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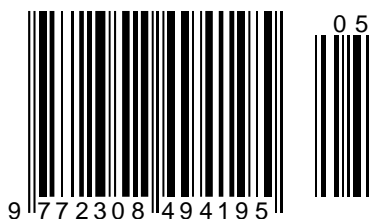
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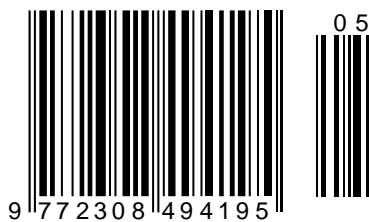
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THE HOMOGENEOUS SOLUTION OF PROBLEMS OF MATHEMATICAL PHYSICS IN THE MAPLE ENVIRONMENT

Abstract: One of the most common and effective methods of solving homogeneous problems of mathematical physics is the Fourier method or the method of separating variables. As you know, the main idea of this method is that the solution of the initial problem is reduced to the solution of auxiliary problems for equations with fewer independent variables. In particular, if the given equation contains 2 independent variables, the auxiliary problems will be dependent on one variable.

Key words: Fourier method, Maple, differential equation.

Language: Russian

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РЕШЕНИЕ ОДНОРОДНЫХ ЗАДАЧ МАТЕМАТИЧЕСКОЙ ФИЗИКИ В СРЕДЕ MAPLE

Аннотация: Один из распространенных и эффективных методов решения однородных задач математической физики - метод Фурье или метод разделения переменных. Как известно, основная идея этого метода состоит в том, что решение исходной задачи сводится к решению вспомогательных задач для уравнений с меньшим числом независимых переменных. В частности, если заданное уравнение содержит 2 независимые переменные, то вспомогательные задачи будут зависеть от одной переменной.

Ключевые слова: метод Фурье, Maple, дифференциальное уравнение.

Introduction

Рассмотрим однородное дифференциальное уравнение в частных производных:

$$L_x(u) + M_t(u) = 0, a < x < b, c < t < d, \quad (1)$$

(a, b) - конечный интервал, (c, d) - конечный или бесконечный интервал, $p(x)$, $p'(x)$, $q(x)$, $r(x)$ - непрерывные функции в (a, b) , $L_x(u)$, $M_t(u)$ - дифференциальные линейные операторы:

$$L_x(u) = \frac{1}{r(x)} \left[\frac{\partial}{\partial x} \left(p(x) \frac{\partial u}{\partial x} \right) - q(x)u \right], \quad (2)$$

$$M_t(u) = A \frac{\partial^2 u}{\partial t^2} + B \frac{\partial u}{\partial t} + Cu, \quad (3)$$

Искомая функция $u = u(x, t)$ по переменной x удовлетворяет одному из граничных условий первого, второго или третьего рода соответственно:

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$$u|_{x=a} = 0, \quad u|_{x=b} = 0, \quad (4)$$

$$\frac{\partial u}{\partial x}|_{x=a} = 0, \quad \frac{\partial u}{\partial x}|_{x=b} = 0, \quad (5)$$

$$\frac{\partial u}{\partial x} - h_a u|_{x=a} = 0, \quad \frac{\partial u}{\partial x} + h_b u|_{x=b} = 0, \quad h_a > 0, h_b > 0 \quad (6)$$

Также для функции $u = u(x, t)$ выполняются условия по переменной t , 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 первого, второго, или третьего рода:

$$u|_{t=c} = \varphi_c(x), \quad u|_{t=d} = \varphi_d(x), \quad (4)$$

$$\frac{\partial u}{\partial x}|_{t=c} = \varphi_c(x), \quad \frac{\partial u}{\partial x}|_{t=d} = \varphi_d(x), \quad (5)$$

$$\frac{\partial u}{\partial x} - h_c u|_{t=c} = \varphi_c(x), \quad \frac{\partial u}{\partial x} + h_d u|_{t=d} = \varphi_d(x) \quad (6)$$

Уравнение (1) гиперболического типа, если $A < 0$. В этом случае, переменная t - время, $t \in (c, +\infty)$ и условия имеют вид

`restart; with(PDEtools) : with(linalg) :`

`a11 := -a2; b := 0; a22 := 0; a1 := 0; a2 := 1; a0 := 0; d := 0; a12 := $\frac{b}{2}$; a21 := a12; 0`

`< x, x < l, t > 0;`

`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;`

`init_c := u(x, 0) = phi(x);`

`bound_c := u(0, t) = 0, u(l, t) = 0;`

`phi := x -> x·(l - x);`

$$0 < x, x < l, 0 < t$$

$$PDE1 := -a^2 \left(\frac{\partial^2}{\partial x^2} u(x, t) \right) + \frac{\partial}{\partial t} u(x, t) = 0$$

$$init_c := u(x, 0) = \phi(x)$$

$$bound_c := u(0, t) = 0, u(l, t) = 0$$

$$\phi := x \rightarrow x(l - x)$$

Выполняем разделение переменных:

$$u|_{y=c} = \varphi(x), \quad \frac{\partial u}{\partial y}|_{y=c} = \psi(x) \quad (7)$$

Если $A = 0$, то (1) - уравнение параболического типа; переменная t - время, $t \in (c, +\infty)$. Тогда условия таковы

$$u|_{t=c} = \varphi(x) \quad (8)$$

Materials and Methods

Применяя метод Фурье, решение задачи находится в виде:

$$u = u(x, t) = X(x) \cdot T(t)$$

Для решения данной задачи воспользуемся средствами математического пакета Maple. Рассмотрим методику решения задачи для уравнения теплопроводности с начальными и 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 :

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```
res := pdsolve(PDE1, 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]);
```

$$res := (u(x, t) = F1(x) F2(t)) \&where \left\{ \left\{ \frac{d^2}{dx^2} F1(x) = -c_1 F1(x), \frac{d}{dt} F2(t) = a^2 -c_1 F2(t) \right\} \right.$$

$$res1 := u(x, t) = F1(x) F2(t)$$

$$res2 := \left\{ \left\{ \frac{d^2}{dx^2} F1(x) = -c_1 F1(x), \frac{d}{dt} F2(t) = a^2 -c_1 F2(t) \right\} \right.$$

$$\left. \left\{ \frac{d^2}{dx^2} F1(x) = -c_1 F1(x), \frac{d}{dt} F2(t) = a^2 -c_1 F2(t) \right\} \right.$$

$$s1 := \frac{d}{dt} F2(t) = a^2 -c_1 F2(t)$$

$$s2 := \frac{d^2}{dx^2} F1(x) = -c_1 F1(x)$$

Получим два обыкновенных дифференциальных уравнения $s1$ и $s2$. Одно из полученных уравнений $s2$ с граничными условиями $u(0, t) = u(l, t) = 0$ представляет

задачу Штурма – Лиувилля с однородными условиями по переменной x . Находим общее решение этого уравнения и составляем систему однородных условий по граничным условиям:

```
PDE2 := lhs(s2) + lambda·F1(x);
assume(lambda > 0) : dsolve(PDE2, F1(x));
F1 := unapply(rhs(%), x);
e1 := F1(0) = 0; e2 := F1(l) = 0;
sist := {e1, e2};
```

$$PDE2 := \frac{d^2}{dx^2} F1(x) + \lambda F1(x)$$

$$F1(x) = -C1 \sin(\sqrt{\lambda} x) + -C2 \cos(\sqrt{\lambda} x)$$

$$F1 := x \rightarrow -C1 \sin(\sqrt{\lambda} x) + -C2 \cos(\sqrt{\lambda} x)$$

$$e1 := -C2 = 0$$

$$e2 := -C1 \sin(\sqrt{\lambda} l) + -C2 \cos(\sqrt{\lambda} l) = 0$$

$$sist := \{-C2 = 0, -C1 \sin(\sqrt{\lambda} l) + -C2 \cos(\sqrt{\lambda} l) = 0\}$$

Вычисляем определитель полученной системы $sist := \{e1, e2\}$; Затем приравняем определитель нулю и получим уравнение для нахождения собственных значений:

```
A := linalg[genmatrix](sist, {_C1, _C2});
Delta := convert(linalg[det](A), trig);
_EnvAllSolutions := true;
solve(Delta, lambda); indets(%) minus{1};
subs(%[1] = k, %%);
ev := unapply(%, k);
A := linalg[genmatrix](sist, {_C1, _C2}); Delta := convert(linalg[det](A), trig);
```


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$$A := \begin{bmatrix} 0 & 1 \\ \sin(\sqrt{\lambda} l) & \cos(\sqrt{\lambda} l) \end{bmatrix}$$

$$\Delta := -\sin(\sqrt{\lambda} l)$$

$$\frac{\pi^2 Z l^2}{l^2}$$

$$\{\{Z l^2\}\}$$

$$\frac{\pi^2 k^2}{l^2}$$

$$ev := k \rightarrow \frac{\pi^2 k^2}{l^2}$$

$$\frac{\pi^2 Z l^2}{l^2}$$

$$\{\{Z l^2\}\}$$

$$\frac{\pi^2 k^2}{l^2}$$

$$ev := k \rightarrow \frac{\pi^2 k^2}{l^2}$$

Зная собственные значения, находим соответствующие собственные функции:

```
F1 := F1; assume(k, posint);
subs(lambda = ev(k), PDE2);
dsolve({%, F1(0) = 0, F1(l) = 0}, F1(x));
```

$$\frac{d^2}{dx^2} F1(x) + \frac{\pi^2 k^2 F1(x)}{l^2}$$

$$F1(x) = -C1 \sin\left(\frac{\pi k x}{l}\right)$$

Найденные собственные функции нормируем:

```
rhs(%);
sqrt(int(rhs(%)^2, x = 0..l)); simplify(% , radical, symbolic); ef := unapply(% , (k, x));
```

$$\frac{-C1 \sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{1 - C1^2}}$$

$$\frac{\sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{1}}$$

$$ef := (k, x) \rightarrow \frac{\sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{1}}$$

Таким образом, уравнение $s2$ решено: найдены собственные значения и нормированные

собственные функции. Находим общее решение уравнения $s1$:

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$ev(k); ef(k, x); PDE3 := lhs(s1) + a^2 \cdot ev(k) \cdot F2(t); dsolve(PDE3, F2(t));$

$$PDE3 := \frac{d}{dt} F2(t) + \frac{a^2 \pi^2 k^2 F2(t)}{l^2}$$

$$F2(t) = _C1 e^{-\frac{a^2 \pi^2 k^2 t}{l^2}}$$

Решение исходной задачи находим в виде ряда:

$spr := Sum(C(k) \cdot exp(-ev(k) \cdot a^2 \cdot t) \cdot ef(k, x), k = 1 .. infinity);$

$$spr := \sum_{k=1}^{\infty} \frac{C(k) \exp\left(-\frac{a^2 \pi^2 k^2 t}{l^2}\right) \sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{l}}$$

Из начальных условий определяем коэффициенты этого ряда и тогда получим решение задачи:

$Ck := Int(phi(x) \cdot ef(k, x), x = 0 .. l);$

$Ck := value(\%);$

$Ck := unapply(Ck, k);$

$sol := spr;$

$$Ck := \int_0^l \frac{x(l-x) \sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{l}} dx$$

$$Ck := \begin{cases} -\frac{2l\sqrt{2}((-1)^k - 1)(-l)^{5/2}}{\pi^3 k^3} & l \leq 0 \\ -\frac{2l^{5/2}\sqrt{2}((-1)^k - 1)}{\pi^3 k^3} & 0 < l \end{cases}$$

$$Ck := k \rightarrow \text{piecewise}\left(l \leq 0, -\frac{2l\sqrt{2}((-1)^k - 1)(-l)^{5/2}}{\pi^3 k^3}, 0 < l, -\frac{2l^{5/2}\sqrt{2}((-1)^k - 1)}{\pi^3 k^3}\right)$$

$$sol := \sum_{k=1}^{\infty} \frac{C(k) \exp\left(-\frac{a^2 \pi^2 k^2 t}{l^2}\right) \sin\left(\frac{\pi k x}{l}\right) \sqrt{2}}{\sqrt{l}}$$

Conclusion

Как видно, большая часть программы связана с нахождением собственных значений и собственных функций уравнения $s2$, которое вместе с граничными условиями представляет задачу Штурма – Лиувилля: от $PDE2 := lhs(s2) + lambda \cdot FI(x);$ до

$ef := unapply(\%, (k, x));$ При формировании матрицы коэффициентов для $-C1, -C2$, возможно столкнуться с трудностями их определения, описываемые в [11]. В этом случае, имеет смысл воспользоваться результатами решения задачи Штурма – Лиувилля с граничными условиями первого рода [11]. Это же

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возможно и при граничных условиях второго рода по переменной x .

Таким образом, использование математического пакета Maple при решении

однородных задач математической физики, несмотря на то, что инструментальный пакет высоко развит и удобен для применения, требует особых разработок и подходов.

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FINDING A SOLUTION TO A REGULAR PROBLEM OF THE STURM - LIOUVILLE PROBLEM WITH VARIOUS BOUNDARY CONDITIONS IN MEDIUM MAPLE

Abstract: Today the Maple system is especially popular in the scientific environment. The developed system of commands, user-friendly interface and extensive capabilities allow you to effectively use Maple for solving mathematical problems. We will use this opportunity to solve the Sturm – Liouville problem with different boundary conditions.

Key words: Maple, Sturm – Liouville problem, boundary conditions.

Language: Russian

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НАХОЖДЕНИЕ РЕШЕНИЯ РЕГУЛЯРНОЙ ЗАДАЧИ ШТУРМА- ЛИУВИЛЛЯ С РАЗЛИЧНЫМИ ГРАНИЧНЫМИ УСЛОВИЯМИ В СРЕДЕ MAPLE

Аннотация: На сегодняшний день система Maple особо популярна в научной среде. Развитая система команд, удобный интерфейс и широкие возможности позволяют эффективно применять Maple для решения математических задач. Этой возможностью воспользуемся для решения задачи Штурма – Лиувилля с различными граничными условиями.

Ключевые слова: Maple, задача Штурма – Лиувилля, граничные условия.

Introduction

Как известно, многочисленные различные краевые задачи приводят к обыкновенному дифференциальному уравнению 2-го порядка:

$$Y''(x) + \lambda Y(x) = 0, \quad a < x < b \quad (1)$$

где λ - параметр, принимающий любые значения с различными граничными условиями:

$$Y(a) = 0, Y(b) = 0, \quad (2)$$

$$Y'(a) = 0, Y'(b) = 0, \quad (3)$$

$$Y'(a) - h_a Y(a) = 0, Y'(b) + h_b Y(b) = 0 \quad (4)$$

где (2) – граничные условия первого рода, (3) – граничные условия второго рода, (4) – граничные условия третьего рода/

Materials and Methods

Для нахождения решения уравнения (1) с одним из граничных условий (2)- (4), называемой задачей Штурма - Лиувилля необходимо определить те значения λ - собственные значения, при которых существуют нетривиальные решения - собственные функции задачи. При различных условиях в конечных

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точках интервала на решение уравнения (1) получают различные задачи на собственные значения, а значит различные собственные значения и собственные функции, которые используются при методе разделения переменных. В связи с этим, имеет практический интерес нахождение собственных значений и собственных функций для задачи, которая включает каждый из граничных условий (2)- (4). Для этого, примем во внимание первое выражение из вышеназванных граничных условий, т.е.

$$Y(a) = 0 \text{ в условиях 1-го рода,}$$

$$Y'(a) = 0 \text{ в условиях 2-го рода,}$$

*restart; with(PDEtools) : with(LinearAlgebra); DU1 := diff(y(x), x, x) + lambda*y(x) = 0;*

$$DU1 := \frac{d^2}{dx^2} y(x) + \lambda y(x) = 0$$

Y := dsolve(DU1, y(x)); dsolve(DU1, y(x)); y := unapply(rhs(%), x); assume(b > a);

$$Y := y(x) = _C1 \sin(\sqrt{\lambda} x) + _C2 \cos(\sqrt{\lambda} x)$$
$$y(x) = _C1 \sin(\sqrt{\lambda} x) + _C2 \cos(\sqrt{\lambda} x)$$
$$y := x \rightarrow _C1 \sin(\sqrt{\lambda} x) + _C2 \cos(\sqrt{\lambda} x)$$

Для нахождения решения задачи с конкретными граничными условиями используем

цикл с тестирующей функцией *hasfun* .:

```
if hasfun(lhs(g1_0), y) and not(hasfun(lhs(g1_0), D(y))) then p := 1; fi;  
if not(hasfun(lhs(g1_0), y)) and hasfun(lhs(g1_0), D(y)) then p := 2; fi;  
if hasfun(lhs(g1_0), y) and hasfun(lhs(g1_0), D(y)) then p := 3; fi;
```

При введенных граничных условиях первого рода нахождение решения задачи Штурма – Лиувилля будет осуществляться по первому циклу:

$$Y'(a) - h_a Y(a) = 0 \text{ в условиях 3-го рода.}$$

Как видно выражение в условиях первого рода представляет значение функции в точке, второго рода - значение производной функции в точке, а условиях третьего рода - и значение функции и значение производной функции в точке. Чтобы отразить это в программе воспользуемся возможностями тестирующей функции *hasfun(V, <Id-функции> {,x})* с помощью которой возвращается значение true, если определенное первым фактическим аргументом V-выражение содержит вхождение функции, заданной своим идентификатором, и, возможно, от указанной третьим необязательным аргументом ведущей x-переменной.

Вводим значения уравнение (1):

Затем вводим требуемые граничные условия, например, граничные условия первого рода и находим общее решение:

$$g1_0 := y(a) = 0; g2_0 := y(b) = 0;$$

$$g1_0 := y(a) = 0$$

$$g2_0 := y(b) = 0$$

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```

if p = 1 then
g1 := y(a) = 0; g2 := y(b) = 0;
sys := {g1, g2}; G1 := GenerateMatrix(sys, [_C1, _C2]); G2 := GenerateMatrix(sys, [_C2,
_C1]);
G12 := <<(G1|G2)>>; G122 := Column(G12, 1); G123 := Column(G12, 4); G := <<(G122
|G123)>>;
del := combine(Determinant(G)); del := select(has, del, lambda); _EnvAllSolutions
:= true : lambda := solve(del, lambda); _EnvAllSolutions := true :
lambda := subs(_Z1 = k, lambda);
assume(k, posint) : y(x);
C1 := solve(g1, _C1); combine(%); simplify(subs(_C1 = combine(%%, trig), y(x)));
combine(%);
Y := unapply(select(has, %, [x]), x, k); Y(a, k) = 0; simplify(Y(b, k)) = 0;
assume(n, posint); assume(m, posint);
Int(Y(x, n) · Y(x, m), x = a..b); simplify(value(%));
Norma := Int(Y(x, n)2, x = a..b); simplify(value(%));
fi;

```

Здесь воспользовались результатами [4], [6], где рассмотрено решение задачи Штурма – Лиувилля для граничных условий первого и второго родов.

$$\begin{aligned}
 g1 &:= _C1 \sin(\sqrt{\lambda} a) + _C2 \cos(\sqrt{\lambda} a) = 0 \\
 g2 &:= _C1 \sin(\sqrt{\lambda} b) + _C2 \cos(\sqrt{\lambda} b) = 0 \\
 sys &:= \{ _C1 \sin(\sqrt{\lambda} a) + _C2 \cos(\sqrt{\lambda} a) = 0, _C1 \sin(\sqrt{\lambda} b) + _C2 \cos(\sqrt{\lambda} b) = 0 \} \\
 G1 &:= \begin{bmatrix} \sin(\sqrt{\lambda} a) & \cos(\sqrt{\lambda} a) \\ \sin(\sqrt{\lambda} b) & \cos(\sqrt{\lambda} b) \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \end{bmatrix} \\
 G2 &:= \begin{bmatrix} \cos(\sqrt{\lambda} a) & \sin(\sqrt{\lambda} a) \\ \cos(\sqrt{\lambda} b) & \sin(\sqrt{\lambda} b) \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \end{bmatrix} \\
 G12 &:= \begin{bmatrix} \sin(\sqrt{\lambda} a) & \cos(\sqrt{\lambda} a) & 0 & \cos(\sqrt{\lambda} a) & \sin(\sqrt{\lambda} a) & 0 \\ \sin(\sqrt{\lambda} b) & \cos(\sqrt{\lambda} b) & 0 & \cos(\sqrt{\lambda} b) & \sin(\sqrt{\lambda} b) & 0 \end{bmatrix} \\
 G122 &:= \begin{bmatrix} \sin(\sqrt{\lambda} a) \\ \sin(\sqrt{\lambda} b) \end{bmatrix} \\
 G123 &:= \begin{bmatrix} \cos(\sqrt{\lambda} a) \\ \cos(\sqrt{\lambda} b) \end{bmatrix} \\
 G &:= \begin{bmatrix} \sin(\sqrt{\lambda} a) & \cos(\sqrt{\lambda} a) \\ \sin(\sqrt{\lambda} b) & \cos(\sqrt{\lambda} b) \end{bmatrix} \\
 del &:= \sin(\sqrt{\lambda} a - \sqrt{\lambda} b) \\
 del &:= \sin(\sqrt{\lambda} a + \sqrt{\lambda} b) \\
 \lambda &:= \frac{\pi^2 Z1^2}{(-b + a)^2} \\
 \lambda &:= \frac{\pi^2 k^2}{(-b + a)^2}
 \end{aligned}$$

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$$\begin{aligned}
 & -C1 \sin\left(\sqrt{\frac{\pi^2 k^2}{(-b + a)^2}} x\right) + -C2 \cos\left(\sqrt{\frac{\pi^2 k^2}{(-b + a)^2}} x\right) \\
 C1 := & \frac{-C2 \cos\left(\frac{\pi k a}{-b + a}\right)}{\sin\left(\frac{\pi k a}{-b + a}\right)} \\
 & \frac{-C2 \cos\left(\frac{\pi k a}{-b + a}\right)}{\sin\left(\frac{\pi k a}{-b + a}\right)} \\
 & \frac{-C2 \left(\sin\left(\frac{\pi k x}{-b + a}\right) \cos\left(\frac{\pi k a}{-b + a}\right) - \cos\left(\frac{\pi k x}{-b + a}\right) \sin\left(\frac{\pi k a}{-b + a}\right)\right)}{\sin\left(\frac{\pi k a}{-b + a}\right)} \\
 & \frac{-C2 \sin\left(\frac{\pi a k - \pi k x}{-b + a}\right)}{\sin\left(\frac{\pi k a}{-b + a}\right)} \\
 Y := (x, k) \rightarrow & \sin\left(\frac{\pi a k - \pi k x}{-b + a}\right)
 \end{aligned}$$

В цикле проверили выполнение граничных условий и ортогональность собственных функций на конечном отрезке, результаты которых представлены ниже:

$$\begin{aligned}
 0 &= 0 \\
 0 &= 0 \\
 & \int_{a^-}^{b^-} \sin\left(\frac{\pi a n - \pi n x}{-b + a}\right) \sin\left(\frac{\pi a m - \pi m x}{-b + a}\right) dx \\
 & \begin{cases} \frac{1}{2} b - \frac{1}{2} a & m - n = 0 \\ 0 & \text{otherwise} \end{cases} \\
 \text{Norma} := & \int_{a^-}^{b^-} \sin\left(\frac{\pi a n - \pi n x}{-b + a}\right)^2 dx \\
 & \frac{1}{2} b - \frac{1}{2} a
 \end{aligned}$$

Для нахождения решения задачи Штурма – Лиувилля с граничными условиями второго рода, вводим их:

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```

DU1 := diff(y(x), x, x) + lambda*y(x) = 0;
g1_0 := D[1](y)(a) = 0;
g2_0 := D[1](y)(b) = 0;
with(DEtools) :
if hasfun(lhs(g1_0), y) and not(hasfun(lhs(g1_0), D(y))) then p := 1; fi;
if not(hasfun(lhs(g1_0), y)) and hasfun(lhs(g1_0), D(y)) then p := 2; fi;
if hasfun(lhs(g1_0), y) and hasfun(lhs(g1_0), D(y)) then p := 3; fi;
Y := dsolve(DU1, y(x));
dsolve(DU1, y(x)); y := unapply(rhs(%), x);
assume(b > a);

```

В этом случае нахождение решения задачи Штурма –Лиувилля будет осуществляться по второму циклу:

```

if p = 2 then
g1 := D[1](y)(a) = 0; g2 := D[1](y)(b) = 0;
sys := {g1, g2}; G1 := GenerateMatrix(sys, [_C1, _C2]); G2 := GenerateMatrix(sys, [_C2,
_C1]);
G12 := <<G1|G2>>; G122 := Column(G12, 1); G123 := Column(G12, 4); G := <<G122
|G123>>;
del := combine(Determinant(G)); del := select(has, del, lambda); _EnvAllSolutions := true :
lambda := solve(del, lambda); _EnvAllSolutions := true :
lambda := lambda[2];
lambda := subs(_Z1 = k, lambda);
assume(k, posint) : y(x);
C1 := solve(g1, _C1); combine(%); simplify(subs(_C1 = combine(%%, trig), y(x)));
combine(%);
Y := unapply(select(has, %, [x]), x, k); simplify(D[1](Y)(a, k) = 0; simplify(D[1](Y)(b, k)
= 0;
assume(n, posint); assume(m, posint);
Int(Y(x, n) * Y(x, m), x = a..b); simplify(value(%));
Norma := Int(Y(x, n)^2, x = a..b); simplify(value(%));
fi;

```

Аналогично поступаем при решении задачи с граничными условиями третьего рода, решение которой осуществляется по третьему циклу

$$(h_a = 1, h_b = 1);$$

