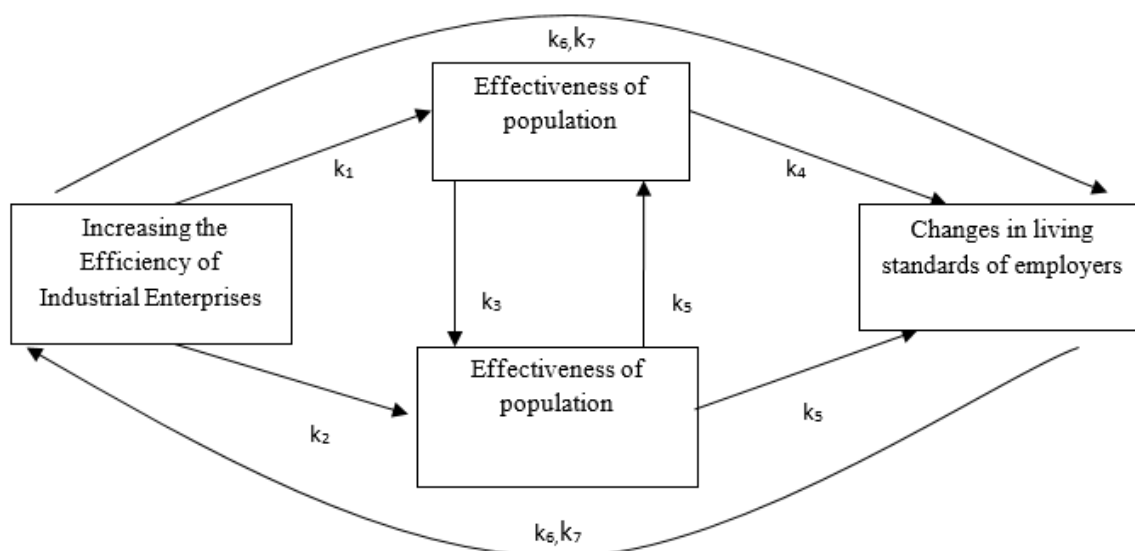
Thus, the general function of the change in the living standards of workers based on the efficiency of industrial enterprises can be expressed as follows:

$$Y = y_1 + y_2 + y_3 + y_4 = \frac{\Delta Q}{\Delta L} + k_1 \Delta W + (k_2 \Delta Q + k_3 \Delta W) + (\kappa_4 \cdot (k_2 \Delta Q + k_3 \Delta W) + \kappa_5 \cdot \Delta T) \quad (12)$$

This is a continuous rotation movement process that is interpreted as a rotation mechanism (Figure 1):

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Picture 1. Mechanism of rotational linkages of industrial enterprises' efficiency and increasing living standards.

Analysis and results

Changes in the values of the above-mentioned coefficients and functions on the basis of industrial production, industrial workers, industrial workers,

average wage rates, transfer payments, and other data were studied and evaluated using economic-mathematical methods and econometric models (Tables 1 and 2).

Table-1

Years	Q (billion UZS)	L (thous. pers.)	W (billion UZS)	T (thous. UZS)	k1	k2	k3	k4	k5
2000	1888,9	1145,0	166,3	88,944	-	0,12	33,26	0,073	38,95
2001	2830,8	1160,0	248,3	130,908	1,31	0,11	49,66	0,069	36,30
2002	4494,0	1186,0	365,8	173,136	1,84	0,1	73,16	0,070	33,32
2003	6127,5	1223,0	478,0	210,792	2,54	0,1	95,6	0,074	32,48
2004	8123,2	1284,0	577,7	265,200	3,05	0,1	115,54	0,075	34,43
2005	11028,6	1348,0	714,4	380,532	3,01	0,13	142,88	0,073	39,11
2006	14640,3	1402,0	945,6	514,296	3,46	0,13	189,12	0,073	39,70
2007	18447,6	1446,0	1307,4	807,036	4,18	0,1	261,48	0,077	47,83
2008	23848,0	1487,0	1798,8	1225,008	3,73	0,08	359,76	0,079	53,51
2009	28387,3	1513,0	2147,1	1639,656	1,99	0,08	429,42	0,070	53,13
2010	38119,0	1605,7	2767,7	2063,028	5,91	0,07	553,54	0,058	43,30
2011	47587,1	1640,7	3477,7	2621,700	2,62	0,06	695,54	0,056	41,89
2012	57552,5	1669,5	4356,8	3288,156	2,54	0,05	871,36	0,056	42,44
2013	70634,8	1703,1	5427,6	3969,228	2,75	0,05	1085,52	0,057	41,49
2014	84011,6	1736,5	6420,7	4852,140	2,48	0,05	1284,14	0,058	44,02
2015	97598,2	1768,7	7494,0	5258,820	2,54	0,05	1498,8	0,061	42,75
2016	118869,4	1802,4	8431,0	5930,760	1,48	0,05	1686,2	0,058	40,79
2017	144185,3	1825,2	8834,3	6737,616	0,36	0,05	1766,86	0,047	36,18

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Table -2

Years	ΔQ (billion UZS)	ΔL (thous. pers.)	ΔW (billion UZS)	ΔT (thous. UZS)	y1	y2	y3	y4
2000	-	-	-	-	-	-	-	-
2001	941,9	15	82	41,964	62,79	107,08	4175,729	1523615
2002	1663,2	26	117,5	42,228	63,97	215,83	8762,62	1407561
2003	1633,5	37	112,2	37,656	44,15	285,15	10889,67	1223775
2004	1995,7	61	99,7	54,408	32,72	303,83	11718,91	1874216
2005	2905,4	64	136,7	115,332	45,40	411,63	19909,4	4512647
2006	3611,7	54	231,2	133,764	66,88	799,20	44194,07	5313517
2007	3807,3	44	361,8	292,740	86,53	1512,77	94984,19	14009702
2008	5400,4	41	491,4	417,972	131,72	1833,28	177218,1	22377912
2009	4539,3	26	348,3	414,648	174,59	694,85	149930,1	22039971
2010	9731,7	92,7	620,6	423,372	104,98	3668,72	344208,1	18351998
2011	9468,1	35	710	558,672	270,52	1863,47	494401,5	23428312
2012	9965,4	28,8	879,1	666,456	346,02	2233,44	766510,8	28330588
2013	13082,3	33,6	1070,8	681,072	389,35	2944,91	1163029	28321026
2014	13376,8	33,4	993,1	882,912	400,50	2462,52	1275948	38944070
2015	13586,6	32,2	1073,3	406,680	421,94	2730,16	1609341	17483204
2016	21271,2	33,7	937	671,940	631,19	1390,97	1581033	27500943
2017	25315,9	22,8	403,3	806,856	1110,3	146,49	713840,4	29223540

Based on the data in Table 1, the relationship between the productive capacity of the industry and the labor productivity of workers is as follows (Fig.2)

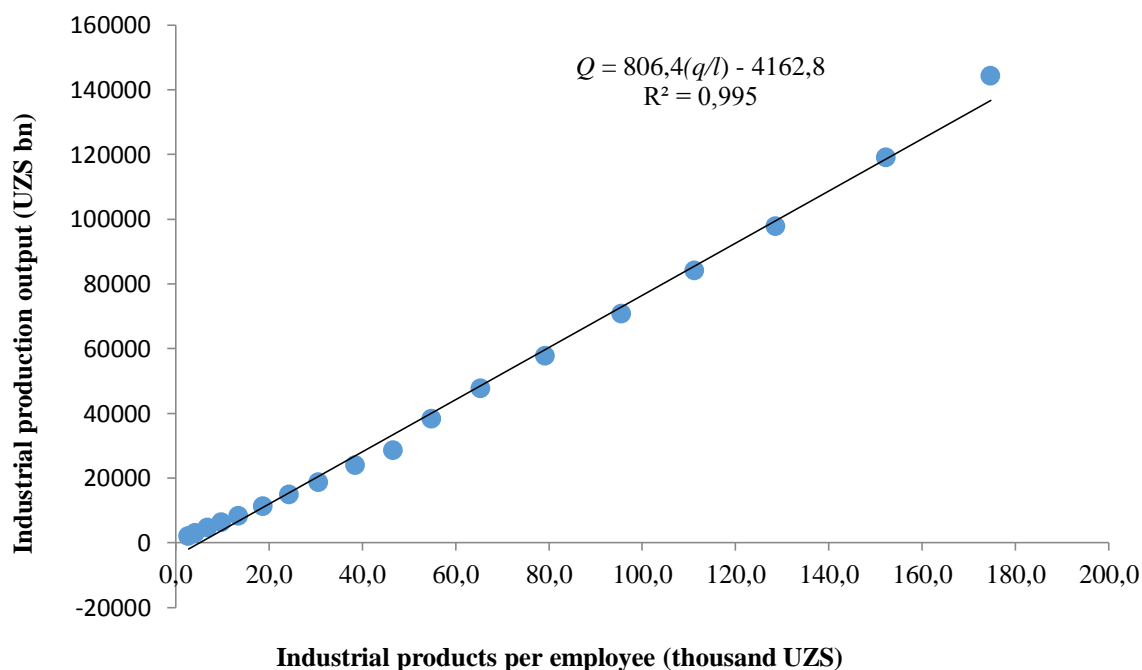


Fig. 2. The function of the product's capacity and productivity dependence on the industry

After determining the transformation of the abovementioned functions and coefficients,

prognostication of the volume of output produced in the industry has occurred (Fig.3)

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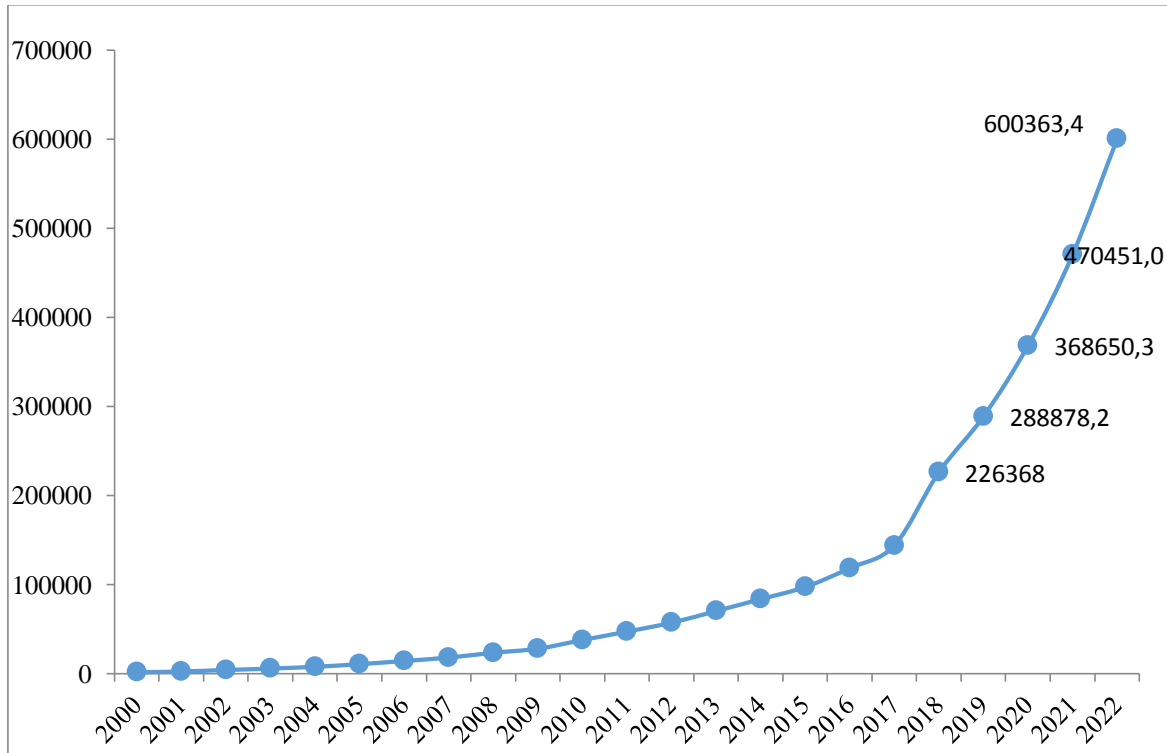


Fig. 3. Productivity trends in the industrial sector

Conclusion

Summary, the expression of the function of improving the quality of life of working people on the basis of cost-effectiveness of industrial enterprises as a whole process has demonstrated the principles of change of organizers of this process. This affects the impact of productivity change on industrial enterprises on the change in the indicators

of living and workforce. Thus, the development of the industrial sector, the implementation of any country-wide measures to increase the cost-effectiveness of industrial enterprises, ultimately, will improve the productivity of workers and improve their living standards.

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**SECTION 31. Economic research, finance,
innovation, risk management.**

PRACTICE OF INVESTMENT FUNDS DEVELOPMENT IN DEVELOPED COUNTRIES

***Abstract:** In this article has been analyzed the development of investment funds, which are the main factor of the country's financial market. In particular, the factors influencing the number of investment funds and the volume of assets in the US were discussed, an author's conclusion was worked out. The tendencies of development of investment funds in the European countries have been analyzed. In addition, the author proposed recommendations on the development of household activity in the stock market.*

***Key words:** fund, investment, investment fund, financial institutions, stock exchange, assets.*

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Introduction

Investment companies are a new form of credit and financial institutions, actively developing in the last few decades in Western countries, as well as in the United States. Priority in the development of these companies belongs to the United States. Investment companies, by issuing their own shares, attract funds, which are then invested in securities of industrial and other corporations. Thus, through the acquisition of securities, they are carried out on an equal basis with other credit and financial institutions and financing of the economy. At present, investment companies are divided into two types: closed and open. Closed-type investment companies issue their shares at once in a certain amount. A new buyer can only buy them from previous holders at a market price. Investment companies of the open type, called mutual funds, issue their shares gradually in certain portions mainly to new customers. These shares, as a rule, can be transferred or resold. A more convenient organizational form is an open-type company, since a permanent issue allows them to constantly increase their money capital and thus constantly increase investments in corporate securities. In general, the organizational form of investment companies, both open and closed, is mainly based on a joint-stock form.

Literature review

Development finance institutions (DFIs) play a fundamental role in emerging markets and developing economies. DFIs provide a broad range of financial services in developing countries, such as loans or guarantees to investors and entrepreneurs, equity participation in firms or investment funds and financing for public infrastructure projects. [17] The global economy needs development support from different sources of financing in diverse geographic areas to bridge the expanding gap in development status of countries. Initially, the Bretton Woods institutions paved the pathway of development finance by investing in and supporting the developing societies to keep pace with developed counterparts. In a short time frame, successful lending and cofinancing projects revealed the impact of development financing tools on infrastructure and living conditions of the population. Problems of development assistance and development finance was researched by Addison T., Mavrotas G.[1], Atkinson A, [2], Scientists as Dollar, D. and Thornton, J. investigated China's Development Finance [3]. Some economists, as well as Greenhill R. and Prizzon, A [4], Head J.[5] Jha R. [7], Mirkin Ya.M. [8-9], Nissanke M. [11], Shafik, N. [14],



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Strange A., Parks B. [15] founded solutions to financing problems.

Review of world experience

The peculiarity of investment companies is that among the buyers of their securities, the share of credit financial institutions and commercial industrial corporations increases. Each investor of an investment fund is required to pay commissions when buying shares for him and managing the deposit. The amount of commissions varies by company and depends, as a rule, on the financial strength and reputation of the latter. In general, the development of investment companies is closely linked to the dynamics and scale of the securities market: the higher the level of development of the securities market, the higher the level of development of the company. Therefore, investment companies received the most strong development in the leading industrialized capitalist countries, especially in the USA, Canada, England, Germany and Japan.