```

if p = 3 then
g1 := y(a) - D[1](y)(a) = 0; g2 := y(b) + D[1](y)(b) = 0; sys := {g1, g2};
G1 := GenerateMatrix(sys, [_C1, _C2]); G2 := GenerateMatrix(sys, [_C2, _C1]);
G12 := <<G1|G2>>; G122 := Column(G12, 1); G123 := Column(G12, 4);
G := <<G122|G123>>;
del := combine(Determinant(G));

```

Матрица коэффициентов и ее определитель отличается от ранее рассмотренных:

$$G := \begin{bmatrix} \sqrt{\lambda} \cos(\sqrt{\lambda} b) + \sin(\sqrt{\lambda} b) & -\sqrt{\lambda} \sin(\sqrt{\lambda} b) + \cos(\sqrt{\lambda} b) \\ -\cos(\sqrt{\lambda} a) \sqrt{\lambda} + \sin(\sqrt{\lambda} a) & \sin(\sqrt{\lambda} a) \sqrt{\lambda} + \cos(\sqrt{\lambda} a) \end{bmatrix}$$

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$$\text{del} := \lambda \sin(\sqrt{\lambda} a - \sqrt{\lambda} b) + 2\sqrt{\lambda} \cos(\sqrt{\lambda} a - \sqrt{\lambda} b) - \sin(\sqrt{\lambda} a - \sqrt{\lambda} b)$$

Для нахождения собственных значений преобразовываем выражение определителя и решаем относительно тангенса:

$$s := \text{convert}(s1, \tan) = 0; \quad s2 := \text{solve}\left(s, \tan\left(\lambda^{\frac{1}{2}} \cdot a - \lambda^{\frac{1}{2}} \cdot b\right)\right);$$

$$s1 := -\frac{\lambda \sin(\sqrt{\lambda} a - \sqrt{\lambda} b)}{\cos(\sqrt{\lambda} a - \sqrt{\lambda} b)} - 2\sqrt{\lambda} + \frac{\sin(\sqrt{\lambda} a - \sqrt{\lambda} b)}{\cos(\sqrt{\lambda} a - \sqrt{\lambda} b)}$$

$$s := -\lambda \tan(\sqrt{\lambda} a - \sqrt{\lambda} b) - 2\sqrt{\lambda} + \tan(\sqrt{\lambda} a - \sqrt{\lambda} b) = 0$$

$$s2 := -\frac{2\sqrt{\lambda}}{\lambda - 1}$$

Conclusion

Как видно, полученное решение тригонометрического уравнения необходимо преобразовать для нашего решения - нахождения собственных значений. Для этого удобно ввести

новую переменную $\mu = \sqrt{\lambda} \alpha$, значения которой определяются из уравнения:

$$f(\mu) = 0,$$

где $f(\mu) = \text{tg } \mu - \frac{2\mu\alpha}{\mu^2 - \alpha^2}$. Положительные

корни этого уравнения будут при $\mu_k = 1, 2, \dots$.

Следовательно, собственные значения будут определяться по формуле:

$$\lambda_k = \left(\frac{\mu_k}{\alpha}\right)^2;$$

$$\frac{2\mu|a|}{a^2 - \mu^2}$$

$$f := \tan(\mu) - \frac{2\mu|a|}{a^2 - \mu^2}.$$

Нахождение собственных функций определяется ниже:

$$_C2 := \text{solve}(g1, _C2);$$

$$_C2 := \text{simplify}\left(\text{subs}\left(\lambda = \left(\frac{\mu}{a}\right)^2, _C2\right)\right);$$

$$y := \text{collect}\left(\text{subs}\left(\lambda = \left(\frac{\mu}{a}\right)^2, y(x)\right), _C1\right);$$

$$\text{subs}(\mu = \mu[n], y);$$

$$y := \text{unapply}(\text{select}(\text{has}, \%, [x]), x, n);$$

Данная программа применяется для определенных значений a и b , для чего в начале программы вводятся их значения.

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DEVELOPMENT OF AN ALGORITHM FOR TRANSLATING NATURAL LANGUAGE SENTENCES INTO SQL QUERIES

Abstract: This article discusses process of development an algorithm for translating natural language sentences into SQL queries

Key words: Database, Text to SQL.

Language: Russian

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РАЗРАБОТКА АЛГОРИТМА ТРАНСЛЯЦИИ ПРЕДЛОЖЕНИЙ ЕСТЕСТВЕННОГО ЯЗЫКА В ЗАПРОСЫ НА ЯЗЫКЕ SQL

Аннотация: В данной статье рассматривается алгоритм транслятора естественного языка в запросы на языке SQL.

Ключевые слова: Базы данных, перевод текста в SQL.

1 Introduction

С развитием технологий во многих сферах нашей жизни нам всё чаще приходится сталкиваться с различными информационными системами, для взаимодействия с которыми требуются определённые навыки и знания. Такие технологии проникают всё в большее количество сфер и, как следствие, возникает необходимость в повышении квалификации некоторых сотрудников, или же найма дополнительных, обладающих нужными навыками. В связи с этим возникает вопрос, можно ли найти менее затратный и автоматизированный способ решения данной проблемы?

Одна из самых очевидных идей – разработка «интерфейса» или прослойки, которая позволит людям без нужных навыков взаимодействовать, например, с СУБД [1].

В данной статье рассматривается разработка алгоритма трансляции предложения на

естественном языке в запросы на языке SQL, анализируются подводные камни данной проблемы, а также указываются конкретные методы их решения.

2 Motivation

Самым лёгким способом взаимодействия с любым не знакомым сервисом для любого пользователя, вне зависимости от его навыков и образования, является взаимодействие через привычный пользователю язык, со знакомыми ему грамматическими конструкциями. Так как преобразовывать машинную логику в естественный язык существенно сложнее, чем проводить обратное преобразование (в связи с более широким спектром эмоциональной окраски и большого количества синонимов в естественном языке).

И именно данную функцию берёт на себя машинный формальный перевод. Больше всего

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нас интересует первое появление интеллектуальной обработки текстов, которое берёт своё начало в 60х годах XX-го века, что в свою очередь, с увеличением вычислительной мощности в последующие года, привело к появлению нескольких базовых способов интерпретации естественного языка, таких как синтаксический и семантический анализ шаблонов. Синтаксический строится на основе разбора фразы с учётом частей предложений, семантический – использует информацию из предыдущего метода и дополняет его информацией из тезаурусов.

Базовые особенности перевода в SQL завязаны на его строгой структурированности и формализованности. Более строгая

структурированность характеризуется малым количеством типовых команд и их форм.

3 Basic interpretation

Основную задачу перевода можно упростить до выявления типа команды, определения полей и дополнение их грамматическими конструкциями языка [2]. Но такой алгоритм применим только на базовом уровне, т. е. с запросами обычной структуры, без использования соединений или вложенных запросов. К тому же возникают сложности, если предложение на естественном языке плохо сформулировано, или содержит большое количество лишней информации. Такая проблема характерна не только для SQL, но и для большинства формализованных языков.

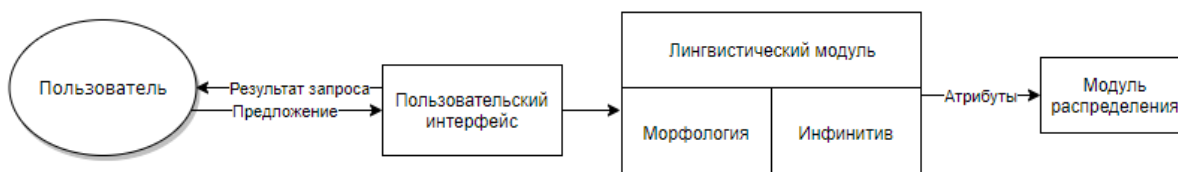


Рисунок 1 - Процедура разбора

Основная идея алгоритма состоит в первую очередь во всевозможной формализации конкретного предложения. Для того чтобы этого достичь следует избавиться от всевозможных словоформ определяя их инфинитив, но при этом сохраняя информацию о первоначальной формулировке. Изначальные формулировки могут помочь в определении логических взаимосвязей между операндами в предложении, так что знать их характеристики тоже полезно.

К определению инфинитивов есть несколько подходов. Один из самых старых и базовых – словарные алгоритмы, основанные на использовании больших и массивных словарей, и поиска по ним [3]. Очевидный минус их использования – довольно медленное выполнение и сильная зависимость от обновления словарей. Другой вариант – алгоритмы, основанные на морфологических конструкциях [4]. Оба подхода позволяют узнать как другие формы слова, так и некоторое количество вспомогательной информации. Но по причинам скорости работы и большого спектра возможностей, для решения нашей задачи логичнее использовать лингвистический анализатор основанный на втором методе. Также стоит отметить, что данный модуль будет необходим ещё и из-за большого синонимичного набора слов (одно и то же действие/объект можно обозначить по-разному) и каждое такое слово может быть не только в базовой форме.

После ввода команды от пользователя, пользовательский интерфейс передаёт её в лингвистический анализатор [5], задача которого определить важные атрибуты (такие как тип команды, объект, с которым требуется выполнить действие и различные параметры), после чего преобразовать их в базовую форму, а также заменить синонимами, если требуется. После этого из команды атрибуты и параметров (в изменённой форме) создаётся вектор, который передаётся в модуль распределения.

Кроме того, для решения поставленной задачи, нам потребуется ещё ряд дополнительной информации, не относящейся к конкретному введённому предложению. Во-первых - модуль взаимодействия с системой управления базами данных. Он используется для получения информации о схеме, с которой нам предстоит работать, для возможности подключения, отсылки запросов в базу данных, а также для анализа ошибок (отдельно хочется отметить, что планируется обрабатывать ошибки на стороне БД, а реагировать только на коды ошибок различными способами).

Во-вторых, небольшой модуль загрузки словарных данных. Дело в том, что для определения ключевых элементов команды нам потребуются различные словари синонимов. Также подобные словари потребуются для конвертации словесных формулировок условий и фильтров.

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Стоит отдельно остановиться на том, что в зависимости от того, какой конкретно вид запроса нас интересует, процесс преобразования будет отличаться, и для разных типов запросов следует использовать разные сценарии транслятора. Для того, чтобы корректно переключаться между этими сценариями, следует проанализировать формализованную версию предложения. Этот процесс представлен модулем распределения (рис.1).

Задача модуля распределения – выяснить, какому из модулей передавать управление. Решение принимается следующим образом – мы имеем информацию о конкретной схеме в базе данных, полях, хранящихся в таблицах, ключах и ещё ряде параметров. По ним модуль распределения сможет определить тип команды. В случае если мы работаем с выборкой - хранится ли вся нужная нам информация в одной таблице, или же нам потребуется соединить несколько таблиц.

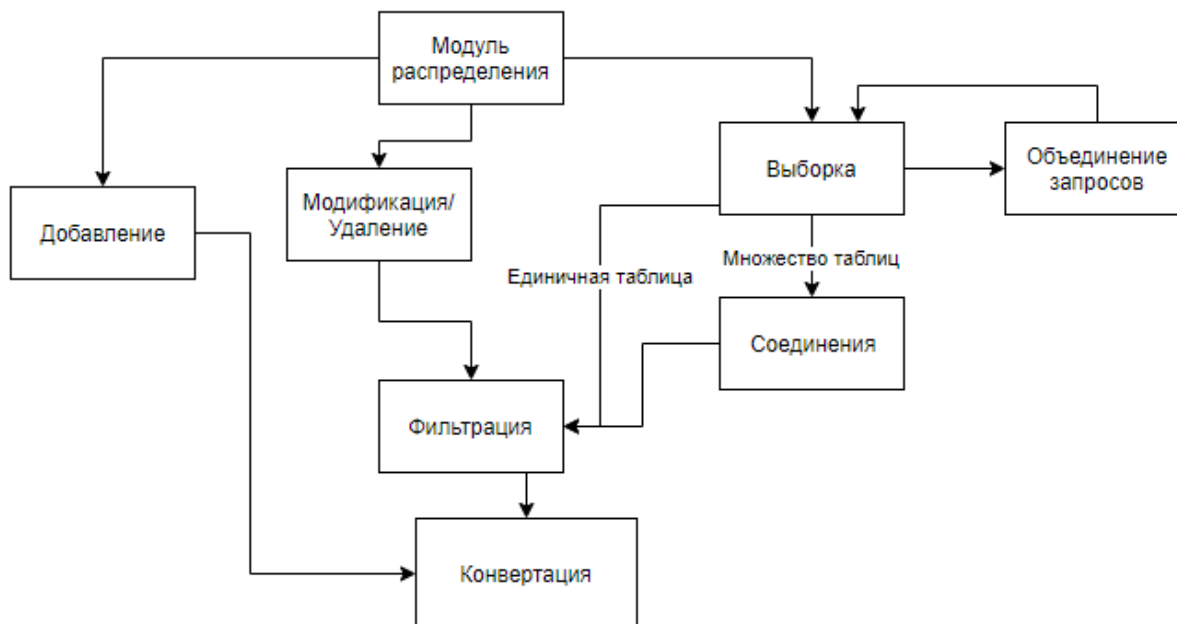


Рисунок 2 - Схема выбора вида запроса

4 Processing modules

Конкретно рассматривая некоторые сценарии разбора запросов (рис.2) для начала хочется обговорить механизм обработки запросов, содержащих в себе множественное соединение таблиц. При попытке перевода связанных запросов с использованием простых методов формализации возникают сложности. Требуется не только определить какую и откуда информацию нужно вывести, но и какую последовательность связей между таблицами нужно построить для создания запроса. Существует несколько способов решения данной проблемы. Один из давно известных – ручное составление словаря-схемы базы данных, с указанием полного пути соединения для каждой двух и более таблиц. Более современный подход – обучение нейронной сети, с целью создания преобразователя [6; 7; 8]. В данной работе хотелось бы взять лучшее из двух подходов, а именно отсутствие необходимости вручную

корректировать решение для других схем базы данных, а также скорость решения конкретной задачи.

Идея такого решения довольно проста - из базы данных получаем набор таблиц, информацию о соединениях по ключам, и эту информацию пускаем в нейросеть, с целью получения полной карты соединений, а также весовой информации [9]. После получения полной карты мы можем использовать её для анализа и составления запроса с соединениями без нужды переделывать карту, пока структура схемы не будет изменена.

Ещё из возможных вариантов выборки стоит отметить запросы, состоящие из объединения двух компонентов, такие как union и minus. Фактически, работа с таким видом мало отличается от базового запроса выборки, за тем исключением, что благодаря позиционным атрибутам и некоторым ключевым словам, мы разделяем предложение на 2 части, анализируя их

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как отдельные запросы, и затем объединяем их нужным оператором [10].

Один из самых часто используемых в разных типах запросов является модуль фильтрации, который будет использоваться как в самых разных видах выборки, так и в запросах модификации и удаления. Фильтрация основывается на целом ряде факторов - во-первых на информации о полях базы данных, во-вторых на логических и позиционных связях, в-третьих на морфологических характеристиках. Модуль фильтрации всегда анализирует обработанное предложение после других модулей для того, чтобы случайно не обработать данные, относящиеся к другим разделам.

Кроме различных запросов выборки, алгоритм должен уметь работать с запросами модификации. Основная сложность с ними состоит в определении конкретного действия, которое следует сделать с изменяемыми данными. Основываясь на морфологических характеристиках и ключевых словах, запрос может представлять собой как замену, так и модификацию с использованием текущих значений, с поддержкой преобразования текстовых операторов изменения и их преобразования в формализованный вид.

Более простым образом обстоит ситуация с обработкой запросов удаления, так как выявление базовой части запроса состоит из простого определения полей базы данных логически и позиционно связанных с командными маркерами. Оба предыдущих модуля, как и модуль обработки выборки, просто посылает обработанную информацию в модуль фильтрации для определения нужды анализа оставшейся части предложения, на предмет маркеров-фильтров.

Следующий модуль, обрабатывающий запросы о котором хотелось бы поговорить - модуль добавления данных. Он довольно прост

алгоритмически и представляет собой последовательный анализатор, использующий позиционно-логические связки между объектами, которые можно отнести к полям схемы и словами, не относящимися к ключевым словам и полям, и преобразования этих связей в формальный вид. Единственная проблема с данным модулем представляется в следующем. Фактически нет никакой возможности проверить корректность введения пользователем информации если поля, в которые добавляется информация имеют, один тип. Как следствие, при работе с данным типом запросов на пользователя переносится наибольшая ответственность за корректность вводимых данных.

Последний модуль, это модуль конвертации, собирающий все разобранные ранее конструкции и подставляющий их в конкретные команды языка SQL. После этого запрос исполняется с помощью модуля взаимодействия с системами управления базами данных и возвращается пользователю либо в виде результата, либо в виде ошибки (рис. 1).

5 Conclusion

Данная статья описывает алгоритм трансляции естественного языка в запросы на языке SQL. Были рассмотрены требуемые для выполнения этой задачи способы формализации данных и основные этапы разбора (рис.1). Так же были обговорены и проанализированы способы и методы определения и трансляции конкретных вариаций запросов. (рис.2) Были перечислены логические модули алгоритма, отдельные этапы анализа и их важные особенности, которые помогут при реализации. Данная статья позволит в будущем разработать транслятор предложения естественного языка в запросы на языке SQL.

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

CRITERIAS FOR THE REGULATION OF THE ORGANIZATION OF THE ACCOUNTING PROCEDURE OF WAGES AND INTERNAL CONTROL OF WORKERS OF CUSTOMS AUTHORITIES OF THE REPUBLIC OF UZBEKISTAN

Abstract: This article describes the features, goals and objectives of the payment for the work of the customs authority. Also, theoretical and practical suggestions and recommendations have been made to improve existing normative legal acts on payment of labor. The Customs Institute was selected as the object of the study.

Key words: budget organization, money supply, wages, sources of financing, pedagogical activity, scientific potential.

Language: English

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Introduction

Today, thanks to the gradual reforms in the budget system and the system of customs authorities in the Republic of Uzbekistan, in the context of a strong competitive market economy, it is important to improve the order of targeted and effective use of state budget funds in the country, as well as the order of payment of salaries, pensions and other payments. Because it is one of the most pressing issues to economize on budget expenditures by the most important cost estimates. In this regard, one of the most important priorities is to reflect them accurately and accurately in accounts and reports. The President of the Republic of Uzbekistan issued the Decree "On the State Program on Implementation of the Strategy of Action on the Development of the Republic of Uzbekistan in Five Priority Areas for the Development of the Republic of Uzbekistan in 2017-2021" at the "Year of Active Investments and Social Development" dated January 17, 2019. It set priorities for the further development of the system of budgetary resources efficient use and inter-budgetary relations, based on the priorities of economic development and active investment attraction [1]. Including:

➤ identifying the stages and directions for the introduction of targeted budgeting system in

Uzbekistan jointly with international financial institutions, deeply studying the world experience in this field;

➤ Development of qualitative and quantitative indicators and evaluation indicators on budget-funded programs and projects;

➤ creation of standards for audit of effectiveness of budgetary funds;

➤ Improving the rules and procedures for allocating high budget targeted budgetary funds (transfers) by the end of 2020, ie setting up an order that sets out the single approach;

➤ Unification of the norms of taxes left to the local budget from 2021 and the introduction of a three-year review practice;

➤ to create a normative legal basis for the implementation of tasks such as gradual transferring the localization expenditure budget from the budget to the lower budget.

The point is: "We all know that reform means renovation, change. In order for the reforms to succeed, first of all, our leaders and our people need to change. When a person changes, society changes." It is necessary to further improve the system for the efficient use of budgetary funds. Any program or project whose budget has been funded should include

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quality and quantity indicators and have result-oriented indicators. "[2]

Literature review

Issues of legal regulation of wages, including wages of public sector workers, were widely covered by CIS scientists such as: N. N. Abakumova, R. Ya. Podovalova [10], E. B. Pasherstnik, M. S. Meyksin, N. V. Pasherstnik [11], A. D. Zaikin, K. S. Remizov [12], M. V. Karlova [13], V. Glazyrin [14], and others.

Analysis and results

In the consistent policy pursued by the President of the Republic, the government of our country, a special attention is paid to the richness and prosperity of the people, the support of entrepreneurs, the creation of a solid foundation for economic development and development.

Labor relations in our country are based on the norms of the Constitution of the Republic of Uzbekistan and the Labor Code [3].

One of the main factors in enriching the people and providing them with decent living conditions is the challenge of rewarding, encouraging. Unfortunately, there have been many acute problems and shortcomings over the years, and it is not possible to solve them shortly. Labor relations in the competitive economy are becoming more complicated than ever before. Solving the problem of real employment, limited workplaces, relative surplus in the workforce, degrees of employment in the globalized economy, social benefits, labor protection, incentives, productivity and productivity are among the most important issues we face today.

So, what changes and tendencies are observed in today's globalized, strong competitive economy. The first and most important factor of the problem is the proper determination of its minimum standards for living.

According to the EU statistics agency, the richest country in the European Union - the minimum monthly wage in Luxembourg is nine times higher than in the poorest country in the European Union - Bulgaria. It is said that the minimum monthly wage in Luxembourg is currently Euro 1999 and 235 euros in Bulgaria. In addition to Luxembourg, Ireland is 1,563 Euros, the Netherlands 1552 Euro, Belgium 1532 Euros and Germany 1498 Euros. The lowest figures

are Romania's 275 Euros, Latvia 380 Euros, Lithuania 380 Euros and 407 Euros in the Czech Republic.

In addition, six of the 28 EU countries have no "minimum wage" concept. These are Denmark, Sweden, Italy, Cyprus, Slovakia and Croatia. In the ranking of average wages in different countries, we can see the following countries. This rating includes 157 countries. The first place is in Switzerland. The average wage in this country is \$ 3,355. In Kuwait, which is on the second place, this is \$ 3,111. The average salary in the United States is \$ 3,202.

Among CIS countries, the highest figure is in Russia - \$ 615. Kazakhstan is ranked 480, Belarus 375 and Turkmenistan at \$ 320. It is noted that in Tajikistan, this figure is about \$ 110. The lowest point is in Zimbabwe - an average of \$ 21 a month. Uzbekistan ranks 118th on this rating. The average salary in Uzbekistan is \$ 235.

The Strategy for Action in the five priority areas of Uzbekistan's development in 2017-2021 and the State Program "Year of Support for Innovative Business, Innovation Ideas and Technology" will focus on the development of social sphere, social protection of the population, taking into account trends of international economic relations and investment attractiveness of the country. and the further improvement of the labor payment system. The program also notes that the real incomes of the population in 2018 increased by 12% compared with 2017. Currently, the President of the Republic of Uzbekistan, issued on May 21, 2012, has adopted the Law of the Republic of Uzbekistan "On the improvement of the procedure for payment of wages, pensions and other payments", PF-5723, "On improvement of the procedure for payment of salaries, pensions and other payments" Decree "was adopted. Accordingly, the differences between the minimum wage and the minimum monthly wage and the principles of their implementation were determined. In accordance with the decree, from September 1, 2019, the following amounts have been set instead of the minimum wage: [4]

- minimum amount of remuneration - 577 170 soums;
- basic calculation - 202 730 soums;
- The basic amount of pension calculation - 202 730 soums.

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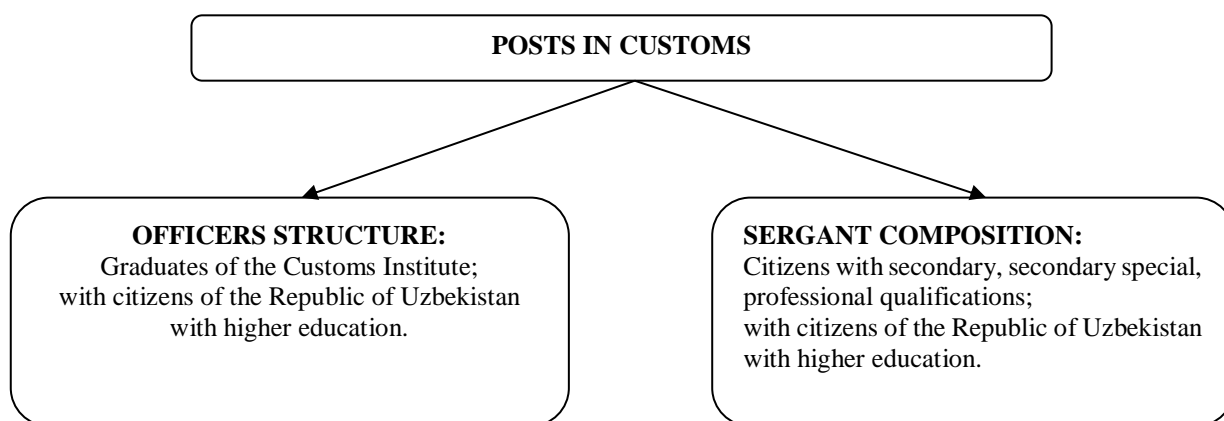


Fig.1. Structure of positions in customs authorities

Based on the above, it is safe to say that the labor relations in the Republic of Uzbekistan are successfully regulated on the basis of the principles of justice established by law.

As a result of step-by-step reforms in our country, it also required a radical improvement of the activities of the State Customs Service and identified a number of urgent tasks [5]. Including:

- protection of the rights, freedoms and legally protected interests of individuals and legal entities;
- within its competence to protect the economic interests of the Republic of Uzbekistan and ensure its economic security;
- customs clearance and registration;
- collection of customs payments;
- including prevention, detection and suppression of smuggling;

Monitoring of foreign trade operations, analysis of execution of export-import contracts, as well as observance of currency legislation on foreign trade operations in respect of customs authorities;

maintaining customs statistics on foreign trade and commodity nomenclature of foreign economic activity;

increasing the legal culture of citizens in the customs area;

systematic monitoring of the effectiveness of the risk management system;

Application of modern information and communication technologies and control over the activities of customs authorities;

development of priority directions of customs development and improvement;

Effective implementation of these tasks requires the training of highly skilled, highly qualified professionals in customs. This requires the proper organization of the procedure for keeping and paying employees of the customs service.

The Customs authorities are the law-enforcement organs in which the staff of officers and sergeants, who have special ranks, and the staff of the service personnel, carry out the activity. Positions on customs authorities are summarized as follows [6]. See the picture upper. (Fig.1))

Table- 1. Special ranks of employees of customs authority

#	Structure of special titles	Titles
1.	Sergeants Structure:	- Small sergeant for customs clearance; - Customs sergeant; - Large sergeant for customs service.
2.	Officers Structure:	
	small officers' structure	- lieutenant of customs service; - Senior Lieutenant for Customs Service; - Captain of customs service.
	Major officers	- Customs Service Major; - lieutenant colonel of customs service; Colonel of customs service.
3.	General Structure:	Major-Major of Customs Service; Lieutenant General of Customs Service; General Colonel of Customs Service.

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The customs authority shall exercise the rights and freedoms set forth in the Constitution of the Republic of Uzbekistan, the legislation and the State Customs Committee's internal normative acts. The Customs authorities shall act as the representative of the state body and shall be under the protection of the State of the Republic of Uzbekistan in carrying out their official duties in accordance with their respective roles and functions.

In the system of customs bodies, there are 4248 personnel consisting of officers and sergeants, having

a special title. The main tasks of the Customs officers' employees, depending on their particular working conditions and specific features, are recorded and paid for. Categorization of customs posts on the basis of characteristic and scope of their service plays a crucial role in their payment. For each category, the maximum allowance is set according to the specific working conditions [7]. The following table shows how:

Table-2. Types of types and salaries of customs officers, taking into account their specific working conditions and working capacity

r/p	Name of categories	Border Customs Offices		Customs posts of foreign economic activity		Amount of premiums
		the number	state unity	the number	state unity	In %
1.	Customs offices except sate	17	1316	6	284	40
2.	First category customs posts	17	490	21	349	35
3.	Second class customs posts	23	390	26	242	30
4.	Kinologists					20
	Total	57	2196	53	875	
	Overall	110 posts		3071 state unity		

The purpose of the registration and payment of the employees of the customs service is to improve the relationships between employees, based on the specificities of the customs system, to justify the labor norms, ensure the effective use of the expenditure estimates, and build trustworthy financial and economic activities.

Customs authorities are a non-commercial organization maintained at the expense of the State budget funds, ie the budget organization is regulated

on the basis of the norms of the Budget Code of the Republic of Uzbekistan and the payment is made at the expense of budgetary funds. It should be noted that customs officials carry out their fiscal responsibilities in replenishment of state budget revenues while carrying out their activity. By the end of 2018 employees of the Customs Service will receive 11.5 billion soums. The customs payments were collected and timely transfer to the state budget was ensured

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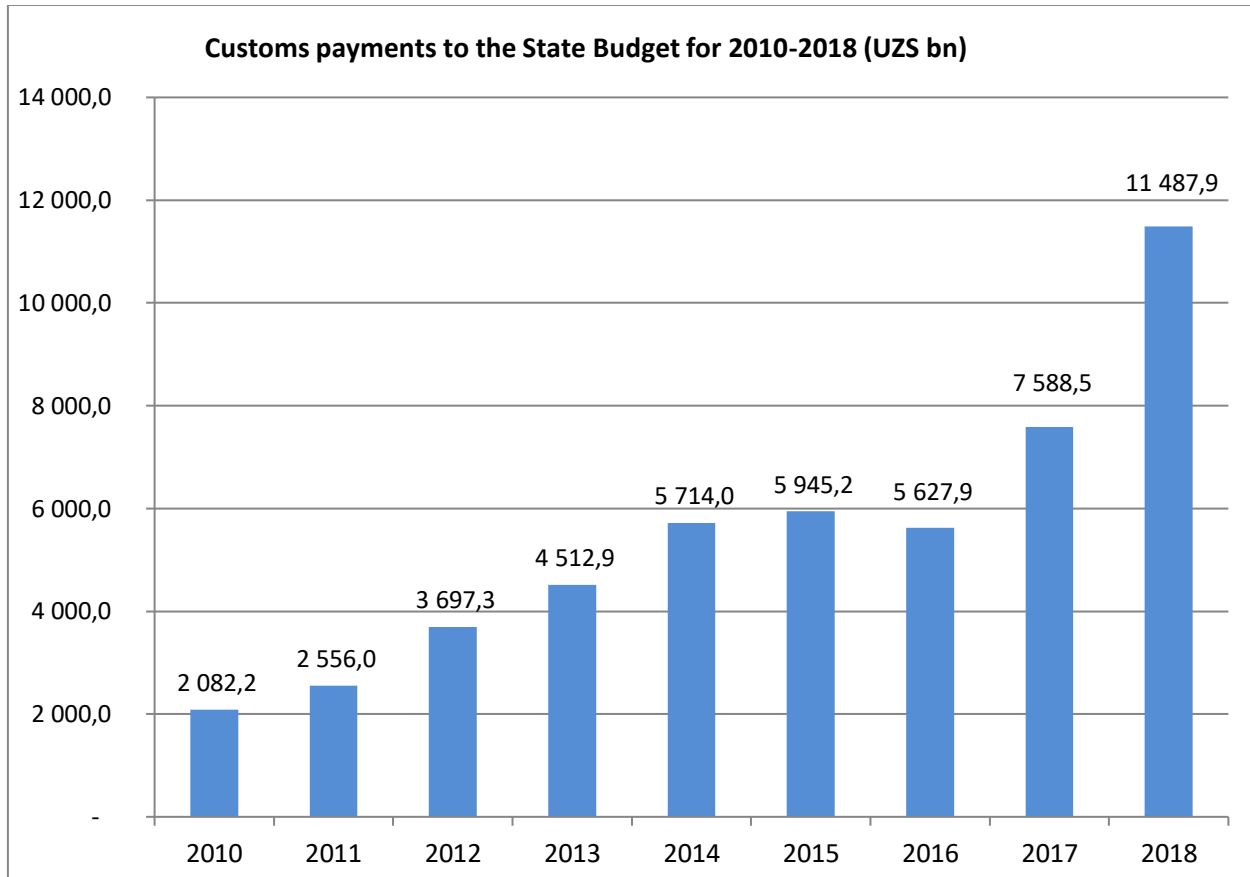


Fig.2. Customs payments to the State Budget

At present, the Customs authorities carry out annually the prospective plans for these customs payments.

Successful implementation of the tasks on liberalizing the foreign economic activity, enhancing investment attractiveness and strengthening the country's export potential are largely dependent on the effective organization of the customs authorities, in particular, the insufficient use of opportunities for material incentives for customs officers to prevent corruption and overall system effectiveness indicates that the In order to avoid these problems, due to the conscientious performance of customs duties, high professional level and moral and ethical character, the Government of the Republic of Uzbekistan issued a number of Decrees and Resolutions [8].

Including:

According to the Decree of the President of the Republic of Uzbekistan from April 12, 2018 "About measures on cardinal improvement of activity of bodies of the State Customs Service of the Republic of Uzbekistan" and the Decree of the President of the Republic of Uzbekistan from April 12, 2018 "About organization of activity of bodies of the State Customs Service of the Republic of Uzbekistan" 3665 RESOLUTION OF THE PRESIDENT OF THE REPUBLIC OF UZBEKISTAN from November 2,

2018 on measures to radically improve the system of training of customs agents of the Republic of Uzbekistan On the introduction of amendments and supplements to certain resolutions of the Government of the Republic of Uzbekistan (the Resolution of the President of the Republic of Uzbekistan No. PP-3995) "On additional measures to improve the customs administration and increase the effectiveness of the activities of the State Customs Service of the Republic of Uzbekistan" additional changes and additions were introduced in the system of labor payment based on the requirements of the main tasks and directions of the service.

The adoption of these decrees and resolutions is fundamentally reformed to materialize the system of labor compensation for the workers of the customs authority, as starting from November 2018, according to approved rates of remuneration of labor tariffs for employees of the State Customs Service of the Republic of Uzbekistan the coefficients of the coefficients were used in 1.7 times. The staff of the customs authority has been financed due to a 50% increase in salaries for special working conditions and at least 70% for professorial teachers of the Customs Institute.

The analysis shows that in the course of the past 2018, the payment for the work of the customs

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authority has been doubled to the current year. However, the basic amount of the salary increased to 100 percent, and the source of funding was the state budget, and the main overpayment was increased by 50-70 percent due to the funds spent from the special funds of the State Customs Committee. A source of formation of a special fund, formed at the expense of deductions of 50% of customs duties. These funds are used in accordance with expenditure estimates approved by the Ministry of Finance of the Republic of Uzbekistan.

From our point of view, it is possible to conclude that the establishment of the customs authority based on the work of the staff and the nature of their payment is a result of the efficient and efficient use of budgetary funds, taking into account the fact that accounting officers are a big responsibility, time consuming, and highly professional. for the purposes of controlling the correct use of the targeted use, labor costs and accounting in their accounting records, the State Customs it is desirable to establish the "Customs Audit Department" in the Committee. See the picture below

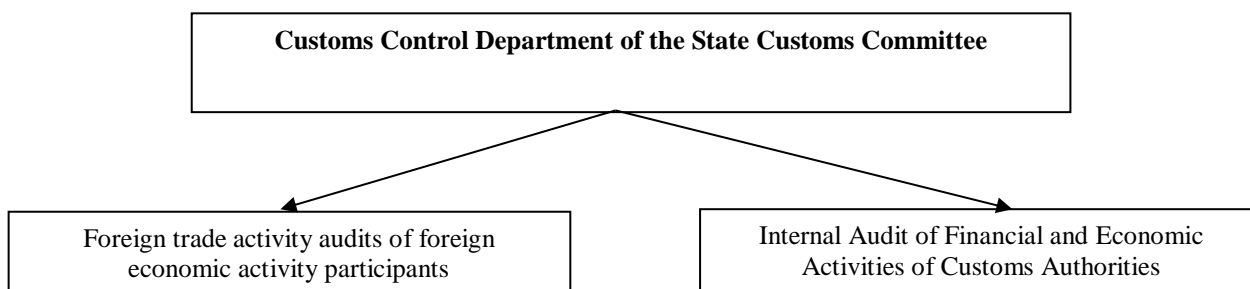


Fig.3. Structure of the Customs Control Department of the State Customs Committee

Conclusions

It should be noted that, along with the establishment of the Customs Control Office of the State Customs Committee, it is desirable to develop

and implement the principles and methodology of service duties in terms of its structure.

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ECONOMETRIC MODELING OF INVESTMENT AND INNOVATION DEVELOPMENT OF THE REGIONS OF THE REPUBLIC OF UZBEKISTAN

Abstract: The article investigated the theoretical and practical issues related to the investment and innovative development of the regions of the Republic of Uzbekistan. Specifically, the country's economy has demonstrated a high level of investment and innovation in the economy, and the dependence of these indicators on the econometric model, and some recommendations have been developed.

Key words: investment, innovation, econometric modeling, panel data, fixed effect model, random effect model, innovative development.

Language: English

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Introduction.

In the current strategic economy, the role of economic and statistical analysis of the economy of the country, especially its regions, is very high. One clear example of this is the Decree of the President of the Republic of Uzbekistan on February 7, 2017 "On the Strategy for the Further Development of the Republic of Uzbekistan" and the August 8, 2017 "On Priority Measures to Ensure Rapid Social and Economic Development of the Regions" PQ-3182 are defined as priority directions for the issues of complex, proportional, socio-economic, investment and innovative development of regions, cities and towns [1].

Statistical and econometric analysis methods are widely used to assess the economy of the country and its regions. However, the methodological and organizational capabilities of this analysis are not being used effectively in the country, especially in the study of regional economies. This prevents their further socio-economic development. One of the most pressing problems of the present day is the transition to an innovative way of achieving competitiveness on the world market through technical and technological

renewal of production, raising scientific expectations. Innovative approach requires development and application of new projects, investment, technical and technological renewal of production, structural transformation in the economy of the country. Particular attention is paid to the work on attraction of investments for the implementation of projects on structural transformation, modernization, technical and technological renovation of the country's economy.

Materials and Methods

Analyze of the above issues statistical analysis and econometrically model the following ideas, not their theory, but also statistical practice. Especially, to explore the investment and innovation environment in the country, including the prospects for their development.

The main results for statistical and econometric knowledge are the normative and analytical model of investment and innovation capacities in the regions. Hereinafter it can be seen at the share of investment in fixed capital in the regions of the country below.

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Table 1. Share of regions into fixed capital investments in the Republic of Uzbekistan, in percentage

Years	Northern Zone	Western Zone	Southern Zone	Central Region	Eastern Zone	Republic of Uzbekistan
2010	5,4	24,6	14,8	42,4	12,8	100
2011	8,0	18,7	15,5	43,5	14,3	100
2012	8,2	17,1	16,3	43,9	14,5	100
2013	12,2	15,7	16,5	40,8	14,8	100
2014	15,3	14,4	16,5	39,5	14,3	100
2015	17,4	13,4	17,3	38,1	13,8	100
2016	10,5	17,8	18,6	39,2	13,9	100
2017	6,7	22,2	20,7	38,2	12,2	100

*Source: Prepared by the author according to the statistics of The State Committee of the Republic of Uzbekistan on Statistics [2].

According to the table data, investments in fixed capital mainly accounted for in the central region, i.e. 40% in 2010-2013 and more than 38% in 2014-2017. The question is why investments in fixed capital are mainly attracted to the central part of the country. They need to be analyzed and analyzed statistically.

Integration of science and industry, cooperation between private entrepreneurs and the state, supporting international relations of small and medium-sized businesses are key prerequisites for the development of innovative activities. It should be noted that almost half of the innovations in the developed countries of the world are carried out by organizations and small and medium-sized businesses. In fact, according to the US National Science Foundation, the number of innovations implemented in smaller firms is much higher than the cost per unit of medium and large firms. In addition, smaller firms have accelerated innovation and deliver consumers approximately three-fold greater than the large firms [2].

Scientific and production integration processes will have a great impact when the university and technology institutes together with manufacturing companies and firms determine their share of patented development and undertake research and innovation projects. It is no coincidence that 85% of all international patents issued by the European Patent Office are in the same proportion.

It is noteworthy that in our country, the volume of innovative goods and services produced by the regions own power is growing year by year. However, it is desirable to consider the volume of innovative goods and services produced by the regions own power by the shares in a country (Table 2).

As we can see from the table that in the research years the share of central and eastern regions is high in the formation of an innovative goods and services. Especially in recent years, the share of the central region relatively higher than other regions.

Table 2. Share of the volume of innovative goods and services produced by regions in the Republic of Uzbekistan, %

Years	Northern region	Western region	Southern region	Central region	Eastern region	Republic of Uzbekistan
2010	0,2	15,8	0,1	18,9	65,0	100
2011	0,6	9,4	0,3	46,9	42,8	100
2012	0,4	2,6	0,5	18,5	78,0	100
2013	0,8	2,6	0,3	50,2	46,1	100
2014	1,0	2,2	0,5	41,3	55,0	100
2015	3,3	1,9	1,8	68,1	24,9	100
2016	19,1	1,4	2,3	64,8	12,4	100
2017	21,9	1,9	1,2	51,2	23,8	100

Source: Prepared by the author according to the statistics of The State Committee of the Republic of Uzbekistan on Statistics.

World experience shows that in countries with developed innovative systems, innovation processes are effectively implemented, technology and other

knowledge-intensive products are commercialized. The role of the state, the real sector of the economy and the leading companies supporting innovation

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activities are essential in this process. Science is the basis of this integration mechanism, which ensures the technical development of the state and socio-economic growth of the society.

The main results of the research according to the author's statistical analysis include: a regression model of Panel data regression models for the creation of the econometric model of analysis of investment attraction in the region is presented and the factors that have a major impact on the growth of the region's innovative products are studied.

Most models typically have one-dimensional structure. However, in practice we often work with two dimensional economic data (structures). Meanwhile, one of the units of measurement belongs to the separate economic units, and the second one belongs to one or another period. Similarly, two-dimensional statistical bulletins appear in the course of observing a large number of objects over a specific period of time. Models based on two-dimensional data are called Panel data regression models in econometrics.

In addition, the followings can be seen as an example of sources of Panel data [3]:

- Observations of The Bureau of Labor Statistics of USA (National Longitudinal Surveys (NLS))[3];
- Observations of University of Michigan in USA (Panel Study of Income Dynamics (PSID))[4];
- Observations of Russian Longitudinal Monitoring Survey (HSE) [5].

The regression model of the Panel data regression models differs from time series regression or space regression. Its variables have two sub-indices:

$$y_{it} = \alpha + x'_{it}\beta + u_{it} \quad [6]$$

where i – track number of the observed item, t – period of time, α is a scalar, β – regression coefficients vector, $x'_{it} = (x'_{1it}, x'_{2it}, \dots, x'_{kit})$ the matrix vector of the variables. Often random error model with one component (builder) is used in Panel data:

$$u_{it} = f_i + \varepsilon_{it}$$

where f_i – unforeseen individual effects, ε_{it} – residual random errors.

In this case, f_i is not time-dependent and represents the characteristics (features) of objects that are not included in the regression equation.

In particular, two approaches are used to account for unobservable indirect effects of economic units [7].

The first is the fixed effect model (FE), f_i individual effects, is considered as the unknown parameters of the model. This model needs to satisfy the following basic assumptions:

- x'_{it} – row vector of a given values of regression;
- a_i – a scalar;
- b – column vector of regression coefficient;
- ε_{it} – satisfies conditions of classical linear regression model, especially those that are not

normally distributed and not correlated with x'_{it} (constant variables).

$$y_{it} = x'_{it}b + a_i + \varepsilon_{it}$$

where a_i – scalars reflects unobservable variables representing individual characteristics over time.

The fixed effects model is expressed in the form of a matrix [4].

$$y = X * b + z * A + \varepsilon$$

(NT,1) (NT,K) (K,1) (NT,N) (N,1) (NT,1)

The Least – Squares Dummy Variable (LSDV) can be used to estimate the parameters of this model, so the following estimates are taken for the parameters:

$$\hat{\beta}_{LSDV} = (x'xx'z)^{-1} (x'y)$$

In special literature, it is called the value of the smallest squares method, which is the fictitious (male, female) included in the regression equation.

Secondly, the random effect model (RE), f_i is considered to be random numbers of the individual effects model and is not correlated with residual limits. The matrix look of this model is as follows:

$$y = X * b + u$$

(NT,1) (NT,K) (K,1) (NT,1)

In this case:

$$\begin{cases} u - \text{normal distributed} \\ x - \text{defined matrix} \\ E(u) = 0, \text{ because } E(u) = 0, E(\varepsilon) = 0 \\ E(uu') = \Omega \neq \sigma^2 * I_{NT} \\ E(u_{it}u_{it'}) = \delta_{ii'}\sigma^2 + \delta_{it'}\delta_{tt'}\sigma_\varepsilon^2 \end{cases}$$

where $\delta_{it'} = \begin{cases} 1, & i = i' \\ 0, & i \neq i' \end{cases}$ Kronecker symbol.

If the above assumptions are fulfilled, the values obtained in the method of Generalized Least Squares (GLS) are ignored:

$$\hat{b}_{GLS} = (x'\Omega^{-1}x)^{-1}x'\Omega^{-1}y$$

Panel data can have different structures. For example, if the existing economic units are not lost for each time and new units do not appear, the Panel data is balanced, otherwise if the existing economic units are lost and not the same for each time and new units do appear then it is called unbalanced data. In unbalanced selection, various economic units are observed at different times. Such information is called counterfeit- Panel data [5].

Listed data processing is performed using the STATA packet (software).

First of all, we convert variables to natural logarithms.

The result symbol: y (the volume of produced innovative products)

$$\ln(\text{innovative product}) = \log(\text{innovative product})$$

$$\text{Factor: } x_1 (\text{Expenses to innovation})$$

$$\ln(\text{Expenses to innovation}) = \log(\text{Expenses to innovation})$$

$$\text{Factor: } x_2 (\text{investment in fixed capital})$$

$$\ln(\text{investment}) = \log(\text{investment})$$

We will add regions as a separate factor to model, that is, create an alternative variable that will

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represent the region and add it to the model, and use the STATA software to summarize the results of our model as followings.

1. Regression model. ln(innovative product), ln(expenses to innovation), ln(investment), eastern,central, southern, western [6-8].

Source	SS	df	MS	Numberofobs	=	90
Model	564,789333	6	94,13155	F(6,83)	=	114,34
Residual	68,332963	83	0,82329	Prob>F	=	0,0000
Total	633,122296	89	7,11373	R-squared	=	0,8921
				Adj R-squared	=	0,8843
				Root MSE	=	0,9074
ln(in.pro.)	Coef.	Std.Err	t	P> t	[95% Conf. Interval]	
ln(ex.in.)	0.4552	0.0805	5.66	0.000	0.2954	0.6157
ln(inv.)	0.2389	0.1191	2.01	0.048	0.0020	0.4758
Eastern	3.4475	0.3271	10.54	0.000	2.7970	4.0981
Central	2.1668	0.3508	6.18	0.000	1.4690	2.8646
Southern	-0.7066	0.3461	-2.04	0.044	-1.3950	-0.0182
Western	0.9548	0.3343	2.86	0.005	0.2899	1.6198
_cons	4.0716	0.5112	7.97	0.000	3.0549	5.0882

In the above regression equation, the positive impact of investment in fixed capital and expenses to innovation on the volume of innovative product was determined. Both factors are statistically important at the 5% significance level ($P > |t|$). According to the

model, the growth of investment by 1% will lead to an increase in the innovative product by 0.24%. Increasing expenses to innovation by 1% leads to an increase in innovation productivity by average 0.46%.

2. Fixed effect model. ln(innovative product), ln(expenses to innovation), ln(investment).

Fixed effect regression model	Numberofobs	=	90			
Group variable: id	Number of groups	=	5			
R-sq: within = 0.6605	Obs per group: min	=	18			
between = 0.7889	avg	=	18.0			
overall = 0.6321	max	=	18			
	F(2,83)	=	80.73			
corr(u_i, Xb) = 0.4213	Prob > F	=	0.0000			
ln(in.pro.)	Coef.	Std.Err	t	P> t	[95% Conf. Interval]	
ln(ex.in.)	0.4552	0.0805	5.66	0.000	0.2954	0.6157
ln(inv.)	0.2389	0.1191	2.01	0.048	0.0020	0.4758
_cons	5.2441	0.5215	10.06	0.000	4.2068	6.2814
sigma_u	1.6671					
sigma_e	0.9074					
rho	0.7715(fraction of variance due to u_i)					

F test that all $u_i=0$: F(4, 83) = 37.67 Prob > F = 0.0000

The Fixed Effects model, as well as the 1st regression equation, the positive impact of investment in fixed capital and expenses to innovation on

the volume of innovative product was determined. The other indicators are the same, ie the effect of the factors on the result.

3. Random effect model. ln(innovative product), ln(expenses to innovation), ln(investment).

Random effect regression model	Numberofobs	=	90
Group variable: id	Number of groups	=	5
R-sq: within = 0.6602	Obs per group: min	=	18
between = 0.7951	avg	=	18.0
overall = 0.6416	max	=	18
	Wald chi2(2)	=	165.36
corr(u_i, X) = 0(assumed)	Prob > chi2	=	0.0000

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	Coef.	Std.Err	z	P> z	[95% Conf. Interval]	
ln(in.pro.)	0.4819	0.0798	6.04	0.000	0.3256	0.6383
ln(ex.in.)	0.2092	0.1188	1.76	0.078	-0.0236	0.4419
_cons	5.2008	0.8257	6.30	0.000	3.5826	6.8191
sigma_u	1.4155					
sigma_e	0.9074					
rho	0.7088(fraction of variance due to u_i)					

F test that all u_i=0: $F(4, 83) = 37.67$ Prob > F = 0.0000

The results of the Random Effect model also confirm the results of the Fixed Effect model, which also shows that the investment in fixed assets and the expenses to innovation have a positive effect on the volume of innovative product. The coefficients found

are very close to the coefficient of Fixed Effect model and the expenses on innovation is at 1% and investments in fixed capital are statistically significant at the 10% significance level [9-14].

Breusch and Pagan Lagrangian multiplier test for random effects Ln(innovative product)[id,t] = Xb + u[id] + e[id,t]

Estimated results:	Var	std=sqrt(Var)
ln(in.pro.)	7.1137	2.6672
e	0.8233	0.9074
u	2.0036	1.4155
Test:	Var(u)=0	
	Chibar2(01)=16029	
	Prob>chibar2=0.0000	

The results of the Breusch and Pagan test above indicate that the Random Effect model can be used for that information.

Conclusion.

Based on the Panel data, the following conclusions were drawn:

- Many objects are observed, resulting in an increase in the number of independent levels and improving the effectiveness of selection value;

- Eliminates aggregate shifts that may appear unwillingly when analyzing time series as well as space data;

- Creating Opportunity to monitor the dynamics of different objects;

- Analysis of many important economic issues will be possible.

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SECTION 9. Chemistry and chemical technology.

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INCREASE THE SAFETY OF IODINATED COOKED SALT

Abstract: A new method for obtaining safe iodized table salt has been proposed. Iodine is administered in the form of dry kelp algae. Laminaria contains organic forms of iodine well absorbed by the human body. To reduce the caking of the product and the oxidation of organic forms of iodine with oxygen in the air, a special additive is prepared. Under the action of ultrasound with a frequency of 3.5–4.5 MHz with an intensity of 3-5 W / cm², the food emulsifier “distilled monoglycine (MHD)” is heated for ≥ 2 min; the sodium chloride solution is heated to a temperature of 70–75 °C -250 g / l and chopped dry kelp seaweed. The amount of food emulsifier MHD should be 2.0 - 2.5 g / kg sodium chloride. The ratio of food emulsifier MHD - solution of salt - 1:25 - 1:30. The appropriate amount of the prepared additive is mixed with heated salt heated to a temperature of 70-75 °C. Mixing the additive with table salt is carried out in three stages. The shelf life of the finished product is 18 months.

Key words: safe iodized table salt, ultrasound, food emulsifier.

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ПОВЫШЕНИЕ БЕЗОПАСНОСТИ ЙОДИРОВАННОЙ ПОВАРЕННОЙ СОЛИ

Аннотация: Предложен новый способ получения безопасной йодированной поваренной соли. Йод вводится в виде сухой водоросли ламинария. Ламинария содержит органические формы йода хорошо усваиваемые организмом человека. Для уменьшения слеживаемости продукта и окисления органических форм йода кислородом воздуха готовят специальную добавку. Под действием ультразвука частотой 3,5 - 4,5 МГц интенсивностью 3-5 Вт / см² в течение времени ≥ 2 мин перемешивают пищевой эмульгатор «моноглицериды дистиллированные» (МГД), подогретый до температуры 70-75 °С раствор поваренной соли 200-250 г/л и измельченные сухие водоросли ламинария. Количество пищевого эмульгатора МГД должно быть 2,0 - 2,5 г/кг поваренной соли. Соотношение пищевой эмульгатор МГД - раствор поваренной соли -

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1:25 - 1:30. Соответствующее количество приготовленной добавки смешивают с подогретой до температуры 70-75 °С поваренной солью. Перемешивание добавки с поваренной солью проводят в два этапа. Срок хранения готового продукта 18 месяцев.

Ключевые слова: безопасная йодированная поваренная соль, ультразвук, пищевой эмульгатор.

Введение.

Производство йодированной поваренной соли в промышленных масштабах выполняется, в соответствии с межгосударственным стандартом ГОСТ 13830-97 Соль поваренная пищевая. Общие технические условия, введением йодата калия в сухую поваренную соль. При этом массовая доля йода в смеси с поваренной солью должна быть $(40 \pm 15) \cdot 10^{-4}\%$ [1]. Недостатком данного способа получения йодированной поваренной соли является наличие йода в неорганической форме, что затрудняет его усвояемость организмом человека, а также недостаточный срок хранения, не превышающий 12 месяцев из-за потерь йода [2, 3]. Кроме того, к существенным недостаткам получения йодированной поваренной соли с использованием йодата калия является его токсичность что требует крайне равномерного размешивания с поваренной солью. Однако, из-за микрокапиллярного эффекта, частички йодата калия мигрируют из центра пачки соли до ее краев и таким образом, опасная концентрация йодата калия образуется через 3-5 месяцев хранения такой соли. [3]. Следует также отметить, что йодат калия является сильным окислителем и в смеси с некоторыми органическими веществами способен образовывать взрывчатые смеси, что требует особых условий его хранения [4].

Нами ранее было предложено для получения безопасной йодсодержащей добавки растворять йодид натрия в этаноле под действием ультразвука (УЗ) частотой 18 – 160 кГц, интенсивностью 0,05-0,45 Вт/см² в течение 10-50 с. При этом получали 40-55% раствор йодида натрия в этаноле. В полученном растворе йодида натрия в этаноле растворяли эмульгатор «Моноглицериды дистиллированные» (МГД) под действием УЗ частотой 19-46 кГц, интенсивностью 0,05-0,40 Вт/см² и УЗ частотой 0,5-3,0 МГц интенсивностью 0,45-0,76 Вт/см² в течение 0,1-3,6 мин. Эмульгатор МГД является пищевым продуктом, используется в странах СНГ при получении маргарина и для его применения не требуется специального разрешения. Соответствующее количество приготовленной таким образом йодсодержащей добавки (содержание йодида натрия должно быть 20-44 мг/кг пробы поваренной соли, а эмульгатора МГД 1,00-2,50 г/кг пробы поваренной соли) смешивали с подогретой до температуры 70-83 °С поваренной солью [5]. Недостатком данного способа получения йодированной поваренной соли является наличие йода в неорганической форме, что затрудняет его усвояемость организмом человека.

Описан способ получения безопасной йодированной поваренной соли с использованием в качестве йодсодержащей добавки измельченной сухой морской водоросли ламинария в количестве 3-7 мас.%, что соответствует содержанию йода (45 ± 15) мг на 1 кг поваренной соли. Достоинством такой йодированной соли является наличие йода в органической форме, в виде водоросли ламинария, что увеличивает его усвояемость организмом человека. Однако, срок хранения такой соли не превышает 6 месяцев из-за слеживаемости продукта и потерь йода в результате окисления его органических соединений кислородом воздуха [6].

Цель данной работы - получение безопасной йодированной поваренной соли с длительным сроком хранения.

Экспериментальная часть.

Применяли генератор ультразвука типа 24–УЗГИ–К–1,2 и пьезоэлектрические излучатели типа ЦТС–19 компании Релтек (Россия) [7].

Смешивание компонентов йодированной соли выполняли с использованием лабораторного смесителя типа ЛС-23 компании «Опытный экспериментальный машиностроительный завод Украинского научно-исследовательского института соляной промышленности» [8].

Опыты проводили следующим образом. Предварительно готовят йодсодержащую антислеживающую добавку. Для этого берут 50-75 мл раствора поваренной соли «Экстра» или хлорида натрия квалификации не ниже «ч» в дистиллированной воде концентрацией 200-250 г/л и нагревают до температуры 70-75 °С. Далее вносят 2,0-2,5 г пищевого эмульгатора МГД и 30-70 г измельченных водорослей ламинария и действуют ультразвуком частотой 3,5 - 4,5 МГц интенсивностью 3-5 Вт/см² в течение времени ≥ 2 мин. При этом образуется устойчивая суспензия в виде пастообразного вещества. Полученную таким образом суспензию перемешивают с подогретым до температуры 70-75 °С 1 кг поваренной соли. Для более равномерного распределения йодсодержащей антислеживающей добавки перемешивание проводят не менее чем в два этапа. Сначала перемешивают 100 г подогретой до температуры 70-75 °С поваренной соли с йодсодержащей добавкой, затем добавляют еще 900 г подогретой до температуры 70-75 °С поваренной соли и снова перемешивают.

Полученную йодированную соль исследуют на содержание йода и на способность слеживания в течение 6-19 месяцев известным эксикаторным

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методом [9, 10]. Для этого соль упаковывают в бумажные пакеты в форме куба со стороной 5 см, которые помещают в эксикатор, содержащий поглотитель влаги. Через определенное количество времени кубики вынимают и определяют сопротивление сжатию. При этом

образец соли считался несслежавшимся при сопротивлении сжатию менее 0,3 кг/см² [10].

Результаты и обсуждение

В табл. 1 наведено сравнение способов получения йодированной поваренной соли предлагаемого и согласно [6]

Таблица 1. Сравнение способов получения йодированной поваренной соли предлагаемого и согласно [6]

№ пробы	Введено йода, мг/кг пробы	Введено МГД, г/кг пробы	Найдено йода, мг/кг пробы соли				Сопротивление сжатию, кг/см ²			
			6 мес.	7 мес.	18 мес.	19 мес.	6 мес.	7 мес.	18 мес.	19 мес.
Способ получения йодированной поваренной соли [6]										
1	45		30,0	12,6	2,3	-	0,12	0,37	1,40	1,87
2	55		36,7	17,4	3,9	1,0	0,18	0,39	1,59	1,92
Предлагаемый способ получения йодированной поваренной соли										
3	45	1,50	40,7	39,4	17,2	11,5	*	0,22	0,34	0,48
4	45	2,00	43,7	40,4	30,2	20,8	*	*	0,11	0,28
5	45	2,50	44,3	42,7	38,7	22,2	*	*	*	0,11
6	45	3,00	44,4	43,0	38,7	22,2	*	*	*	0,10
7	55	1,50	50,4	51,9	28,5	22,5	*	0,22	0,35	0,48
8	55	2,00	53,9	52,7	40,7	24,2	*	*	0,11	0,28
9	55	2,50	54,0	52,8	41,0	28,0	*	*	*	0,11
10	55	3,00	54,1	52,7	41,0	28,2	*	*	*	0,10

В этой таблице и в последующих приведены усредненные результаты шести опытов. *Йод вводился в составе сухой водоросли ламинария, содержание йода - 1500 мг/кг сухой водоросли. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5 Вт/см² в течение времени 2 мин. Соотношение пищевой эмульгатор МГД - раствор поваренной соли - 1:25. * - Признаков слеживаемости не обнаружено.

поваренной соли со сроком хранения - 18 месяцев, а способ согласно [6] – до 6 месяцев. При этом, количество эмульгатора МГД должно быть 2,0 – 2,5 г/кг пробы. При количестве эмульгатора МГД менее 2,0 г/кг, йодированная поваренная соль из-за потерь йода и слеживаемости имеет срок хранения менее 18 месяцев. Увеличение количества эмульгатора МГД более 2,5 г/кг к увеличению срока хранения йодированной поваренной соли не приводит (табл. 1).

Из табл. 1 следует, что предлагаемый способ обеспечивает получение йодированной

поваренной соли. В таблице 2 приведено влияние частоты ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 2. Влияние частоты ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли

Частота УЗ, МГц	Найдено йода, мг/кг пробы соли						
	12 мес.	14 мес.	15 мес.	16 мес.	17 мес.	18 мес.	19 мес.
3,0	47,3	40,2	35,8	30,3	28,4	24,2	18,9
3,5	54,8	51,4	50,3	47,9	45,8	41,0	25,4
4,5	53,0	51,3	50,2	48,0	46,1	42,3	25,7
5,0	45,2	40,2	38,9	33,1	29,6	28,6	20,3
Без воздействия УЗ*	19,3	12,9	4,5	0	0	0	0

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Количество введенного йода (в составе введенной водоросли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука интенсивностью 5 Вт/см² в течение времени 2 мин. Соотношение пищевой эмульгатор МГД - раствор поваренной соли - 1:25. Количество эмульгатора МГД – 2,5 мг/кг. * Использовано механическое перемешивание в течение 5 мин – 150 об/мин.

Как следует из табл. 2 лучшие результаты достигаются при использовании ультразвука

частотой 3,5 - 4,5 МГц. При использовании ультразвука частотой более 4,5 МГц и менее 3,5 МГц содержание йода в йодированной поваренной соли во время хранения значительно уменьшается. Без действия ультразвука, с использованием механического перемешивания получить йодированную поваренную соль, удовлетворяющую требованиям ГОСТ 13830 -97 с содержанием йода (45 ± 15) мг на 1 кг поваренной соли не представляется возможным [1] (табл.2).

В таблице 3 приведено влияние интенсивности ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 3. Влияние интенсивности ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли

Интенсивность УЗ, Вт/см ²	Найдено йода, мг/кг пробы соли						
	12 мес.	14 мес.	15 мес.	16 мес.	17 мес.	18 мес.	19 мес.
2,5	41,5	39,2	33,2	27,8	21,5	19,5	9,6
3,0	54,0	50,1	48,9	46,4	44,3	40,0	23,4
5,0	54,8	51,4	50,3	47,9	45,8	41,0	25,4
5,5	41,5	30,8	28,6	27,3	25,6	21,5	12,3

Количество введенного йода (в составе введенной водоросли ламинария)) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц в течение времени 2 мин. Соотношение пищевой эмульгатор МГД - раствор поваренной соли - 1:25. Количество эмульгатора МГД – 2,5 мг/кг.

Как следует из табл. 3 лучшие результаты достигаются при использовании ультразвука интенсивностью 3-5 Вт/см². При использовании ультразвука интенсивностью более 5,0 и менее 3,0 Вт/см² содержание йода в йодированной поваренной соли во время хранения значительно уменьшается.

В таблице 4 приведено влияние времени воздействия ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 4. Влияние времени воздействия ультразвука при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли

Время воздействия УЗ, мин	Найдено йода, мг/кг пробы соли						
	12 мес.	14 мес.	15 мес.	16 мес.	17 мес.	18 мес.	19 мес.
1,5	30,5	24,7	20,1	15,6	9,5	4,4	0,6
2,0	54,8	51,4	50,3	47,9	45,8	41,0	25,4
2,5	54,2	51,0	50,6	48,5	45,1	41,7	25,9

Количество введенного йода (в составе введенной водоросли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5

Вт/см². Соотношение пищевой эмульгатор МГД - раствор поваренной соли - 1:25. Количество эмульгатора МГД – 2,5 мг/кг.

Как следует из табл. 4 время действия ультразвука должно быть не менее 2 мин. При времени действия ультразвука более 2 мин улучшения результатов не происходит.

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В табл. 5 приведено влияние вида поваренной соли и ее концентрации при

приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 5. Влияние вида поваренной соли и ее концентрации при приготовлении йодсодержащие добавки на содержание йода при хранении готового продукта – йодированной поваренной соли

Вид поваренной соли	Найдено йода через 18 месяцев хранения, мг/кг при использовании раствора соли концентрацией, г/л					
	180	190	200	250	260	270
Поваренная соль «Экстра»	29,5	38,7	41,0	41,0	38,4	37,9
Хлорид натрия, ч	29,5	38,8	41,3	41,4	40,0	37,9
Поваренная соль каменная	24,1	36,8	38,8	38,6	26,6	25,9
Поваренная соль бассейновая	21,3	36,8	38,5	38,3	24,4	24,0
Поваренная соль озерная	21,1	35,9	38,2	38,4	21,2	20,0

Количество введенного йода (в составе введенной водоросли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5 Вт/см² в течение 2 мин. Соотношение пищевой эмульгатор МГД - раствор поваренной соли - 1:25. Количество эмульгатора МГД – 2,5 мг/кг.

Как следует из табл. 5 концентрация поваренной соли (хлорида натрия) при приготовлении йодсодержащей добавки влияет на содержание йода при хранении готового продукта. Наилучшие результаты получены при концентрации хлорида натрия 200-250 г/л. Причем, вид поваренной соли также влияет на

количество йода после 18 месяцев хранения. Наилучшие результаты обеспечивает наиболее чистая поваренная соль «Экстра» и хлорид натрия квалификации не ниже «ч». Также следует отметить, что использование данного способа позволяет получить йодированную поваренную соль со сроком хранения 18 месяцев, соответствующую по содержанию йода требованиям действующего ГОСТ 13830-97. Соль поваренная пищевая. Технические условия при использовании всех видов поваренной соли [1].

В табл. 6 приведено влияние соотношения пищевой эмульгатор - раствор поваренной соли и ее концентрации при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 6. Влияние соотношения пищевой эмульгатор - раствор поваренной соли и ее концентрации при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли

Соотношение эмульгатор МГД – раствор поваренной соли	Найдено йода, мг/кг пробы соли						
	12 мес.	14 мес.	15 мес.	16 мес.	17 мес.	18 мес.	19 мес.
1:20	29,4	26,8	21,5	16,7	9,8	1,9	-
1:25	54,8	51,4	50,3	47,9	45,8	41,0	25,4
1:30	54,0	51,1	50,2	47,5	45,3	40,9	25,4
1:35	26,9	23,1	18,9	12,1	5,3	0,9	-

Количество введенного йода (в составе введенной водо росли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л,

температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5 Вт/см² в течение 2 мин. Количество эмульгатора МГД – 2,5 мг/кг.

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Как следует из табл. 6 соотношение пищевой эмульгатор МГД - раствор поваренной соли должно быть 1:25 - 1:30.

В табл. 7 приведено влияние температуры раствора поваренной соли при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Таблица 7. Влияние температуры раствора поваренной соли при приготовлении йодсодержащей добавки на содержание йода при хранении готового продукта – йодированной поваренной соли.

Температура, °С	Найдено йода, мг/кг пробы соли						
	12 мес.	14 мес.	15 мес.	16 мес.	17 мес.	18 мес.	19 мес.
69	43,3	34,8	31,0	25,6	17,3	12,1	5,9
70	54,8	51,4	50,3	47,9	45,8	41,0	25,4
75	54,5	51,7	50,8	47,1	45,7	41,3	25,7
76	40,3	32,2	27,9	24,8	14,9	10,3	8,9

Количество введенного йода (в составе введенной водоросли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5

Вт/см² в течение 2 мин. Количество эмульгатора МГД – 2,5 мг/кг.

Как следует из табл. 7 температура раствора поваренной соли должна быть 70-75 °С.

В табл. 8 приведено влияние температуры поваренной соли на равномерность ее перемешивания с йодсодержащей добавкой.

Таблица 8. Влияние температуры поваренной соли на равномерность ее перемешивания с йодсодержащей добавкой.

Температура, °С	Найдено йода, мг/кг пробы соли в точках отбора пробы						
	1	2	3	4	5	6	7
69	65,7	44,1	31,0	65,4	67,3	32,1	45,9
70	54,8	55,4	54,8	54,9	55,3	55,0	55,4
75	55,8	55,0	55,3	53,9	54,3	55,8	55,0
76	57,3	55,2	57,8	52,1	57,4	53,2	55,9

Количество введенного йода (в составе введенной водо росли ламинария) 55 мг/кг. При приготовлении йодсодержащей антислеживающей добавки использовали раствор поваренной соли «Экстра» концентрацией 250 г/л, температурой 70 °С. Эмульгатор МГД растворяли в растворе поваренной соли под действием ультразвука частотой 3,5 МГц, интенсивностью 5 Вт/см² в течение 2 мин. Количество эмульгатора МГД – 2,5 мг/кг.

Как следует из табл. 8 температура поваренной соли должна быть 70-75 °С. При температуре выше 75 °С или ниже 70 °С равномерного размешивания йодсодержащие добавки с поваренной солью достичь не удается.

Таким образом, эксперимент показал, что перемешивание подогретой до температуры 70-75 °С поваренной соли с йодсодержащей антислеживающей добавкой, приготовленной путем перемешивания под действием ультразвука частотой 3,5 - 4,5 МГц, интенсивностью 3-5 Вт/см² в течение времени ≥ 2 мин пищевого эмульгатора «Моноглицериды дистиллированные» (МГД), подогретого до температуры 70-75 °С и раствора поваренной соли 200-250 г / л, а также измельченных сухих водорослей ламинария при количестве пищевого эмульгатора МГД 2,0 - 2,5 г/кг поваренной соли и соотношении пищевой эмульгатор МГД - раствор поваренной соли - 1:25 - 1:30 позволяет получить безопасную йодированную поваренную соль со сроком хранения 18 месяцев.

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

FOREIGN EXPERIENCE IN THE PREPARATION OF A SPORTS MANAGER: IN CASE OF RUSSIA

Abstract: *The questions of the need for training and advanced training of sports managers are analyzed, the relevance of their work in the modern world is reflected. A special, specific role in the formation of new economic and cultural relations is played by specialists and teachers of physical education. The features of training sports managers abroad are considered.*

Key words: *sports manager, sports management, sports organization, manager, healthy lifestyle.*

Language: *English*

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Introduction

The sphere of physical culture and sports is not only the most important area of society's activity [1], but also a branch of the economy with special working conditions. Issues of high-quality training of managers of sports organizations at the moment not only have not lost their relevance, but, in our opinion, have become more popular. Successful performances of Russian athletes in the world arenas reflect not only the professionalism of their coaches, but also the professional work of sports managers.