Analyzes based on average values often cause a smile from experienced experts, but when it comes to aggregate performance of funds, the average performance in the industry begins to play the role of indicators, which should be based on conclusions about the profitability of a fund. It will be reasonable to recall that in Western practice, there is often a relationship between the type of fund created by certain characteristics and the maximum possible return that such a fund can bring. In part, this dependence is logically explained by a change in the market situation. For example, after March 2012, the shares of funds investing in enterprises of the US military industrial complex rose sharply, as the government of this country increased the volume of state orders, but at the same time, securities of funds that invested in high technology fell in price. Approximately the same logic explains the changes in the value of fund units with large, small and medium capitalization. Simply put, funds respond to market changes in accordance with the restrictions

that the management companies imposed on them when the funds were created. The investment declaration and the description of the strategy of the funds are not accidentally necessarily the information disclosed. Such information encourages investors to become acquainted with the procedures of the fund and adequately react to changes in market conditions.

Under the circumstances of the deepening of the global financial crisis, the world's leading stock exchanges index fell sharply and there was a tendency to decline in the value of securities, which attracted investors and households' resources and their investment funds mainly investing in securities.

Studies show that in 2008, the net assets of openly-funded investment funds in the context of the global financial crisis dropped sharply compared to 2007. In particular, net assets of open joint-stock investment funds decreased by 27.6% in comparison with 2007. The largest decline (44.6%) fell on the share of Asia and Pacific investment funds. Nevertheless, the assets of regulated investment funds increased in 2009. An analysis of international mutual funds for the period 2008-2015 has shown that the assets of investment funds regulated in Asia and the Pacific have grown at relatively high rates in other parts of the globe (132%; Table-1.).

The trend of investment funds development in the US

In 2015, net assets of all regulated open joint-stock investment funds increased by 80.3% compared to 2008 and amounted to about 37.2 trillion soums. US Dollars. In 2015, the share of US regulated open joint stock investment funds in net assets was 47.7%. The European average was 34.3%. Luxemburg is one of the leading countries in the development of European investment funds. Net assets of its regulated investment funds will amount to 3.6 trln in 2015. At the same time, the net inflow of openly regulated European investment funds amounted to 27.9%. The US publicly traded fixed investment funds require a thorough analysis of its practice, with the largest share of net assets available.

Table-1.
Dynamics of Gross Domestic Assets of Open Traded Funds, Bn. USD at the end of the year

World kits and countries	2008	2009	2010	2011	2012	2013	2014	2015	2015/2008 change, percent in your account
The whole world	20631,0	25088,9	27374,4	26578,6	30213,6	34462,5	37072,4	37190,5	+80,3
America continent	11130,3	13355,4	14591,5	14583,2	16488,6	18864,2	20009,5	19557,3	+75,7
Including the United States	10151,9	1 1889,7	12825,4	12680,5	14393,8	16725,4	17849,6	17752,4	+74,9

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Europe	7393,8	8912,1	9573,9	8949,1	10257,6	11715,5	12858,6	12772,3	+72,7
Including Luxembourg	2042,3	2538,9	2799,0	2587,1	3007,4	3453,4	3518,6	3565,8	+74,6
Asia and the Pacific	2037,5	2715,2	3067,3	2921,3	3322,2	3740,0	4057,8	4738,8	+132,6
Africa	69,4	106,3	141,6	125,0	145,2	142,9	146,5	122,1	+75,9

Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

In 2015, the total number of investment funds in the United States was 16860. This is by 2016 less than in 1997. The number of unified investment incentives in the US investment funds has sharply decreased from 1997 to 2015 (from 11,593 to 5,188), which has led to a decrease in the number of joint investment funds. The number of open funds has grown in the last five years and has reached 9520 in

2015. The number of stock market quotations on the stock exchange also has a tendency to grow, and in 2015 it was 1594, which is 2 times more than in 2009 (table-2). At the same time, despite the fact that the stock market has increased at higher rates, however, the largest share in the number of US investment funds in 2015 to various types of investment funds.

Table-2.

Change in the number of US investment funds

Years	Open kind of foundations	Closed-type funds	Stock market quotations on the stock exchange	Integrated Investment Trusts	Total investment funds
1997	6778	486	19	11593	18876
1998	7489	491	29	10966	18975
1999	8003	511	30	10414	18958
2000	8370	481	80	10072	19003
2001	8518	489	102	9295	18404
2002	8511	543	113	8303	17470
2003	8426	581	119	7233	16359
2004	8417	618	152	6499	15686
2005	8449	634	204	6019	15306
2006	8721	645	359	5907	15632
2007	8745	662	629	6030	16066
2008	8879	642	728	5984	16233
2009	8611	627	797	6049	16084
2010	8535	624	923	5971	16053
2011	8673	632	1134	6043	16482
2012	8744	602	1194	5787	16327
2013	8972	599	1294	5552	16417
2014	9259	568	1411	5381	16619
2015	9520	558	1594	5188	16860
2016	9524	549	1604	5203	16901

Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

In the United States, they must be ready to buy back their open-end equity securities at their fair value. A net asset value is determined by dividing the market value of the aggregate assets into the number of outstanding stock quotes without deducting the fund's liabilities. Unlike investment funds, the closed type of investment funds does not deal with the redeemable shares. In other words, the shares of closed-type investment funds are not redeemed directly by the stock, but its shares are traded in the open market by investors. Closed-type funds are traded on a daily basis at stock market-based traded

stocks, with a fixed rate of return.

Therefore, it does not need sufficient cash backfall or sale of securities in its portfolio of assets to buy shares of closed type investment funds.

Because of the regular sales at the ETG stock exchange, the value of the shares acquired by the two investors at different times can vary and these two estimates may differ from their net realizable value. Investors can make orders during the day to buy or sell shares of an open type investment trust. However, all orders are satisfied at the same price.

In 1998, assets of US investment funds totaled

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5.79 trillion. At the end of 2007, the global financial crisis, which is about \$ 13.0 trillion, US dollars. In 2008, the assets of the funds dropped significantly (-20%) and amounted to 10.4 trillion. dollars. As a result of the global economic recovery, assets of investment funds started to grow in 2009 and beyond, and exceeded the level of the crisis by 18.1 trillion. US dollars.

In 2015, the share of total net assets of open investment funds in total assets of investment funds made up 86.4% (Table-3). During the period from 2010 to 2015, the US has seen an increase in assets of all types of investment funds. In particular, in comparison with 2009, the growth of open investment funds, closed-type investment funds, investment incidents 40.8 percent, 17.0 percent, 170.0 percent and 147.4 percent respectively.

Our analysis shows that over the past decade the assets of the funds, which are traded on the stock exchange, have risen sharply. This, in turn, indicates an increase in the role of EITI in recent years. In 2015, the assets of such investment funds increased

by almost 7 times in comparison with 2005.

Recently, competition for financial intermediaries has become even more pronounced, with the share of commercial banks having a tendency to decline, the share of investment funds, and vice versa. This is driven by the increase in the sustainability of investment funds' financial markets, reducing the risk for private investors, increasing investment funds, raising savings profits, and increasing the demand for new forms of investment.

In addition, the development of investment funds plays an important role in mitigating the negative impact of the global financial crisis on the stability of the financial market, particularly in increasing the share of households in the stock market.

In 2015, nearly half of the assets (56%) of open-type investment funds accounted for shares in the United States. Also, in the structure of open type investment funds, the money market funds had 21%, bonds funds - 16%, and other hybrid funds - 8%.

Table-3.

**Total net assets of U.S. investment funds at the end of the year
billion In US dollars⁴⁰**

Years	Funds of open type (ti ia1 Gypsum 1 \$)	Closed type foundations (s1o \$ es1-eps1 GipsTs)	Stock market quotations (exs1gap\$e- (gas1s1 GipsTs, ETG '))	Integrated Investment Tips (IPK TueTweet * 1g "Ts)	Total investment funds
1998	5525	156	16	94	5790
1999	6846	147	34	92	7119
2000	6965	143	66	74	7247
2001	6975	141	83	49	7248
2002	6383	159	102	36	6680
2003	7402	214	151	36	7803
2004	8096	253	228	37	8614
2005	8891	276	301	41	9509
2006	10398	297	423	50	11168
2007	12000	312	608	53	12974
2008	9621	184	531	29	10365
2009	11113	223	777	38	12151
2010	11833	238	992	51	13114
2011	11632	242	1048	60	12983
2012	13057	264	1337	72	14729
2013	15051	279	1675	87	17091
2014	15875	289	1974	101	18240
2015	15652	261	2100	94	18107

Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

Assets of all regulated open investment funds in the world will reach 37.2 trillion yuan in 2015. US

dollars. Of these, 47.7% were US, 34.3% European countries, 13.0% - Asian and African countries, and 5.0% - the rest of the Americas. The United States

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has invested 17.8 trillion. The United States dollar has maintained a leading position in the structure of internationally-adjusted open type investment funds (see Table 3.1).

Our analysis shows that the largest share of 5, 10, and 25 funds in the total assets of publicly traded assets in the United States has a tendency to grow over the years. Particularly, the share of five largest investment funds in total assets of investment funds makes 45% in 2015 and 13% in comparison with 2000. (Table-4).

Funds, which are one of the types of open type investment funds (GipsE oG' Ishbz), are investing in shares of other investment funds. At the same time, the share of the assets of hybrid funds in the fund of funds is 91.6%. Funds of hybrid funds are mainly invested in the basic asset, stock, and other hybrid funds.

Leading world mutual funds

At present, the mutual funds represented in Table 1 occupy a leading position in the United States. Such funds as Fidelity, Dreyfus, Vanguard and Franklin have gained wide acceptance in the US and in the Western world due to their investment activities. their power they are at the top of the pyramid of investment companies of an open type. In

other Western countries there are also mutual funds. However, in the US they are distinguished by great dynamism and ingenuity of their actions. A number of specialists in the United States believe that "funds have become a kind of alternative to the banking system of the country." They create free movement of capital, which can not be done by banks whose activities are limited by various rights. At present, mutual funds are an ingenious mechanism for accumulating the savings of the population and turning them into investments.

At the same time, the fund has one serious drawback. If huge funds are in the hands of a limited number of legal entities (mutual funds), then the destabilization of the securities market and especially stock exchanges is possible, if all funds simultaneously start buying a sale. This is evidenced by a number of recent stock market shocks. A similar picture can also be observed in the municipal bond market, where the impact of the funds is quite significant. Such a market can collapse instantly, if the funds, say, urgently need money and they will throw out a large batch of these bonds. In addition, in the practice of mutual funds, there is no "incentive for long-term ownership of shares or a calm state of capital," which is due to the variable nature of their capital.

Table-4.

The largest mutual funds of the USA

Mutual funds	Assets billion.	Market share, %
1. Фиделити Инвестмайтс	164,3	10,2
2. Merrill Lynch	107,6	6,7
3. Vengard	92,6	5,8
4. Dreyfus	75,8	4,7
5. Franklin California Tex Free Incom Foundation	64,6	4,0
6. Capital Research	62,1	3,9
7. Dean Witter	52,9	3,3
8. Camper	45,4	2,8
9. Federated	45,2	2,8
10. Shiarson	45,1	2,8

Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

Therefore, managers of investment funds, in contrast to their counterparts on pension funds, operate fairly quickly and are mainly oriented to the near future. So, holders of certificates of deposit after expiration of their validity transfer money to mutual funds. The fact is that the deposit certificate is guaranteed by the state, and the obligations of mutual funds do not have such guarantees. However, the funds have won too high the confidence of investors, often neglecting guarantees. In addition, investment funds, unlike banks, brokerage firms, savings and loan associations and insurance companies, were not seen

in various kinds of abuse and scandals. At the same time, the development of funds over time somewhat outpaced the emergence of regulations governing their activities. The heads of the largest groups of mutual fund companies operate with billions of dollars, and the fund companies own large amounts of securities. At the same time in each group there are dozens of funds that manage their assets independently, pursuing their own investment goals. Experts believe that due to the rapid growth in the number of funds, in the end, they will gain tremendous power over corporations and companies in the United States.

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Thus, the largest group of mutual funds "Fidelity" encourages its securities portfolio managers to set requirements for the management of companies and corporations to update the board of directors, increase pay rates and take decisions against acquisitions. Such examples are followed by other groups of mutual funds. Thanks to the new rules developed by the Securities and Exchange Commission (SEC), mutual funds are not difficult to pursue such a policy. However, this policy is not always feasible if the funds are not represented on the board of directors of corporations. According to the existing legislation in the US, mutual funds are deprived of the opportunity either to control the activities of a particular company. Only when the portfolio manager becomes a member of the board of the company, then he gets access to her internal information, but in this case he can not participate in making decisions about the sale or purchase of securities for his fund, without violating the law prohibiting the use of "inside information" "In carrying out such operations. As a result, he is not entitled to serve the shareholders of his fund and any other company. However, the impact of funds on corporate policies is significant, since the cost of capital on the market depends on their investment decisions. The following data testify to the power of mutual funds in the United States. Only in the first half of 1998, the funds purchased securities worth \$ 243.5 billion, while other financial institutions combined, purchased securities for only \$ 12 billion. Thus, 95% of all investments in shares in In 1998, the funds were provided. In addition, it is necessary to emphasize the trend: the share of shares in individual ownership decreased from 71% in 1980 to 42.2% in 2000. At the same time, indirect ownership of them through funds is growing. Thus, during the same period, the share of mutual funds' assets, formed by shares of individual individuals, increased from 5 to 35%. The increased importance of funds in the accumulation of capital is evidenced by their growing share in US financial assets. A greater role is played by funds on the securities market for newly established companies. As a rule, the outcome of trading for them depends largely on the reaction of mutual funds.

Usually the pace of sales of newly issued shares and the acquisition of their mutual funds almost coincide. Mutual funds have always had a big impact on companies in rapidly developing new industries. So, the financing of biotechnology is mainly carried out by mutual funds. Those of them, whose activities are primarily focused on the health sector, control about 7 billion dollars. Besides, hundreds of other funds have shares of this industry for many billions of dollars. Thus, funds from the Fidelity group own \$ 2.4 billion in biotech companies, i.e. 7% of the total value of shares in this industry, with half of them in the hands of "Fidelity". The inflow and outflow of cash into funds with high-yielding bonds has a powerful

impact on the junk bond market. The funds invested \$ 60 billion in them, and, in fact, became the main protagonist in a fairly profitable market, since many of those who in the 1980s, played a significant role there, in fact, in the early 1990s, they recognized themselves as defeated. Since 1991, from 50 to 80% of daily transactions are made with the participation of mutual funds. The main direction of their activity is not connected with shares or with junk bonds. Investors of funds now prefer to buy bonds that are subject to a small tax or not taxed at all. The value of these government securities reached \$ 350 billion in 1999. Therefore, mutual funds represent a significant force in this market, helping to cover the budget deficit. If pension funds, insurance companies and foreign investors occupy a prominent place in the US government securities market, then mutual funds are the first place in the market of mutual funds, although banks and insurance companies occupied the leading position here 10 years ago. But when profitability in this area has shrunk and changes in taxes have been introduced, banks and insurance companies have drastically reduced activity and currently mutual funds have remained almost the only market in this market. The funds have done quite a lot of work to establish and organize the market of municipal bonds that have movement within one state. Today, funds specializing in transactions with such municipal bonds are developing quite quickly. One of the reasons is that they offer local investors income that is not levied either by state taxes or federal taxes. For example, the Franklin Fund, with securities of local governments and the government of California at \$ 18 billion, has concentrated in its hands about a third of the assets of all state funds working with bonds. Therefore, in California, almost all transactions with bonds are carried out under the control of the Franklin Foundation. Issuers and bankers are constantly consulting this fund. Almost continuously changing the terms of transactions with municipal securities to take into account the interests of depositors of mutual funds. Portfolio managers of securities, leading transactions with these bonds are wary of new types of financial transactions and agreements, including options, futures and swaps. Issuers can save money by using these financial instruments. At the same time, they are rather complicated for private investors, who are unlikely to resort to urgent transactions without the participation of mutual funds.