Some training programs for sports managers are a synthesis of Russian and foreign experience. Higher education institutions play a leading role in the training of specialists with a high level of competence for the cultural, social and economic spheres of our state. This applies to all graduates, but to a greater extent to graduates of pedagogical specialties, who later become the main actors in the educational process, taking part in major transformations and updates of society [2]. The leading role in the construction and formation of modern economic and cultural relations remains with the specialists - teachers of physical culture.

Literature review

The national management-education system actively absorbs the experience of countries with a free market economy in training managers (T.E. Kruglova, 2009; VN Zuev, 2006). Thus, B. Pitts and

D. Stotlar (2002) define that the scope of sports management is "people, activities and organizations involved in the production, promotion or organization of any type of product related to sports, fitness or physical recreation" [13]. This definition includes a large selection of career paths for a modern sports manager.

Currently, sports managers in our country are faced with the problems of socio-economic transformation, the transition from a centralized system of sports management to a decentralized one (V.N. Zuev, 2006; S. E. Voronin, 2002, S. S. Filippov, 2006), organizations in terms of partial or full self-sufficiency (V.V. Aleshin, 2000; V.V. Galkin, 2006), restructuring of organizational methods in a market economy (A.V. Minaev, 2003), pushing away from the planned management system of physical culture - sport movement (L.V. Toropov, 1995).

Currently, one of the main tasks of higher education is to identify and apply such innovative training technology that ensures the development of a person's ability to self-improve, be creative, adapt to working conditions and constantly update their professional knowledge, be ready to work effectively. rapidly changing conditions, which is implemented in the framework of the competent approach [2].

Competence approach in the generally accepted interpretation implies the integration of theoretical and practical training in the process of education, i.e. the formation of not only the "knowledge", but also

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the personal component, which includes the emotional-value and operational basis of the regulation of activity, ensuring the graduate's adaptation to the labor market [12].

The need to integrate a competence-based approach into the education system is determined by the pan-European and global trend of integration, the globalization of the world economy, and the changing educational paradigm to the personality-oriented one that has occurred in the last decade. The definition of the productive side of education through the operationalization of the category of "competence" is the conceptual basis for the transformation of modern domestic universities, defined as the competence approach [12].

Preparing sport managers in Russia

The system of existing socio-economic relations in Russia has undergone major changes in recent years; the structure of society, value orientations, consumer behavior [2, 8] significantly change. The economic transformations carried out in the country are not always carried out consistently and are contradictory. All this has a negative impact on health, duration and lifestyle, behavioral stereotype of Russians.

Today, out of 10 school graduates, 7 are unsuitable for military service for health reasons. According to 2014, the average life expectancy for men is about 62 years. There is a high mortality rate at working age among men from 18 to 60 years old - twice as often as women. The reasons for this negative state of affairs are well known: insufficient physical activity of the country's population, stress, the presence of bad habits in the form of alcohol abuse, drug use and smoking [9].

The role of physical culture in the formation of knowledge, the inculcation of healthy lifestyle skills and the adoption of a healthy lifestyle, the formation of personal physical culture at the present stage of development of society is greatly increasing.

In order to reverse the current negative trend in the country, it is necessary to adopt legislative and regulatory documents, to carry out effective work on the introduction of physical culture in the constituent entities of the Russian Federation.

Today, the manager's profession is one of the most sought-after and most popular in Russia, and interest in sports management is constantly increasing, at the end of the 19th century. in Europe and the United States as a result of the widespread and active promotion of a healthy lifestyle among the population and the mass hobby for sports appeared the profession of a sports manager [8]. In Russia, sports management is in its infancy. The All-Russian public organization "Federation of Sport Managers of Russia" was formed, which brought together management specialists in the sports industry.

In order not to be distracted from the training and competitive process, foreign athletes of international level enter into contracts with agents, managers and other specialists who make up his team and take on all administrative, organizational, economic issues, and often deal with the personal affairs of an athlete. It is these people who decide on the performances of the athlete, on communication with the media, interviews, on the conclusion of contracts with sponsors, etc. Often, income managers exceed the fees of athletes, this profession has become one of the most prestigious.

Sports managers often became former athletes and coaches who knew the whole process from the inside and represented it as a whole, they received the necessary managerial skills in economics departments and university courses. Later, independent educational institutions appeared in Europe that specialized in training professional sports managers [7]. The specifics of the sports industry as an economic sector determine the specifics of training sports managers [3].

Modern education in sports management reflects the entire spectrum of this industry: "sports tourism", "fitness management", "sports goods industry" and "sport administration", "sports marketing" and many other specialty areas offered by the best educational centers in the world. International hospitality schools in many countries offer a specialization in sports management. This fully demonstrates the specifics of the development of sports abroad, where a sports manager should understand the basics of the hospitality industry, since the sports industry is focused on providing services and the interests of the viewer.

All main disciplines in educational institutions of such a profile are common to both programs, of course, there are also subjects with specialization. Specialties for which one can study in educational institutions vary and depend on both the profile of the educational institution and the country in which it is planned to study sports management [1, 6].

Russian professional and student sports are developing today according to the American model (O. Matytsin, 2008). Years of experience in the development of the sports industry in a market economy, as well as theoretical and practical experience in the preparation of sports managers abroad is, in a sense, a guideline for creating a national school of sports management. The study of the competence of existing sports managers abroad will reveal the features of modern training in the university of Russian sports managers at the present stage of development of the national sports movement.

We have conducted a study of the competencies of a sports manager at the professional football club Vancouver Whitecaps FC, Canada. The survey involved 12 people, of whom 10 managers and 2 directors of the club. The experience of respondents in

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the sports industry in various positions varies in the following ranges: from 6 months to a year (3 respondents); 2-4 years (5 respondents); 5-7 years (4 respondents). An analysis of the previous positions of the respondents shows that they had experience in areas other than sports, and only after that got a job in a professional club. Only 2 respondents have education in the field of sports management, the rest have education in the widest specialties.

The questionnaire questions were aimed at identifying the features of training a sports manager abroad, determining the forms of training managers the club, identifying the formation of professional competencies, determining the mobility of a specialist in related fields, as well as identifying key competencies, according to sports managers.

In the process of questioning, managers indicated, in descending order, key competencies for a sports manager, using the list of 22 core competencies required for a successful graduate's career in the 21st century [14, p.61]. Thus, in the list of key competences in descending order, managers indicated communicative competence (oral and written); interpersonal relationships; teamwork; professional ethics; organizational qualities; honesty / decency; flexibility / adaptability; orientation to the study of details and details; motivation / initiative; self-confidence; analytical competence; personal qualities (friendliness, sociability); leadership skills; business / occupational risk; ability to self-education; ability to work in constantly changing working conditions; computer skills; creativity / creativity; knowledge of languages; nurture \ politeness; sense of humor / stress tolerance; high performance.

Thus, managers have pointed out the need and importance of those categories for the education of which education can be directed within the framework of the competence approach, which is reflected in the works of many scientists. [14-15]

The results of the other part of the questionnaire showed that the club's sports manager should be ready for intense and varied content (100%); be ready to show leadership skills (92%); show initiative (92%); be able to make quick decisions in a difficult situation (83%); be able to adapt to new working conditions due to globalization (83%); constantly improve their potential for effective work in changing conditions (75%); make decisions based on personal opinion (72%); periodically adapt to new organization methods at work (67%); periodically use innovative solutions (58%); periodically face changes in socio-economic conditions (50%); to face several times a year with the impact of socio-economic changes on working conditions (50%); often refer to information about innovations in their field of activity (50%); often isolate problems and look for solutions to their own (50%); often use the skills of fast information retrieval using technical means (50%); be ready for heavy adaptation in a new workplace (33%); often

organize the work of other people to increase efficiency (33%); often control their own work and the work of other people to achieve compliance with the objectives of the work and the result (33%). Managers also indicated that the formation of a world view and professional culture is necessary for a sports manager (92%).

In assessing the mobility of a sports manager for positions within the organization, a gap was revealed in the assessment of their own professional competence. Thus, only 17% of respondents indicated that their competence allows them to carry out professional activities in the field of finance and accounting of the organization; 25% in the field of sports law. At the same time, there was a high assessment of their own competence in the field of sports sales, management of a sporting event and sports sponsorship - 67%, and in the field of marketing (communication \ RYa \ work with the media) 92% indicated their high competence. When answering questioning questions and interviewing, managers pointed to the frequent occurrence of work situations in which it is necessary to use, among others, knowledge of finance and legal issues. At the same time, the participants of the survey indicated that they see opportunities for professional advancement not only in their department and often pointed to work in related fields of sports management. Considering the emphasis on training a broad specialist in the field of sports management at the university, as well as on increasing the mobility of a specialist in a chosen professional activity, more time should be spent on acquiring competence in the field of finance and legal issues of a sports organization, as well as expanding the professional horizons in other types activities.

In evaluating options for improving their own professional competence, managers indicated a study on the Internet - 100%; refresher courses - 75%; special magazines, trainings, public speaking at meetings - 50%; professional internships 42% (where they also indicated the high importance of this criterion) and communication with industry colleagues - 25%. It can be concluded that when preparing in higher education institutions, specialists need to be given information on ways to improve their skills through participation in professional conferences and meetings, as well as opportunities for internships (provided for and not covered by the curriculum) and volunteer participation in the field of professional activity such as for example, volunteer participation in the organization of a sporting event.

The results of the survey showed that the modern specialist in the field of sports management is required to manifest developed personal qualities in a constantly changing professional environment. Training a sports manager should manifest itself not only in the transfer of knowledge, but also contain the requirements for the development of professional competencies, the ability to adapt to the changing

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conditions of the professional environment, and the willingness to increase one's professional potential.

According to the results of the research, it can be said that the nature of the work of a sports manager determines the requirements for the manifestation of high competence in such activities as: communicative, informational, analytical, organizational, managerial. Such competences are based on the effective manifestation of diverse personal qualities in a constantly changing professional environment, which greatly affect the outcome of the professional club.

Using the method of observation included, we evaluated the work of sports managers in the PFC Vancouver Whitecaps FC, Canada. Thus, the work of managers is distinguished by the following characteristics: unexpressed

hierarchy of interpersonal relations between the head and the subordinate; frequent use of methods of motivation of employees of the club (action "on the winner", team building events, joint celebrations, etc.); there is practically no control by the directors over the course of work, but high control over the result, which gives managers autonomy and responsibility in decision making; focus on active interaction within the department through internal events (daily creative meetings, monthly joint events); competition within the department is welcomed; setting personal goals for each employee and striving to create a friendly atmosphere between employees and the integrity of the team.

Preparing sport managers in Europe

The continuing growth of the sports industry and interest in it from the private sector and various institutions puts additional demands on the quality of training of sports managers abroad. The increasing interaction of sports and business at all levels of sports relations in rapidly changing conditions requires the sports manager to comply with environmental requirements and to demonstrate the ability to most universally use and apply the knowledge and skills obtained, in which the success of the subject's professional activity is natural. The use of advanced foreign theories of sports manager training in conjunction with the adaptation of the competence-based approach to modern education will determine the basis for the creation of a national school of sports management.

In foreign publications, it is noted that the future generation of sports managers will face the problems of technology development, sports ethics, globalization and social responsibility [5, C.24]. It is important to correctly navigate the focus of methodological issues and general practical problems of management in order to best implement the training of sports management personnel [10].

In Switzerland, training is conducted in the direction of "Event management and management of the sport and entertainment industry", in France in

international sports management or management of sports organizations. In the UK, you can complete the universal specialization "Management in Sport", and in the United States of America, you can choose a whole range of managerial specialties, including individual sports.

Modern sports managers are distinguished by universal knowledge and high qualification; they possess knowledge of innovative technologies, new ideas and values, All this gives them a chance for career growth and successful business. The sports industry is developing rapidly, and schools and faculties of educational institutions are responsive to market demands. Future sports managers study a wide range of traditional "managerial" disciplines, as well as a range of specialized subjects, such as product policies and pricing in sports, the marketing strategy of a sports organization, sports event marketing, sports branding, distribution and sale of sports products and much more [6]. A graduate of such a foreign university can confidently occupy a senior position in various areas of the sports industry: hospitality companies, specialized PR and event agencies, fitness clubs, sports clubs, sports schools, professional associations and federations, and sports complexes.

In Germany, the training of certified sports managers can be characterized by highlighting the following features and main features. Representatives of the German school, engaged in training specialists in the field of sports, believe that because of the constant attention to sports due to the economic interests of society, the importance of sports for the nation as a whole, the inevitability of transformation processes affecting not only professional participants - athletes and their coaches - everything more obvious. The changes should also affect all professional managers and economists who know how it is most expedient to conduct financial and economic activities in physical education and sports organizations [5].

Produced specialists are sharks in the world of sports business, who are fluent in issues of financing, planning, organization, sponsorship and patronage and other issues necessary for organizations of physical culture and sports activities of various forms of ownership and scale.

As for the training of sports professionals in Canada, the main feature here is the use of a unified training system, regardless of basic education and further desire to continue training. Special training programs on sports management have been created and tested, which are taught in a differentiated form at specialized universities and colleges in the country.

Considering the existing practice in the Russian scientific community on the issues of advanced training of all heads of organizations at various levels, we can, unfortunately, state the existence of problems in this matter. The problems of not taking into account the differentiated nature of the activities of sports workers, direct management experience, the

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availability of vocational education not only in sports, but also of managerial and economic nature and the level of professional skills of a leader, come to the fore. The most significant drawback, in our opinion, is the complete lack of listeners of these refresher courses of personal desire to apply the acquired managerial knowledge in their work, in their organization's work. None of the trainees of the courses takes part in the development, shaping and direct testing of various solutions aimed at improving the work of specialists in the field of PC & S [10].

Conclusions

Thus, we found that the professional activity of a sports management specialist abroad is

characterized by independence in decision making, teamwork and personal responsibility in carrying out work, which, along with the peculiarities of the necessary competencies and constant changes in the professional environment, places new demands on the preparation of a modern specialist. These requirements should be manifested in the emphasis of training on the compliance of abilities and values of a specialist with the requirements of a professional environment.

The materials obtained will be used in the course of writing a PhD thesis to identify the process of formation of key competencies in a sports manager in the context of socio-economic transformation.

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HISTORIES OF RESTORATION MEDRESE ULUGBEK IN THE CITY OF SAMARKAND

Abstract: In this article the originality of Samarkand architecture and significance for today is considered. The scientific research of scientists and statements, opinions in the field of architecture is analyzed.

Key words: memorial, arch, dome, architectural forms

Language: English

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Introduction

A lot of work is being done to get acquainted with the urban planning monuments in Uzbekistan and around the world and to study the state of modern museums. Nowadays, in the independent Republic of Uzbekistan, great attention is paid to the national values and their restoration, deep analysis of the history of our people, sources of science and culture, as well as archival materials in town-planning monuments, as well as a number of works in the monumental works and bringing these architectural monuments to the next generation is one of today's actual issues.

By the decision of UNESCO in 1990, - The city of Khiva, 1993 - Bukhoro, 2001 - Historical parts of cities such as Samarkand are included in the UNESCO World Cultural Heritage List. They are included in the list of 40 world-class open air museums, and the wide range of architectural monuments reflecting their spiritual and material wealth and their conservation has been widely discussed.

Materials and Methods

A madrassah and observatory built in Samarkand is one of the most important centers of education and education in the Middle Ages, leading to the city's popularity. The name of this building engineer has not been identified. However, according to the poet Zainiddin Vasifi, who lived in Tashkent for 40 years, the engineer's name was Kamaluddin's engineer, Qizizoda Rumi.

The formation of Registan began in 1417 under the order of the young leader, the construction of a madrasah. The author of the project is the famous Kuvomiddin Sherozi, the master of the palace architect of Shokhrukh (father of Ulugbek), and many architectural complexes built for the khans in Herat. The Ulughbek madrasah is a classic representation of these buildings in the Muslim East in terms of architectural design and quality. Ulughbek madrassah was built in 1417-1420, its height is 81x56 meters. As we have already noted, only one of the buildings built in Registan in the 15th century, but only one Ulugbek madrassah has been restored to us. In the rooms on the second floor of the Ulughbek madrasa there is a large library of religious and secular science enriching humanity, most of which are collected by great Amir Temur and his children.

From the madrassah of Ulughbek in 1752, Amir Muhammad was used as a non-reservoir in the time of Rahim. Later, in the 19th century, the Ulughbek madrassah was again transformed into a student's educational institution. It was during that period that the repairs of the outer sundeck were carried out. In 1907, almost all of the terraces in the yard were damaged by an earthquake. In the same year a special commission was set up to repair damaged areas. He was appointed to the post of V. L. Vyatkin, but the group under his leadership was ineffective.

The Ulughbek madrasa suffers a lot from the effects of the tsunami, the earthquake, and especially the battle of the 18th century. The outer tower, the dome, two towers, and several mosques were

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destroyed. In 1918 the Bukinist book was first discovered that the north-east minaret was sloping, and it fell apart from the main building. Clearly, the tower would be destroyed if no action was taken. Being afraid of falling into the tower of the tower, he decided to inform the VL Vyatkin, an employee of the Samarkand Committee for the Protection of Museums and Monuments of the Ancient Manuscripts. V.Vyatkin was a specialist in monuments protection in Samarkand. In May 1920, a special commission for the reconstruction and restoration of ancient monuments of Samarkand SamKomistaris started its work. The commission consisted of three departments: construction, art and archeology.

It is surrounded by wooden corsets to save a temporary tower. 24 steel ropes with 36 tons are mounted on the wooden anchors to the north-east end of the tower. As a result, the minaret stops and stops at the mark of 108 characters in its normal state.

Regarding the importance of preserving the monument, M. E. Mason said: "The members of the Commission understand that the famous Ulughbek madrasa has great scientific and artistic significance and its façade is unmanageable. In 1870, two castles were destroyed one by one in 1870.

There are two ways to restore the tower. Mukhtar BN Kastalskiy says the tower is to be rebuilt from the brick. Regional architect MF Mauer has suggested that such a restoration would destroy an ancient monument. Instead, a structure that does not have value is created. Second, the method proposed by M. M. Mauer was to rebuild this tower from the main building. The contention between these two engineers will last long. On June 5, 1920, M.F. Mauer was asked to work quickly. The Commission has entrusted the Technical Department to restore the tower and to carry it out uninterruptedly.

BN Kastalski and M. M. Mauer were invited to attend each meeting at the Commission, from Tashkent, technical advisors from Tashkent. They are more satisfied with Mauer's ideas. Mauer began to learn more about madrasa and began studying Persian.

Mikhail Fyodorovich personally inspects the architectural dimensions of the madrasah in Registan and finds himself in the position of a minaret connected with steel ropes ", wrote M.Masson. At the invitation of M. M. Mauer, a two-stage monument reconstruction project will be considered in Moscow. The first one is left untouched because the information is not complete. In the second half, the project is being developed by the leading Russian engineer Vladimir Grigoryevich Shukhov. Mauer presents this project in agreement with VG Shukhov.

Vukhshukh Shukhov, as well as radios of Shabolov, decorated domes of GUM, Metropolitan, Petrov Passage and some wonderful building workers,

have always found an uncertain solution to the Tower of Ulughbek madrasah. This idea was very simple. Overall, it was as follows: to raise the height of the tower with a height of 37 meters and a 2.5 tower ridge, with the rising side of the tower. There is a proposal to fill the gap with concrete when the minaret was restored. This idea was unexpected and inaccessible for A.Kuznetsov's instruction. But Shukhov proved that it was easier to lower the towers than lifting the lift, because it was said that external assistance would not be utilized for the sinking of the building. The second method was to build a minaret from any environmental impact. The idea is being implemented.

In 1927 under the supervision of V.Shukhov under M.F.Mauer project metallic constructions were made from Moscow's "Mostet" plant and sent to Samarkand. These constructions had to be fixed on the base of the tower. Mauer, who looked at the designs, said that these errors would lead to an accident. As a result, he returned to Moscow and managed to overcome the mistakes. By 1931, the deviation of the tower increased by 5.1m, indicating the risk of its collapse. The gravity center of the tower was moved from the horizontal plane to 1055 mm relative to the base axis. It was necessary to begin work immediately. The work on the project of Shukhov started.

Before removing the fifteen hinged columns on the tower, the pillars had to be fastened and fixed to the top. This material has been tested. The pillars were fitted with a square-shaped design. Each skeleton that surrounded the structure's tower is 2-4 cm between the iron alibraces. This intermediate water is filled with water vapor. Then it was necessary to secure them to prevent the stem from falling. Each case has a length of 1275 mm, thickness is 89.2 mm, on the other side is 147 mm and is heavily attached to the stems - progons. To keep the pressure uniform, the thicker stepped under the pavement.

The pawns were smashed to the sides of the tower (on the ground floor) to prevent the sinking of the tower and to secure it. These pounds were made of steel cushions with cylinder floors. These pillows are shifted to new locations. The outer pillows are made of thick red currants, as they are firmly rooted in the elm.

All the elements of the constellation have been calculated in a definite way. The minaret's rotation is accomplished by using the tricolor system. A soft tree was lined up underneath them so that the tower was not damaged.

On March 11, 1932, V.Shukhov received a letter from Samarkand from Mauer saying that the minaret was being rebuilt, and it was inserted in the annex as photos were attached to the columns using the design of the frame structure. Thus, the minaret of the madrasa was again rebuilt.

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Ulugbek madrassah is surrounded by mosaic ornaments, which are made of ceramic plates. This pattern was rebuilt during the 1965 renovation. Blue background patterns are of great beauty in harmony with white and blue colors.

Using the 5-way stars in ornaments on the main portal, their drawing, that is, the technique of creating gyuses, remains a mystery. At the top of the portal, the mosaic panels used a variety of ornamental patterns. These mosaics are carved from marble stones. It is also one of the peculiarities of the Ulughbek madrassah.

In 1920-26, the main façade of the madrasah was repaired. By 1927, the building was rebuilt as a museum. The southern dome was restored in 1930.

The biggest repairs of the Madrasah were carried out in 1952, according to which the reinforcement of the roof of the building, reconstruction of the main shaft, repairs of the dwellings in the yard and repair of the building were carried out in full.

Under the Gendel project, in 1967, the south-south tower of the madrassah was rebuilt. According to this, the fortifications of the tower were strengthened and the damaged parts were constructively constructed. The Ulughbek madrassah is surrounded by belts, the reason for which is the collapse of the second building of the building and the disappearing dome of the two sides of the building, and then the large roof can be overthrown. To prevent the roof overturned, pull the cord with crosswalk.

Ulugbek madrassah In October 1977, the building was repaired because of the overflow of water. Accordingly, engineers were given the task to repair the basement of the western wall of the building. Particularly in the north-south part of the western part of the valley was more or less ruined. Because of the damage of the base, it was also necessary to adjust the north-east and south-east towers.

Based on these objectives, the plan for the reconstruction of the Ulughbek madrasa was developed, according to which:

1. Install special equipment for air circulation throughout the Madrasah;
2. Dry dampened areas with these devices;

3. Using traditional and modern methods of repair;

as well as a number of plans.

Coming to the exterior wall of the walls, each region has been thoroughly studied.

By 1977 the outer cover of the tympan was completely renovated. The constructive roof of the roof is parallel to the inscription, which together with the records moved, and 35-40% were repaired. The southernmost pile of Madrasah is well-preserved, but the bottom marble has been completely redone.

The rest of the rest of the madrasah roof is restored and the rest of the mosaic cover of the upper part of the roof is completely rebuilt. The northern part of the wall is rebuilt like a southern part.

Losses on the main portal of Ulughbek madrasa:

- 95% of Arabic writings have been lost
- Over 50% of the top coating of colon-
- 50% of the Arabic texts on the front of the wall,
- 75% of decorative backgrounds have been repaired.

Only the first floor had been preserved in the eastern wing of the Northern courtyard. Almost all parts of the outer cover have been reconstructed. The tympanus, that is, the outer coat of canoes and poras almost did not survive.

Conclusion

In summary, at Ulughbek madrasah, smaller constructive works have been carried out over the years for the type of earthquake and floods and moisture. In the years of independence almost all the places of madrassah are reconstructed. In the period from 2011 to the 12th, the western end of the madrasah was rebuilt. The dome was two-layer, the first of which was a constructive dome, and the second one was decorated with decorative dome, with a distance of 10 meters.

During the years of independence, the Registan Square, including the Ulughbek madrassah, are undergoing major repairs. But in the process of repair, it was desirable to use high quality construction and decoration materials, and to be more careful about the quality of the work, which would help to present the architectural pearls to the future generations.

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PROGRESSES OF PROGRESS IN MUSEUM INTEGRATION OF THE XXI CENTURY: BASED ON NATIONAL AND INTERNATIONAL EXPERIMENTS

Abstract: *In this article, on the basis of historical and cultural monuments, scientifically developed questions of making plans, providing types of servants, as well as the place and role of museums in the formation of national tourism.*

Key words: *museum, history, architectural ensembles, monuments, innovation, exhibit, exposition.*

Language: *English*

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Introduction

The museum's phenomenon has deep roots in the culture of the ancient world, and museums have gone through the path of change and transformation. Historians of the museum exhibit the stages of the most important development in the history of world culture: proto-koleks of the ancient world, the appearance of the first museums during the Renaissance, the museums becoming the art and science of the era, the phenomenon of the mass museum in the new era. With the emergence of museums in European countries, their evolution is over, collections of genuine objects of natural or social history, or literary collections, are the basis of which should be used to promote public awareness.

In the nineteenth century, the classic model of the European Museum had clear signs such as systematicness, orderliness, hierarchy. The history of the emergence and stages of the museum itself, in our opinion, confirms its following characteristics: the long history of history, the flexibility as a socio-cultural structure, and the ability to design as a cultural model. Along with the development of the museum, there is also the creation of museum studies (museum work) as a specific area of social and cultural activities, which is to ensure that the museum operates as an institution and performs its social functions.

Materials and Methods

The beginning of the 20th century and the historical changes in it have transformed the essence of the museum into a source of development from the cultural institution model. Particularly during the second half of the 20th century, there have been significant changes in the development of society and culture. First of all, it is important to emphasize the communication revolution which has initiated cultural pluralism, intercultural co-operation, and open-minded dialogue. Duncan Cameron, a renowned Canadian-based museum expert, tried to think about the changes in the museum phenomenon in the context of rapid development of mass media (media, television). Cameron's research was a manifestation of the leading trends in the development of the museum business and its predictability in the long term. His ideas were based on the theory of museum communication in the future.

In the second half of the 20th century, the trend of the regional expansion of the museum in Uzbekistan also appeared to vary: they began to cover even more places in the open space (architectural ensembles, nature complexes, museum reserves). Today, there are 96 museums in the Ministry of Culture of the Republic of Uzbekistan, of which 56 are branches of museums. There are 96 museums, 27 historic, 28 local lore, 11 artistic, 8 literary, 14 monuments, one natural science and 7 literature

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museums, and 3 of them are museums. The total area of museums is 136 km and 52939,27 square meters. It is also exhibited in the area, and also is 13235.19 sq. m. stock storage space. The total number of existing museums currently operates in 149 buildings. In addition, Uzbekistan has more than 10,000 sites of cultural heritage, of which 7570 are protected by the state, including 2330 architecture, 3945 archeology, 1138 sculpture and monumental artifacts and 157 attractions, and more than 700,000 portable cultural and it is possible to see inheritance objects.

The main task in the museum work is to bring the aesthetic and artistic value of our cultural treasures to the public, to inform foreign tourists interested in them, to explain to tourists. Based on the above arguments, it is possible to say that the current cultural and artistic process and periods are reviving the image of new expositions in a special way. The sense of art in the exposition is not only the period of renewal, but also the moral level of the studied environment. In our opinion, the spiritual level of the environment determines the cultural potential of the time. At present, museums have been developing many non-traditional forum projects in the field of international tourism development. At the same time, the generalization of the cultural tourism sectors, taking into account the cultural, historical and geographical potential of the regions, positively detects the processes. The monuments of international significance are the main attraction and are an important factor in attracting tourists. The study of museum reserves in the formation of tourism industry in museums and the use of national, traditional handicrafts and ethnographic non-material objects are among the most important types of modern tourism. Plans and types of services, based on interesting objects, historical and cultural monuments, are the main propaganda tools for shaping national tourism. The main purpose of the museum tourism project is to summarize the needs and interests of tourists. The development of various cultural forums projects is one of the most important stages in the development of tourism museums. One of the major issues in this area is to keep museums in the tourism business and to protect the economic growth of tourism museums. It is also a good opportunity to create various "museum-show" projects within the framework of the museum forums. In traditional handicraft programs, tracking and implementing their creation is also an important issue.

Eco-refinement is a relatively new form of museology, which has been developing in many countries in the last half century. Its determining factor is the close connection between socio-cultural processes in the region. In this direction of museums' social-cultural and nature-friendly preservation, Ecuadoris can provide self-restoration of vital values

and cultural traditions for a specific place. Historical monuments of history, not just material and spiritual monuments, are studied. The idea of "new museum" was another important conceptual turn in the theory and practice of the museum's work in the second half of the 20th century, which led to the appearance of new types of museums and the increase in the number of museums. "The eco-friendly is based on the heritage of its owner, which is used as a basis for continuous reproduction and is the basis of everyday activities and is the basis of all the invisible experiences of man. Talking about inheritance is primarily intended to study, describe, and interpret both material and non-material objects. " The growth and development of eco-domains described as "time and place of action" was based on the theoretical justification of George Anri River's "Evolutionary Overture Ecouse."

The idea of a museum or an "infinite museum" was one of the new concepts that seriously affected the development of the museum world. They were portrayed in the works of the French writer, cultural researcher and art theorist, A.Malro, who in a sense had predicted the appearance of virtual museums.

Another important factor in the development of the museum was the object of state policy in the field of culture, which determined the main directions of the museum activity and the formation of museum professions in the 20th century. But in the late 20th century, under the rapidly changing globalization of Uzbekistan, the concept of "museum work" did not reflect the radical changes that museums are experiencing, and this has led to a broader understanding of the "museum world". The museum world is a constant and active evolving concept, and its components are:

- a venue (valuable and important history, culture, nature objects, structures that help them survive) in the museums of Bukhara, Khiva, and Samarkand;

- "Baysun's Spring", "Silk and Spices", "Sharq Taronalari", International Bachelor's Festival;

- communication space (cultural and social practice, conditions and parts of museum activity) are exhibits of museums of different specializations in Uzbekistan and practical advancement of excursion in introducing them to the public.

In other words, the museum world should be regarded as part of an entity with a museum character. In our opinion, these are the most important and serious ones:

- Globalization in political, social and cultural dimensions;
- informatics and computer technologies;
- Economic sociodynamics and market fundamentalism;

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Postmodernism, which confirms the broad cultural, cultural and artistic pluralism.

The postmodern's phenomenon of a stable historical culture, such as a museum, can be regarded as an "exciting museum". It was based on a famous architect and postmodernist theorist Charles Jenkins, who wrote his article in an article titled "Spectacular Museum: Dwelling and Shopping Center: Thinking About Contradictions".

According to the modern French museum Raymond Monpetining point of view: "The museum belongs to the postmodernists Episteme consumer of these products, resources and experience to offer and use of modern valence is turning into a cultural center, museum, because it is not limited to buyuruvchiga and control information and receive emotional experiences invites you. " In this regard, the development of local and regional museums in Uzbekistan is acknowledged as an urgent task. Promoting excursion programs, high quality exhibits, and project-related texts on the theme of the audience are among the issues that can be addressed. Most museums are still working on the slogan 'One Excursion Text is to Promote Everyone'.

Thus, the situation in the development of the museum world created in the early 21st century can be described as the motto "flight and crisis, between crises and new shoots". The structure of the museum to be balanced consonant social and cultural ennui current openness, democracy and the technological, scientific reflection, professional expression and gross seek to take the lead.

Real increase of the museum architecture is one of the leading vectors of the development of the 21st century. Emphasis on architecture is related to the ability to demonstrate new trends and meanings that are identified in the process of changing the culture of modern society. Denver Art Museum (architect Daniel Liebeskind), Stuttgart Mercedes-Benz Museum (Dutch UN Studio Werner Zobekning Engineering Bureau), in conjunction with the Bureau of Milwaukee Art Museum (architect Santiago Kalatrava), London's Tate modern gallery (architect Xertsog and museums, such as de Mier) projects, but only epataj somewhat aggressive, claiming the status of the urban advantage, compared to the naturalness and simplicity of transgression is not related to the characteristics or the Earth, the alien ke to reflect the occurrence of aspiration. In contemporary museum architecture, there are two opposing tendencies. The former is a conditional "on the wall of the museum," The trend appears to be to say which is absorbed into the museum in harmony with the environment, and thematic packages in a variety of collections designed for open space and harmony. Moma in New York for the collection of the Museum of Modern Art (architect Taniguchi), people of Asian, African and American

art collections demonstrate the beach Quai Branly Museum (Paris architect Jean-core), the nineteenth century and the beginning of the twentieth century French painting that the museum's collection is the basis of the Danish Museum of Ordrupgaard (architect Zaja Hadiid) can be included in this category.

The second tendency can be described as "unrestricted museums", which implements the idea of traditional collections. It is based on Chancellor's Guidelines, "Make and They Arrive", in which collections, artists, events, and spectators are envisioned. Buildings intended to showcase the works of art have become a work of art. This is what appears to be the projects at the Guggenheim Museum in Bilbao (architects Frenk Back), Vilnius (architect Zaja Hadiid) and the Guggenheim Museum in Abu Dhabi (architects Frank Back). Such museums are not just architectural units in the city's widest area, they are actively involved in social life, and change the environment they live in. Additionally, new museum structures use extremely modern materials and elements: glass walls, floors and ceilings, transparent lifts, holographic screens for multimedia viewing. In modern museums, the solution of the interior space plays a special role. They require the elimination of the old structure of the museum organization, which exposes the obvious exposition logic, which creates the barrier between the viewer and the exhibitor, which determines the movement of the viewer. In contemporary Uzbekistan museums, however, the richness of the room width, the transparency of the barriers, and the richness of the illumination effects and colors of the miraculous artistic aberration play a decisive role. It's obvious that all the museums in the world do not have a real value, so the architecture of museums should make the audience feel fascinated. Thus, the vector of development of the museum world shows that it is important for everyone to be in the best of times so that the museum can survive successfully, even when it comes to celebration or even passion, visiting museums and museums.

As one of the ways to counter the theatrical exposition of the museum in order to conform to the dominance, duality, theoreticality, and audience demands emerging through globalization, it is important that museums develop as a place of origin, in which the museum represents the past memories. The humanistic essence and mission of the museum should be "less, specific and inexpensive". Orhan Pamuk, the Turkish writer and laureate of the Nobel Prize, drew attention to the fact that in the "manifesto for museums".

Conclusion

In the modern world museology practice, museums and exhibition venues continue to radically and dynamically change in the 21st century. Reality is

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expanding to become a natural landscape for urban environments. They master architectural monuments, abandoned industrial and transport facilities, actively enter the media environment and become part of it. Museums are repairing, reconstructing, expanding, and building new buildings. The accelerated development of museums and tourism around the globe is turning museums into a venue where many people find themselves, as well as their emotional, aesthetic and social learning space.

The museum design and architecture are often contradictory. Today's vectors of museums, in many ways, solve their problems today and create future problems for them. Due to the rapid influence of

external factors, the role of the museum community will grow, the level of competence, mutual understanding and mutual support will increase. Strategic alliances, such as the decision to merge resources, should be an important element of the museum world, often lacking in both the museum and culture. It can be expressed in the unification of finance or people. The essence of the merger is that it will be easier to work with the required volume or the new project together. Thus, "resource of mutual understanding" becomes one of the key elements of the museum community's development in the twenty-first century.

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HISTORICAL STAGES OF UZBEK ART FILMS

Abstract: This article comparatively analyzes the history and development of the art of cinema in Uzbekistan and highlights the process of the creative development of Uzbek cinematography.

Key words: cameraman, film director, image, foreshortening, feature film, popular science film, documentary, method.

Language: English

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Introduction

The Uzbek cinematography, which has a history of 100 years, has gone through different periods. The films produced by silent films of 20-30 years, the first soundtrack, the first color film, and wide-format films were shot in different genres and directions, each of them having the production technique and technology in its ideological direction.

What are the images of these films, and what are their factors? Each movie has its own creation environment, social environment, and includes three main factors. These are:

1. The socio-political environment in which the film was created, the diversity of subjects that the environment requires.
2. The creative group of film production, in particular, the function and function of operators.
3. the role of technology, technology used to create the image.

Not only in the world cinematography, but also in the Uzbek cinematography, in the last decade, there have been significant developments.

Materials and Methods

In Uzbekistan, the first film was shown in 1897 in the Eski Zhuva square. From 1908 in Tashkent, Samarkand, Kokand and other cities began to show foreign films. In Central Asia, mainly showed films with an exotic image of America, France. Uzbek national cinema has been forming since the twenties of the twentieth century. The first Uzbek cameraman Khudoybergen Devanov, in his first documentary –

chronicle films, sought to portray the life and traditions of the Uzbek people, the nature of Khorezm.

The Bukhkino Russian-Bukhara association, organized in 1924, and the Star of the East film factory (Uzbekfilm since 1936), organized in 1925 in Tashkent, became the initial stage in the development of Uzbek cinema art. However, due to the lack of local personnel, the desire to organize studios and the organization of permanent shooting in the “Bukhkino” association was not a success.

The arrival to the Tashkent studio of not-quite-experienced Russian filmmakers, their low professionalism did not make it possible to create genuine national films. The films they created were mainly of an exotic and propagandistic nature, the life of the Uzbeks and the role of Uzbek women are incorrectly shown in them. Most of them were visiting actors who could not reveal the inner world and psychological experiences of the heroes. For example, “Minaret of Death” (dir. V. Viskovsky), “Muslim's Daughter” (D. Bassaligo), “Second Wife” (M. Doronin), etc.). The rejection of national prose and dramaturgy in the development of cinema, the creation of films based on scenarios created by Russian experts who did not know the life of Uzbeks, was a huge loss in Uzbek cinema. Therefore, for many years, the Uzbek cinema could not acquire its national face, the national form as “Uzbek national cinema”.

In silent films, the audience was mainly shown the point of view of European specialists, because the films of the specialists, who did not know the national traditions at all, were created in this spirit. In the 1920s, the films “Closed Arba” (O. Frohlich), “Ravat

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Wolves” (K. Gertel), “Macrli Chingal” (V. Kozlov), and “Chodira” (M. Averbakh) were created; what is said above. With the emergence of voice cinema, the artistic value of Uzbek film production increases. The first Uzbek voice film “The Oath” (1937, dir. A. Usoltsev – Graf) fully reflects the national acting culture, the life and psychology of the Uzbeks, and social contradictions. Mostly because here the main leading roles were played by Uzbek actors.

However, this film was not completely cleared of the old film culture of the times of silent cinema, so it seemed to remain between modernity and the past. This film could not rise to the level of the best films made in Georgia, Azerbaijan. The film “Nasriddin in Bukhara” (1943, dir. J. Protazanov) is considered one of the first successful films of Uzbek cinema, where the real possibilities of the theme of the people are revealed, a beautiful construction of graphic means and a high level performance style are shown.

The film "Tahir and Zuhra" (1945, dir. N. Ganiev) crosses the border of films based on folklore. He created the basis of historical films, made it possible to feel the breadth of coverage of the national spirit of role playing. “Tokhir va Zuhra” became a reliable foundation for the creation of the film “Alisher Navoi” (1947, dir. K. Yarmatov). Then such works of art as “Bai and Batrak”, “Sacred Blood” (1953, 1957, dir. L. Fayziev), “Silk syuzane” (1954, dir. A. Beknazarov) and others were screened. A new look is being formed for the requirements of modernity among young performers of Uzbek cinema, they have significantly retired from the old template, had the opportunity to take a fresh look at the world. At the same time, a new page was opened in the Uzbek art of the screen, which has educational significance, especially for urban youth, who considered love to live in kabaks, beautiful clothes and others as real life. These trends are openly viewed in films directed by E. Eshmukhamedov (“Beauty” (1966), “Lovers” (1969), etc.).

The films “Fascinated by you” (1958, Y. Agzamov), “Everyone speaks in the makhalla”, “You are not an orphan”, “Kalbingda kuyosh”, “Tashkent is a city of bread” (1960, 1962, 1966, 1967, dir. Sh. Abbosov), “Little Birdie”, “Star of Ulurbek”, “Natashakhonim” (1961, 1965, 1966, dir. L. Fayziev), “Past Days” (1969, dir. Y. Agzamov) and others. In connection with the new approach to organizational and creative work, the experience of national cinema workers and the increased demand for screen art, along with films on historical and revolutionary topics (“The Black Consul's Defeat”, director K. Yarmatov; “The Seventh Bullet” by A. Khamroev and others. A number of films on the modern theme were released: “Siddat” (dir. U. Nazarov), “Summer rain” (A. Kobulov), “Falokat oyostida” (3. Sobitov), “The Tragedy of Love” (Sh. Abbosov), “Fiery Roads” (Y.

Agzamov), “Achchyn Danak”, “Alien Happiness” (K. Kamalova), “Chinor Ostidagi Duel” (M. Abzalov). And the film “A Man Follows the Birds”, directed by A. Khamrayev, won the Silver Peacock Award at the Delhi International Film Festival in 1976.

In the film studio "Musilima" (1925), "The Tower of Death" (1925), "Happiness Sun" (1926), "Second Woman" (1927), "Ravot Kashkiri" (1927), "Under the Dome of the Mosque" (1928), "The Last Beat" (1930), "Rising" (1931), "Awliya kizi" (1931), as a great art school. Nabi Ganiev, Suleyman Khodjaev, R.Ahmedov, Arif Hodjaev, M.Jalilova, Komil Yormatov, Yuldosh Agzamov, Ergash Hamroev, Rahim Pirmuhamedov and others participated in such silent films. Many of them later became prominent art figures. Despite the fact that in the first decade of black and white film, no matter what the spectacle, the factors and techniques that influenced the audience have already begun by filmmakers, especially operators. Wide plans, sharp emotions, the periods of the appearance of the film have been the primary task for operators to translate the word and influence the viewer.

Operators should be photographed from high to low, low to high; capture images; capture the subject in a subjective camera; shooting from the pan, as an observer; rapid capture; The aim of the presentation was to find out about the picture-orientation of the target audience.

"Second wife" In 1926 the director M.Doronin was shot by V.Dobransky, the operator. Effective portraits of justice from the film's main heroes, sharp edging images, and unrivaled portraits of the portrait were tools to uncover the idea of film art.

The introduction of the film to the film soon became an important event in its development. The vocabulary component of the audio film industry has played a crucial role. Thus, with the use of sound in the cinema, this type of art was able to speak fluently from the language of infantile language. Operators have started to create technical inconveniences. Extras have been moved to interior. Because of the lack of technique and technology of sound recording, the cameras are becoming more stable and more and more images appear in the operators' work. Over the next decade, the quality of the movie has improved, and the cameras are slowly moving slowly. Although the quality of the optics improved and the sensitivity to the light increased, there was no change in the picture quality. The filmmaking time was not proportionate to light, and filmmakers were drawn directly from the drama, with no emphasis on the essence of the task.

Russian cameramen did not have two: cameramen of Moscow and Petersburg schools, but did not create educational and production methods at the operator's school of Uzbek cinema. In 1937, the director of the first "Voice" film, A.G.Usoltsev, said:

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"I was a little surprised when I was asked if I would like to comment on the Uzbek cinematography about the initial work.

In the dark night of February, when I entered the Shayhantoxur Madrassah, I saw the inscription "The Star of the East" written with capital letters. In the studio, there was a creative team that created the basis of Uzbek cinematographers. S.Hojayev, N.G'aniev, N.Klado, A.Ibragimov, A.Bulinskiy, M.Kayumov, M.Krasnyanskiy, Y.Agzamov. On the screen of the country there were soundtracks "Vostochny", "Vesyolye rebyata", "Aerograd", but in the Tashkent film studio there was still a silent atmosphere.

When and how does the picture of the Uzbek cinematography come from? Certainly, short-term activities in the Uzbek cinema, such as "Tohir and Zuhra", "Nasriddin Bukhara", "Nasriddin's Adventures", were donated by Daniil Porfirevich Demutskiy. He created a poetic image on the screens, a monolithic lens with a soft and pleasant image, soft shades in the frame, and the curtain curtains and smoke used to create a fairy-tale atmosphere and a horizontally defining the future of the Uzbek cinema. Malik Kayumov recalls: "He taught me to see, to be able to see clearly and to understand the beauty in detail."

Before that, my look was like a cover. I was not interested in some things that seemed natural to him. The image displayed on the screen would not have been simple, unpacked, unassembled, or arranged. He felt, felt, and loved the environment as a poet. He would not have been a jealous man and nature. Something in the ordinary life would be in his eyes a poet and a miracle. All the streets, ditches, steppes and gardens all breathed in, and I enjoyed this music. We called him a "teacher" - a teacher.

Forty years have passed, he has spent three days until he finds the spot in the Fergana valley. We have not invented a new point yet. I remember that together, we were photographing something together, the desk dock, and the side-by-side units.

After that, we scratched the films. There is no word to describe it, but it's just as simple as that. I asked: how did Daniil Parfirovich paint together, at a point in the same place? He answered, "You know, Malik, somewhere I just pushed the stamp somewhere." Here's the answer, it's a little bit. That "little" can not be studied. That is the skill.

It seemed to me that there was no one more open to me than Demutsky. He was helping everyone, explaining the good and bad things that we received. It did not mean that we should explain some simple

things to ourselves. He would like to raise us to the level he himself is. He did not understand one thing well, "he could not see, he would not go mad about what he saw, but he would not blame us for not stifling us. In our everyday lives, our eyes have been severely affected by the sights and scenes that are accustomed to our eyes.

He could not imagine any creature without loving its work, without being woken up. It is just like the Danil Parfirovich Demutskiy who is a charming, joyful person.

Demutsky's observation collected data for himself at what time of sunrise in our sunshine, the movement of the sun over the course of the day, the harmony of the architecture and the landscape, the behavior of people, the clothes, the utensils of the house. This overview has developed a unique method of operation for the operators of the Uzbek cinema and instructions for using the technique. As we have noted, the reasons for the creation of the Russian School of Communication in EK Tisse and Peter A. Mosevin in Moscow are that the sun and movement in the two regions are varied. The schoolshops are the soft and elegant cadres of the schoolchildren, while MS Thyse's School is sharp shadows and cadres are documented. In the same way, it is generally recommended to capture the time of the filming in our country, as well as in the early morning hours and in the evening when the shadows are long.

In fact, the film is based on all the types of art that preceded it. He has perfected his own imagination, complementing all the necessary and necessary aspects of each of them. Fitrat in his article "Art of Manning" - "The theater, as well as theatrical art, consists of six spectacular types of art: dance, music, literature, fine arts, sculpture, architecture. In other words, cinema is an excellent fruit of ancient art."

Conclusion

All the attractive features of the arts have played a major role in the formation of cinema. The movie did not copy them. The black-and-white film studio was a graphic and the colorful film studied samples of fine art. The architecture was an example for the film's aspect.

In short, cinematography is a broad spectrum of art. Operator image processing should not be limited to illustrative tools. The film uses a wide range of meaningful ideas to uncover the essence of the movie. In this collective artistic way, the operator has a dedicated and respected role. The cinematography is illustrative of the nature of creation.

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TERMINOLOGY: THE NATURE OF CONCEPTS AND TERMS

Abstract: *The paper challenges a theoretical and methodical approach towards Traditional Terminology (TT), which was triggered by the Austrian E. Wüster. Wüster's last work Einführung in die Allgemeine Terminologielehre und Terminologische Lexikographie (1979) became the most comprehensive account of the terminology theory. In spite of the fact that it still constitutes the basis for most theoretical approaches towards terminology, Wüster's work has been criticised by many specialists in the area. The following research claims to what extent the rules and principles constituting the theory are proper to the cognitive aspect of terminology on the examples of gender terms.*

Key words: *traditional terminology, sociocognitive terminology, cognitive approach, prototype structure, synonymy, gender, metaphorical transfer, categorization, feminization.*

Language: English

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Introduction

The development of any science or scientific discipline urges the existence of an object, the social need, a subject with its own methods and the theory providing the facts related to the object. Today, Terminology is presumed to be an independent discipline and as V.M. Leytchik asserts "Terminology is an independent scientific-applied discipline that has grown from linguistics and "absorbed" the achievements of a number of modern sciences and applied fields of activity [4; 19].

As is known, the importance of studying terminology as a means of specialized communication was discovered in the middle ages due to terminological difficulties faced by translators of the famous Toledo translation school [6], whereas a systematic coordination of terminology has started from the XVIII century, which is marked by Carl von Linné's (1707-1778) work on fundamental botanica. However, a theoretically and methodologically oriented approach towards terminology goes back to the early XX century. This boom of the terminology development was triggered by E.Wüster's [10] fundamental work "Introduction to general terminology teaching lexicography and terminology" (Einführung in die allgemeine Terminologielehre und

terminologische Lexikographie) which is still of the utmost importance. However, this work has always been and remains the subject to criticism by many specialists (Cabre 1999; Temmerman 2000, Kageura 2002; Leitchik 2007) for it did not succeed in representing terminology as an independent discipline in tackling terminological issues from all perspectives.