Mutual funds, operating with these bonds, require issuers more complete and qualitative financial information than individual investors. Thanks to mutual funds, the level of reporting and publicity regarding the finances of local authorities has become immeasurably higher. And although it is difficult for small issuers to maintain such reports because of the high costs incurred, holders of securities and large issuers are now better informed. Even the most discerning issuers prefer to deal with



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mutual funds. Currently, it is easier to sell securities to several funds than individual individuals, the number of which can be more than one thousand. So, the Massachusetts Water Resources Authority decided to place its bonds for \$ 836 million and organized a meeting with representatives of 25 mutual funds. As a result, all but two funds purchased bonds, and 60% of the bonds issued by the Water Resources Authority were in the hands of the funds. The funds have large capitals and buy these bonds in large packages, so they manage to reduce the cost of sales. The lower cost of bond placement allows issuers to reduce such expenses by 0.06 -0.1 percentage points. Although this economy seems at first small, but in dollar terms it can reach 230 million annually. Although mutual funds work mainly in the stock market and municipal bonds, they are also active in the money market. In the 1970s they allowed individual investors to enter the market of commercial securities, treasury bills and deposit certificates with a capital of 100 thousand dollars. Mutual funds in these years, conducting operations in the money market, lured to themselves not only the best investors, but also the best borrowers of banks.

Funds, taking the largest and most solvent customers from banks, made it more difficult for them to expand lending to small and medium borrowers. Most of the new money goes to the funds from those who are striving to make savings, but are not satisfied with the low banking rate on deposits, or those who invested in shares in the hope of a market for banks. But if interest rates crawl up or the stock market crashes, investors will start giving away their securities at bargain prices. However, most likely they will change the funds, but they will not leave them. So, during the exchange crash of 1987, mutual funds made less than 1% of the invested money, and this is due to their reliable protection from this kind of cataclysms.

In this regard, for banks, the only way to compete with mutual funds, fighting for the money of the population, is by this business itself. In 1999, the banks managed about 12% of the assets of the funds and accounted for 15% of their sales. Not only banks are likened to mutual fund companies. Most brokerage and investment firms also follow this path. Thus, the largest investment bank Merrill Lynch and Co is the second largest "family" of mutual funds, and three of the ten most significant mutual fund companies are essentially branches or subsidiaries of broker companies. According to the estimation of "Securities Industry", the income from attracting investors to mutual backgrounds for 10 years from 1990 to 2000 increased 10-fold, and payment for fund management services - more than 8 times. It is believed that mutual funds are becoming one of the most profitable goods that brokers have ever dealt with. Investment companies invest in a wide variety of sectors of the economy. Historically, the first form

of investment company investment was the acquisition of large stakes in the shares of railway companies. They own stocks of oil companies, office equipment, automotive, electronic, electrical, chemical corporations. This is followed by such industries as aircraft construction, textile, building materials and equipment. In the first of these groups of industries - the highest return and profitability. Owning a significant shareholding in corporations increases the influence of investment companies and in some cases they directly intervene in the affairs of the corporation.

Thus, investment companies contribute to the even greater multistep and entanglement of the whole mechanism of control over the activities of corporations. By investing huge amounts of money in ordinary shares, they become practically holdings for individual corporations. Moreover, several companies concentrate their shareholdings in corporations (one or several) in sufficient amount to control. Investments of investment companies are not limited to the national framework, as they also invest in securities of foreign corporations. All major US investment companies conduct their operations abroad.

Their international activities are characterized by a great mobility of capital, which allows them to quickly transfer capital to various sectors of the economy of different countries. In addition, there are also multinational companies, formed from investment companies of different countries. As a result, there are counter-crossing investment flows. The creation of international investment companies is conditioned by a number of circumstances: firstly, it is a flexible way of transferring private capital from one country to another, and secondly, these companies have the opportunity to enjoy favorable conditions for investments in other countries, unlike the domestic domestic market, securities in the market of one industry can be accompanied by a reverse process - a fall in another. These fluctuations can be used to increase profits.

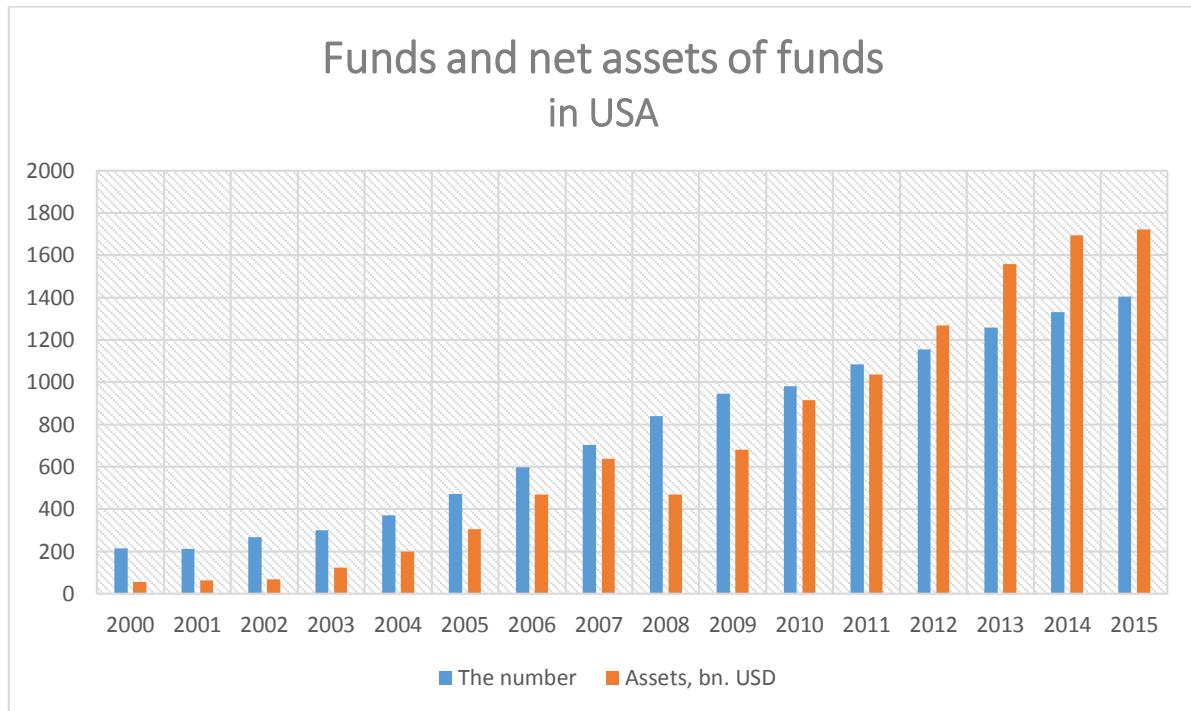
Therefore, multinational investment companies play a big role in the system of control over the economy not only of their country, but also of other countries. In the postwar years, investment companies played an important role in the intertwining of American, West European and Japanese financial and industrial groups. They act as an important link in the management of various financial and industrial groups, concentrating in their own huge stakes in corporations.

By the end of 2015, assets of the funds' funds amounted to 1721.6 billion soums. The total number of US dollars was 1404. Its assets increased by 30 times in 2015 compared to 2000. Accordingly, their number increased to 1189 in this periodic period (Fig.1).



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Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

Fig.1. Funds and net assets of funds in USA

Index funds are also popular among open-type investment funds. Their assets have significantly increased over the past few years: from \$ 327 billion in 2002. From the US dollar to 2.2 trln in 2015 Up to USD. In 2015, the number of index funds reached 406, 33% of its assets were securities of 8 & R 500.

In 2015, 258 EGs in the United States were rebuilt and 75 were abolished. Their net sales in 2015 will be 231 billion soums. (US \$ 244 billion), which was achieved in 201444 45.

In the United States, a substantial part of assets of closed type of investment funds is placed in bonds and their share is 62% in 2015. Of these, 34% are local municipal bonds. In terms of history, the share of bond funds in the structure of assets of closed type of investment funds is high. For example, in 2000, 75% of assets of all types of closed-type investment funds were owned by bonds.

Closed-type investment funds may, in addition to ordinary shares, also utilize preferential stocks to increase capitalization. In 2015, all shares of closed type investment funds worth 261 billion soums. US dollars.

Experience in the development of investment funds in Europe

The world value of net assets of unit investment funds in the third quarter of 2016 is 43997946 million US dollars [6]. Of these, 54%, in absolute terms, 23684560 million US dollars, are US mutual funds. The second position in the global NAV structure is occupied by the funds of European countries, their share is determined by 34%, that is, 14879616 million US dollars. A less significant part is the NAV of mutual funds of Asian and Pacific countries. The share they occupy is 12%, which in absolute terms is equal to 5269921 million US dollars. The share of NAV funds of African countries is at the level of 0.4%, that is, 172849 million US dollars. In Europe, Luxembourg, France, Ireland, Germany, and the United Kingdom have developed a wide range of investment funds, especially open types of funds. The share of these five countries in the total volume of open joint-stock investment funds in 2015 was 84.9% (Table-5).

Table-5.

Countries of the open type of investment funds in Europe interest rate

Countries	2008	2009	2010	2011	2012	2013	2014	2015
Luxembourg	27,6	28,5	29,2	28,9	29,3	29,5	27,4	27,9

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Ireland	9,7	9,7	13,0	14,8	15,4	15,5	15,7	16,2
France	21,5	20,3	16,9	15,4	14,4	13,1	15,1	14,3
Germany	15,3	15,1	14,5	15,2	15,5	15,6	14,4	14,1
Great Britain	6,8	8,2	8,9	9,1	9,6	10,0	11,7	12,4
Other countries	19,1	18,2	17,5	16,6	15,8	16,3	15,7	15,1
Total European countries	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Source: World Bank Documents & Reports. Url: <http://www.documents.worldbank.org>.

In general, the tendency of development of investment funds in the developed countries has been slightly reduced due to the global financial and economic crisis.

Conclusion

In 2008, under conditions of the global financial crisis, net assets of openly-funded investment funds declined sharply (by 27.6 percent) compared to 2007. The largest decline (44.6%) fell on the share of Asia and Pacific investment funds. In 2015, net assets of all regulated open joint-stock investment funds increased by 80.3% compared to 2008 and amounted to about 37.2 trillion soums. US Dollars. Of these, 47.7% of US dollars have been invested, and it has maintained a leading position in the global open investment funds. The European average was 34.3%. In 2015, the share of total net investment assets of the United States in the structure of assets of total investment funds amounted to 86.4%.

The largest share of 5, 10, and 25 funds in the total assets of US open-source mutual funds has a tendency to grow over the years. Particularly, the share of five largest investment funds in total assets of investment funds makes 45% in 2015 and 13% in comparison with 2000.

In the United States, a substantial part of assets of closed type of investment funds is placed in bonds and their share is 62% in 2015. Of these, 34% are local municipal bonds.

In Europe, Luxembourg, France, Ireland, Germany, and the United Kingdom have developed a wide range of investment funds, especially open types of funds. The share of these five countries in the total volume of open joint-stock investment funds in 2015 was 84.9 percent.

In the Russian Federation, the share investment funds are developing. The trend of growth has been preserved in their number. In 1997, the number of PIFs increased to 1,374 as of January 1, 2016.

In developing countries, there are adequate conditions for diversification of investment funds' assets in various sectors. Their share is particularly well-developed with sovereign investment funds, particularly those with closed-type investment funds. The transition from a planned economy to a market economy has played a major role in the CIF and XIF.

Evaluation and forecasting of possible economic events as a result of the interaction of stock markets with the economy are among topical issues. Therefore, the dissertation was based on the econometric models that reflect the impact of the stock market index on some economic indicators (gross domestic product, gross domestic product, gross savings, unemployment, inflation rate) and analysis on them. The results obtained from the US data show that the 8 & R500 index and the gross domestic product were not entirely correlated, with the remaining figures being high enough.

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ASYNCHRONOUS MOTOR - OPERATING PRINCIPLE AND DEVICE

Abstract: The article deals with the use, principle of operation and features of asynchronous electric motors and the main criterion.

Key words: asynchronous motor, short-circuited rotor, phase rotor, squirrel cage.

Language: English

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Introduction

The greatest contribution to the creation of induction motors was made by Galileo Ferraris and Nikola Tesla. In 1888 Ferraris published his research in an article for the Royal Academy of Sciences in Turin, in which he outlined the theoretical foundations of an asynchronous motor. Merit of Ferraris is that, making an erroneous conclusion about the small efficiency of an induction motor and the inexpediency of using alternating current systems, he drew the attention of many engineers to the problem of improving asynchronous machines. The article by Galileo Ferraris, published in the magazine *Atti di Turino*, was reprinted by an English magazine and in July 1888 caught the eye of the graduate of the Darmstadt Higher Technical School, a native of the Russian Empire, Mikhail Osipovich Dolivo-Dobrovolsky. Already in 1889 Dolivo-Dobrovolsky received a patent for a three-phase asynchronous motor with a squirrel-cage rotor of the "squirrel wheel" type (German patent No. 51083 dated March 8, 1889, entitled "Anker für Wechselstrommotoren"), and in 1890 - patents in England No. 20425 and Germany No. 75361 for a phase rotor with rings and starting devices. The invention disclosed an era of mass industrial application of electrical machines. Currently, the asynchronous motor is the most common electric motor.[1, p 4]

Materials and Methods

Advantages and disadvantages of an induction motor with a short-circuited rotor in comparison with other types of machines:

Pluses:

- Ease of manufacture.
- Relative cheapness.
- High reliability in operation.
- Low operating costs.
- The ability to connect to the network without any converters
- All of the above advantages are due to the

lack of mechanical switches in the rotor circuit and led to the fact that most of the electric motors used in industry are asynchronous machines with a short-circuit rotor.

Disadvantages:

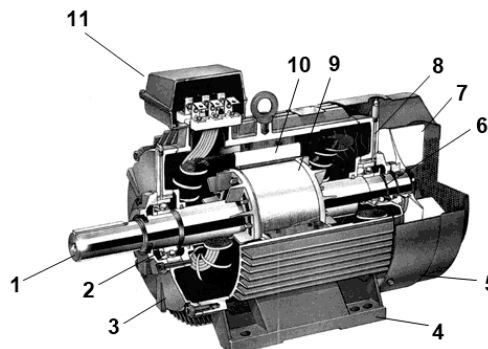
- A small starting moment.
- Significant inrush current.
- Low power factor.
- The complexity of speed control with the necessary accuracy.
- The maximum speed of the motor is limited by the network frequency.
- Strong dependence of the electromagnetic moment on the supply network voltage.
- The most perfect approach to eliminating the above drawbacks is to feed the motor through a frequency converter, in which control is performed using complex algorithms.[2, p 56]

Asynchronous motor - operating principle and device

Modern three-phase asynchronous motors are converters of electrical energy into mechanical. Due to its simplicity, low cost and high reliability, asynchronous motors are widely used. They are present everywhere, this is the most common type of engines, they are produced by 90% of the total number of engines in the world. Asynchronous electric motor has truly made a technical revolution in the whole world industry.[2, p 58]

The huge popularity of asynchronous motors is associated with the simplicity of their operation, cheapness and reliability.

An asynchronous motor is an asynchronous machine designed to convert the electrical energy of an alternating current into mechanical energy. The very word "asynchronous" means not simultaneous. This means that for induction motors the rotational frequency of the stator magnetic field is always greater than the rotor speed. Asynchronous motors operate, as is clear from the definition, from an alternating current network.



Picture- 1. Asynchronous motors

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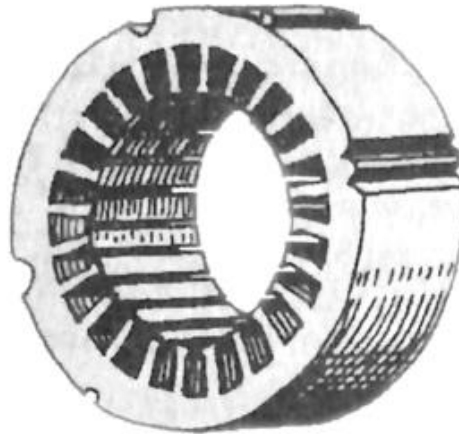
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In the figure: 1 - shaft, 2,6 - bearings, 3,8 - bearing shields, 4 - paws, 5 - fan casing, 7 - fan impeller, 9 - squirrel cage rotor, 10 - stator, 11 - terminal box.

The main parts of the induction motor are the stator (10) and the rotor (9).[3]

The stator has a cylindrical shape, and is

assembled from sheets of steel. In the grooves of the stator core, stator windings are laid, which are made of winding wire. The axes of the windings are shifted in space relative to each other by an angle of 120° . Depending on the voltage supplied, the ends of the windings are connected by a triangle or a star.

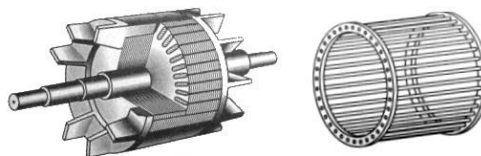


Picture- 2. Rotor

Rotors of the induction motor are of two types: a short-circuit and a phase rotor.[4, p 566]

The short-circuited rotor is a core, recruited from sheets of steel. In the grooves of this core molten aluminum is poured, resulting in the

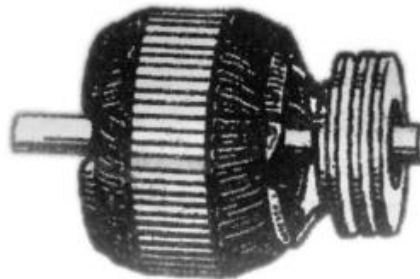
formation of rods, which are short-circuited by end rings. This design is called a "squirrel cage". In heavy-duty engines, copper can be used instead of aluminum. The squirrel cage is a short-circuited winding of the rotor, hence the name itself.[4, p 571]



Picture- 3. Short-curved rotor and squirrel cage.

The phase rotor has a three-phase winding, which practically does not differ from the stator winding. In most cases, the ends of the windings of the phase rotor are connected to a star, and the free ends are brought to the contact rings. By means of brushes that are connected to the rings, an additional resistor can be introduced into the winding circuit of

the rotor. This is necessary so that the active resistance in the rotor circuit can be changed, because this helps reduce the large inrush currents. More information on the phase rotor can be found in the article - an induction motor with a phase rotor.[5, p 613]



Picture- 4. rotor

Principle of operation

When a voltage is applied to the stator winding,

a magnetic flux is created in each phase, which varies with the frequency of the applied voltage.

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These magnetic fluxes are shifted relative to each other by 120° , both in time and in space. The resultant magnetic flux is thus rotating.[5, p 615]

The resultant magnetic flux of the stator rotates and thereby creates in the conductors of the EMF rotor. Since the rotor winding has a closed electrical circuit, a current appears in it, which in turn interacts with the stator magnetic flux, creates the starting torque of the motor, which tends to rotate the rotor in the direction of rotation of the stator magnetic field. When it reaches the value, the braking torque of the rotor, and then exceeds it, the rotor starts to rotate. Thus there is a so-called slip.[6, p 216]

Slip «s» is a value that indicates how much the synchronous frequency n_1 of the stator magnetic field is greater than the rotor speed n_2 , in percent.

$$s = \frac{(n_1 - n_2)}{n_1} \cdot 100 \%$$

Slip is an extremely important quantity. At the initial moment of time it is equal to one, but as the rotational speed n_2 of the rotor increases, the relative frequency difference $n_1 - n_2$ becomes smaller, as a result of which the EMF and current in the conductors of the rotor decrease, which entails a decrease in the torque. In the idling mode, when the engine runs without load on the shaft, the slip is minimal, but with increasing static moment, it increases to the value of «s» - critical slip. If the engine exceeds this value, a so-called overturning of the engine may occur and result in its unstable operation. Slip values lie in the range from 0 to 1, for general-purpose asynchronous motors it is in the nominal mode - 1 - 8%.[6, p 208]

As soon as there is a balance between the electromagnetic moment causing the rotation of the rotor and the braking torque created by the load on the motor shaft, the process of changing the values will cease.

It turns out that the principle of operation of an induction motor is the interaction of the rotating magnetic field of the stator and the currents that are induced by this magnetic field in the rotor. Moreover, the torque can occur only in the event that

there is a difference in the rotational frequencies of the magnetic fields.[6, p 209]

Methods for controlling an asynchronous motor

Under the control of an induction AC motor is meant a change in the rotor speed and or its torque.

The following methods for controlling an induction motor are available:

- rheostat - the change in the rotational speed of an induction motor with a phase rotor by changing the resistance of the rheostat in the rotor circuit, in addition it increases the starting torque and increases the critical slip;
- frequency - the change in the frequency of rotation of an induction motor by changing the frequency of the current in the supply network, which entails a change in the rotational speed of the stator field. The motor is switched on via a frequency converter;
- switching windings from the star to the triangle during the start-up of the engine, which reduces the starting currents in the windings by about three times, but at the same time, the time decreases;
- pulse - power supply of a special kind;
- the introduction of additional EMF according to or counter-directed with the frequency of sliding into the secondary circuit;
- changing the number of pole pairs, if such switching is provided constructively;
- a change in the amplitude of the supply voltage, when only the amplitude of the control voltage changes. Then the control and excitation voltages remain perpendicular;
- phase control is characterized by the fact that the change in rotor speed is achieved by changing the phase shift between the excitation and control voltage vectors;
- The amplitude-phase method includes two described methods; inclusion of stator reactors in the feed circuit;
- inductive resistance for a motor with a phase rotor.[7, p 13]

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SECTION 16. Music. Theatre.

FROM THE HISTORY OF ACTIVITY OF UZBEK THEATRE IN KAZAKHSTAN

Abstract: *This article shows the history of formation of the Uzbek Drama Theatre of the South Kazakhstan region of the Republic of Kazakhstan, its subsequent activities and representatives of the culture that contributed to the development of theatre. Uzbek Drama Theatre of The South-Kazakhstan region serves devotedly in rebuilding the national values, traditions and spirituality of the Uzbek people, as well as taking its worthy place in the social-political and cultural life of society.*

Key words: *Ethnic Uzbeks, Drama Theatre, Sayram, Turkestan Theatre, Shodlik Ensemble, the Prominent of the Culture of the Republic of Kazakhstan, theatre actors, genre.*

Language: English

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Introduction.

(We know) As is generally known that the President of the Republic of Uzbekistan, Sh.M.Mirziyoyev pays special attention to "Further improving friendly relations with foreign countries and relations between nationalities" [1.] and relations with neighboring countries and fraternal peoples [2,25-28]. It is worth noting that the first official visit of the President of the Republic of Uzbekistan Sh.M.Mirziyoyev to the Republic of Kazakhstan was held on March 22-23, 2017, with this visit a new stage of cooperation based on "Long-term friendship and strategic partnership" began[3].

Therefore, learning the cultural, spiritual and scientific heritage of the Uzbek and Kazakh people, and giving a fair and impartial assessment of the history of the two peoples, especially the presentation of interethnic harmony and tolerance to a large scientific community has become one of the urgent tasks of today.

At present, more than 130 nationalities inhabit in Kazakhstan. The country pays special attention to satisfy the social, cultural and educational needs of different ethnic groups, strengthen interethnic accord, solidarity and friendship. We can see this in the example of sphere of culture and art. In particular, the Kazakh and Russian theatres, as well as Uighur, German, Korean and Uzbek theatres are the brightest proofs of our work.

The main part.

As for the history of the Uzbek theatre in Kazakhstan, at the beginning of 1934, the first musical drama theatre was created in Chimkent region [4, 59]. That was the beginning of the Uzbek musical drama theatre whenever the pride of Uzbeks in the republic. A year later, the Kazakh Drama Theatre was organized and the two fraternal nations' theatre began to provide cultural services to the region's workers. The theatre made a tour to Leningrad in season 1937-1938. The troupe picture that was described eight actors on May 23, 1940 is being kept in the archive. Unfortunately, they have neither their name nor their surname, so we do not know who they are. It is known that they all went to the front and did not come back. The Uzbek theatre stopped functioning because of World War II.

At that time the Uzbek musical theatre was one of the largest theatres not only in Kazakhstan but also in Central Asia. The proof of this is the creative complex of the theatre consisting of 11 plays: "Arshin Mololon", "Nurkhon", "Guncha", "Khalima", "Golibiyat", "Gulsara", "Maysara", "Takhir and Zukhra" and others. The theatre team consisted of 60 people, 33 of them participated in the creation of performances directly, and the rest went out with a concert program. Songs and dances of Uzbeks, Kazakhs, Uygurs and other nations were used in the plays of the theatre.



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The elders of the representatives, brothers Khayitmat and Shoyim Musabekov, Shamshi Normatov, Mahkamboy Tilloev, Mukhammadjon Yuldashev, Abdugofur Suleymanov, Kuchkar Toshmatov, Yoldosh Nishonov, Ergash Iriskulov, Abduraim Kurbontoev, Mastura Niyazova, Yuldosh Eshonkulov, sisters Oimkhan and Khanimbuvi Mukhammadova, Eshmatova, Muborak Sayidrasulova, Asalkhon Kuramboeva, Zukhra Sulaymonova, Oromjon Mekhmonkulova, Isomiddin Sulaymonov, Kurbonoy Soatova, Abdukarim Soatov, Rashid Karimov, Ergash Yuldashev, Imamali Aripov, Yunusmat Siddikov and others worked in the theatre.

When it is looked at the history of the national theatre of the Uzbek people in Kazakhstan, it is necessary to talk about the Uzbek folk theatre of Karakash village of Turkistan district. Because it is not wrong to say that it is the inheritor of the Shymkent theatre.

The establishment of the Korachik folk theatre, the Uzbek folk ensemble of songs and dances, the construction of the Korachik village culture house are connected with the name of Saydan Jamolov, the chairman of the collective farm "Pobeda". In 1970, Safidulla Ibotov established an independent art circle in the club of the village of Korachik of collective farm "Pobeda". The talented youth of the village began to be busy in that culture house and organized various concerts. The ensemble "Shodlik" was created on the basis of this circle in 1971. On March 5, 1972, the play "Toshbolta oshik" has been performed for the first time in the club's stage. Then the play was performed at the Turkiston Railway Club and in the villages of Turkistan District. The independent troupe was well-known with its activities throughout the country. In 1974, Jurash Otakhanov, the famous professional producer, was appointed as the head of the troupe. Because of his services, the status of the Uzbek folk theatre "Pobeda" to the independent troupe was given by the decree of the Presidium of the Supreme Soviet of the Kazakhstan SSR in 1981. This folk theatre became as the only Uzbek theatre in the Republic of Kazakhstan until 2003, until the opening of the Uzbek Drama Theatre in the Southern Kazakhstan region. From 1981 to present the Uzbek folk theatre has been working successfully. Many performances, little plays of theatre and comedies were performed there. The theatre team became a laureate of the festival with participating in the folk creative festivals devoted to the 50th anniversary of Kazakhstan, the 60th anniversary and the 70th anniversary of Kazakhstan. The theatre team was a laureate at the United Nations International Creative Festival in 1987, and at the Youth Alliance in Moscow in 1989. The Uzbek Folk Theatre "Pobeda" has played its concert programmes and performances in all Uzbek villages in the region. The theatre was broadcasted

on the Central Television of the UzSSR in 1985 and was broadcasted on the air. In 1990, about theatre was broadcasted on the Central Television of the Kazakhstan SSR. This village theatre was given status of the Turkestan Uzbek Folk Theatre in 2000.

Jurash Otakhanov from 1974 to 1990, Bobokhon Bukharboev from 1990 to 1997, Tilash Izzatullaev worked from 1997 to 2005, Akmal Izaullaev were as the head producer at the Uzbek Folk Theatre in Turkestan from 2005 to 2006, Tilash Izatullaev has been working as the head producer of this theatre from 2006 until nowadays.

Among the talented rural youth in the theatre life, the following people were active: Yu. Azizbekov, Z. Otajonova, B. Nishonova, B. Bukharboev, T. Zaynisheva, M. Isroilova, S. Yusufalieva, M. Bobokhonov, H. Sotiboldieva, N. Tursunmetova, Kh. Abdugofforov, R. Ibotov, T. Izzatullaev, I. Ganiev, N. Marimova, K. Kayomov, B. Tatkaev, S. Masodikova, K. Temirova, B. Misirov, A. Qakhxorov, R. Holmetova, G. Ganieva, G. Mammetov, A. Yusufaliev, H. Ibragimov, M. Yusufalieva, Sh. Mirzaev, S. Azizbekov, I. Musabekova, H. Mamenova, M. Haytova, A. Zatlullaev, A. Ganishev, Sh. Ismoilov, R. Rametov and others [5].

If we speak about the activities of the Uzbek Drama Theatre in the Southern Kazakhstan region, it was established by the decree №127 of the governor of the city on March 14, 2003. On October 22, 2003, the President of the Republic of Kazakhstan, Nursultan Nazarbaev, personally participated in the solemn opening ceremony of the theatre [6].

Today more than 50 people work at the Uzbek Drama Theatre in the Southern Kazakhstan region. 25 of them are artists, of which about 10 are considered highly qualified specialists. Ikromjon Khoshimjanov has been working the director of the theatre since 2013. In the first premiere of the theatre, Sh. Boshbekov's play "Iron Wife" was performed. Works of Kazakh, Russian, Czech and German dramatic artists take also place among the repertoires. The theatre team participates in almost all theatrical festivals and contests. For instance: it might be shown that the events of the Association "Dustlik" of Uzbeks in Kazakhstan, the newspaper "Southern Kazakhstan" and the Little Assembly of the Southern Kazakhstan region. Theatre team had been on tour all over the cities and districts of Southern Kazakhstan, as well as in Jambul, Alma-Ata regions and Alma-Ata city. Theatre actor Saidkarim Makhmudov was awarded the title of "Culture prominent".

For Uzbeks living in Kazakhstan, this theatre is the center of spirituality, the "Askiya" Humor and Laugh Festival which every year the International Poetry Contest – "Stars of poetry", which are attended by all Central Asian word masters is held [7]. In 2009, five plays were staged.



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The theatre team participated with its concert program at "Day of Uzbek Language, Culture and Traditions" which is held Taldykorgan and Almaty according to the invitation of the Assembly of the Nations of Kazakhstan and presented the play based on "Three Days World" (about modern social life) by the Uzbek playwright N. Kodirova and R. Saidkhujaev played the leading role.

The theatre team took thanks letter by the Almaty governor and the authority of the Small Assembly of the region for their contributions to consolidating peace and propagandizing and developing national culture in Kazakhstan. Similarly, "Five Wives of Afand" performance by playwright I. Sodikova from Tashkent was performed and deserved applauds of spectators on the "Day of the Uzbek Language, Culture and Traditions" where has been held in Taraz according to the invitation of the Uzbek Culture Center in Jambul region[8].

The joyful spectacles and parodies of the theatre actors can be seen not only in performances, but also in the annual "Kulgu Karavani" program. In 2005, Odiljon Tugunbaev (Dulat Isabekov's "Pamyatnik" ("Remembrance")) deserved a scholarship of the region governor [9].

The initiative of reorganizing theatre is began from the article by Z. Muminjanov's about the history of Uzbek theatre of and its necessity in the newspaper "Southern Kazakhstan" and attracted Berdibek Saparbaev's attention who was governor of the region at that time. The Uzbek Culture Center has officially called Hoshimjanov to the presence of Deputy Governor - "If you want it, we will open a theatre, but only collect actors for this purpose and show some plays, and will be financially supported" – he said. So They needed actors for this. The announce was given about the need actors to open the Uzbek theatre. Khamidjon Kulabdullaev was the first person to express his positive attitude for this invitation.