Nevertheless, we can certainly say that retrospective theory serves as a basis for new approaches and theories, as it provides new prospects to see a problem from different viewpoint.

Discussion

An Austrian terminologist E.Wüster becomes a doctor of technical sciences at the Technical University of Stuttgart (Germany) in 1931 and publishes his doctoral dissertation "Linguistic Standardization in Technics". His general theory was originally based on the following principles: Terminology studies concepts before terms (the onomasiological perspective); concepts are clear-cut and therefore are placed in a concept system; concepts should be defined in a traditional definition; a term is assigned permanently to a concept; and terms and concepts are studied synchronically.

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R. Temmerman observes the following gaps regarding the theory of Traditional terminology schools and claims that they have been influenced by Saussurian structuralism as follows [8; 51-93]:

– TT disregards the fact that naming of many concepts is a part of their creation in the human mind.

For some concepts, as *discrimination*, *gender* there is evidence that the phenomena existed before they were understood and named, but others are pure products of human activity and understanding as gender equality, *gender mainstream*, *glass ceiling*, *empowerment of girls and women*.

– TT believes that the best way to describe concepts is to determine their position in the concept system, by logical and ontological means and the definition is formulated accordingly.

For some concepts, we claim that many of them are not clear enough, and the assignment of terms may cause some troubles respectively. For instance, the creation of the term *temporary special measures*, or defining the difference between the concepts *non-discrimination* and *equality* by the Committee on the Elimination of Racial Discrimination.

– TT believes that the concept acts as an initial point for meaning description, as well as the *term* as a secondary one, as if prescribed to the concept. TT says that the concept exists objectively; it is defined in the concept system and named with the term; it is considered the meaning of the term.

The process of transferring a concept into different culture in the form of “culture blob” [7; 51-93] as described By Yu. Stepanov, urges the terminologist to start with the transfer of the term, thus, the term precedes the concept.

– TT disregards the dynamic study of the language, as it is focused mainly on the concept system; therefore terminology is synchronic.

Regarding the language planning, it is also challenged to be an obstacle against terminological meaning description, since according to the supporters of the modern Terminology theory, standardization supports a univocity following *one concept – one term*, the principle which ignores polysemy and synonymy.

R. Temmerman, in turn, argues on the description limit of the semantic triangle offered by Wüster, which represents a model of relationship between the world, language, and the human mind. Regarding the relationship of a language and mind, she claims that “the creative potential of language is not ignored, but disregarded, brushed aside as irrelevant”¹ in traditional Terminology, asserting that language has a role to play in the mental activity of understanding the world.

However, we disagree that Vienna school ignores this view on a language perspective; the fact

itself that the triangle is represented by three nominations allows speculating that the authors made their argument based on their “experience”, however they did not have any pre-requisite in terms of “cognitive semantics” to make “perfect” conclusions as modern Terminology does.

R. Temmerman highlights the following principles of cognitive terminology:

- the prototype structure hypothesis is viable for the structuring and understanding the category;

- polysemy and synonymy are functional in the special language. Concepts lacking a prototype structure have a natural tendency towards univocity;

- polysemy is the result of a meaning change over time. Why words grow into polysemy can be explained from a prototype structure” [8; 73].

Based on the above mentioned thesis, the following research questions if prototype structures in social sciences (in particular gender mainstreaming (GM) discourse) support a tendency of polysemy of a lexical unit by increasing the informational density and ensuring flexible adaptability enabled to make an assumption that “the possibility to find examples of categories which illustrate cognitive models of understanding are prone to polysemisation and other units of understanding which are not prone to this criteria will therefore resist polysemisation”, which after all has justified itself. Diversification in contrast to polysemiphobia [1] leads to the functionality of polysemy in a special language from sociocognitive Terminology viewpoint.

Results

We observed that univocity is peculiar to clear-cut categories, however clear-cut categories are rare in the social sciences, in particular in GM discourse. Hence, the case a clear-cut category at one point is likely to evolve into polysemy has been observed.

The basic term of GM discourse *gender*, in fact, has exploited its polysemic potential several times in the course of its history. Our data show that the semantic overloading is part of a more general situation, when generic shifting of *gender* from a special language term to a general one has been observed. However, the term is considered a polyfunctional term as well. Since, it represents a grammatical category in linguistic discipline, whereas it is a phenomenon of social sex in humanities. The prototype of both genders goes back to the biological sex; being considered a notional category initially, it acquired a status of a linguistic category, and then borrowed by the social sciences addressing the issues of masculinity and femininity. It has already entered the vernacular and can be found in newspaper articles, being frequently heard on radio and television, since

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it concerns the issues related to the social existence of a human being.

Two types of shifts in the semantic structure of terms have been observed. The first shift involves a metaphorical transfer of *gender bender* (*gender changer*) – the process of metaphorization from the domain of biology (*gender*) to the domain of electronics, a new ‘value-added’ meaning component is a hardware device placed between two cable connectors of the same type and gender, which in turn makes a new shifted meaning extension possible. It demonstrates that lexicalization is not arbitrary, that polysemy has a role to play in the process of understanding:

Gender bender – a person who dresses and behaves in a way characteristic of the opposite sex;

Gender bender – ‘in electronics’ – a device for changing an electrical or electronic connector from male to female, or from female to male.

Gender changer, gender mender, gender blender – an electrical adaptor, which allows two male or two female connectors be connected to each other.

The second shift in the semantic structure is a case of generic posting. The term feminization gradually applies to a wider range of fields, becoming generic for this kind of process. The result is that we have a broad common category called *feminization*. Next to it, we have separate, more specific units, with their own features, but still called *feminization*. These units have their own partially common and partially distinct subunits. The result is polysemy, which may eventually be eliminated when techniques develop sufficient distinctiveness as their own specialists are working on them.

The term *feminization* has extended its meaning in relevant fields due to new inventions and developments.

Feminization (sociology), the shift in [gender roles](#) and [sex roles](#) in a society, group, or organization towards a focus upon the [feminine](#);

Feminization (biology), the hormonally induced development of female sexual characteristics;

Feminization (activity), a sexual or lifestyle practice where a person assumes a female role;

Feminization of agriculture, the measurable increase of women's participation in agriculture;

Feminization of the face, a set of reconstructive surgical procedures that alter typically male facial features to bring them closer in shape and size to typical female facial features;

Feminization of language, the process of making a word or name female;

Feminization of migration, a trend where a higher rate of women migrate to labor or marriage;

Feminization of poverty, phenomenon in which women represent disproportionate percentages of the world's poor;

Feminization of voice, the desired goal of changing a perceived male sounding voice to a perceived female sounding voice;

Feminization of the workplace, the trend towards greater employment of women, and of men willing and able to operate with these more ‘feminine’ modes of “interaction” (<https://en.wikipedia.org/wiki/Feminization>).

The categorization of the term is not just due to its modified meanings. They are the result of understanding through conceptualization a particular concept in different disciplines.

It is worth noting that GM discourse has exploited verbs, which are actively used: Gender as a verb – *gendering* – prescribing a sexual characteristic of activity: *gendered term, gendered gaze, gendered media, gendered vision, gendered society, gendered cyborg* are among them; victim – *victimization, empowerment – empowering*, etc.

The existence of metaphorical terms actively used in GM discourse and glossaries as well, urges to support the proposition that metaphorical terms are formed on the basis of interconnection of a *language, world* and *mind*, whereas the creative potential of the language has to play a significant role respectively.

Conclusion

The empirical data we deal with, when studying a gender discourse language in human rights texts, will serve to validate the criticism of the principles of the traditional Terminology schools. There are at least two reasons why we have chosen the vocabulary of GM discourse: it is a recent, global and quickly progressing domain within international community and its results are the consequence of interdisciplinary approaches towards GM issues. The interdisciplinary character of a gender science makes its vocabulary an interesting test field for studying categorization and naming, terms operate in different fields from different perspectives and one can observe the effect of this fact on lexicalisation.

Since a special language can be defined as the collection of spoken and written discourse on a subject related to a discipline (Hoffmann 1984; Ahmad & Rodgers 1992, 1994; Kocourek 1982; Sager 1980), the discourse we have been studying was restricted to written sources – human rights texts.

The application of the findings of cognitive semantics to the modern socio-cognitive Terminology enables to demonstrate the cognitive potential of a language. However, in many cases, even modern Terminology remains to be skeptic regarding the questions of *semantics*. In this respect, gender discourse deals with polysemantic terms, the fact which proves its character to be self-regulating and open system, encouraging the introduction of the new methods of Terminology description from a cognitive semantics viewpoint.

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SECTION 7. Mechanics and machine construction.

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QR – Article



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DESIGNING AND MANUFACTURING OF SHAPING PARTS OF A DIE MOLD

Abstract: Manufacturing stages of a die mold were considered in the article. Attention was paid to computer designing and subsequent manufacturing of the die mold shaping parts and tools of the second order (copper electrodes).

Key words: a die mold, an insert, designing, machining, an operation, a machine.

Language: English

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Introduction

A die mold consists of many groups of parts, each of which performs its a specific technological function. The parts group of the die mold, responsible

for shaping of a casting, is the most complex and time-consuming. This group of the parts is 70% of cost of the entire die mold. High requirements for accuracy, physical and mechanical properties, surfaces

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roughness and manufacturability are imposed to the parts [1 – 10]. Designing stages and production of the shaping parts of the die mold are considered in this article.

Technological part

The designed die mold consists of two inserts (upper and lower), the cylindrical signs (the rods) and the rectangular signs (the inserts). Cavities of gating channels and the shaping cavities are performed on the

inserts. The channels for melt injection into the shaping cavities of the die mold are performed in the lower insert. The minimum diameter of the conical channel for melt injection is 0.6 mm. The inserts are made of 1.2379 (EN) steel. Material hardness of the lower and upper inserts after heat treatment should be 58...62 HRC. Four castings are simultaneously poured into the die mold. The three-dimensional solid model of the die mold is presented in the Fig. 1.

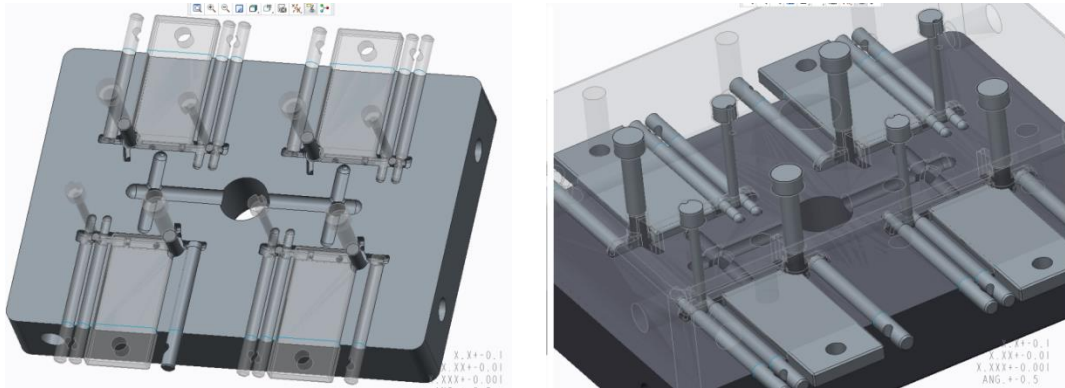


Figure 1 – The three-dimensional solid models of the die mold parts in assembly.

The cylindrical and rectangular signs are placed in the shaping cavities of the upper and lower inserts. These signs form the outer and inner surfaces of the casting. Roughness of the contact surfaces of the rods should be 0.32...2.5 μm . The signs are made of 1.2108 (EN) steel. Hardness of the signs material is 49...53

HRC. Roughness of the contact surfaces of the rectangular sign should be 0.63...1.25 μm .

The three-dimensional solid models of the shaping signs of the die mold are presented in the Fig. 2.

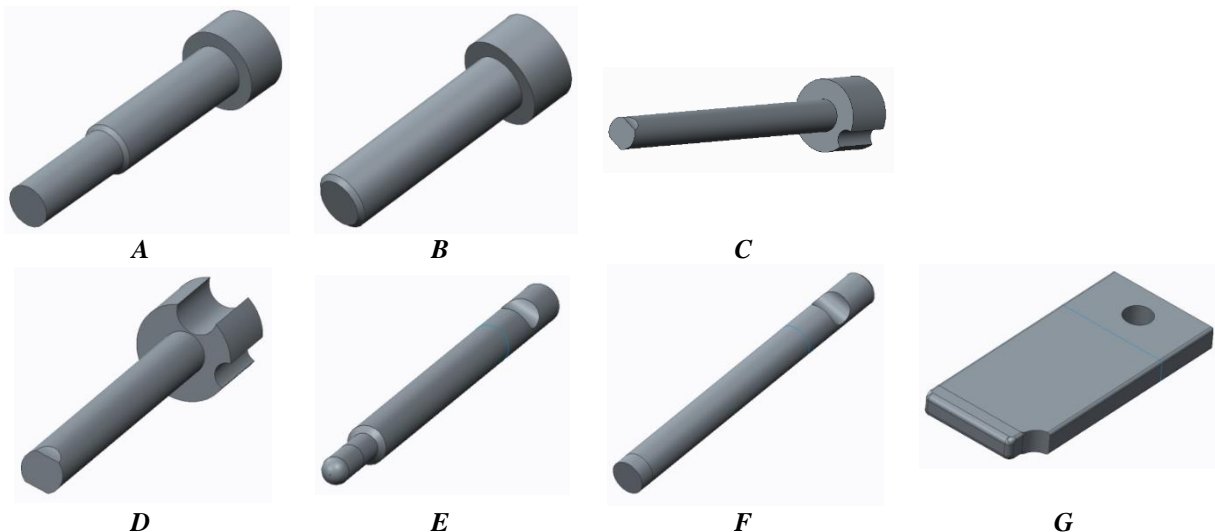


Figure 2 – The three-dimensional solid models of the cylindrical and rectangular signs:
A – F – the rods; G – the insert.

Operations of a technological process of manufacturing of the main shaping parts of the die mold are described in the table 1. The technological process consists of 13 operations. Processing is

carried out on the universal machines and on the machines with numerical control. Grinding is carried out by a grinding wheel (graininess – 2000).

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Table 1. The processing technology of the parts "Insert".

The operation	The operation description	The equipment
Blanking	Cutting of a billet with allowances of 2.5 mm on a side.	The band saw "Pegas"
Milling	Milling of the billet with six sides with allowance of 1.25 mm on the side.	The milling machine "WM121M"
Grinding	Grinding of the billet with six sides to the angle of 90° with allowance of 0.4 mm on the side.	The grinding machine "3L722A"
Coordinate boring	Drilling and boring of holes for the signs, the ejectors and the gate bushing; drilling of the holes for fastener.	The coordinate boring machine "2N135"
Locksmithing	Drilling of the holes for threads and the cooling channels; threading according to a drawing.	
Coordinate milling	Milling of the shaping cavities and the cavities for the signs, the gating channels, the retainer of the gate bushing and the technological holes for the pins previously with allowance of 0.4 mm on the side, fillets on the corners completely.	The machining center "C-tek KM 80"
Thermal	Hardening of the billet according to the drawing up to 58...62 HRC. The heat treatment modes: holding 4 hours in coal at the temperature of 1000 °C, cooling with oil, tempering 3 hours at the temperature of 250 °C.	
Grinding	Grinding of the billet with six sides to the angle of 90° with allowance of 0.1 mm on the side.	The grinding machine "3L722A"
Coordinate boring	Boring of the technological holes for the pins completely.	The coordinate boring machine "2N135"
Coordinate milling	Milling of the gating channels, the cavities for the signs, the cavities for the rectangular signs completely, the shaping cavities preliminary with allowance of 0.1 mm on the side for performing of the electrical discharge operation.	The machining center "C-tek KM 80"
Grinding	Grinding of the insert in assembly on the pins with four sides completely according to the drawing; allowance is distributed evenly.	The grinding machine "3L722A"
Electrical discharge	Burning of the inserts by special electrodes. The channels for injection in the gating channels, the shaping cavities, three shaping grooves are burned on the insert "08". Permissible roughness in accordance with the sample No. 28. The shaping cavities are burned by the special electrodes on the insert "09".	The EDM "SODICK AM55L"
Electrical discharge	Burning of the cavities for the cylindrical signs by the special electrodes in the inserts in assembly. The inserts "08" and "09" are assembled on the pins for achieving of the highest accuracy of the cavities.	The EDM "SODICK AM55L"

Designing of mechanical and electrical discharge processing of the shaping surfaces on the parts of the die mold in the *PTC Creo* software environment is presented in the Fig. 3. Final processing of the gating channels and preliminary processing of the shaping cavities in the inserts are carried out by milling. Machining is carried out by the three-dimensional model of the part. A trajectory of a

cutting tool is presented by red lines. The tools of the second order (the special copper electrodes) must be processed for final processing of the inserts on the EDM machine. The electrodes are processed in parallel to manufacturing of the inserts. The shaping cavity of the insert is processed by the first electrode. Three grooves are processed by the second electrode.

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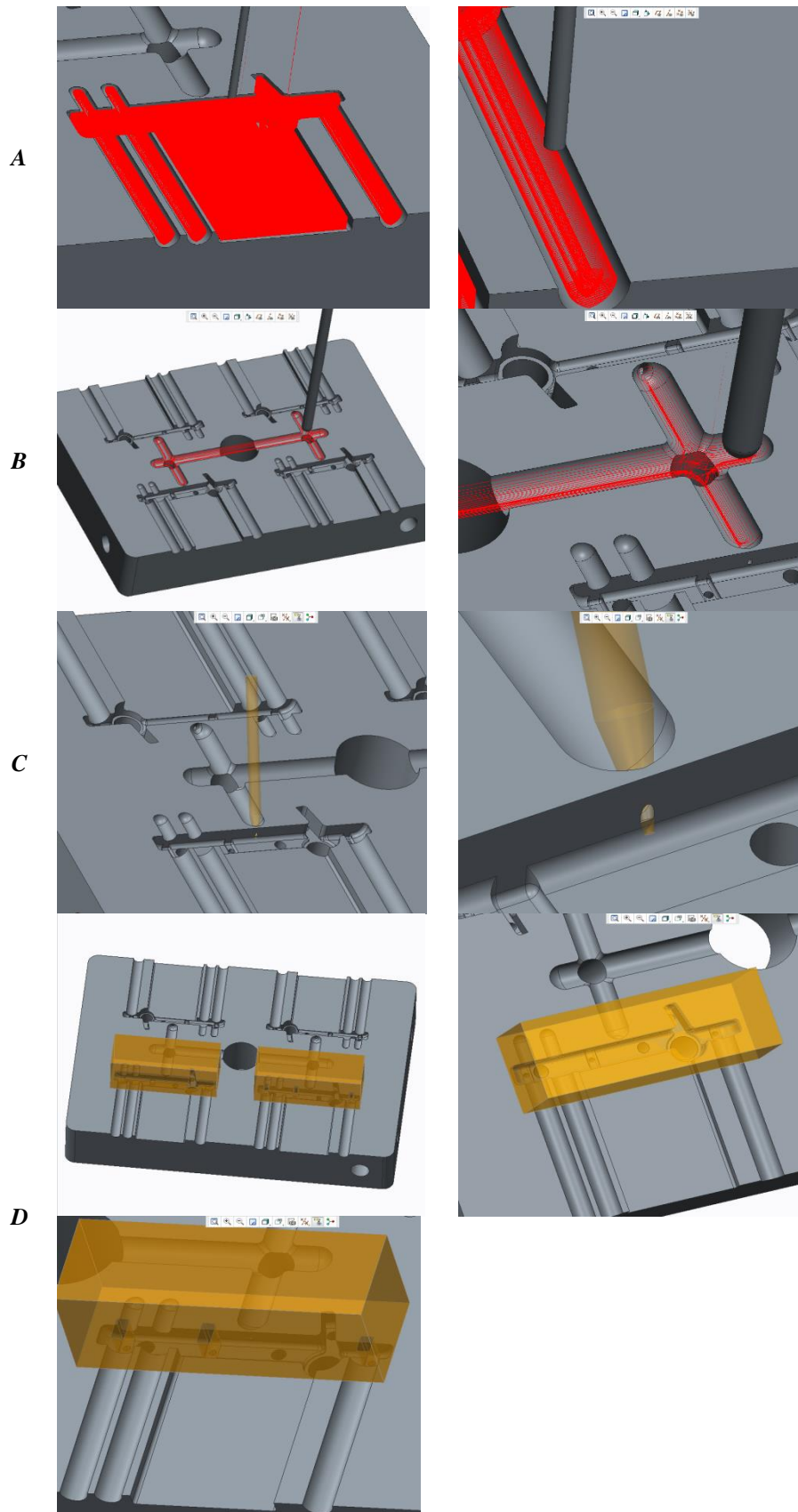


Figure 3 – Processing designing of the shaping surfaces: *A* – the cavities for the cylindrical and rectangular signs; *B* – the gating channels; *C* – the channels for melt injection in the gating channels; *D* – the shaping cavities and three grooves.

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The some operations of the technological process of manufacturing of the die mold are shown in the Fig. 4. The main operation of obtaining of the gating channels and the shaping cavities of the insert

is presented in the photos of *A* and *B*. The photos of *C* – *G* demonstrate the manufacturing process of the tools of the second order. The rectangular signs are processed in the photos of *H* and *I*.

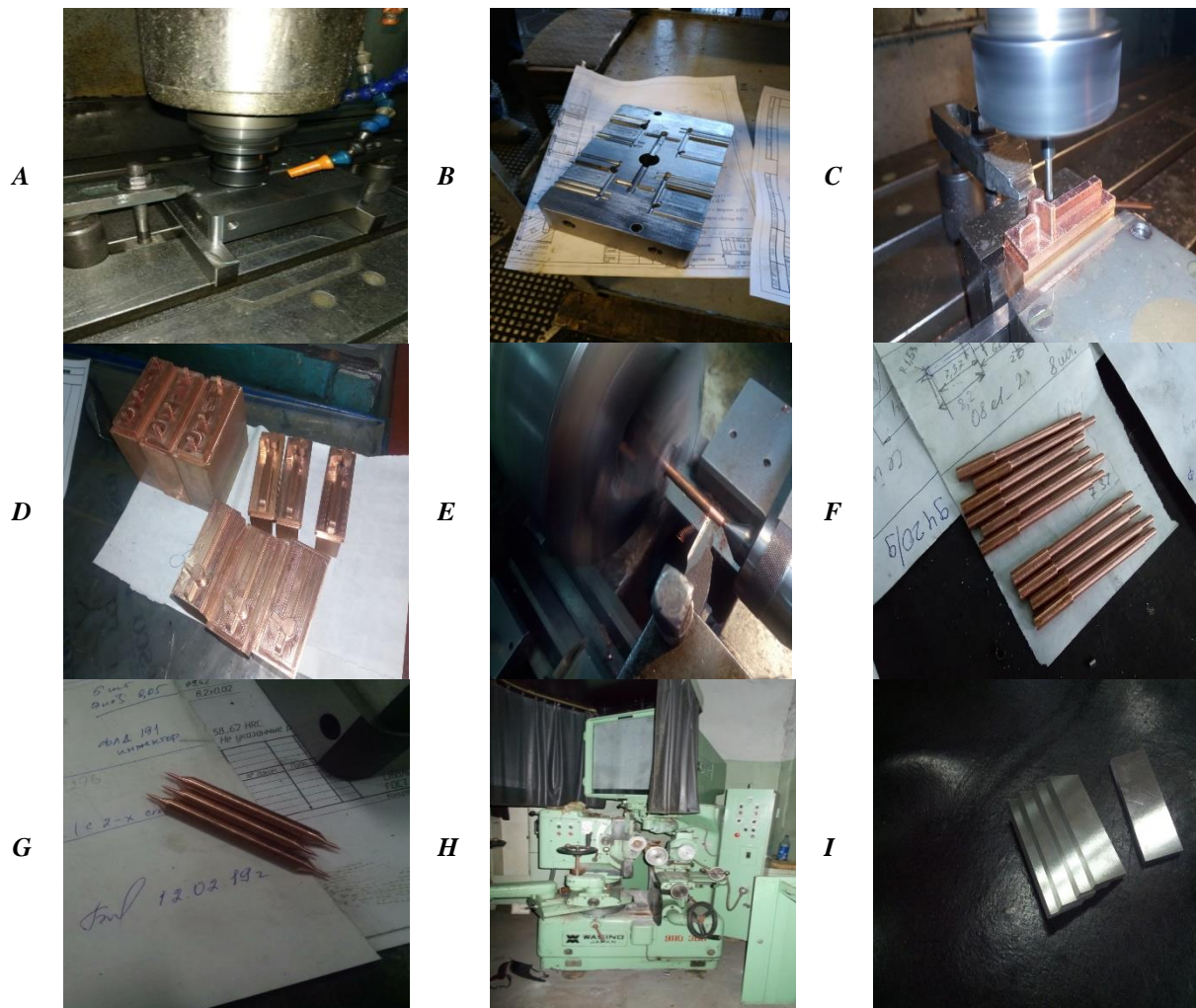


Figure 4 – The operations of the technological process of manufacturing of the die mold: *A* – milling of the gating channels and the cavities for the signs; *B* – the billet after milling; *C* – a profile milling of the copper electrode for burning of the cavities for the signs; *D* – the processed copper electrodes; *E* – turning of the cylindrical electrodes; *F* and *G* – the processed cylindrical electrodes; *H* – the machine "GLS-125a WASINO" for optical grinding; *I* – the billets of the rectangular signs after grinding.

The cylindrical signs are processed on the following technological equipment:

A. The lathe "16K20". Turning of a contour with allowance of 0.8 mm.

B. A furnace. Hardening of the signs according to the drawing. The heat treatment modes: holding 20 minutes at the temperature of 850 °C, cooling in oil, tempering one hour at the temperature of 500 °C, air cooling.

C. The grinding machine "Karstens AS 15 A". Grinding of the signs in a size.

D. The optical grinding machine "GLS-125a WASINO". Grinding of the cylindrical grooves and slopes on the signs according to the drawing.

The designed three-dimensional solid model of the casting is presented in the Fig. 5.

The casting is made of MIM 4140 alloy. A volume of the casting material is designed with shrinkage of 18%. The casting slopes are performed in direction of reducing of the sizes. The ejector marks with the depth of not more than 0.1 mm are allowed on the some casting surfaces.

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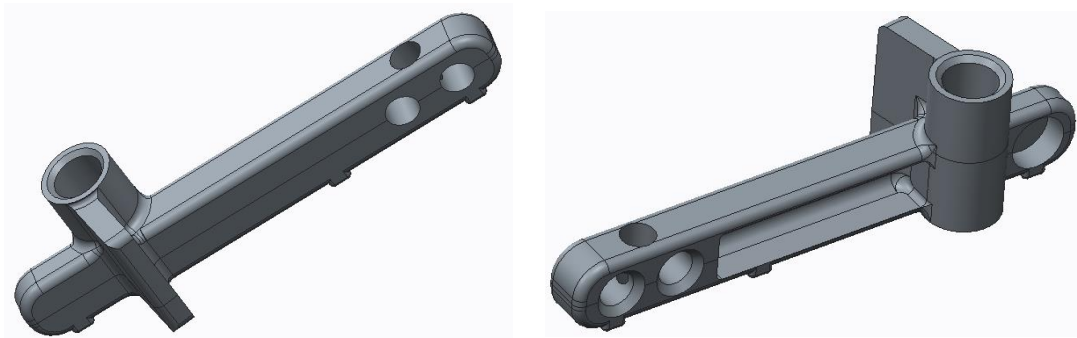


Figure 5 – The three-dimensional solid model of the casting.

The assembled die mold is subjected to mechanical finishing and testing under the different operating conditions for obtaining of the best results after manufacturing of all the parts.

Conclusion

Designing of the shaping parts of the die mold includes the development and manufacturing of the

tools of the second order for sequential processing of the shaping surfaces. The complex shaping surface on the inserts is processed by means of the rough, semi-finishing and finishing profile electrodes. Configuration and orientation of the cylindrical and rectangular signs in the inserts are presented.

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

FEATURES OF MANAGEMENT AND MODELING OF BUSINESS PROCESSES AT RETAIL TRADE ENTERPRISES

Abstract: The article reveals the content of the concept of "corporate standards of customer service", describes the process of developing, implementing and monitoring standards. The necessity of enterprise management on the basis of the process approach is substantiated. The results of the implementation of the standard in the organization. Also, the author examined the models of the main target function of retail enterprises and highlighted the main functions of the retail trade and factors influencing their volume. The main classifiers for the construction of an organizational-functional model of a retail enterprise are formulated. Examples of modeling business processes in IDEF0 format are given.

Key words: trade, customer service, retail, standards. business processes, retail, organizational and functional model.

Language: English

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Introduction

It is known that the main influence on the visitor is provided by the store employees, who in the process of servicing act as the face of the company. The image of a commercial establishment, its ability to retain customers, is largely dependent on the knowledge and experience, friendliness and appearance of its employees. No matter how attractive the pricing policy and display of goods in the sales area, rudeness and bad manners of sellers often negate all the efforts of merchandisers.

Relations with customers are one of the leading components in the system of external relations of the organization, since in many respects it determines its competitiveness. The desire to manage customer relationships leads to the fact that companies are beginning to pay great attention to the development and implementation of corporate service standards. Customer service standards are an essential element in the organization's corporate culture structure, which, on the one hand, is a manifestation of the values that dominate the organization, and on the other, it sets specific parameters for employee behavior.

Corporate standards of work with clients is a complex of precisely formulated, approved and mandatory for execution principles, rules and

technologies of work with clients, which are designed to guarantee a high level of quality of the tasks performed.

The development and implementation of service standards includes three phases:

1. creating a standard;
2. implementation of the standard;
3. execution control [3, 4].

The following important corporate documents should be used in developing customer service standards:

- The mission and values of the company;
- Corporate Code of Conduct;
- Rules of the internal labor schedule;
- Job descriptions.

Corporate Retail Standards

The main purpose of developing corporate service standards is to provide the company with a strategic competitive advantage. The availability of standards guarantees the client that no matter who it is from among the company's employees, he communicates, he will receive the service of "brand-name" quality, which is inherent in this store and brand.

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Developed corporate service standards are manifested in two areas of work with staff. The first direction is the selection of personnel, that is, companies are trying to attract to their work only those potential employees who

support her values. The second area is staff training. Standards are the basis of corporate training.

In order to evaluate the effectiveness of the implementation of service standards, they use customer feedback. For example, the method of Mystery Shopping (secret buyer).

At the moment there is no single approach and any classical technology for developing standards of customer service. Standards are an unconditional know-how of any company, and there are no rules for writing standards [6].

The personnel service of one of the largest retail organizations in the city of Kirov (Kirov region) developed and implemented the Unified Customer Service Standard "Legendary Service" - these are rules and patterns of employee behavior in typical situations of interaction with customers. The objectives of the "Legendary Service" are the provision of the Company's sustainable competitive advantage in the market and an increase in the number of customers.

The standard is intended for all company employees interacting with customers on the trading floor, among themselves and with other departments. Each employee has the right to make his own proposals for the improvement of the "Legendary Service" by submitting his proposals to the immediate supervisor, hall administrator or Personnel Service in writing. Standardization of services implies compliance by the Company's staff with certain rules and procedures.

The standard includes two sections:

- 1) general customer service rules;
- 2) the main scheme of service.

The first section defines the principles of quality customer service, as well as the general requirements for service: appearance; rules of conduct for the seller in the sales area; rules of communication with customers; standards of interaction between company employees; prohibited phrases in the performance of official duties and the rules of communication by telephone.

The second section describes sequence of actions in servicing visitors to the store. There are six main stages:

- 1) meeting phase, making contact;
- 2) identifying the needs of the buyer;
- 3) presentation and demonstration of goods;
- 4) work with objections;
- 5) an offer to make a purchase;
- 6) the stage of completion of the contact.

Using the Standard is quite simple.

It is a set of basic flowcharts, each of which characterizes a particular stage of the sales process. To

simplify the perception, the most important information is highlighted in color font, and in addition to textual information.

The standard contains some characters: "speech module", "Remember!" And "Unacceptable."

All employees of the Company are trained in accordance with the requirements of the Standard, each has its own copy. To assess the effectiveness of the standard implementation process, a system of control over the work of sellers using the "secret buyer" method is used. The information obtained is the basis of motivation and is used for further development and adjustment of in-house training programs. Also, in accordance with the Uniform Service Standard, the Company conducts a daily assessment of the work of the sales personnel by checklists.

The introduction of the Unified Service Standard "Legendary Service" in the Company allowed:

- achieve a uniform quality of service and customer service for the entire store;
- optimize workflows and procedures (elimination of unnecessary or erroneous actions on the part of the staff);
- to ensure clarity of the workflow for employees, to minimize the time costs for managers to adapt new employees;
- increase employee motivation by understanding their criteria for evaluating their work and the work of their colleagues.

"Every visitor, regardless of whether he made a purchase or not, must leave the store with the feeling that he has visited a great store and will be happy to return to it again and again" [5].

One of the main factors of the transparency of retail enterprise management (PRT) is its representation in the form of a network of business processes. Since each organization or system is created in order to achieve certain goals (create value added), it is therefore indisputable that this statement is true only when such a network of business processes is determined by the mission and objectives of the GoT. Speaking about the main goal of the management of GRT, it should be noted that it is inextricably linked with the main objective function of the management of the GRT as a whole and is implemented with it in a single complex. The objective function of the GoT is considered in the framework of the behavioral economic theory of enterprises, which explores the real behavior of individual economic entities. With the development of microeconomic theory, approaches to the definition of the main goal of the functioning of enterprises changed and different models were developed.

The profit maximization model is based on the theoretical approaches of classical economic theory, on A. Smith's conclusion that maximizing the profits of individual business entities leads to maximization of the entire social welfare. To assess the real result of

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economic activity of an enterprise, the concept of "economic profit" was introduced, which represents the difference between the amount of income of an enterprise, on the one hand, and the sum of both its external and internal current costs, on the other.

The next model - the model of minimizing transaction costs - is based on the theoretical approaches of neoinstitutionalism. [5]. R. Coase first introduced the concept of "transaction costs", which he defined as the costs of servicing transactions in the market. Later, they began to include any types of costs that accompany the economic interaction of economic agents, wherever it takes place - on the market or within the enterprise². The sales volume maximization model is one of the best-known target alternatives to the profit-maximization model, which enjoys wide practical support. This criterion in the best way reflects the results of the business activity of the enterprise, the results of the implementation of not only the economic, but also the social mission of the GoT, aimed at meeting the needs of customers for goods and services. The growth in sales requires not only intensifying the marketing efforts of enterprises, but also constant changes in the technology of sales of goods. The model of maximizing the pace of sustainable growth of ORT is based on one of the modern concepts of enterprise theory. As part of this model, unlike the previous one, there are growth rates of operating profit of the GoT, and the main proportions of the distribution of this profit. The advantage of this model is its clear focus on a strategic perspective, ensuring

In market conditions, profit maximization is one of the most important tasks of the work of the GoT, or as a criterion for evaluating the effectiveness of using its capital (assets).

² In the modern economy, transaction costs include the cost of resources and time associated with the search and processing of commercial information about suppliers and customers, necessary goods and services, prices; costs associated with the implementation of commercial negotiations; the costs associated with the acceptance and verification of products by quantity and quality; other types of costs associated with servicing commercial transactions.

in the development process of the PRT sustainable formation of its income and profits. A wide development in the system of strategic management has received a model for ensuring competitive advantages. A distinctive feature of this model is that it reflects the results of the activities of almost all its main services - competitive advantages can be achieved by improving the quality of goods and services, developing a new product, optimal pricing policy, effective marketing and logistics, reducing costs, using advanced technologies and tools, effective organizational management structure. The model of value-added maximization¹ allows to maximize the economic interests of employees,

managers and owners of the PRT, forming a sufficient level of remuneration for all departments of the PRT and smoothing the contradictions between them. This criterion is long-term, i.e. it is easily modeled in a strategic perspective. The model for maximizing the market value of ORT reflects the conceptual idea that the main function of an ORT is to maximize the welfare of its owners.

Having defined the mission of the GoT, having formulated the Goals of the GoT, identifying the main groups of consumers and their needs, analyzing the suppliers of goods made by the GoW, competitors, identifying the key competence of the PRT², should proceed to identify all business processes and control loops (speakers in the form of a list of functions implemented by the GoT).