He worked at the stage of State Academic Theatre under name Khamza with famous Uzbek producers Bakhodir Yuldashev and Latif Fayziev, who have had actor's and producer's skills. He was assigned for organizing a troupe and selecting a pesa and preparing experimental performance. They prepared the play "Iron Wife" by Sharof Boshbekov and deserved the audience's applause. A month later, a formal agreement was signed for the organization of the Uzbek theatre, and a building was searched. Neglected Culture Palace in Sayram where was 8 km away from Chimkent was selected, \$ 32 million tenge was retained from the budget, was repaired and furnished.

In short, the governor of the region, Bolat Jylkyshev, signed a decree on the establishment of the "Regional Uzbek Drama Theatre" and was launched the 7th National Theatre in Kazakhstan.

Only 9 actors (in the state) were in the theatre which was just organised, five of them were professional (experienced) actors. For instance, Saidkarim Makhmudov, Ortigoy Imomboeva, Odiljon Tugonbaev, Madazim Sulmetmetov, (Kh. Kulabdullaev). All of them were graduates of the Tashkent Theatre and Art Institute, who had performed many roles at the stage and had the conception about the theatre.

Not only the Uzbeks in Sairam, but also Uzbeks from Shymkent, Turkistan, and other regions came to the theatre. More than 3,000 Uzbeks lived in the Suzak village, while more than 600 ethnic Uzbek students attended the School under name Navoi. They had not seen any plays in their own native language yet. The theatre team organizes tours to Taraz, Kyzyl-Orda and all towns and villages where living the Uzbeks.

The theatre planned to stage three performances in the first season, and in the second year planned to stage five of foreign performances [10].

More than 30 plays of different genres have taken place in the theatre repertoire so far. The following works can be mentioned.

In 2003, the tale "Magic apples" based on the work of the Czech playwright, Josef Lada, was staged by Khamidjon Kulabdullaev and the actors performed the following roles, Madazim Sultonmetov - the tale-teller, Maksad Nuraliev - Begzod, Dilfuza Tursunboeva - Manzura aunt, Bekhzod Goyipov - Gani, Tulkin Eshpulatov - King, Jildora Bobosheva - Princess, Ortigoy Imomboeva - nurse, Saidkarim Makhmudov - Commander, Odiljon Tugonbaev - Cook, Bobur Norboev - Guest.

1. In 2002, Alp Jamol's producer who stages the comedy "Unfaithful" was Kh. Kulabdullaev, artist was - Yu. Salametov. The Actors played the following roles, Saidkarim Makhmudov - Latif, Dilfuza Tursunboeva - Zevarkhon, Madazim Sultonmetov - Father, O. Tugunboev - Toji miller, B. Goipov - Siroj, Maksad Nuraliev - Nusrat Khafiz, Shokhista Usmonova - Dilfuza, Rustam Saidkhudjaev - Okil.

2. Vladimir Orlov's "Oltin Jo'ja (Golden chicken)" fairy tale was directed by Kh. Gulabdullaev, head artist - Yusufjon Salametov and wolf - R. Saidhudjaev, Otamurod Kurbanshikov, fox - Ahmedvay Ergashev, Javlon Saitov, chicken - Javlon Saitov, Ahmadhov Ergashev. The premiere was held on December 10, 2006.

3. The premiere was held on May 11, 2007. Kh. Kulabdullaev staged Alibek Fayzulaev's tale "Silver partridge" based on Khavazmat Kuchkorov's translation, actors played the following roles: Ulugbek Nosirov, Otamurod Kurbanshikov – emcee, O. Tugunboev, M. Majrimov - the old man, Venera Nishonboeva, Sarviniso Ruzmetova – the old woman, S. Makhmudov - Kuvvat, Sh. Usmanova -

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silver partridge, R. Saidhujaev, O. Kurbonshikov - merchant, Mardon Majrimov, O. Tugonboev - cow.

4. Nabijon Kodirov's work "Three days' world" in comedy genre, we can see them in the following roles: R. Saidkhujaev – the old man, O. Imomboeva - the old woman, O. Tugonboev – Raim grandfather, Sotvoldi - Akbar Erkanov, Sotvoldi's wife - V. Nishonboeva, Sharof - Ulugbek Nosirov, Sharofat - Klara Shodibekova, the grandson - Akhmedov Ergashev. (the premiere was held on March 14, 2007).

Kh. Kulabdullaev was the head producer of the five works above, and Tulkin Khasanov was the music director.

Tale "Susambil" was staged (in 2009 at the A. Jumaev's inauguration) by guidance of Akhmatullo Niyazov.

The play "The Happiness in the roof of life" in the genre of lyrical drama by Dilbar Makhmudova and Tilab Makhmudov, staged by Kahramon Sa'dullaev, theatre actors are characterized below:

Avaz father - O. Tuganboev, Turdikul Kholikulov, Khadicha mother - V. Nishonbaeva, S. Ruzimetova, Rustam - A. Ergashev, Rano - Luiza Khayrulina, Vasilya Abdurakhmanova, Azim - S. Makhmdov, Makhkam - U. Nosirov, Munira - Dilfuza Ibragimjonova, Kholdor - Javlon Saitov.

Kazakh playwright Dulat Isabekov's "A scandal of a thought" in comedy genre based on Nosir Fozilov's translation was staged. O. Tugonbaev - Ashten Jeldiboev, S. Makhmudov - Jonaydarov, Tulkin Eshpulatov - Esirkepov, Dildora Bobosheva (Gulmira Israilova) – translator, Madazim Sultanmetov – Mr. Charlton, O. Imomboeva - Mrs. Charlton, Bekhzod Goipov - Mr. Konrad, U. Nosirov - Satanov, Maksad Nuraliev - Kulay and R. Saidkhujaev – Salahov's roles were played.

The play "If perfect in perfect" in the comedy genre by Sharof Boshbekov based on J. B. Moller's work "Flying doctor" was performed by Olimjon Salimov who was the Honored Art Worker of Uzbekistan, State Prize laureate.

The music director was Anvar Ergashov who was Honored Art Worker of Uzbekistan. Roles were performed by R. Saidkhujaev (the menial), S. Makhmudov (father), S. Ruzimetova, V. Nishonboeva (cousin), Luiza Khayrullina (girl), U. Nosirov, J. Saitov (young man) and (servant) O. Tuganboev (groom) [11, 3].

There are a group of cultural representatives whose names are listed below: they have a unique place in the history of the Uzbek theatre. One of such people is Dusov Rakhmat Tojievich. Dusov who was born in 1913 in Chymkent had been interested in art and culture of the Uzbek people since he was child. When Rakhmat Dusov was the director of the Uzbek musical and drama theatre in the city of Chymkent, he had invited Tamarakhanim, a well-known Uzbek artist, to the theatre (in the Chimkent theatre). He

also organized tour concerts of famous Uzbek singers such as Subkhanovs and Komiljon Otaniyazov. He went to the front in July 1941. He participated to liberate Czechoslovakia, Germany, Austria, and Germany at the military ranks and went to Berlin. Then he served as a senior commandant in Dresden, Germany. Rakhmat Dusov who returned to his homeland in 1946, was awarded with many orders and medals, such as the second class "Motherland War", "Red Star", "For Courage", "For Military Service", "For Devoted Work" and "Labor Veteran".

Bukharboev Bobokhon Khasanovich graduated from the Tashkent Theatre and Art Institute named after Ostrovsky in 1970 and worked in the culture house of "Pobeda" collective farm in the village of Korachik in 1970. Bobokhon Bukharboev participated in several plays and played leading roles. He is considered one of the founders of the theatre artistic troupe, which worked independently at the collective farm "Pobeda", in taking the name of "folk theatre" and setting the first brick to the foundation of the theatre. In 1981, he became a laureate participating in the Republican Folk Theatres Festivals in the part of Korachik Uzbek Folk Theatre. He participated in the United Nations Population Festival and "Spring of the Theatre" in Alma-Ata in the part of the Uzbek Folk Theatre in 1987.

Rokhatoy Abdullaeva also, born in 1961 in the village of Korachik in the Turkistan district of the Southern Kazakhstan region, had been also interested in art and music since she was child. During her school years she participated in the troupe of the KorachiK Rural House of Culture. She played the leading role in more than 20 plays such as "Brides' revolt", "A Little World" and "Waiting Impatiently For Child". Rokhatoy Abdullaeva was a member of the theatre team in Central TV programs in 1981-1985 in Alma-Ata. She also became a laureate of Republic folk creative festivals which are devoted to the 50th anniversary of Kazakhstan and the 60th anniversary of Kazakhstan. Abdullaeva Rokhatoy is one of the founders of folklore ensemble "Dilshod" and has long years been an artistic director of this ensemble. She also participated in the part of group called "Lapar" consisted of the old women who sing Uzbek national folk songs. Moreover, the service of Makhmudov Saidkarim Saidakhmadovich is unique in the history of the Uzbek theatre in Kazakhstan.

Makhmudov Saidkarim Saidakhmadovich was born on May 5, 1954 in Chymkent city. Beginning from the 8th grade, he participated in many competitions and festivals on the scale cities and regions. After leaving his school, he studied at the Faculty of Drama and Cinema of Tashkent Theatre and Arts Institute under name Ostrov in 1972-1977. He had been worked at the Uzbek Drama Theatre named after Muqimiy under the leadership of People's Artist of Uzbekistan, R. Khamraev since 1977. In 1981, he came back to Chimkent because of

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his family situation and he headed the Kizilsuv club in Sayram. He also participated in many contests and festivals as a soloist (solo singer) at the part of Folklore Ensemble "Guncha" since 1981. He had been on tours in the area of region. He had been teaching music at secondary school named after M. Gorkiy in Chymkent since 1993. After the opening of the regional Uzbek Drama Theatre, he was invited to work. Saidkarim Makhmudov has been still working here to the present. He played leading roles in a number of plays and movies [12]. In 2003, he won award "the Best Actor of the Year" of the governor of the southern Kazakhstan region. In 2006 he was awarded the honorable title "Prominent of Culture of the Republic of Kazakhstan". He has played more than 20 roles from the establishment of the Uzbek Drama Theatre of the region to the present. In particular, he performed the following roles in work "The Unfaithful Yakan" by Alp Jamol, (2002) - Latifjon, Y. Ladan's "Magical Appels" (2003) - Commander (полководец), M. Mirza's "When to morning" (2004) - host, J. Khudoyberdiyev's "Munajjim" (2005) - magician, S. Ahmad's "Brides' revolt" (2005) - Askar, S. Arvar's "The Man Who Comes From the Sky" (2005) - Ergash, B. Brekht's "Masterful mother and her children" (2005) - Pop, M. Mirkholdorov and I. Turkiy's "Yusuf Saryomiy" (2006) - Yusuf Sayromiy, I. Sodikov's "Five Wives of the Afandi" (2006) - Kodir, I.V. Gogol's "Auditir" (2007) - the governor of the city, A. Fayzullaev's "Silver partridge" (2007) - Kuvvat, N. Abboskhon's "Garden" (2007) - Sadridin, Z. Soliev's "The widowers" - Anvar, E. Khushvaktov's "Bashful bride" (2009) - Svekr, D. Makhmudova and T. Makhmudov's "Happiness in the roof of life" (2009) - procurator, A. Jumaev's "Susambil" (2009) - kashkir, R.I. guntekin's "Khalala" (2009) - Salokhiy, Sh. Boshbekov's "If Perfect in perfect" (2010) - father, in B. Sobit's work (2010) - Pulat.

Khamidulla Gulabdullaev is considered another representative of the theatre who has contributed heavily improving theatre. Khamidulla Gulabdullaev graduated from the faculty of Theatre and Cinema of Tashkent Institute of Theatre and Art named after N. Ostrovsky in 1981. He began his career as Deputy of Producer at the Tashkent State Academic Theatre. In 1996, he returned to his native town, Chymkent and taught singing at the Secondary School № 13 named after Mukimiy. Khamidulla Gulabdullaev is one of the founders of the Uzbek Drama Theatre. He ruled the theatre troupe until the opening of the Uzbek Drama Theatre of the region. From the first day of the theatre was the head producer of the theatre. He is currently working at the regional opera theatre.

Another representative of the theatre, Adiljon Turgunbaev was born on September 24, 1962 in Sayram village of Sayram district. In 1986 he graduated from the faculty of Musical Drama and

Actor's mastership of Tashkent Institute of Theatre and Art. From 1986 to 2003 he had worked in the Folklore Ensemble "Guncha" of Sayram District. From 2003 to the present he has been working as the head of the troupe of the Uzbek Drama Theatre.

Another Culture Worker is Ortigoy Imonboeva. She started her career at the Theatre of Young Spectator named after Okhunboboev, she studied at the faculty of actor's mastership of Tashkent Institute of Theatre and Art in 1970-1974. In 1979 she came back to Chymkent because of her family situation and she had taught music and songs at the Secondary School № 21 named after Chekhov since 1979. Ortigoy Imonboeva began to work at the Uzbek Drama Theatre in the Southern Kazakhstan region in 2003. She was awarded with honorary titles of the governor of the Southern Kazakhstan several times.

Muminjonov Zokirjon graduated from the faculty of Theatre criticism of the Tashkent Institute of Theatre and Art named after Ostrovsky in 1981. Since 1999, Zokirjon Muminjanov, the head of department in the "Southern Kazakhstan region" newspaper, has been the director of Uzbek Drama Theatre in the Southern Kazakhstan region from 2003 to 2013.

Besides being a member of the Kazakhstan Journalists Association, Zokirjon Muminjanov is also the author of a collection of poems. His poems took place also in 8 collections of poems. He is one of active propagandists in spreading Kazakh literature among Uzbeks and also famous literary translator[13]. Zokirjon Muminjanov, the secretary of the Association "Dustlik" of Uzbeks in the Republic of Kazakhstan, the chairman of Sayram and Koratepa Uzbek National Cultural Center, actively participated in the social life of the Uzbeks in Kazakhstan and was awarded with many honorable titles.

Conclusion

In conclusion, ethnic Uzbeks in southern Kazakhstan had tried and achieved in order to obtain the theatre which is in their own native language, so as to satisfy the requirements which got their heritage, spiritual, educational, religious knowledge of ancestors.

Nowadays, Uzbek Drama Theatre of the Southern Kazakhstan region in the area serves diligently in rebuilding the national values, traditions and morals of the Uzbek people, as well as to take worthy place in the social-political and cultural life of society. Moreover, the South Kazakhstan Region Uzbek Drama Theatre stages not only national works of the Uzbek-Kazakh, but also the patterns of works of world literature and art and plays an important role in the spiritual and cultural life of the Uzbek and Kazakh people in Kazakhstan.

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SECTION 30. Philosophy.

IDEAS OF SYMMETRY AND THEIR DEVELOPMENT IN NATURAL SCIENCE THE WORKS OF ABU RAYHAN AL – BIRUNI

Abstract: The article analyzes the role of the ideas of symmetry and asymmetry we will make sure that these ideas were methodological regulatory basis for the nomination of scientific hypotheses of al - Biruni. The thinker pays special attention to the role of sensation, mind and memory in cognition and emphasizes that observation of specific phenomena of nature and their generalization contribute to the final conclusion of science.

Key words: symmetry, asymmetry, harmony, matter, inertia, conservation, order.

Language: Russian

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ИДЕИ СИММЕТРИИ И ИХ РАЗВИТИЕ В ЕСТЕСТВЕННО - НАУЧНОМ ТВОРЧЕСТВЕ АБУ РАЙХАН АЛЬ – БИРУНИ

Аннотация: В статье анализируются роли идей симметрии и асимметрии мы убедимся в том, что именно эти идеи были методологическим регулятивным основой при выдвижении научных гипотез аль - Бируни. Мыслитель уделяют особое внимание роли ощущения, разума и памяти в познании и подчеркивает, что конечному заключению науки способствуют наблюдения конкретных явлений природы и их обобщение.

Ключевые слова: симметрия, асимметрия, гармония, материя, инерция, сохранение, порядок.

Введение.

Изучение богатого творческого наследия и вклада в развитие науки великого мыслителя Абу Райхана аль - Бируни является одной из важнейших задач современности. Анализируя роль идей симметрии и асимметрии, мы убеждаемся в том, что именно эти идеи были методологической регулятивной основой при выдвижения научных гипотез аль - Бируни. Здесь исследован и обобщен лишь один из аспектов богатейшего научного наследия выдающегося ученого. Многие из них сохраняют свое значение и в наши дни и ожидают своих исследователей.

Основная часть.

По словам известного русского востоковеда И.Ю. Крачковского, Бируни был энциклопедистом, охватившим весь круг современных ему наук. Легче перечислить сферы наук, которыми не интересовался он, чем те,

которыми он интересовался. В отдельных источниках встречаются сведения о том, что Бируни написал свыше 200 книг, каждая из которых была своеобразной энциклопедией. Например, одно из его первых произведений «Памятники древних народов» (Ал-осор ал-бокия ан ал-курун ал-холия), написанное на арабском языке, является настоящей энциклопедией, вобравшей в себя сведения об исконных народах Хорезма, древних евреях, христианских и мусульманских традициях, обычаях, праздниках, календарях, религиях, пророках, священных книгах. В Европе этот фундаментальный труд известен как «Хронология». Её первое издание было осуществлено немецким ученым, бируниведом Эдуардом Захау в 1876-1887 годах на немецком языке в Лейпциге. В 1950-ом году ученый востоковед А. Расулов переводит часть произведения на узбекский, а в 1957-году книга



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переводится и издаётся на русском языке ученым арабистом М.А. Сале.

Бируни во время службы во дворце правителя Горгана Вашмгира пишет книгу о драгоценных камнях и минералах – «Минералогию» (Китоб ал жамохир фи маърифат ал-жавохир - «Собрание сведений для познания драгоценностей» (1048 г.)). В этой книге Бируни подробно описывает физические и химические свойства минералов. В 1963-году эта книга издаётся на русском языке московским востоковедом А.М. Беленицким. В сочинении при определении и классификации минералов он использовал не только цвет, блеск и прозрачность, а также твердость и удельный вес. Он объединял минералы в группы по внешним и физическим признакам. В одних случаях он сближал минералы, родственные по составу, в других – по какому-либо одному свойству: цвету, твердости, прозрачности, удельному весу. Бируни привел свыше 300 наименований минералов и их разновидности.

Трактат «Книга наставлений по основам искусства астрологии» написан в 1029-ом году в городе Газна. В ней в простой форме истолкованы основные понятия по астрологии, поэтому эту книгу ещё называют «Астрологией».

Бируни считается основоположником экспериментальной науки, так как он, отвергая господство разумной абстракции, опирался больше на испытание и собственное исследование. Он считал, что теория без ее экспериментального применения пуста и безосновательна.

Экспериментальные методы познания – важнейшая составная часть методологического арсенала в современной науке. От уровня их развития существенным образом зависят не только количественные, но и качественные характеристики роста научного знания, а также та быстрота, с которой оно находит свое применение в различных сферах человеческой жизнедеятельности.

Одним из важнейших выводов научных исследований ал-Бируни является то, что между новыми идеями, которые возникают и процессами, происходящими в бытии, должно быть соответствие (симметрия) и только в этом случае можно достичь объективной истины. Поэтому при сравнении данных с помощью современных методов результаты Бируни оказываются весьма точными. К сожалению, они стали известны в Европе очень поздно. Русский консул в Америке Н. Ханьков в 1857 году нашел рукопись аль - Хазини под названием «Книга о весах мудрости» (Абу ар-Рахман ал-Хазини. Китаб мизан ал-хикма. Хайдарабад, 1359. На араб. языке), в которой имелся раздел, содержащий теорию весов, и раздел,

посвященный «искусству изготовления» весов и их градуировке, а также были приведены сведения из книги Бируни «Об отношениях между металлами и драгоценными камнями в объеме», содержащие описание прибора Бируни и полученные им результаты [1, с. 25].

В астрономических исследованиях аль-Бируни, опираясь на идею симметрии, производил точные астрономические и географические измерения. Он определил угол наклона эклиптики к экватору и установил его вековые изменения. Для 1020 года его измерения дали значение $23^{\circ} 34' 0''$. Современные вычисления дают для 1020 года значение $23^{\circ} 34' 45''$. Во время путешествия в Индию Бируни разработал метод определения радиуса Земли. По его измерениям, радиус Земли оказался равным 1081,66 фарсах (1 фарсах = 6 км) т. е. около 6490 км.

А также, Бируни пишет, - «Диаметр Луны совпадает с линией, проходящей через центры мира и [орбиты] апогея в момент соединения и противостояния, проходит через симметрические точки центра мира. В таком положении Луна остаётся и при прохождении через апогей, но ей оказывает сопротивление точка, которая находится на расстоянии в два раза больше, чем расстояния между центрами апогея и остающейся симметричной» [2, с. 160]. В основу этого предположения Бируни первым заложил гипотезу о том, что траектории небесных светил имеют не круглую, а эллипсоидную форму и изобрёл способы их вычислений. Эти методы доработаны в новую эру И. Кеплером.

Во всех современных науках, в той или иной мере, используются научные открытия Бируни. Нет науки, в развитие которой Бируни не внёс бы своего существенного вклада. Например, мир, окружающий нас, не всегда можно познать существующими методами: извилины рек, горы, берега морей, деревьев и т.д. Бируни для их измерения применял фрактальные измерения. Самоподобие определяется как инвариантность при изменении масштабов или размеров. Динамический хаос и странный аттрактор – соотносимые смыслы и явления. Геометрия странных аттракторов соотносена с их фрактальной размерностью. Смысл фрактальности проявляется в её соотношении с понятиями различия, подобия и самоподобия. Одним из видов симметрии, наблюдаемой в природных явлениях, является самоподобие, поэтому, имея объективный статус, оно играет познавательную роль. Самоподобный объект после увеличения или уменьшения кажется неизменным.

Основываясь на принципе симметрии, как самоподобия во фрактальных измерениях в 995 г. Абу Райхан Бируни первым создал глобус земли

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с очень большим диаметром, примерно 5 – 6 метров, которым сегодня пользуются все ученые географы мира. Этот глобус использовался для точного измерения расстояний между городами, а также для определения широты и длины местности. Но Европейские ученые считают, что в 1492 году немецкий ученый Мартин Бехаум впервые изобрел глобус Земли, а в 1519 – 1522 гг. экспедиция Фердинанда Магеллана совершила первое кругосветное путешествие, доказав экспериментально шарообразность Земли.

Следствие самоподобия – объекты с очень тонкой структурой – фракталы. В современной науке основателем теории фракталов считается французский математик Бенуа Мандельброт. И правда, в частности, Б. Мандельброт задался целью создания нового «философско-математического синтеза»[3], результатом которого будет фрактальная геометрия как инструмент описания практически всего в мире, от предсказания цен на рынке ценных бумаг до совершения новых открытий в теоретической физике.

Книгу «Закон Масуда» («ал-Канун ал-Масъуди») великий учёный Бируни завершил в 1030 г. В ней подробно освещены основные законы астрономии, координаты светил, пути вычисления порядков их движения. Большинство учений он сопоставляет с аятами из «Корана». Это свидетельствует о том, что он был хорошо знаком с «Кораном». Также, в этой книге аль-Бируни подробно излагает формы проявления симметрии как гармонию, равенство, пропорциональность, четность, правое и левое и. т. д. [4, с. 502-506].

Основываясь на идее симметрии, Бируни пишет: «Над Европой и Азией имеются две симметричные местности и с юга две симметричные водные территории. Если в природе действуют законы симметрии, то на противоположной стороне Земного шара должны быть аналогичные территории». Развивая эту мысль, можно сказать, что Бируни на основе математических подсчетов за 450 лет до Колумба предположил возможность существования Америки.

Таким образом, теоретические предсказания аль-Бируни, основанные на законах симметрии, подтверждают их важную роль. Кроме этого, следуя своим взглядам, он предсказал существование внеземных цивилизаций, форму Земного шара, описал изменение цвета Луны при лунных затмениях, появление солнечной короны при полных затмениях солнца.

Высказав мысль о движении Земли вокруг Солнца и считая геоцентрическую теорию весьма уязвимой, он осознал гелиоцентрическую теорию раньше Коперника и Леонардо да Винчи.

Знаменитый кристаллограф и теоретик симметрии Е. С. Федоров в своем произведении «Начала учения о фигурах» в 1885 году писал: «Более определенные понятия современного учения о симметрии стали вырабатываться лишь в середине текущего (XVII -века) столетия, и поводом к этому послужило изучение кристаллов» [5, с. 150].

Но, с другой стороны, уже в IX веке аль-Бируни научно доказал идею о том, что живую природу можно отразить в геометрических формах, в определенных структурных объектах. На примере некоторых растений он сумел показать, что наряду с классической формой симметрии существует иная - эдрическая симметрия, то есть, существует запрещенная теорией кристаллографии 5-ая поворотная симметрия. Она характерна для некоторых цветов плодово-ягодных растений, для цветов плодовых растений и т. д. Аль - Бируни показывает это на примере морфологии растений, кристаллов, снежинок, пчелиных сот. О классических формах симметрии он писал: «число листьев, края которых образуют кружок, когда цветок распускается, в большинстве случаев соответствует правилам геометрии. Чаще всего оно совпадает с хордами, которые можно найти геометрическими методами, но не с коническими сечениями. Едва ли найдется какой-нибудь цветок, количество листьев которого составляет семь или девять, так как их нельзя методами геометрии вписать в окружность в виде равнобедренных треугольников. Напротив, (листьев) бывает три, четыре, пять, шесть или восемнадцать» [4, с. 329].

Бируни выдвинул гипотезу о том, что свет, идущий от светил состоит не только из световых волн, но и мелких частиц. В XX веке доказана гипотеза о том, что свет в одно и тоже время имеет природу и волны, и частицы. Учитывая известное еще в классической физике положение о том, что электромагнитная волна переносит энергию, и, используя закон (открытый М. Планком) о дискретном характере переноса энергии [6, с. 27]

Идею о силе притяжения земли к центру первым выдвинул Бируни. Современная теория тяготения – это общая теория относительности. В ее основе лежат два фундаментальных положения, которые могут быть истолкованы как определенные принципы симметрии: принцип общей ковариантности и принцип эквивалентности. Таким образом, история создания релятивистской теории тяготения – это и глава в истории развития концепции симметрии в физике [7, с. 222].

Идея о симметрии, посредством которой человек пытается постичь порядок, красоту и совершенство выступает методологическим

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регулятивом современной науки. С позиций симметрии в современной науке рассматриваются такие проблемы, как: имеет ли значение внутренняя среда организмов для их морфологии или она полностью определена адаптацией организмов к условиям внешней среды; проблема морфологической самоорганизации; проблема биологических, физических, а также социальных структур и их эволюционных преобразований [8, с. 8]. Симметрия и асимметрия в биологических объектах являются фундаментальными составляющими общих закономерностей для живой и неживой материи. Действительно, изучая симметрии организмов, животных или растений, можно убедиться, что они состоят из совокупности симметрий составляющих органов.

В бесконечных изысканиях Бируни ещё одной группой предельных вопросов, наряду с выяснением сущности бытия, были вопросы о том, что же лежит в основе мира: существует ли некое особое образование, которое или содержится во всех предметах и явлениях мира, или всё можно выделить из него. У Бируни всё это выполняет “естественная сила”, которая распределяет количество материи для того или иного создания. Но, как мы знаем, иногда случаются “ошибки природы”, когда строение материи нарушает порядок, обычный для какого-то явления. Бируни именует это “выходом материи из среднего порядка” [9, с. 33].

Итак, во многих научных работах аль-Бируни указано на существование порядка и хаоса (симметрия и асимметрия) в природе. В его взглядах обоснован неабсолютный характер симметрии, т.е. существование асимметрии. Он подчеркивает, что структура человека может быть симметричной (глаза, уши, легкие, ноги, руки – правая-левая) и асимметричной (сердце, печень). Также было указано, что нарушение симметрии, т.е. появление асимметрии вместо симметрии (горбатость, хромота и др.) являются ошибкой природы [10, с.17-18; 34].

Сравнивая идеи Бируни с теориями Мальтуса и Дарвина о процессе эволюции живых организмов, можно отметить, что он превосходит теорию естественного отбора и борьбы за выживание. Эволюционная теория Бируни отличается от теории европейских естествоиспытателей XVII – XVIII вв. своей природной простотой. Он не склонен к тому, чтобы сделать человеческое мышление преемником божественной воли и считать его образцом истины. Бируни считает воображение

происходящим в результате эволюции и природы и отдельно останавливается на проблеме катаклизмов и ошибок природы.

Заключение.

В любой науке Бируни овладел не только всеми достижениями своих предшественников, но и внес значительный вклад в их развитие, обогатил их личными наблюдениями и размышлениями; систематизировал их, исправил ошибки, устранил пробелы и неясности, исключил все недостоверное, сократил и общедоступно изложил.

Из сказанного следует, что объективно существующие единство и взаимосвязь атрибутов материи являются основой единства и взаимосвязи всеобщих категорий нашего познания. Симметрия представляется порой как внешняя гармония в очертаниях предметов, как некая повторяющаяся правильность.

Вышеуказанный анализ показывает, что в гипотезах Бируни центральное место занимают идеи симметрии и асимметрии, которые и в настоящее время в процессе научного познания выступают в качестве синтезирующего и упорядочивающего и систематизирующего принципа, которые в множестве явлений раскрывают единое начало и вносят существенно новые моменты в научный поиск, динамику науки, в процесс создания целостных систем.

Как пишет С. Толстов: «Вспомним слова Розена, оценивающего «Индию» Бируни как «памятник, не имеющий себе равных во всей древней и средневековой литературе Запада и Востока»; слова Сартона, именующего первую половину XI века в истории мировой науки эпохой Бируни; слова Ауреля Стейна, называющего Бируни Леонардо да Винчи XI века; слова Карра де Во, ставящего Бируни рядом с тем же Леонардо и Лейбницем.

Мы оставляем в стороне сами формулировки этих похвальных отзывов, хотя, казалось бы, если уж сравнивать великого хорезмийца с великим итальянцем, то логичнее было бы назвать Леонардо «Бируни XV века» - приоритет остается приоритетом, и никому не придет в голову, скажем, Птолемея назвать «Бируни II века» [11, с. 28].

Его величие, как одного из ученых-энциклопедистов средневековья, отражается в неизмеримом наследии, его вкладе в развитие многих наук не только той эпохи, но и многих тысячелетий вперед.



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SECTION 2. Applied mathematics. Mathematical modeling.

THE SOLUTION OF INHOMOGENEOUS PROBLEMS OF MATHEMATICAL PHYSICS IN THE MAPLE ENVIRONMENT

Abstract: The main analytical methods for solving inhomogeneous problems of mathematical physics are known to be the method of bringing to a homogeneous problem and the Greenberg method. The use of the mathematical package Maple in solving these problems, despite the fact that the tools package is highly developed and easy to use, requires special developments and approaches.

Key words: analytical methods, inhomogeneous problems, Maple.

Language: Russian

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РЕШЕНИЕ НЕОДНОРОДНЫХ ЗАДАЧ МАТЕМАТИЧЕСКОЙ ФИЗИКИ В СРЕДЕ MAPLE

Аннотация: Основными аналитическими методами решения неоднородных задач математической физики, как известно, являются метод приведения к однородной задаче и метод Гринберга. Использование математического пакета Maple при решении данных задач, несмотря на то, что инструментарий пакета высоко развит и удобен для применения, требует особых разработок и подходов.