The role played by retail trade (RT) in the system of social reproduction, involves the implementation of a number of functions. Some scientists combine all the functions of RT in two groups [6].

1 Value added is calculated as the difference between the income from the sale of products for a certain period and the sum of the costs of raw materials, materials and services purchased from external suppliers.

2 Key competences are those business processes, know-how, experience and skill that are directly related to the mission of the enterprise and cannot be transferred to the side or subcontractor without significantly weakening the enterprise itself. Strategic planning allows you to identify the functions and processes that form the core competence of the enterprise.

The first group of so-called trade (commercial) functions includes the study of consumer demand for goods sold, the formulation of applications for suppliers for the delivery of goods, the formation of the product mix, and the advertising of goods and services. Technological functions can be attributed to the second group: acceptance of goods received by the PRT in terms of quantity and quality, ensuring storage of goods, performing operations related to the production processing of goods (packaging, packaging), intra-company movement, placing goods in the sales area, selling goods to customers. Other scientists [10] include the most significant functions of RT:

- planning the range of products sold, satisfying the demand of the chosen market segment;
- procurement of goods from manufacturers and wholesale enterprises in large quantities;
- transportation of purchased goods to the warehouses of the GOT;
- acceptance and storage of the purchased goods in the warehouse of the GOT;
- sub-sorting, part-time processing and preparation of goods for sale;
- the organization of the placement of goods on commercial equipment;

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- advising and serving customers in the process of selling consumer goods;
- The organization of the sale of goods to end customers;
- the formation of a complex of after-sales services for consumers of goods;
- collection and processing of information on the consumer market;
- research of a conjuncture of the consumer market on which this PRT functions;
- financing of trade operations;
- taking on part of the risk associated with the sale of goods to consumers;
- advertising and sales promotion of goods.

The main parameters of performed ORT functions (their volume and nature) depend on the ratio of factors:

- features of the consumer market in which the PRT operates (the number of real and potential buyers of the PRT, their income level and structure of needs, etc.);
- specifics of products sold by the GoT (the nature of the demand for products sold, the level of prices, quality and technical complexity, etc.);
- specifics of the GoT itself (size and location of the GoT, stage of its life cycle, goals and organizational structure of the GoT, etc.).

Further, in the business model it is necessary to fix areas of responsibility for the functions performed¹. This technology is based on two modeling tools: classifiers and matrix projections [8]. Classifiers are exact hierarchical lists of model elements. Each of the elements can be characterized by a set of additional attributes. The number of such classifiers is determined by the purpose of building the model. In fact, classifiers are a set of management registers containing mostly non-quantitative information, the totality of which specifies the coordinate system for describing the activities of the GoT. That is, to obtain a complete picture of the business, in addition to the usual accounting registers developed in the chart of accounts and reflecting only financial and business activities, additional registers are introduced that reflect other accounting objects. Matrix projection (matrix) - these are two classifiers, whose elements have established connections with each other. The purpose of the projections is to define the system of relations between the classifiers of the business model [9]. Just as a spatial object of any complexity (for example, a building) can be represented by a finite number of two-dimensional (flat) projections - drawings, and several matrices make it possible to build multidimensional structural descriptions of the system, making complex structures observable and documentable [10].

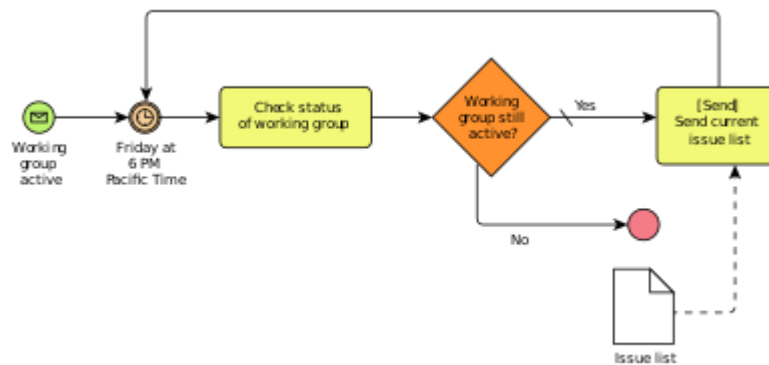


Fig.1. Business process modeling in trade company

Each PRT is permeated with the most complicated system of relations and connections; nevertheless, all decision-making tasks on securing responsibility, means, etc. are solved by the method of paired projections of register-classifiers with the subsequent output of multidimensional reports. By choosing the number of classifiers and the depth of the hierarchy, we can get the business model of this or that operation is called “assign process owners”.

different degree of accuracy. For example, only a few classifiers are used to build an organizational-functional model:

- the main activities, groups of products and services of the GoT;

- resources consumed by the GoT in the course of its activities;
- business processes supported by the GoT;
- organizational units of the GoT.

An example of describing the structure of external interactions of ORT at the 0-level based on the technology of functional structural modeling in the IDEF0 notational agreement is presented in Fig. one.

Having selected the logistics business processes from the activity model of the entire ORT, we will get the business process A3 “Transportation and Warehouse Management” and in fig. 2 we will present its decomposition. It includes the main functional elements of the warehouse and transport parts of the logistics system of the PT and consists of nine main functional units.

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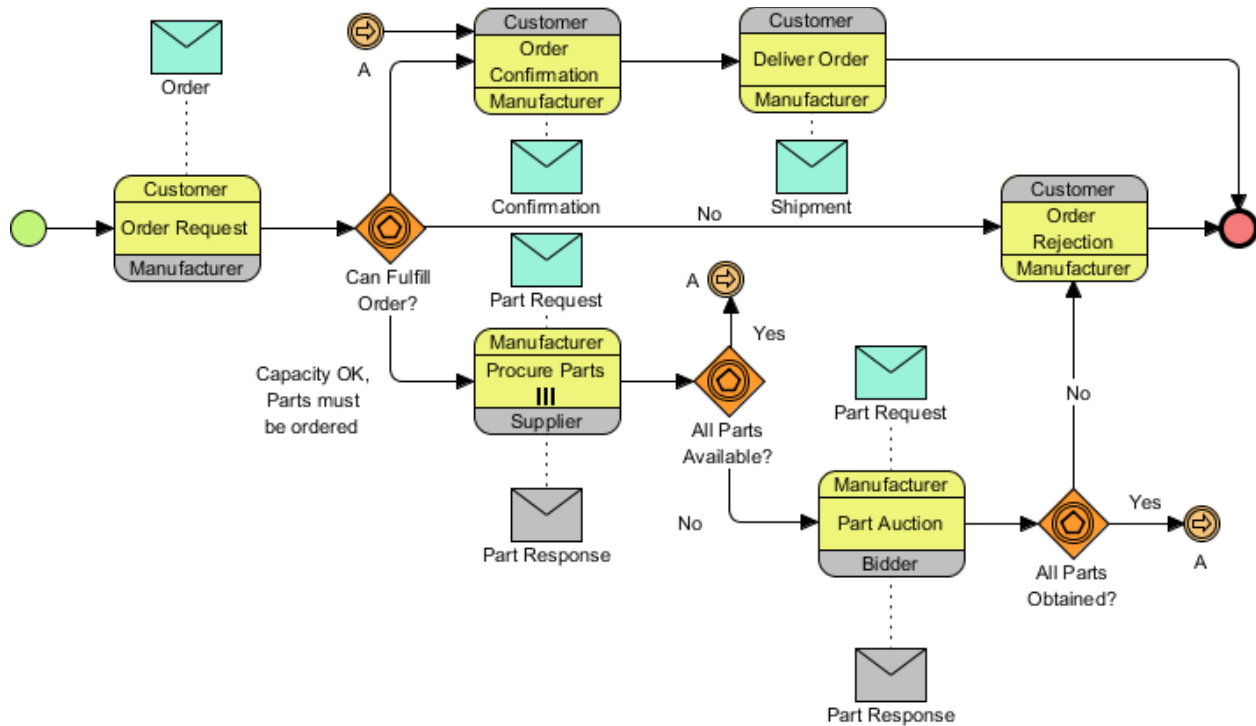


Fig.2. Business process modeling in trade company

Each logistics business process of a modern ORT is reflected in the logistics budget of the GoT. In the developed system of logistics business processes, we included it in the composition of the business process A31. However, usually budgeting for the GOT is part of the general business process of the enterprise “Financing activities and settlement of liabilities”.

The inputs of the business process A3 “Transportation and Warehouse Management” 2 are: data for the preparation of the logistics budget, delivery requests, information about carriers, goods. Outputs of the process are: return of goods, delivery of goods, documents for cargo, delivery report, logistic budget.

Management: ORT logistics strategy; regulatory documents and regulations; algorithm for quality control and quantity of goods; application for placement in stock; algorithm for optimal placement of goods in stock; inventory application; application for shipment of goods to the trading floors of the GOT. Mechanisms and performers: PRT Logistics Service. The main information objects of the process are goods (goods and materials).

2 The transportation function on the ORT is performed only in the case and to the extent that it is not fulfilled by suppliers (wholesale companies of products).

Conclusions

Thus, effectively using corporate standards of customer service, the company maintains a high level

of quality of work with customers, ensures the success of its positions in the market, creates a favorable atmosphere for employees and most importantly creates trust, respect and commitment of its customers, creates an image.

Accepting a customer’s order, delivering goods to a customer, and calculating employee salaries are all business processes. Based on the technology of functional structural modeling IDEF0, we have developed and identified the main logistics business processes of top-level ORT. This and further decomposition and regulation of business processes makes it possible to make the logistics functions of the PRT more visible (transparent), linked to the entire system of functions of the PRT, “ready” for analysis (management, improvement). The presented formalization of the business processes of GRT, including the logistics system of the GRT in the format of business processes, is of a rather generalized nature and in a number of specific practical cases may need additional decomposition and refinement. However, it should be noted that the task setting is of decisive importance during the formalization. In our case, the “goal” was defined as providing an understanding of the structure and dynamics of the logistics business processes of the PRT in the system of general processes of the GoT and it has been successfully achieved.

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COMPARATIVE EVALUATION OF DIGITAL FILTRATION OF SIGNALS IN ANALYTICAL INFORMATION MEASUREMENT SYSTEMS

Abstract: The paper are considering the issues of digital filtering of the signals of analytical devices in the composition of information-measuring systems. Two groups of algorithms are compared: a) polynomial filtering in the time domain; b) wavelet filtering in the spectral region. Boundary estimates and recommendations on the use of algorithms are given.

Key words: analytical devices, chemical-analytical information systems, primary signal processing, polynomial and wavelet filtering of signals, comparative evaluations.

Language: Russian

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СРАВНИТЕЛЬНЫЕ ОЦЕНКИ ЦИФРОВОЙ ФИЛЬТРАЦИИ СИГНАЛОВ В АНАЛИТИЧЕСКИХ ИНФОРМАЦИОННО-ИЗМЕРИТЕЛЬНЫХ СИСТЕМАХ

Аннотация: В статье рассматриваются вопросы цифровой фильтрации сигналов аналитических приборов в составе информационно-измерительных систем. Сравниваются две группы алгоритмов: а) полиномиальная фильтрация во временной области; б) вейвлет фильтрация в спектральной области. Даются граничные оценки и рекомендации по использованию алгоритмов.

Ключевые слова: аналитические приборы, химико-аналитические информационные системы, первичная обработка сигналов, полиномиальная и вейвлет фильтрация сигналов, сравнительные оценки.

Введение.

Настоящее время характеризуется устойчивой тенденцией к широкому распространению химико-аналитических информационных систем (ХАИС) с универсальными физико-химическими анализаторами состава и свойств вещества, особенно анализаторами спектрального типа (хроматографами, спектрометрами излучения, масс-спектрометрами и др.). Названные аналитические приборы нашли применение для решения задач экологической направленности в составе химико-аналитических комплексов (ХАК) типа ИНЛАН (РФ), Agilent Technologies (USA) и Perkin Elmer. Приборы этих фирм внесены в реестр государственной системы обеспечения единства измерений РК №КЗ.02.02.00192-2003.

1. Информационно-измерительные системы химико-аналитических комплексов.

Основным фактором, затрудняющим использование аналитических приборов (АП), является сложность и разнообразие алгоритмов первичной обработки выходных сигналов. К задачам первичной обработки относятся: дискретное представление сигнала АП, предварительная фильтрация (сглаживание), обнаружение информативного (полезного) участка сигнала, коррекция дрейфа и оценка параметров полезного сигнала [1]. Все алгоритмы первичной обработки можно разбить на две группы:

а) алгоритмы, реализуемые во временной области (без преобразования сигнала);

б) алгоритмы, реализуемые в спектральной области (с преобразованием или отображением сигнала в другое пространство).

Вторая группа по сравнению с первой позволяет достичь более высокой эффективности оценок, что вместе с возможностями современной элементной базы делает эту группу алгоритмов более предпочтительной. Традиционные алгоритмы в большинстве своем относятся к первой группе

Выходной сигнал прибора химико-аналитического комплекса $y(t)$ в большинстве случаев можно рассматривать как аддитивную смесь полезного сигнала $s(t, \mathbf{l})$, помехи $n(t)$ и базисного сигнала $b(t)$ [1, 2]:

$$y(t) = s(t, \mathbf{l}) + n(t) + b(t) \quad (1)$$

где $\mathbf{l}_0 = \{l_0, l_1, l_2, \dots, l_{N-1}\}$ – вектор N параметров сигнала, подлежащих оценке;

t – независимая переменная. Параметр l_0 выделен из остальных и назван существенным, так как характеризует положение компонента на оси развертки \mathbf{l} и позволяет различить компоненты между собой.

Нахождение по реализациям одного случайного процесса $y(t)$, поступающего в обработку, оценок другого, зависящего от него случайного процесса $y^*(t)$ является задачей фильтрации. Если процессом $y(t)$ является сигнал (1), поступающий в обработку, а процессом $y^*(t)$ – детерминированная (или квазидетерминированная) его часть

$$y^*(t) = s(t) + b(t), \quad (2)$$

то такая обработка называется сглаживанием сигнала. В процессе сглаживания в той или иной степени устраняется влияние помеховой составляющей $n(t)$ сигнала.

2. Полиномиальное сглаживание сигналов ХАИС

Характеристики шума, прошедшего цифровой фильтр, можно получить, представив входной шум как решетчатый стационарный случайный процесс с корреляционной функцией [3]

$$B(l\Delta t) = \frac{1}{q} \sum n(k\Delta t)n((k+l)\Delta t) \quad (3)$$

$$B(l\Delta t)^* = \sum_{q=-m}^m \sum_{r=-m}^m h(q\Delta t)n(r\Delta t) \times B[(l+q-r)\Delta t] \quad (4)$$

где $h(q\Delta t)$ – импульсная характеристика фильтра. Для нерекурсивного фильтра [3] имеем:

$$B(l\Delta t)^* = \sum_{q=-2m}^{2m} B[(l+q)\Delta t] \times \sum_{k=-m}^m h_k h_{k-q} \quad (5)$$

Для среднеквадратичного значения шума получим:

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$$\sigma_{uu}^* = \sqrt{B(0) - B(\infty)} = \sqrt{\sum_{q=-2m}^{2m} B(q\Delta t) \sum_{k=-m}^m h_k^2} \quad (6)$$

При действии на входе фильтра белого шума это выражение упрощается:

$$\sigma_\phi^* = \sigma_\phi \sqrt{\sum_{k=-m}^m h_k^2} \quad (7)$$

Таким образом, ослабление шума пропорционально корню квадратному из числа

точек в окне фильтра, при этом даже в случае белого шума на входе фильтра шум на его выходе будет коррелирован.

На рисунке 1 приведены кривые подавления шума полиномиальными фильтрами с $L=1$, $L=2$ и $L=4$, где L – порядок полинома. Наиболее эффективно подавляет шум фильтр скользящего среднего: подавление в этом случае при $m=2$ такое же, как и фильтром $L=2$ и $m=5$ или $L=4$ и $m=8$. При больших значениях m изменение L и типа фильтра на его эффективность влияет меньше.

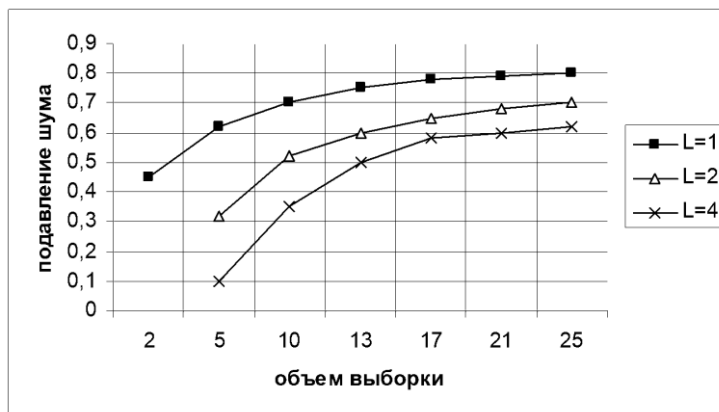


Рисунок 1. Сглаживание нормального шума полиномиальными фильтрами

Так как подавление шумов значительно более эффективно, чем уменьшение амплитуды сигнала вследствие сглаживания, выходной сигнал фильтра должен иметь большее отношение сигнал/помеха. Однако увеличение отношения сигнал/помеха $\xi = q^* / q$ относительно невелико. О величине ξ_c можно судить по его оценке для оптимального (согласованного) фильтра.

Как показано, например, в [2-4] $q_{i\hat{a}\hat{e}\hat{n}}$ на выходе фильтр достигается, если его переходная (весовая) функция $h(t, \tau)$ является решением интегрального уравнения,

$$\int B(t, \tau) h(t, \tau) d\tau = f_i(t), \quad (8)$$

где $f(t)$ – ожидаемое значение сигнала. Получается, что $h(t, \tau)$ при белом шуме с точностью до множителя совпадает с моделью сигнала, почему фильтр и называется согласованным. При этом ρ_{\max} (по энергии) равно в случае белого шума:

$$\rho_{\max}^2 = 2E_c / G_0 = E_c / (\sigma_{\text{ш}}^2 \Delta t) \quad (9)$$

Форма сигнала $s(t)$ на выходе такого фильтра существенно искажается. При обработке

аналитической информации согласованная фильтрация используется при обнаружении сигналов и оценивании их параметров методом максимального правдоподобия, поскольку выход такого фильтра $y_c(t)$ совпадает с зависящей от сигнала $y(t)$ частью функционала логарифма отношения правдоподобия.

В случае сглаживания Гауссового сигнала в белом шуме, учитывая, что $E_c = \sqrt{\pi} A^2 \mu^* \Delta t$ для ξ_c из (9) после преобразований получаем:

$$\xi_c = \sqrt{\mu^*} \sqrt{\pi} \quad (10)$$

(где $\mu^* = \mu / \Delta t$). Таким образом, ξ зависит от μ (фактически от энергии сигнала). При реальных значениях $\mu^* = 5 \div 10$ для оценки полиномиальных нерекурсивных фильтров имеем $\xi < \xi_c = 3 \div 4$, что совпадает с результатами, полученными в эксперименте.

При этом следует учитывать, что полиномиальные фильтры эффективны (близки к согласованному), если сигнал в окне фильтра хорошо описывается первыми членами разложения Тейлора.

3. Вейвлет фильтрация сигналов химико-аналитических комплексов.

Вейвлет-анализ является разновидностью спектрального анализа[5-9], в котором роль простых колебаний играют вейвлеты. Понятие частоты классического спектрального анализа здесь заменено масштабом, и, чтобы перекрыть "короткими волнами" всю временную ось, введен сдвиг функций во времени. Таким образом, базис

вейвлетов – это функции типа $\psi\left(\frac{t-b}{a}\right)$, где: b – сдвиг, a – масштаб. Кроме того, чтобы быть вейвлетом, функция $\psi(t)$ должна иметь нулевую площадь и, еще лучше, равные нулю первый, второй и т.д. моменты. Дискретное вейвлет преобразование (ДВП) основано на теории кратко – масштабного анализа (КМА) сигналов. Положив параметр сдвига $b_0 \neq 1$ (в классической теории КМА b_0 всегда равен единице), это понадобится в дальнейшем при изложении теории вейвлетов, применим понятный инженерам спектральный подход к анализу сигналов. В вейвлет-анализе предусматривается применение масштабирующей $\varphi(t)$ и вейвлетной $\psi(t)$ функций, сдвиги и масштабирование которых образуют базисы соответствующих подпространств. Эти функции образуют особый класс смещенных базисных систем (СБС), так как они позволяют выполнять спектральный анализ локальных возмущений сигнала, формируя его частотно – временной спектр. Рассмотрим некоторые основные соотношения КМА при $b_0 \neq 1$, относящиеся к синтезу вейвлет - подобных базисов и вычислению коэффициентов масштабирующего уравнения и их свойствам [10-12].

Пусть $\{V_j, j=Z\}$ образуют последовательность подпространств цепочки КМА. В соответствии с определением КМА найдется такая функция $\varphi \in V_0$, которую называют масштабирующей функцией (scaling function), что множество ее сдвигов $\varphi_{0,k}(t) = \varphi(t - b_0 k)$ образует ортонормированный базис подпространства V_0 . Более того, оказывается, что для любого V_j существует базис

$$\{\varphi_{j,k}(t) = 2^{j/2} \varphi((t - 2^{-j} b_0 k) / 2^{-j})\}$$

КМА накладывает на сами функции $\varphi(t)$ определенные и достаточно жесткие требования: поскольку $\varphi \in V_0$ и $V_0 \subset V_1$, то $\varphi(t)$ является линейной комбинацией функций $\varphi_{1,n}(t)$

$$\varphi(t) = \sum_n h(n) \sqrt{2} \varphi(2t - b_0 n) \tag{11}$$

Это выражение называется масштабирующим уравнением (scaling equation, two-scale equation, refinement equation). Коэффициенты $h(n)$ называются масштабирующими. Они использу-

ются в качестве импульсных откликов в блоках цифровых фильтров, реализующих быстрые вычислительные алгоритмы дискретных вейвлетных преобразований (discrete wavelet transform – DWT) –ДВП. В образах Фурье уравнение (1) имеет вид:

$$\varphi(\omega) = \frac{1}{\sqrt{2}} \sum_n h(n) e^{-in b_0 \omega / 2} \varphi\left(\frac{\omega}{2}\right) = m_{b_0}\left(\frac{\omega}{2}\right) \varphi\left(\frac{\omega}{2}\right) \tag{12}$$

где

$$m_{b_0}(\omega) = \frac{1}{\sqrt{2}} \sum_n h(n) e^{-in b_0 \omega} = \frac{1}{\sqrt{2}} h(\omega) \tag{13}$$

$2\pi/b_0$ – периодическая функция $m_{b_0}(\omega)$ полностью определяет масштабирующую функцию. Базисом для подпространства вейвлетов W_j ($V_{j+1} = V_j \oplus W_j$) являются функции $\{\psi_{j,k}(t) = 2^{j/2} \psi((t - 2^{-j} b_0 k) / 2^{-j})\}$, образованные сдвигом и масштабированием одной вейвлетной функции $\psi(t)$.

Так как $W_0 \in V_1$, то $\psi(t)$ может быть представлена в виде взвешенной суммы функций $\varphi_{1,n}(t)$:

$$\psi(t) = \sum_n g(n) \sqrt{2} \varphi(2t - b_0 n) \tag{14}$$

$$g(n) = (-1)^{1-n} h(1-n) \tag{15}$$

Разрешающую способность и чувствительность предлагаемых подходов оценивали с помощью набора из четырех пиков гауссовой формы $a_s \exp\{- (t-t_s)^2 / 2\mu_s\}$. Модель определена на сетке из $N=2^{10}$ точек ($t=[1:1024]$) при $\mu_s=20$; интенсивности $a_s=[0.25 \ 0.7 \ 1 \ 0.35]$; положении пиков $t_s=[200 \ 200+6.6\mu_s \ 580 \ 580+10.2]$. Из анализа качества восстановления входного сигнала $x(t)$ по наблюдаемому сигналу $y(t)$ (таблица 1) в зависимости от уровня шума (отношение сигнал/шум по входу при моделировании изменялось от 15 до 150) сделаны следующие выводы (все ошибки восстановления вычислялись по формуле (6) и усреднялись по 50 реализациям шума):

$$\varepsilon = RMSE(x_0 - \tilde{x}) = \left\{ \frac{\int (x_0(t) - \tilde{x}(t))^2 dt}{\int |x_0(t)|^2 dt} \right\}^{\frac{1}{2}} \tag{16}$$

- систематическая ошибка (без шума) не превышает 1%;
- увеличение отношения сигнал/шум 8-кратное для гауссовой модели;
- несовпадение формы сигнала и аппаратной функции приводит к увеличению СКО восстановления примерно на 20% и к ухудшению подавлению шума на 25%.

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Таблица 1. КО восстановления и увеличение отношения сигнал/шум

Отношение сигнал/шум на входе	Без шума	150	60	30	15
Увеличение отношения сигнал/шум	-	4	7	8	9
Относительная ошибка восстановления	0.0069	0.0087	0.0162	0.027	0.035

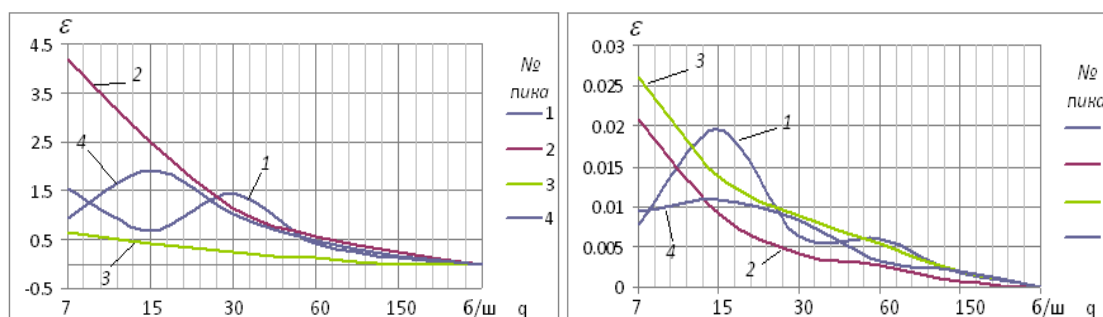
Из анализа качества оценки параметров пиков (положения и амплитуды) при различных отношениях сигнал/шум (рисунок 2) до обработки и после нее сделаны следующие выводы:

– если до обработки некоторые пики не обнаруживаются (из-за шума), то после обработки они обнаруживаются все со случайной ошибкой по интенсивности не более 2% и по положению – одна-две дискреты при отношении сигнал/шум 15;

– оценка положения пиков смещенная. Величина смещения не более трех дискрет и

зависит от положения пика по отношению к большему соседнему пику;

– оценка интенсивности пиков также смещенная. Величина смещения составляет до 12% при отношении сигнал/шум 7. При увеличении отношения сигнал/шум в 20 раз, величина смещения меняет знак на отрицательный и уменьшается до 80 раз.



а) СКО положения пиков;

б) СКО интенсивности пиков

Рисунок 2. СКО положения и интенсивности пиков

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FEATURES OF THE USE OF MOBILE ANDROID APPLICATIONS IN THE EDUCATIONAL ENVIRONMENT

Abstract: Modern mobile devices (gadgets) use various operating systems, such as Android and IOS. Among them, the Android OS occupies a leading position, as it is the most accessible and convenient. This article discusses the architecture and mobile applications of the Android OS, providing training in a modern educational system, provides a comparative analysis of efficiency.

Key words: online learning, distance learning, online courses, online mass courses, mobile applications, mobile application development, mobile applications market analysis

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ОСОБЕННОСТИ ИСПОЛЬЗОВАНИЯ МОБИЛЬНЫХ ANDROID ПРИЛОЖЕНИЙ В ОБРАЗОВАТЕЛЬНОЙ СРЕДЕ

Аннотация: В современных мобильных устройствах (гаджетах) используются различные операционные системы, такие как Android и IOS. Среди них ОС Android занимает лидирующие позиции, так как является наиболее доступной и удобной. В данной статье рассматриваются архитектура и мобильные приложения ОС Android, обеспечивающие обучение в современной образовательной системе, дается сравнительный анализ эффективности.

Ключевые слова: онлайн обучение, дистанционное обучение, онлайн курсы, онлайн массовые курсы, мобильные приложения, разработка мобильных приложений, анализ рынка мобильных приложений.

Introduction

Парадигма «обучение через всю жизнь с технологией доступной в любом месте и в любое время» является актуальной платформой современного образовательного процесса. Реализация этой платформы в образовательной системе стало возможным в связи бурным развитием цифровых технологий и устройств, таких как интернет, компьютеры, мобильные устройства. Сегодня мобильные устройства и мобильные технологии совершают революционные изменения в методах и технологиях обучения, заставляя пересматривать концептуальные основы системы образования во всем мире.

Операционная система Android была разработана Энди Рубином, Ричем Майнером, Ником Сирсом и Крисом Уайтом в 2003 году. В последние годы Android привлекает большое внимание в развивающемся сегменте образовательных технологий, на данной ОС уже разработано более 100000 образовательных приложений. Android-приложением может быть любая образовательная информация разработанная для мобильных устройств под управлением ОС Android, которая обеспечивает удобство и доступ для учащихся из любого места. По проведенным анализам, у учащихся благодаря использованию образовательных технологий наблюдался рост интереса к обучению, креативность. Мобильные приложения позволяют вмещать в себя сразу несколько областей обучения, и дает доступ к ним из любого места. Повсеместной учебной средой является любая обстановка, в которой учащиеся могут полностью погрузиться в учебный процесс. Поскольку мобильные устройства поддерживают обучение в любое время и в любом месте, мобильное обучение с использованием Android может способствовать развитию системы образования. Платформа приложения обучения Android позволяет учащемуся получить доступ к учебной информации и взаимодействовать с другими учениками, будто они находятся рядом, в то время, когда он дома либо в другом отдаленном месте. Использование портативных вычислительных устройств (таких как ноутбуки, планшетные ПК и смартфоны на базе Android) с

беспроводными сетями обеспечивает мобильность и обучение, позволяя преподаванию и обучению выходить за пределы традиционной формы обучения в учебных классах. Из-за развития современных мобильных устройств увеличивается количество и мобильных приложений, разработанных связанных с образованием. Последние мобильные аппаратные и программные платформы благодаря 4G позволяют запускать более быстрые и объемные приложения [1].

Materials and Methods

Обучение с помощью платформы Android-это форма цифрового обучения, которая может применяться в целях обучения и преподавания, некоторые эксперты в области образования рассматривают его как подмножество электронного обучения, но с глубоким содержанием, которое дает доступ напрямую на мобильные Android устройства. Преподавание и обучение с использованием платформы Android можно легко реализовать без оснащения тяжелыми оборудованием. Есть несколько факторов, которые создают мобильную компьютерную базу. Во-первых, операционная система Android бесплатно предоставляется для мобильных устройств, что делает разработку и установку приложений очень простой. Во-вторых, существует большая база учебных материалов и контента, которая продолжает расширяться и к ней имеют доступ как студенты, так и преподаватели. Например, студенты могут загружать и практиковаться в коротких тестах на своих мобильных устройствах где присутствует мгновенная обратная связь, которая, предоставляет информацию для лучшего понимания. Данный тип обучения стремительно набирает актуальность, что в свою очередь привлекает молодое поколение. Кроме того, студенты напрямую могут загружать заметки с веб-сайта Google Doc, используя платформу Android. В настоящее время технология позволяет учащимся совместно использовать и редактировать документы онлайн. Таким образом, концепция коллективного интеллекта превратилась из абстрактной концепции в

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осязаемую реализацию в образовательной сфере [2].

Android - операционная система для мобильных устройств и ноутбуков, а также платформа для приложений, поддерживаемая Google, а архитектура Android обучения является дополнением к платформе мобильных приложений. Предоставляя открытую платформу разработки, Android предоставил разработчикам возможность создавать чрезвычайно насыщенные и инновационные приложения с очень богатым набором пользовательских интерфейсов, которые

поддерживают широкий диапазон форматов аудио и видеофайлов. Разработчики и производители мобильных телефонов по всему миру приняли эту платформу из-за ее открытого исходного кода и разнообразных возможностей работы, а также разработки приложений с использованием языков программирования, таких как Java и Kotlin.

Архитектура обучения Android, показанная на рисунке 1, реализует положения новой парадигмы образования, которая предполагает «обучение в любое время и в любом месте». Обучение можно проводить как в традиционных

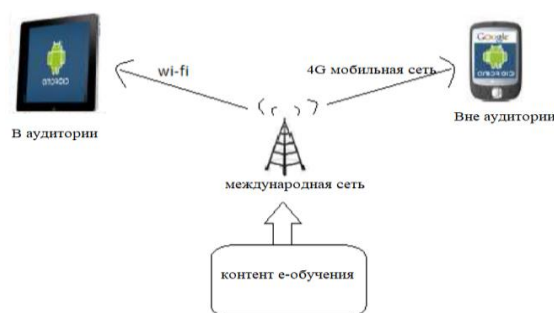


Рисунок 1. Блок-схема архитектуры с использованием Android

классных комнатах, так и вне классной комнаты, например, в автобусе или дома с использованием проводной и беспроводной сети с 4G и локальной сетью для постоянного подключения к университетскому серверу с архитектурой web-служб. Интерактивное обучающее приложение, в котором оба клиентских модуля работают на мобильных устройствах, подходящих для самых разных сред обучения, позволяет студентам получать знания из того, что они видят, слышат, читают и воспринимают [3].

Образовательные приложения дают возможность учащимся использовать свое мобильное устройство для получения образовательных преимуществ в доступное для них время независимо от их местоположения. Мобильные телефоны Android являются не просто дополнительным оборудованием для развитых стран, но и могут играть важную роль в их системах образования. Мобильные Android устройства обеспечивают доступ к огромному количеству образовательных и учебных ресурсов. В развивающихся странах мобильные устройства Android могут легко компенсировать ограниченный доступ к Интернету и доступ к данным, что, в свою очередь, способствует развитию их инфраструктуры и образования.

Android Learning- это приложение электронного обучения, которое предоставляет

учебные контенты и материалы для обучения с помощью устройств беспроводной связи. Электронное обучение дает возможность собирать исследовательские данные по предмету. Использование Android Learning для образовательных и социальных сетей и коммуникаций более распространено, чем для разработки пользовательских приложений - 38,2% внедряют, разрабатывают или готовят учебные материалы для социальных сетей и только 24,7% для пользовательских приложений и разработок. 71,2% респондентов используют свои мобильные устройства в коммерческих целях. Из тех, кто проводил внедрение Android Learning, 50% получали положительные результаты (табл. 1).

Conclusion

Несмотря на некоторые ограничения возможностей мобильных устройств и мобильных приложений, популярность Android растет, около 29% студентов учатся с помощью программного обеспечения для Android. Все больше образовательных учреждений и компаний переходят на разработку мобильных приложений для Android, так как они просты в установке, более надежны и удобны для обучающихся, влияние мобильных приложений приобретает глобальный характер [4].

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Таблица 1. Сравнение видов обучения

	Традиционное образование	Электронное образование	Android образование
Доступ	Ограниченный	24/7	24/7
Качество	меняющийся	последовательный	Последовательно-прогрессивный
Запоминаемость	меняющийся	меняющийся	Высокая запоминаемость, персонализированное обучение

Кроме того мобильные приложения эффективно и дешево расширяют сферу охвата образования в каждой части мира [5]. Это, в свою очередь, повышает престиж университетов, тем самым улучшая образовательные результаты и

доходы [6]. Таким образом, использование Android приложений в образовательных целях увеличивается, это иллюстрирует диаграмма представленная на рисунке 2.

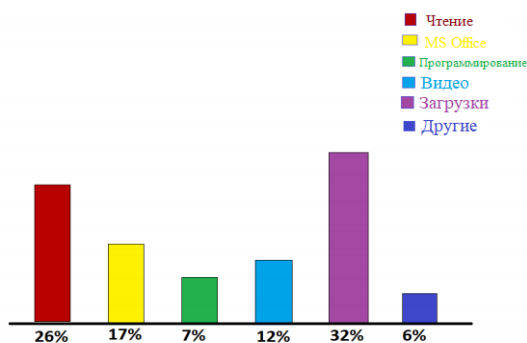


Рисунок 2. График использования Android приложений

Кроме того, использование мобильных приложений обеспечивает персонализированное образование. Это позволяет учащимся контролировать предмет, время и способы обучения. Таким образом, увеличивается количество источников, расширяющих сотрудничество и социальные сети среди студентов [7]. В сущности, Android приложения способствуют высокому уровню взаимодействия между студентами без посредничества и

модерации инструктора, что позволяет учащимся самостоятельно развивать свои собственные идеи, навыки, знания, обучающую сеть, усиливать самовыражение [8], [9], [10], глубокое обучение и абстрактная концептуализация [11], [12]. Однако применение Android приложений разностороннее и охватывает многие сферы жизнедеятельности человека, что показано в соответствии с рисунком 3.

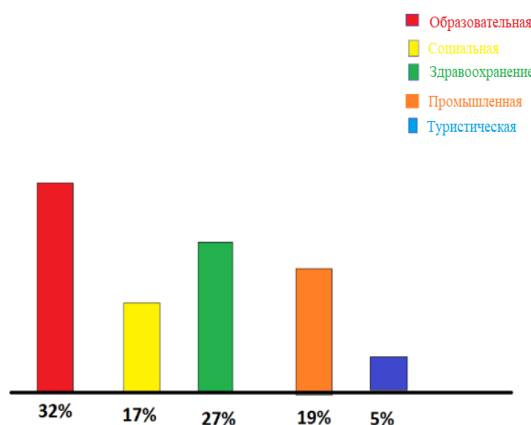


Рисунок 3. График сфер применения Android приложений

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JIF = 1.500	SJIF (Morocco) = 5.667	OAJI (USA) = 0.350

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**SECTION 13. Geography. History. Oceanology.
Meteorology.**

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TRADE RELATIONS BETWEEN BUKHARA - RUSSIA IN THE SECOND HALF OF XVIII CENTURY - IN THE XIX CENTURY

Abstract: This article analyzes trade relations between Bukhara Emirate and Russian Empire in the second half of XVIII century - in the XIX century based on written sources and scientific literatures.

Key words: Russian Empire, Bukhara Emirate, trade relations, trade routes, products, market, merchant.

Language: English

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Introduction