Ключевые слова: аналитические методы, неоднородные задачи, Maple.

Introduction

Рассмотрим неоднородное дифференциальное уравнение в частных производных:

$$L_x(u) + M_y(u) = F(x, y), \quad (1)$$

$$a < x < b, c < y < d$$

(a, b) - конечный интервал, (c, d) - конечный или бесконечный интервал, $p(x)$, $p'(x)$, $q(x)$, $r(x)$ - непрерывные функции в (a, b) , $L_x(u)$, $M_y(u)$ - дифференциальные линейные операторы:

$$L_x(u) = \frac{1}{r(x)} \left[\frac{\partial}{\partial x} \left(p(x) \frac{\partial u}{\partial x} \right) - q(x)u \right], \quad (2)$$

$$M_y(u) = A \frac{\partial^2 u}{\partial y^2} + B \frac{\partial u}{\partial y} + Cu, \quad (3)$$

Materials and Methods

Искомая функция $u = u(x, y)$ по переменной x удовлетворяет одному из условий первого, второго или третьего рода соответственно:

$$u|_{x=a} = f_a(y), \quad u|_{x=b} = f_b(y), \quad (4)$$

$$\frac{\partial u}{\partial x}|_{x=a} = f_a(y), \quad \frac{\partial u}{\partial x}|_{x=b} = f_b(y), \quad (5)$$

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$$\frac{\partial u}{\partial x} - h_a u \Big|_{x=a} = f_a(y),$$

$$\frac{\partial u}{\partial x} + h_b u \Big|_{x=b} = f_b(y), h_a > 0, h_b > 0$$
(6)

Также для функции $u = u(x, y)$ выполняются условия по переменной y , зависящие от типа уравнения (1). Тип уравнения определяется знаком A . Если $A > 0$, то (1) - уравнение эллиптического типа и на концах интервала (c, d) выполняются условия (c, d) первого, второго, или третьего рода:

$$u \Big|_{y=c} = \varphi_c(x), \quad u \Big|_{y=d} = \varphi_d(x),$$
(4)

$$\frac{\partial u}{\partial x} \Big|_{y=c} = \varphi_c(x), \quad \frac{\partial u}{\partial x} \Big|_{y=d} = \varphi_d(x),$$
(5)

$$\frac{\partial u}{\partial x} - h_c u \Big|_{y=c} = \varphi_c(x),$$
(6)

$$\frac{\partial u}{\partial x} + h_d u \Big|_{y=d} = \varphi_d(x)$$

Уравнение (1) гиперболического типа, если $A < 0$. В этом случае, переменная y - время, $y \in (c, +\infty)$ и условия имеют вид

$$u \Big|_{y=c} = \varphi(x), \quad \frac{\partial u}{\partial y} \Big|_{y=c} = \psi(x).$$
(7)

```
a11 := _; b := _; a22 := _; a1 := _; a2 := _; a0 := _; d := _; a12 :=  $\frac{b}{2}$ ; a21 := a12;
PDE1 := a11·diff(u(x,t), x, x) + 2·a12·diff(u(x,t), x, t) + a22·diff(u(x,t), t, t) + a1
·diff(u(x,t), x) + a2·diff(u(x,t), t) + a0·u(x,t) + d = 0;
inC := _;
```

Задаем решение в виде функции с соответствующими переменными по уравнению. Например, $u(x, t) = v(x) + v(x, t)$ для уравнения

$$\frac{\partial u}{\partial t} - a^2 \frac{\partial^2 u}{\partial x^2} = 0$$

```
u := (x, t) → v(x) + v(x, t); eq1 := diff(v(x), x$2) = 0; dsolve(eq1, v(x));
```

Если $A = 0$, то (1) - уравнение параболического типа; переменная y - время, $y \in (c, +\infty)$. Тогда условия таковы

$$u \Big|_{y=c} = \varphi(x).$$
(8)

Применяя метод приведения к однородной задаче, искомую функцию необходимо представить в виде суммы двух неизвестных функций $u = u_1 + u_2$. Одну из функций подбирают таким образом, чтобы и уравнение для этой функции было однородным и граничные условия по какой-либо переменной относились к однородным. Вторую функцию определяют из полученной однородной задачи, решение которой находят методом Фурье.

Решение неоднородной задачи методом Гринберга находится, как и по методу приведения к однородной задаче в виде двух функций $u = u_1 + u_2$. Но одна из функций подбирается так, чтобы удовлетворяла только неоднородным граничным условиям. Вторая функция является решением однородной задачи.

Рассмотрим методику решения дифференциального уравнения в частных производных с неоднородными граничными условиями. Подключаем специальный пакет для решения дифференциальных уравнений в частных производных PDEtools, пакет линейной алгебры linalg:

```
restart; with(PDEtools); with(linalg);
```

Вводятся значения $a_{11}, a_{12}, a_{22}, a_1, a_2, a_0, d$ уравнения, само уравнение, начальные и граничные данные:

Функцию $v(x)$ подбираем, решая уравнение:

$$\frac{\partial^2 v}{\partial x^2} = 0$$

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Вторую функцию $v(x, t)$ находим из однородного уравнения:

$$\frac{\partial v}{\partial t} - a^2 \frac{\partial^2 v}{\partial x^2} = 0$$

```
c11 := _; b1 := _; c22 := _; c1 := _; c2 := _; c0 := _; d1 := _; c12 :=  $\frac{b1}{2}$ ; c21 := c12;
PDE2 := c11·diff(v(x, t), x, x) + 2·c12·diff(v(x, t), x, t) + c22·diff(v(x, t), t, t) + c1
·diff(v(x, t), x) + c2·diff(v(x, t), t) + c0·v(x, t) + d1 = 0;
```

Выполняем разделение переменных:

```
res := pdsolve(PDE2, HINT = F1(x)·F2(t));
res1 := op(1, res); res2 := op(2, res);
res2[1];
s1 := op(1, res2[1]); s2 := op(2, res2[1]);
```

Получим два обыкновенных дифференциальных уравнения $s1$ и $s2$. Одно из полученных уравнений с начальными условиями $u(x, 0) = u(l - x)$ представляет задачу Штурма – Лиувилля с однородными условиями по переменной x . Находим общее решение этого уравнения, для определенности, пусть это уравнение $s2$ и составляем систему однородных условий по граничным условиям:

```
assume(lambda > 0) : dsolve(PDE2, F1(x));
F1 := unapply(rhs(%), x);
e1 := F1(0) = 0; e2 := F1(1) = 0;
sist := {e1, e2};
```

Вычисляем определитель полученной системы $sist := \{e1, e2\}$; Затем приравняем определитель нулю и получим уравнение для нахождения собственных значений:

и вводим $c_{11}, c_{12}, c_{22}, c_1, c_2, c_0, d$ уравнения, само уравнение:

```
assume(lambda > 0) : dsolve(PDE2, F1(x));
F1 := unapply(rhs(%), x);
e1 := F1(0) = 0; e2 := F1(1) = 0;
sist := {e1, e2};
A := linalg[genmatrix](sist, {_C1, _C2});
Delta := convert(linalg[det](A), trig);
```

Зная собственные значения, находим соответствующие собственные функции:

```
F1 := F1; assume(k, posint);
subs(lambda = ev(k), PDE2);
dsolve({%, F1(0) = 0, F1(1) = 0}, F1(x));
```

Найденные собственные функции нормируем. Таким образом, уравнение $s2$ решено. Находим общее решение уравнения $s1$:

```
PDE3 := lhs(s1) + a^2·ev(k)·F2(t); dsolve(PDE3, F2(t));
```

Решение исходной задачи находим в виде ряда:

```
spr := Sum(C(k)·exp(-ev(k)·a^2·t)·ef(k, x), k = 1..infinity);
```

Из начальных условий определяем коэффициенты этого ряда.

Conclusion

Решение неоднородных задач уравнения математической физики, согласно вышеописанной методики показывает о введении необходимых поправок, исходя из исходных данных решаемой задачи. И эти поправки вводятся, начиная с подбора функции.

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STORY COMPOSITION AND EPIC IMAGE

Abstract: *The article discusses the story of the story genre. Changes in artistic detail, image, time and space are analyzed in the context of Uzbek story. It has been emphasized that the artistic image of the ensemble depends on the evolution of the story composition.*

Key words: *Story composition, epic imagery, artistic expression, story volume, artistic detail, artistic character, Chronotopic artwork, art work, artistic portrait, artistic motive.*

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Introduction

Headline, epigraph, docked episode, lyrical retreat, landscape, portrait, and other elements of the composition of the artworks. Izzat Sultan, Hotam Umurov, Tohta Babaev, Dilmurod Quranov, Erkin Hidayberdiev in the literature of Uzbekistan addressed these components in explaining the elements of the composition of the literary composition. However, literary critic Matyaqub Koshjanov made a fair comment on this subject. The composition of the artists' center of attention placed on the top of conformity, in principle, the game characters in the picture as a work of art by determining the composition evaluation. Especially, the scientist's views on the issue of the dimension in the picture are still relevant today. "Another important aspect of composition is the issue of norm – writes the writer M. Koshjinov – The writer works, if he has aesthetic taste, feels strict in size, does not have the right to arbitrarily extend or shrink some details and facts. The author, who ignores this situation, can not create a strong artistic creation" [1, 275-276]. Thus, each piece in the artistic work must be illustrated in accordance with the laws of art. This requires a wider study of the elements of art. In this sense, we try to understand and explain the artistic component of the story genre. At first, about artistic imagery.

Materials and Methods

Artistic expression, in contrast to stories, contains several compositions in the context of the

art. The present thing in the image is that the subject is restored by the artist to the artwork. Picture (picture, picture, etc.) is a visualization of events in the real world by means of artistic means that can be readily perceived by the reader (the viewer) directly and individually, with the individual features unique to them. Essentially the term T although it is specific to fine arts, it is appropriate to apply it to other types of art, especially to literary literature... [2, 317].

In art literature, landscape, interior, portrait are the classic forms of the image, which includes the heroes' image, their spiritual state, and regular recurring habits in their behavior. For example, let's take a look at Shukur Holmirzayev's story "Clouds That Shut Down": "It was so heavy that it was impossible to stand on the stall. It was a breeze and a rainstorm" [3, 205].

As an integral part of the composition of the composition of the composition, the picture is different from the narrative, with the help of the above-mentioned tools. The sum of dynamic motifs of the artwork is composed of the storyline, and the sum of static motifs belongs to the image area. The composition of the artwork is illustrated by describing the compositional elements. In general, storytelling and visualization in the artistic text make up a single poetic stream, but in some cases it is different.

The artistic composition is a component of the poetry of poetry, which is reflected in descriptive descriptions of heroes, their analysis of their inner world, drawing their outward appearance, expressing



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their nature, revealing episodes that help to reveal a certain reality, to link it to the general line of the lineage [4, 24-25]. For example, Nazar Eshankul's "White Flames" is a masterpiece of the problem of storytelling and represents the idea of a mystic. "The young man left the room. As he walked home, he looked at the room window. The room was full of flames ... " [5, 252].

Imaging arts are found in most types of art. It is actively used in arts such as painting, sculpture, theater and cinema. In literary literature, the comparison of the picture with its storytelling reveals its essence. Famous thinkers and aesthetic G.E.Lessing writes: "Time, space, and personality are described, actions are described. Increasing the attractiveness of the image, the story becomes more interesting. In artistic literature, it is possible to distinguish between external and internal images. When it comes to the external appearance of the scene, space, landscape, interior, portrait, the psychological state of the heroes, their character and their spiritual world are of the type of image" [6].

Literary expression is specifically expressed in epic, lyric, dramatic works. Regardless of whether it is used in oral or written texts, it is a poetic language.

Dilmurad Kuronov writes in his book of Dictionary of Literature studies: expanding the capabilities of the literary works are now widely used in terms of attitudes, perspectives, pessimism, grand plan, general plan. This indicates that the term T now understood as being a qualitative character and can be regarded as a separate composite element at a given moment" [2, 317]. Indeed, it has been proven by British and American literary critics that the imprint was used as an important composite tool for the artistic analysis. From the second half of the twentieth century, various stories appear in the stories. For example, in the stories of Sh.Khalmirzaev, extensive rendering of the picture leads to the exposure of the details, and the parallels with the elements of the image when storing up the rules of the little genre, or the stories in the storyline. One of the features of this period is related to the interior of the picture, in which stories are characterized by the spiritual state of the heroes, the character and the spiritual world. That is, the essence of the heroes' souls is the image of a montage composer. This type of composition is in the works of Uzbek writers, such as Alim Atakhon, N.Eshankul, Tuhtamurad Rustamov, Khurshid Dustmuhammad, Ulugbek Hamdam and Isajon Sultan.

At the same time, the language of the image changes dramatically over the course of the literature. Its specific features are updated according to the genre. Therefore, it is natural that the story is about the type of story: the story is the same, whether the volume is small, whether the number of images is limited, or the boundaries of time and space, is good

for the event, or beautiful image The authors of the Uzbek story have the answer to these questions. However, the stories created during the years of independence call on every reader. The stories written by A.Atahan, H.Dustmuhammad, N.Eshankul, U.Nazar, I.Sultan and U.Hamdham are stacked in the second stage of the scale when the stories written by Sh.Halmirzaev.

In the second half of the scales, the writer's work creates a new dress on the backdrop of the shaping of the story in its composition, such as image, detail, image, style, language. For stories about this type of writers, Kh.Dustmikhhammad writes: "Newly-arranged images have emerged in artistic contexts, with a range of opportunities for different human studies. The author, for his part, readily accepted the world as a precious, meaningful and important one, as well as the insight into the human heart, from its incomplete experiences to the world, from the intrigues of this old world" [7, 177-178]. In the last quarter of the last century and the thirties of the XXI century, it is true that changes in shapes and sizes have been influenced by the genre canons. Somerset Moem, one of the world-class narratives about the peculiarities of this genre, explains: "The story is an artistic integrity that can be read from ten minutes to an hour without adding anything in the edit" [8, 203]. Or the storytelling scientist Michael Veller: The story tells us about a forty-forty five page completed prose piece. Why is it forty-forty-five pages? This is definitely an approximate amount. Such works are read "in a breath" [9]. In both approaches, the story is timely, and the newspaper and the story are limited, and the details of the details are a sign of a genuine genre. Sh.Kholmiraev's great stories were examined in accordance with the above rules, it would take six and a half hours to read the story of the Uzbek grandfather, one hundred and ninety-two pages, three and a half hours, to read the story "The Autumn of the Autumn in the Spring". It is evident that such changes in compositional composition of writer stories are primarily related to the image. That's why we've come up with an analysis of the story's storyline.

First of all, the story refers to the heroic image:

a) It was a primary task to describe an imaginary man with a self-analysis ability, rather than an image of a hero in the story scene. The story of the story, the hero described in the storyline, comes to the end of the story and becomes another person. The characters of Shukur Holmirzaev's "Wild Flower", Uchqun Nazarov's "Dare", Nazar Eshonkul's "Dead Season" are among such characters.

b) In the story, the use of parallel imaging for the lighting of the hero's mental state and the various elements of the existence is widespread. It helps to define the meaning of the hero's image, to deepen its

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understanding, and to ensure the compositional composition of the story's semantics. Shukur Holmirzaev's "Freedom", Anvar Suyun's "Father and Son" and Sanjar Tursun's "The Last Shoe of August" are of this type of story.

c) The story of another heroic image in the story is their lack of identity. The stories of heroes are addressed to me, you, her pupils, or by their profession, profession, nickname. Such forms of poetic visualization played the role of an artistic tool in checking the interior of the hero's image, expressing the attitude of individuals and society, and creating new heroes in Uzbek stories. Examples of heroes in the stories of Ahmed Azam "Tiqin", N. Eshankul "Tong", "Sharpa" and "Tobut".

d) When creating a portrait of a hero's image in the story, emphasis is placed on the internal image of the art. These images are metaphorical in their nature, and reflect the psychological conflict. Story episodes are described in an associative plot composition. Khurshid Dosmukhammad's views on the stories of Alim Atakhan clarify our view: The careful approach and look for obvious novelty, the hero of the writer's works – was that passion and wonder. The scientist took the passion and amazement into the first layer of human existence, set his own desires, desires and dreams in its entirety and sought to describe the elegant feelings of passion and ambition. And, of course, it has raised the passion, and emotions that everyone does not respect, to the level of social reality. In this way, in their stories, the most sensitive, the most subtle, the most subtle of human nature has created a kaleidoscope" [7, 177]. An example is Kh.Dustmuhammad's "Scream", N.Eshankul's "The dog of Bahawuddin", A.Atakhan's "The fourth floor is a yellow window", we can bring heroes of the stairway.