The Russian Empire in their own interests, economic problems and in order to develop industry, began to study the situation in Central Asia and prepared for large-scale military-political attacks to the khanates. One of such actions was occurred in 1858 year to the khanates of Khiva and Bukhara under the leadership of N.P.Ignatiev. Although Ignatiev's actions did not achieve any results in Khiva, but they achieved some positive results in Bukhara. The Emir of Bukhara agreed with the requirements imposed by Ignatiev. The requirements for the Bukhara government were to reduce customs duties on Russian goods, introduce a temporary trade agency in Bukhara, release Russian prisoners in captivity, and give a separate caravansarai for Russian merchants [1, P. 227-228]. At the same time, the trade turnover between Bukhara and Russia increased intensively.

Materials and methods

The goods exported from Bukhara were handicrafts, agriculture and livestock. T.S.Burnashev, who was in Bukhara in 1794-1795 years, informed the rural and urban population of the emirate was engaged in crafts, which made their production in their own home. N. Grigoriev, who lived in Bukhara from 1734 to 1752, wrote in Bukhara that the factory for the manufacture of handmade products belonged only to a man named Rakhimbek, and that there were no factories or facilities elsewhere in the emirate [2, P. 14].

P.Ivanov, according to information provided by Russian tourists, highlighted that in Bukhara owners divided raw materials to people. For example, to one family cleaned cotton and the other weaved, third painted.

The owners did not care about buying the building for the factory in Bukhara, that major merchants did not want to spend too much [3, P. 125].

The production of knives made of hard steel was also developed in Bukhara, and the steel was imported from India. Good quality knives were sold from 1 to 3 tillo (gold coin). Knives made from Bukhara swords were sold for the price of 1 tillo (gold coin), and knives from high-quality Iranian swords were sold ten times expensive more than Bukhara swords [4, P.116]. Besides Bukhara, Karshi also played an important role in the production or manufacturing of high-quality knives. Karshi was the second place after Bukhara in sales [2, P. 22]. Vambery recognizes having 10 karavansarays in Karshi. High-quality knives made by Karshi craftsmen were also popular not only in Central Asia, but also in Persian and Arab countries [5].

Sources report that it was forbidden to import openly metal from Russia to Bukhara before the beginning of the 19th century. But exclusively at the invitation of the Bukhara government, rare metals were imported by the consent of the Russian government. For example, in 1731, with the permission of the Russian government, 3,000 pud (1pud=13 kg) copper were imported [2, P. 22].

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At the beginning of the 19th century, it was allowed to freely import metal from the Russian Empire into Bukhara. Afterwards, Central Asia, including the Emirate of Bukhara, began to be imported freely from iron, copper, steel and cast iron. In the trade between the Russians and the khanate, iron imports occupied a leading position. In the period from 1840 to 1850, over 40,000 pud copper (1pud=13 kg), 400,000 pud iron, 75,000 and 25,000 pud steel were imported from Bukhara through the Orenburg customs in Russia [2, P. 22].

Metals imported from the Emirate of Bukhara were made of agricultural machinery and equipment of various types necessary for farming. P. Velichko, who studied the domestic markets of the Bukhara Emirate in 1806, recognized the Bukhara Emirate that goods made by craftsman were independently removed and sold by the trader or craftsman, and there were no restrictions for them, and traders from other countries also engaged in free trade in the markets. These markets had special conditions for this period, and that traders from Bukhara had no obstacles to their living for many years [2, P. 35].

From January to May, the Emirate of Bukhara had a high level of trade, and many trade caravans from Iran, Afghanistan, India, Tibet and the neighboring khanates came to this time.

According to F. Yeremremov, in Bukhara had four caravanserais. In the morning the market was located in Chorsu, and in the afternoon the market continued on Registan Square, in the center of Bukhara. T.S. Burnashev reported that there were 9 two-story houses in Bukhara, and merchants paid for the arrival and departure of the caravan [6, P. 73].

According to the Orenburg border custom system's data, in Bukhara serviced 10 karvansarays to foreign traders and sold them various goods on commercial sites, at the beginning of the 19th century, [2, P. 37].

When visiting Bukhara, A. Negri considers 14 karvansarays in Bukhara: Abdullajon, Kushbegi, Hindu, Nugai, Khoja Juybara, Tashkent, Karshi, Maragul, Amir, Kulota, Fishina, Jongkulshira and two small karvansarays named Urganch. The largest of these is the Abdullajon Karvansaray, built in 1819 [4, P. 100].

During his visit to Bukhara, N.V. Ganykov noted that there are 24 stone and 14 wooden karvansarays in Bukhara [7, P. 88]. Meyendorf informed about the karvansaray construction plan of the Bukhara emirate was in the form of a rectangular structure, the karvansarays had a warehouse, on the second floor there was a warehouse, and half a day to store goods in the warehouse, and for the carnival they paid 16 rubles per month. He also notes that the karvansaray was a hotel for merchants, some merchants have their own warehouses, while others had placing in outside of karvansarays [4, P. 100]. Vambery wrote about 30 karvansaray in Bukhara, karvansarays served as a

warehouse for their goods and a hostel for tourists [5, P. 182].

Bukhara Emirate in the summer months after the melting of snow in Afghanistan, a year of tense trade relations, 3–3,500 camel caravans arrived from Afghanistan to the Emirate of Bukhara. From Kabul to the Bukhara Emirate in one year, the cost of 170 thousand pounds or 1 million rubles Indian and English goods were imported. Various materials in goods include silk and lace, Kashmiri lumber, indigo and other goods. A large amount of silk fabrics, cotton fabrics, as well as goods from Russia, iron products, boxes and other products were imported from Bukhara to Afghanistan. Afghanistan did not need to produce Russian handmade goods. They were imported goods from England and India [8, P.116].

Many trade caravans engaged in trade from Bukhara to India via Kabul. Fabrics brought from India demanded the Bukhara emirate. Bukhara merchants took the fabrics brought from India and brought them to Russian cities. From 1790 to 1800, 50,000 rubles of Indian fabrics were made of rubble, folded, curtains, bedspreads, silk fabrics and Indian walnuts. In Bukhara, there were many Indian traders who lived in separate provinces. According to the information, more than 300 Indian traders lived in only one place [2, P. 73].

It is noteworthy that Indian traders brought a large amount of indigo (paint) to the emirate of Bukhara. Her every pud sold in Bukhara from 44 rubles (10 *chervans*). In some cases, only the paint was brought on 2,000 camels. At the turn of the 19th century, Indian traders brought large quantities of cashmere and Persian shalisi to Bukhara. Bukhara merchants also exported these products to Russia and other European countries. For example, in 1828 the Bukhara merchant Margaboev from India sent 600 Kashmir shalisi to Orenburg. In Bukhara, a couple of Kashmir shalisi sold from 100 to 300 tillo and in Russia at a very expensive price - from 400 to 1000 rubles. This product has been purchased by palace officials and clerks. According to the information, in 1809 the governor-general of Orenburg G. Volkonsky personally ordered to purchase of 15 different colors of Kashmir shalisi from 400 rubles in the amount of 6 thousand soums [9, P. 141-142].

Bukhara's cotton and silk fabrics were bought by poor families living in the Volga, Kazan and Siberian regions of Russia. In Bukhara, one arsh (about 22m) of cheap fabric was sold at 1-2 kopecks (*tiyin*), these fabrics were sold in Russia for 5-6 kopecks [10, P. 57]. Merchants also greatly benefited from this, and they were also affordable for dwellers.

The merchants from the Bukhara and Khiva khanates were brought to Russia through the Russian Orenburg customs and imported a large amount of silver. Only in 1749 the Bukhara merchants exchanged 418 pud of silver for Russian products in Orenburg [2, P. 80].

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Jewelry made of precious metal and stone of Russian production the demand was the great in Central Asian khanate.

That is why a large amount of gold and silver was brought to Russia. In the period from 1748 to 1755 The Central Asian khanates supplied 50 pud of gold and 4,500 pud of silver. 1749–1750 yy to Orenburg was imported 10 pud of gold and 2,540 pud of silver [11, P. 1-10]. According to the information, in the second half of the 18th century and later in the Bukhara Emirate cotton fabrics of silk and silk fabrics were produced by artisans in large quantities. Among the Central Asian khanates, the Bukhara Emirate occupied a special place in the export of textiles to Russia. The fabric zandana, which was produced in Bukhara, was the first to be exported to Russia. In 1747-1750, 84210 arshin fabrics were exported to Russia, and in addition to 81950 arshin fabrics in different colors. Silk and silk fabrics produced in Bukhara were sold 6-7 times more than silk and silk fabrics produced in Iran in the Orenburg trade centers [2, P. 81].

The emirate of Bukhara occupied an important place in Central Asia due to its convenient geographical location. Foreign countries and neighbour khans traded through the Bukhara Emirate. It is reported that caravans came to the Bukhara Empire annually more than 15 thousand camels from different countries [8, P. 116]. Bukhara merchants traded with Russia not only through the Orenburg Customs, but also through Troitsk. Over 200 merchants from Bukhara visited the trade centers in Troitsk [12, P. 91].

In 1816, 6126 camels were loaded from Bukhara to Russia and 5008 camels from Russia. In 1818, 7584 camels a year were loaded into the Orenburg trade center from the Central Asian khanates, 5616 of them were from the Bukhara Emirate. In 1820, 4951 camels were loaded from Bukhara, it was reported that this year, 268 camels load was from the Khiva khanate.

According to the information, since 1821, the arrival of trade caravans from the Central Asian khanate has sharply declined in the Orenburg trade center. Only from Bukhara in 1783 a caravan goods, and from Khiva 5 camels delivered. One of the main reasons for this is the lack of security of the caravan routes due to the fact that pirates are attacking in the deserts. As a result, Russian merchants do not want to come to Central Asia. Considering another aspect of the problem, Russian traders visited Central Asia more often than ever before. During this period, trade control was in the hands of the merchants of the Central Asian khanates, where they imported and exported goods to Russia. Central Asian traders became millionaires, a large amount of capital gathered in their hands. For example, Galibay Kushakov from Bukhara, had more than a million. In addition, he had 2 commercial stores in Moscow. In addition, Galibay Kushakov regularly participated in

exhibitions of Makarev, Irbit and Koren with her trade goods, and also controlled Bukhara merchants' shali and other textile products. Every year he sent iron, copper, tin and foreign coins in large quantities from Russia to Bukhara. During this period, the trade turnover between Russia and Bukhara reached 10 million rubles [2, P. 87].

In the period from 1818 to 1824, trade goods which cost total of 3384854 rubles was exported from Central Asia to Russia. In particular, in 1824 1228852 rubles from Bukhara and 14869 rubles from Khiva were exported. According to the Orenburg customs, the price of each pound of feruza precious stone 100 rubles and 4 silk fabrics were sold at 100 rubles.

In 1827, the load was taken out of Bukhara and Khiva with the cost of 12070.73 rubles, in the first place by cotton products were (4343324), cotton yarn (286945 rubles.), Kashmir shali (249930 rubles.), a great deal of soft old products (107457 rubles.), cotton fiber (1600 rubles), wool products (776 rubles), dried fruits (9070 rubles), silk and semi-silk products (3174 rubles), feruza (3200 rubles), seeds of darmana (720 rubles.) and sarogin wheat (189 rubles) for export [2, P. 88].

The emirate of Bukhara occupied a leading position in trade relations between Russia and Central Asia. For example, in 1828 to the Orenburg trade center was visited by 3,578 camels from the Central Asian Khanate. The total cost of the goods was estimated at 4456,241 rubles. Of these, 2,480 cargoes were from Bukhara, 1003 cargoes from Khiva and 95 - from Tashkent. In Bukhara - Russian trade relations the Orenburg trade center played an important role. In 1829 year 213, in 1833 year 152, in 1835 year 341 and in 1837 year 388 of the Bukhara merchants visited Orenburg.

In the 40s-50s of the 19th century, the trade between Bukhara and Russia did not change, with the exception of tea and unprocessed silk and shiy. During this period, high-quality cotton yarns, medium-quality cotton yarn, third class cotton yarns which exported to Russia, comprised 120, 100 and 80 rubles respectively and 100 pieces of well colored fabric was 120 rubles, 100 pieces of market fabrics were 100 rubles, 10 sheepskins, merlushki was 12 rubles, first class wheat – 2.4 rubles, second class – 2rubles, third class – 1.8 rubles, three sack barley was sold for 4 rubles.

The value of trade relations between Central Asia and Russia in 1840 and 1850 years was 10 million pounds sterling. There was 788,785 pounds share to Bukhara, 199830 to Khiva and 39936 to Kokand [13, P. 337-341].

The total value of goods imported and exported from the Bukhara Emirate to Russia in 1850-1852 years amounted to 4 million rubles [2, P. 100].

Conclusion

Bukhara Emirate occupied a leading position in trade relations between Russia and other countries.

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Above mentioned statistics showed that Russian Empire paid a great attention to study and use economical relations of Central Asian khanates.

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SIGNS OF THE CONSONANT POSITIONS IN TURKIC LANGUAGES (The example sin Namangan area Kipchak dialects in republic of Uzbekistan)

Abstract: The article is about the consonants in the Namangan area Kipchak dialects, their strong and weak positions, comparing them with Turkic protolanguage and other Turkic languages in the world.

Key words: phonological opposition, correlation, phoneme tents, distribution, invariant, variant strong and weak position.

Language: Russian

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ПОЗИЦИОННЫЕ ЗНАКИ СОГЛАСНЫХ В ТЮРКСКИХ ЯЗЫКАХ (на примере кипчакских диалектов Намангана Республики Узбекистан)

Аннотация: В статье рассматривается вопрос о сильных и слабых позициях согласных кипчакского диалектного ареала Наманганской области путем сравнения с современными тюркскими языками, а также тюркским праязыком.

Ключевые слова: Фонологическая оппозиция, корреляция, оттенки фонем, дистрибуция, инвариант и вариант, сильная и слабая позиция.

Introduction

Известно, что фонема является единицей фонологии. Она признана лингвистической единицей во всех фонологических концепциях. Опорной точкой теории фонологии является фонологическое учение основателя Ленинградской фонологической школы И.А. Бодуэн де Куртене. Фонологические концепции как научный предмет сформировались в Пражском лингвистическом кружке и отражена в труде Н.С. Трубецкого [9.216; 14.001-352].

Н.С. Трубецкий указал на необходимость подхода к фонеме, как к абстрактной единице определил конкретные звуки, как материальные символ фонемы, которая может быть реализована несколькими звуками, являющимися вариантами фонем. Ученый утверждает, что любая фонема в системе фонологической оппозиции обладает определенной структурой, благодаря чему приобретает определенное фонологическое значение [14.001-352].

В связи с логической обоснованностью противопоставлений, согласно трактовке А.А. Реформатского, слова и морфемы образуют значимые единицы языка и для разграничения фонемы должны быть противопоставлены друг другу. Такое противопоставление называется фонологической оппозицией [11. 211; 12.74-95].

Materials and Methods

В лингвистической литературе фонологическая оппозиция определяется следующим образом: фонологическая оппозиция – это сопоставление двух фонем на основе одного признака или противопоставление фонем на основе фонологических признаков [5.39].

Фонологические оппозиции классифицированы Н.С. Трубецким следующим образом:

1. По отношению к системе оппозиции: одномерная, пропорциональная, многомерная и обособленная оппозиция.

Impact Factor:

ISRA (India) = 3.117
ISI (Dubai, UAE) = 0.829
GIF (Australia) = 0.564
JIF = 1.500

SIS (USA) = 0.912
РИИЦ (Russia) = 0.156
ESJI (KZ) = 8.716
SJIF (Morocco) = 5.667

ICV (Poland) = 6.630
PIF (India) = 1.940
IBI (India) = 4.260
OAJI (USA) = 0.350

2. В зависимости от отношения между членами оппозиции: оппозиция, различающаяся от другой наличием /отсутствием признака в одном из членов (привативная); основанная на степень раскрытия речевого аппарата.

3. По действию в разных позициях постоянная и нейтрализованная. [14.72-83].

Профессор А. Абдуазизов отмечает, что большое количество согласных фонем предполагает оппозицию между собой и такие парадигматические отношения требуют удобной их классификации. В связи с этим он рекомендует опираться на первичную классификацию фонологических оппозиций, предложенной проф. В.А. Васильевым, так как он создает благоприятные условия для применения классификации оппозиции Н.С. Трубецкого. Кроме этого, с учетом вышеуказанного им представлена классификация оппозиции согласных звуков узбекского литературного языка. По мнению А. Абдуазизова, согласно классификации В.А. Васильева, каждая фонологическая оппозиция должна определяться между двумя фонемами (*n-m, t-k*), и если имеется одна отличительная черта, от следует рассматривать как «одионочную оппозицию», если таких признаков два – «двойную оппозицию», если более двух – «множество оппозиций». Парадигматические отношения между согласными фонемами проявляются в бинарных оппозициях, состоящих из двух членов. [1.120].

Представитель Ленинградской фонологической школы Л.В. Щерба также отмечал, что смысловозначительная функция фонемы является ее главной отличительной чертой. Главное внимание он уделяет функциональной стороне фонемы, отодвигая на второй план ее артикуляционно-акустические свойства. Ученый отмечал также способность фонем образовать систему оппозиций. [15.185-186]. Важным в фонологической теории Л.В. Щербы является учение об оттенках фонемы. Оттенки являются реальным видом произношения фонемы, все реально произносимые звуки являются оттенками (вариантами).

Варианты фонем (оттенки) классифицируются разными учеными по-разному. Согласно теории пражской лингвистической школы и мнению Л.В. Щербы в речевом окружении один оттенок не выступать на месте другого. А в американском языкознании это явление называется дополнительной дистрибуцией [8. 239-241].

Видно, что парадигматические отношения согласных фонем являются сложными и разнообразными, следует подчеркнуть, что глубокие изучения особенностей фонемы с точки зрения синтагматической будет способствовать выявлению большого количества вариантов.

В мировой лингвистики имеется, играет большое количество трактовок инвариантной и вариантной теории фонем, применение которых может привести к новым научным заключениям по узбекской и тюркской диалектологии.

Ученый языковед Д. Набиева, касаясь вопроса об инвариантности и вариантности в узбекском языке отмечает, что частности, объединенные общим признаком и различающиеся частными признаками, образуют инварианты вариантов, а варианты являются единицами, объединенными общими признаками и образующими определенную группу. По мнению ученого, отношение инвариант-вариант. Характерно для единиц всех пластов языка, а варианты считают с воздействующими на фонемы чувств единицами, путем сравнения вариантов выявляется субстанция, на основе которой определяются инварианты [6.14-37].

Действительно, фонема является инвариантной единицей и в процессе речи употребляется в нескольких вариантах. Следовательно, варианты фонем является самыми мелкими сегментными единицами.

Согласно теории пражской лингвистической школы, варианты делятся на позиционные, комбинаторные и стилистические.

Обязательные варианты делятся: позиционные, комбинаторные и стилистические.

Позиционные варианты – это форма фонемы по отношению к ударению, характеру слова, мелодии речи;

Комбинаторные варианты – это форма, образовавшейся под влиянием находящиеся рядом фонем;

Стилистические варианты связки стилем произношения.

Варианты, появившиеся в результате диалектных различий, чередующиеся в одной позиции без изменения смысла слова, называются факультативными вариантами. Кроме вышеуказанных вариантов имеются индивидуальные варианты, обусловленные речевыми особенностями говорящего.

Исследование особенностей звуковой системы диалектов тюркских, в частности узбекского языка проводится с опорой на теоретические положения мировых фонологических школ.

Известно, что проблемы фонологического пласта на материале тюркских языков освещены А.М. Щербаком, который на материале древних письменных источников выделяет фонологических признаки и на основе существенных признаков восстановил систему согласных фонем тюркского праязыка [16. 97].

Известный тюрколог А.А. Баскаков путем сравнения четырех моделей фонетической структуры одно – сложных слов определяет

фонетическое строение подобных слов тюркского праязыка.

Фонетико-фонологическая система диалектов тюркских языков, в частности узбекского языка на основе принципов фонологической теории представлена в трудах таких языковедов, как А. Фитрат, Ш. Рахматуллаев, И. Кучкартаев, В.В. Решетов, Ф. Абдуллаев. В трудах этих ученых представлена информация о фонеме, и её вариантах в диалектах тюркского и узбекского языков. Наблюдается стремление к освещению соотношения языка и речи в фонетическом пласте, отличается, что проблема фонемы и её вариантов возникла на основе трактовок Л.В. Щербы и А.А. Реформатского. [10. 272-273].

Согласно концепции Московской фонологической школы в зависимости от степени разграничения формы слов с звуковой стороны выделяются две позиции фонем сильная позиция (позиция максимального разграничения) и слабая позиция (позиция минимального разграничения).

Позиция, мало подвергающаяся с я влиянию окружающих звуков, дифференциальная с перцептивной стороны, считается сильной позицией.

Варианты сильной позиции делятся на две группы: 1) основные позиционные варианты (аллофоны); 2) слабые комбинаторные позиции (аллофоны).

В классификациях позиции фонем отличается, что позиция, сильная по одному признаку может быть слабой для этой фонемы по другому признаку [10. 240-241].

В учение Московской фонологической школы фонемы рассматриваются, как составная часть слов морфем и при их разграничении понятие позиция считается важным признакам.

А.А. Реформатский разделяет слабый позиции на перцептивные слабые (со стороны познание) и сигнификативно слабые (со стороны различения) и отмечает, что первые означает образование вариаций фонем, а второе ее вариантов [13.74-95].

Для согласных фонем узбекского языка интервокальное положение и позиция конце слова являются слабой позицией, что в этой позиции они склонны к изменениям.

Фонемы могут иметь коррелятивные и не коррелятивные основные признаки. Общие для двух фонем признаки, имеющиеся в одной, и отсутствующие в другой считаются коррелятивными признаками [8. 19].

В отличие от литературного языка, в составе согласных диалектов этот процесс происходит по-другому. Именно эти фонологические признаки выражают своеобразие диалектов.

Первоначальные сведения об оппозиции и корреляции фонем представлены в трудах

выдающихся мыслителей Востока Мусо ал-Хорезми, Абу Али ибн Сино, М. Кашгари, А. Наваи, в «Бабурнаме» З.М. Бабура [8. 19; 5. 39].

В кыпчакских говорах Намангана согласные по признаку звонкость/ глухость также являются коррелятивными парами: *б – п* [бэнэ] якинда (недавно) // [пэнэ] пона (клин), *с – з* [сэмэн] (солома) // [зэмэн] замон (время) и др.

Согласных кыпчакских диалектов Намангана свои коррелятивные признаки в основном сохраняют в начале слова и имеют сильную позицию. Например: [бэв] - боғ (тук), [бэвлык] - боғлик (связано), [полээн] - полопон (маленькая птица), сильную позицию имеют начальные *б* и *п*, а в словах [кэвоп] - кабоп (кабаб-шашлык), [сэвоп] - савоб (благородная дело), [кътэным/кътөвим] - китобим (моя книга), [сэвь] - сопи (рукоять) *б* и *п* в интервокальном положении находятся в слабой позиции.

Фонемы *х, й, м, н, л, р* в литературном языке по признаку звонкость/глухость не обладают коррелятивными отношениями и образуют пары по этому признаку. Как и в других диалектах, в диалектах кыпчакского диалекта Намангана разные факультативные варианты фонем образуют корреляцию (пару), и не меняя значение, чередуются. Например, *с-х*: [энэхь]-онаси (мать); *ш-х*: [эхнэкэ] ана шунака (вот так); *ч-х*: [хэвдыш] чойжүш (кумган) и др. Согласная фонема *х* старотюркском языке существовала как протеза, в рунических памятниках не встречается вообще, в некоторых современных тюркских языках имеет прочное место, в диалектах имеется протетический, в частности в азербайджанском языке и его диалектах: [хэрэх]-ўрок(коса), [хэвэс] - новвос (бык); имеется также в узбекском литературном языке [хэрып] чарчамок (уставать), [хурпэй] - хурпаймок (непорядичины), в туркменском: [хүн]-кун (день) и т.д.

Как результат следующей ступени развития праязыка звуки *с, ш, ч, з* в современном башкирском и якутском языках используются вместо *х*. В частности, в якутском языке в интервокальном положении *х* считается звонким. В башкирском языке, *с-х*: [хөз]-сүз (слово), [хэрр] - сарик (жёлтый), [хыз]- сиз (вы), [хоң]- сүнг (после), [бөхэ]-бүлса, (быть), [хэв]-соғ; в якутском языке, *ш-х*: [өхэ]- үша (через), [кьхын] - киш (зима); *ч-х*: [пьхэх]-пичок (нож) [16.81].

В кыпчакских диалектах Намангана наблюдается, независимо от того, что тюркское или заимствованные это слово, чередование согласных *ч, ш, с, х*: [энэхь], [эхнэкэ]. Это явление могут быть рассмотрены как один из появлений средств праязыка в диалектах. В кыпчакских диалекта Намангана встречаются комбинаторные варианты фонем *р-л*: [дүвэл] –

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двор (*стена*), г-й: [түйын] тугун(тюк). под влиянием окружающих фонем.

В слабой позиции могут выпадать различительные признаки коррелятивных пар. Этот фонологический процесс получил название нейтрализации [6.14-37].

Как отличает известный ученый тюрколог А.М. Щербак, фонетико-фонологические

особенности тюркского праязыка постепенно, сами по себе адаптируются к современным условиям. В тюркском праязыке и в некоторых тюркских языках звонкие и глухие согласные могут иметь сильную позицию, однако это явление не представляется важным с точки зрения фонологической. [16.88-89]. Сравним:

азарб.	тюркск.	тюркм.	тувинск.	татарск.	узбекск.	диал. Намангана
дабан	тебэн	дэбан	даван	табэн	тавэн	тэвэн
дэйъб	тайъб	тэйъб	дэйъв	тэйъп	тэйиб	тэйгэнып
дүрнэ	түрнэ	дүрнэ	дүрйэйэ	дөрнэ	турнэ	түрнэ
төрпак	тэпрэк	төпрэк	дубурак	түфрэк	тупрэк	турпэк
табақ	табаг	тэбаг	тавак	табэк	тэвэк	тэвэ://тэвэк
тук	түй	түй	дук	түк	тук	түк

В научных исследованиях по тюркологии отличается, что имеется масштаб тюркских языков, сохранивших согласно эволюционному развитию звуков и фонем особенности праязыка, в частности подчёркивается что в чувашском,

хакасском, шоорском языках на отношении смывчно-взрывной фонеме *б* её глухая пара [п] в оппозиции имеет сильную позицию [16.93]. Например:

Хакасск.	Тюркск.	Казахск.	Узбекск.	диал. Намангана
пақ	баг	бав	бэг	бэв
пақа	бақа	баке	бақа	бэқэ
палых	балък	балък	балык	бэлык
палта	балта	балте	бэлтэ	бэлтэ
пар	вар	бар	бэр	бэр
пос	баиш	бас	бэш	бэиш

В других тюркских языках в анлауте также в литературных словах может быть использовано фонема [п]. Например:

тюркск.	тюркменск.	уйгурск.	узбекск.	диал. Намангана
пус	пүс	пъс	пис (яширинмоқ)	пъс
-	-	пэлчък	балчиқ	бэлчық//пэлчық
-	палта	-	болта	бэлтэ
-	-	пака	бақа	бэқэ
пут	пүт	пут	оёқ	пүт//эйқ
-	-	пат	бот	бэт
бичен	бичэн	пичан	пичан	бъчэн

Наличие *б>п*, *б>в*, *б>м* свидетельствует о наличии неразрывной связи тюркского праязыка и современных тюркского языков.

Как было отмечено выше, по мнению А.М. Щербака, в праязыке сильные и слабые звонких и глухих не имели фонологической значимости. Использование глухих на месте звонких и или шумных на место сонорных образует репрезентацию, т.е. чередование. Он также отмечает, что согласная фонема *м* этимологически появилась в результате корреляции *п* по звучности

и шума и объясняет следующим образом: *П(б) →β/М* [16. 97].

По мнению некоторых исследователей сонорные звуки *м*, *р*, *л*, *н* не употреблялись в начале слова. Начальный звук *м* как результат озвончения [п], т.е. переход его в [б], а [б]соответственно перешел в [м]. Узбекский ученый-языковед Х.Неъматов показывает развитие губных согласных следующим образом: *П>(ф)→Б>в, в(ш) →М* [7.61-66].

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Как и в некоторых тюркских языках в кипчакских диалектах Намангана сильная фонема литературного языка [б] произносится как м [мурын]- бурун (нос), [мўйын]-буйин (шея),

[мьннарса] бир нарса (кое-что). Хотя и в большинстве тюркских языков начальные б/п употребляются как в оригинале, в некоторых перешли в коррелятивное м. Сравним:

тюрским.	азерб.	киргизск.	уйгурск.	хакассск.	узбекск.	диал. Намангана
бъз	бъз	мъз	-	миз	бигиз	бугуз
батир	батир	батыр	батур	матир	ботир	бэтыр
балта	балта	балта	палта	малта	болта	бэлтэ
балчих	балчих	-	-	малчах	балчик	бэлчық
буйук	буйук	-	-	мүзек	буйук	улық
борсук	борсук	-	-	морсук	бўрсик	бөрсық
бен	бен	мен	мэн	мин	мен	мэн
дана	дана	музоо	мозай	-	бузок	бүзэв

Анализ примеров показывает, что в большинстве тюркских языков сохраняются фонетико-фонологические особенности согласных звуков, относящихся к среднему периоду развития праязыка. В частности, и в кипчакских диалектах Намангана встречаются некоторые морфологические показатели древнего языка: *п/б-* [унақа + бас] унақа + (э)мас (нетак), [кэчэ + бас] кеча + (э)мас; (не вчера); *с/з/р* - [бэр+ас+тъм] - бор+ар+дим (иёл), [кэл+ас+тъм] - кел+ар+дим (пришёл бы).

Conclusion

В заключении можно отметить, что синтагматические отношения системы согласных кипчакского диалекта Намангана обладают специфическими особенностями. Изучение позиционно-комбинаторных вариантов согласных звуков диалектиков узбекского языка с точки зрения инвариантной и вариантной концепции дает возможность для выработки особенных научных выводов о тюркских языках и своеобразиях их фонетико-фонологической структуры.

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Contents

	p.
59. Krahmaleva, U., & Shevtsov, V. The homogeneous solution of problems of mathematical physics in the maple environment. ...	401-406
60. Krahmaleva, U., & Besbayeva, M. Finding a solution to a regular problem of the Sturm - Liouville problem with various boundary conditions in medium maple.	407-413
61. Sabinin, O. Y., & Gorbatov, N. V. Development of an algorithm for translating natural language sentences into SQL queries.	414-418
62. Karimjonova, M. I. Criteria's for the regulation of the organization of the accounting procedure of wages and internal control of workers of customs authorities of the republic of Uzbekistan.	419-425
63. Nuriddinov, Z. A. Econometric modeling of investment and innovation development of the regions of the republic of Uzbekistan.	426-431
64. Pyshkova, E. P., Dmitriev, P. A., & Baklanov, A. N. Increase the safety of iodinated cooked salt.	432-438
65. Mirzaev, F. R. Foreign experience in the preparation of a sports manager: in case of Russia.	439-444
66. Turgunova, F. N. Histories of restoration medrese Ulugbek in the city of Samarkand.	445-448
67. Amanhodjaeva, G. N. Progresses of progress in museum integration of the XXI century: based on national and international experiments.	449-452
68. Qodirov, B. B. Historical stages of Uzbek art films.	453-456
69. Ergasheva, G. I., & Mulladjanova, N. A. Terminology: the nature of concepts and terms.	457-460
70. Chemezov, D., et al. Designing and manufacturing of shaping parts of a die mold.	461-466
71. Safarov, B. J. Features of management and modeling of business processes at retail trade enterprises.	467-472
72. Tulenbayev, M. S., Manapbaev, M. D., Beglerova, S. T., Alipbekov, A. S., & Makovetskaya, A. A. Comparative evaluation of digital filtration of signals in analytical information measurement systems.	473-478
73. Alipbekov, A. S., Aldashova, Z. T., Makovetskaya, A. A., Dulatbaeva, S. S., & Tulenbayev, M. S. Features of the use of mobile android applications in the educational environment.	479-483

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Trade relations between Bukhara - Russia in the second half of XVIII century - in the XIX century. 484-487
75. **Darvishov, I. U.**
Signs of the consonant positions in Turkic languages (The example sin Namangan area Kipchak dialects in republic of Uzbekistan). 488-492

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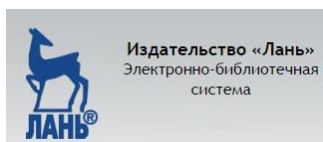
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