Secondly, in the story is an art detail detailing. Color, sound, smell, and taste others have become an literary element in the semantic structure of the story, which has made it possible to expand the image. Consequently, such details have played poetic role in concealing the author's creative intent, creating a rhythmic tune in the story structure, depicting stories and describing the unity of images. In addition, the expression of the motives of the oral folk tales in the story genre tells about the acceleration of the artificial synthesis process, if the details of the life of the prophets and the Islamic traditions are migrated to novels, stories, novels, and poetic meanings. N.Eshanqul's art pieces in the stories "Evolution", "Tobut", Isajon Sultan's "Ring", "Tashkelinchak", Erkin Samandar's "Wonder Birds"

Third, the image of time and space. Usually, the idea of time and space is limited to the story. This is why the nature of the genre is displayed. Therefore, the storyteller tells the story to be retrospective. However, in the last quarter of the twentieth century, the wide coverage of the time and the image of the

moon caused the genre to expand. In a number of other stories of this period, he defines the time and place of the space and serves to describe the spiritual world of images according to the author's creative intent. Later, in the work of some writers, portraits of several images were created in a chronological space. For example, it is prove, that writing the idea of Murad Mohammad Dost's "galatepaliklar", Nazar Eshankul's "terotalilar", and the Anvar Suyun's "g'ubdintog'liklar". Most of the above-mentioned are the result of the form of research in the Uzbek narrative, which enriched the artistic component.

"An active creative process has not stopped for a moment in the modern Uzbek story field, which was erected nearly a century ago. There are many studies, achievements, dreams and expectations in this area, and are waiting for their specialists to analyze, research, and make comparative analyzes. As the writer of literature Abdulla Ulugov writes, the Uzbek storytelling is boldly portrayed as an expression of the art of describing the phenomenon of life and the expression of a human being. The artistic imagery does not know the boundaries ..." [7, 187].

Thus, the role of literary imaging in the changing of the story's enlargement and the nature-specific features is important. However, if you do not follow the standard criteria, the story composition will be damaged. But in some modern Uzbek stories it is hard to say that the artistic scene has come to an end. There are also places in the narrative story that we have to avoid, from the dictatorship, to the fictional artistic scene, with an increasing number of art stories. The writer should also be able to feel the need to be more specific in addition to knowing where to write.

A.S.Makarenko wrote: "One of the issues that bother me in the matter of composition is intensity. The density problem is that I understand a certain number of texts – pages or sections. Every reader knows that at times in a small place, big and important events are described. At the same time, the story is overwhelmingly detailed, and the actions of heroes are characterized by inconsistent little details. In this way not only the external features of the characters, but also their inner world. This can be called a density of artistic creativity" [10, 278]. M.Koshjanov believes that the density in the composition of art is divided into two. They are great density and sparse, i.e. small density, which is an important factor in determining the poetic function of the artistic image. The intensity of density is that when a portrait, interior, and behavior of the images are expressed through a plurality of details corresponding to the idea of artistic work, a small density is in the art of information, and is actively involved in the creation of a chain of events and the logic of equilibrium, The poetic piece is understood. "In some of the works of Uzbek literature, the



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shortcomings are largely dependent on this great deal of intensity and low concentration. Point of view of the M.Koshjanov, sometimes our writers describe events that require a “pillory” style without feeling the norm. Sometimes, on the contrary, they describe events that require great density” [10, 279]. Unfortunately, in modern Uzbek stories, the problem of density in art is a painful point. Thus the evolutionary way of the story genre develops in relation to the author’s artistic abilities, aesthetic tone, style and expression of the artistic image.

Conclusion

Summarize, Sh.Halmirzaev, Narmurad Narqabilov, A.Atakhan, M.Muhammad Dust, A.Azam, U.Nazarov, Kh.Dustmuhammad, N.Eshankul, U.Hamdani, I.Sultan and other writers’ stories have a special role in defining new trends in Uzbek stories. It should be noted that the complexity of a single art style had a significant impact on the genre, the character of the hero, the artistic detail and the artistic chrono-nature.

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ETHNOGRAPHIC COLLECTIONS OF THE STATE MUSEUM OF TEMURIDS' HISTORY: SAMPLES OF ART OF COPPER-EMBOSSING

Abstract: The article is devoted to the study of ethnographic collections of the state Museum of Temurids' History. Ethnographic collections of the Museum were studied on the basis of samples of copper-embossing art. The article deals with Ethnography, ethnographic collection, factors of formation of ethnographic collections of the state Museum of Temurids' History. The process of development of the Uzbek copper-embossing art was analyzed on the example of copper samples of the state Museum of Temurids' History.

Key words: Ethnography, ethnographic collections, museum, object, museum collection, metal carving, wood carving, painting, ornament, copper products.

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Introduction

Ethnographic expositions are formed on the basis of existing ethnographic collections in museum funds. There are lots of ethnographic collections in the museums of Uzbekistan. Only a tenth of these collections are exhibited in museums. Ethnographic collections differ from other museum collections by its extensive presence. The diversity of ethnographic collections is directly related to ethnography. While speaking about ethnographic collections of museums in Uzbekistan, it is worth mentioning ethnography and ethnographic collections.

Ethnography is a system of special science that studies the distinctions between the different types of ethnic groups of the world, their ethnic origin, their lifestyle, customs, level of material and spiritual development, and their distinctive features, is calculated.

Materials and Methods

The object of ethnography is ethnos, and objects of the whole sphere of the public are the objects of research. This includes:

- the appearance and history of ethnos on earth;
- the number and distribution of ethnos;
- appearance of representatives of the ethnos;
- Language and Religious Beliefs;

- basic forms of traditional culture - economic activity, material culture (places and lodging, clothes and food);
- social culture: social institutions (kin, societies, families, etc.), morals and others;
- Spiritual culture: Rituals of the cycle of life cycle (birth, marriage, death), seasonal rituals, beliefs and ideas[1].

Ethnographic collections are the collection of items representing the culture of a particular ethnos or ethnic group. The museum is of great importance when the ethnographic collection of ethnographic pieces of information is preserved.

There are two types of ethnographic collections: material (household, economic, production and religious) reflecting the material culture of the ethnos and examples of non-material heritage (traditions, beliefs, ceremonies and folklore). Ethnographic collection artifacts have their own characteristics and have vital importance to the ethnographic culture.

Ethnographic objects contain ethnographic data - evidence of cultural expressions that are characteristic of some ethnos[2].

The State Museum of Temurids' History started its work on October 18, 1996 in connection with the 660th anniversary of the great leader Amir Temur. There are about 5,000 objects in the museum fund today. More than 2500 exhibits of the museum



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exposition are included. The main part of the State Museum of Temurids' History consists of rare exhibits such as Amir Temur and manuscripts of the Temurids epoch, correspondence with various statesmen, coins and ceramics, architectural decorations, books, ethnographic works, works of artists of our country.

There are rich ethnographic collections in the State Museum of Temurids' History. The collection of ethnographic collections of the museum dates back to the time of the museum establishment. After publishing a museum dedicated to the history of Amir Temur and the Temurids, many collectors donated their collections to the museum. Most of these collections are ethnographic collections. An ethnographer - collector Saltanat Siddikova from Tashkent, collector Sanobar Sultanova and Rakhima Sharafutdinova have enriched the museum with their ethnographical collections.

Specialists of the museum Saltanat Siddikova, Khamida Jurayeva, Sanobar Sultonova, Gulsara Babanazarova from Samarkand and others have contributed to the museum's contribution to enriching the museum[3].

Ethnographic collections of the State Museum of Temurids' History consist of ceramic items, samples of metal and sugar, porcelain, weaponry, embroidery samples, ornamental patterns, clothes and fabrics. The samples of this museum are the materials of the XIV-XX centuries.

Pasturing on the territory of Uzbekistan is a kind of folk art that has been developed and decorated since ancient times. Among archaeological findings, it is known that the rarity is related to the VII-V centuries BC. In the beginning, the legendary heroes and the image of creatures were widely used in decoration, but after the Arab conquest, some changes took place, such as other types of art. They are "girrikh", "islimy" (types of handcraft) patterns and bytes in the Arabic alphabet.

Patterning of copper rose to its top in the time of Amir Temur and the Temurids. The masters of that era are amazed by its elegance, impeccable taste, richness and complexity of decorations. Fine ornaments, black silver, gold and silver patterns are widely used[4].

Throughout the centuries, schools with specific features have been formed in the art of patterning of the copper. Schools Tashkent-Ferghana, Samarkand-Bukhara and Khiva differ from each other by methods, depth or shallowness of patterns of printing, applied patterns.

Copper tools and samples of the State Museum of Temurids' History, which were widely used in everyday life were made for various purposes. They include *kitchen utensils and household items*: harvester, vase, vase with handles, pots, and pots with one holder and two holders, "dekcha", "xurma", "xurmacha" (types of household items), bowl, cup,

large flat dish, plate, tray, "hovoncha-(type of household items) and its copper handle", "tutqichli drushlak" "mantiqasqon" (types of household items), lid, copper basin, skimmer, incense bowl, cast iron door ring; *water and tea items*: "oftoba, qumg'on" (types of household items), bucket, kettle; *items for washing*: hand washer with lid, basin, "tos, dastshuy" (types of household items); *items of horses and pets*: horse's collar, bridle, horses, dog's collars; *equipment of cosmetology*: "surmadon" (box for colour); *Candlesticks*: metallic candlestick; *smoking equipment*: "chilim" (a kind of hookah); *Writing instruments*: ink pot, pair of compasses, equipment of drawing; *astronomical instrument*: telescope; *Military equipment*: an equipment for putting on the top of the flag; bronze vessels for military expeditions constitute ethnographic collections of this museum.

Majority of calligraphic items of The State Museum of Temurids' History consists of kitchen utensils and water tanks.

The copper bowl in the museum collection (KP 81-1 / 2-1) dates back to the XVI-XVII centuries, and its straightforward walls were tilted toward the cascade and the bottom is round. The decorations are arranged horizontally in the center of the container. The outer part of the wall decorated a wide circle. Two-leaved patterns are made of square trimmings. Leaves are limited to small spots. In the lower part of the circle, the flowers are drawn with patterns. It is made using carving technique. This copper bowl was presented to the museum by Sanobar Sultanova, a collector from Tashkent in 1999.

Among the samples of the ethnographic collection of the State Museum of Temurids' History there is a red copper vessel (KP 67-5), presented by President Islam Karimov in 1998. The pot is related to XIX century. This exhibit consists of heavy handle and lid. The shape of the container is like pear, and has a heavy conical platen. Plant-geometric patterns were made by carving. Patterns were placed as arch in the circle of the plant-shaped ornament. Decorative ornaments have Arabic inscriptions.

One of the ethnographic exhibits decorated with calligraphic art is considered "mantikaskon" (a type of kitchen equipment which cook dumplings on steam) (KP 87-13) XIX-XX. The shape of the rectangle is stored up to the middle of the "mantikaskon". The middle part makes image as tied. On the side wall of the "mantikaskon" there is a handle. The handle is curved on both sides and flat. It is attached with the elegant ring with triangular shaped flowers. Only one handle of the "mantikaskon" has been preserved. For this reason, one of the attached rings has been preserved. In the "mantikaskon" there is a tray which can be put dumplings. It was round shaped with leaf like holes. There are fixed rectangular handles. The "mantikaskon" is largely based on herbal ornaments.

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This exhibit was presented by the ethnographer Saltanat Siddikova in 2000.

The water container of the XVI-XIX centuries, belonging to Bukhara school, located in the museum collection (inv. 1458/7), is characterized by its riches with decorations. The water container, tap and lid are well-preserved. Made of yellow copper water container are elegantly made and cut. Mainly ornaments decorated with 6 edges. The lid is made of red copper with a six-sided edge.

The flower bowl of the water flask extends up to the top, handle is fastened to it. There is a lid on the base of the handle. The mouth of the container extends up to the bottom; the main part of the container forms a shape that is a shape of a cut cone. The body of the vessel is formed like hearts. Its main part is a conical porcupine leg. The handle part is attached to the base with a triangular pattern, and in the upper part decorated with semi-circular leaves. The handle is gently curved. The nose of the bottle is finished with a six-leaf blossom. Calligraphic patterns are primarily plant-like patterns and geometric patterns are used on the cover lid. The water tray covers all the surface of the container.

“Dastshuy” – (narrow-necked jug with long spout used for washing) (KP 5-9) is made of copper, multi-core, eight-cornered base, mushroomed shaped, eight-sided side walled. The container extends from the base to the mouth. The lid is also made of eight-edged, with carvings made of elegant ornament. Each of the eight edges is embroidered. There is a small six-leaf bouquet in the middle of the tie. Herbal patterns on the side of the lid are made of three leafy flowers. “Dastshuy” belongs to the XVII century, made of yellow copper.

There are several types of buckets decorated with different patterns in the museum. The bucket provided by the collector Sanobar Sultanova (KP 87-2/1) is made of red copper, the tiniest bleached interior. It has a reel shape. The middle part is narrow; the upper and lower parts are extensible. The whole surface of the bucket is covered with patterns. Top of the bucket covered with lid. The handle is

heavy, shaped, attached to both sides. The handle is finished with the patterns like leaf. The decorations form the horizontal circle. The patterns include vertical paths, semi-circles, and curls. The circle pattern is made up of patterns like leaf. Medals are made of zigzag patterns on the outside of the container. The medallions are made of glass, like the spatters of drops. This pattern is completed with triangular shapes and patterns as fir tree.

Another bronze bucket (KP 87-2 / 2) also has a spherical shape with a conical base. The bucket which is belong to the XVI-XVII centuries was presented to the museum by the ethnographer-collector Saltanat Siddikova. The whole circle is covered with patterns. The patterns are placed in a horizontal circle, like the previous bucket. The pail is finished with a swelled part which is planned to lid. Ornaments have started from the swelled part. The edges of the first circle are finished with a triangle that reduces the appearance of the wave. The second circle is made up of a half circle until the bucket. In the main part, the ornament is decorated with oval shapes of oval medallions. Among them there are decorations in the form of flowers. Herbal patterns are made up to the bottom of the bucket.

Conclusion

In summary, it is possible to say that the majority of the calligraphic items preserved in the ethnographic museum of the Temurids' History Museum relate to later centuries. Metal objects, widely used in public life, are not only articles of everyday life, but are also examples of applied art decorations. Metal objects are widely used in all spheres of the people's lifestyle. In the daily life and household there was great need for them. The great need of metal goods in everyday life has resulted in the art of decorating it from ancient times. Today, samples of popular folk dances have become a rarity in the collection of museums. Ethnographic collections are important examples of people life style, and their past.

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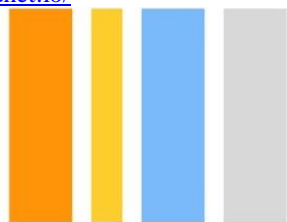
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