



Белгородский  
государственный  
национальный  
исследовательский  
университет

# WE MAKE THE FUTURE (МЫ ДЕЛАЕМ БУДУЩЕЕ)

Сборник научных статей  
Выпуск XI

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Федеральное государственное автономное образовательное  
учреждение высшего образования  
«Белгородский государственный национальный  
исследовательский университет»

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(МЫ ДЕЛАЕМ БУДУЩЕЕ)**

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# SECTION 1

## NATURAL AND HUMANITARIAN SCIENCES

UDK 621.039

### ZUR FRAGE DER DEUTUNG DER BEGRIFFE „LÄNDLICHE SIEDLUNG“ UND „LÄNDLICHE SIEDLUNGSLANDSCHAFTEN“ IN DER GEOGRAPHISCHEN FACHLITERATUR

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***Annotation.** Durch die Definition der in diesem Artikel verwendeten Begrifflichkeiten werden die Bedeutungen und die Besonderheiten der zentralen Begriffe wie Siedlung, ländliche Siedlung und ländliche Siedlungslandschaften vorgestellt. Im Mittelpunkt der Arbeit standen die Recherche und Analyse der vorhandenen thematischen Literatur, Berichten und Forschungsansätzen, in denen die Begriffe untersucht werden.*

***Schlagwörter:** die Siedlungslandschaften, die Siedlung, ländliche Siedlungen, die Siedlungen des ländlichen Raumes, ländliche und städtische Siedlungen, Merkmale ländlicher Siedlungen.*

Die Architektur kann heute vieles leisten, kann aber die Menschen nicht in ihren Gebäuden halten, selbst wenn sie von hoher architektonischer Qualität oder interessanter städtebaulicher Setzung sind. Die Architektur der Städte entwickelt sich und aber steht zurzeit im starken Kontrast mit den landwirtschaftlich genutzten Inlandbereichen. Der Dualismus von Stadt und Land greift nicht mehr.

Der Fokus dieser Arbeit liegt in der Frage der Deutung der Begriffe „Siedlung“, „ländliche Siedlung“ und „ländliche Siedlungslandschaften“ in der geographischen Fachliteratur. In der Geographie gibt es mehrere Bedeutungen dieser Begriffe, die man in diesem Artikel zu erklären versucht.

Bevor man den Begriff „ländliche Siedlungslandschaften“ zu klären beginnt, muss man zuerst den Begriff „ländliche Siedlung“ deuten. Mit diesem Begriff werden in erster Linie die Siedlungen des ländlichen Raumes definiert. Bei solcher Definition schließt man alle im ländlichen Raum liegenden und mit diesen funktional eng

verknüpften Siedlungen mit ein, auch wenn sie funktional und physiognomisch nicht von der Land- und Forstwirtschaft geprägt sind. Innerhalb dieses Bereiches bilden diese Siedlungen eigene, nach verschiedensten Gesichtspunkten differenzierbare und typisierbare Raumkategorien“ [Lienau, 2000: 9].

Der Begriff „*ländliche Siedlung*“ bildet ein Konstrukt aus zwei in direkter Wechselbeziehung stehenden Begriffen „*ländlich*“ und „*Siedlung*“.

Lexikon der Geographie definiert den Begriff „*ländliche Siedlung*“ als „eine mit landwirtschaftlicher Funktion verbundene menschliche Niederlassung im nichtstädtischen Raum. Im weiteren Sinne umschreibt der Begriff der ländlichen Siedlung heute auch menschliche Niederlassungen mit Funktionen im Rahmen nicht-agrarischer Urproduktion (z.B. Tourismus). Hier ist entscheidend, ob im äußeren Erscheinungsbild einer Siedlung agrarische Wirtschaftsformen prägend wirken (ländlicher Raum)“ [https://www.spektrum.de/lexikon/geographie/laendliche-siedlung/4555].

Unter dem Begriff „*Siedlung*“ wird jeder menschliche Wohnplatz mit seinen Wohn- und Wirtschaftsbauten, den Verkehrsflächen, den Gärten und Hofplätzen und den Erholungsflächen verstanden. Nach außen hingesehen, kann eine Siedlung durch Zäune, Gräben, Mauern und andere Befestigungsanlagen begrenzt sein [Lienau, 2000: 9]. So bezeichnet man mit diesem Terminus eine menschliche Ansiedlung im engeren Sinne, d.h. ohne dazu gehörige Flur [Lienau, 2000: 9].

Ihre Kennzeichen sind unter anderem die Dominanz der ländlichen Nutzfläche, geringe oder fehlende Zentralität, spezifische Entwicklungsdynamik, besondere Wuchsformen und ein eigenes Erscheinungsbild [Haversath, Ratysny, 2002: 52].

Als „*Siedlung*“ wird jede Form der menschlichen Wohnstätte bezeichnet [Borsdorf, Bender, 2010: 30]. Sie kann sowohl als Einzelsiedlung aber auch als Gruppensiedlung vorkommen. Die Siedlungen des ländlichen Raumes werden als ländliche Siedlungen bezeichnet [Borsdorf, Bender, 2010: 30].

Unter „*ländlich*“ versteht man die kleine Gemeinde, geringe Bevölkerungsdichte, Dominanz der landwirtschaftlichen Tätigkeit, natürliche Umgebung, Homogenität der Bevölkerung, geringe Stratifizierung und Mobilität, Dominanz personaler und informaler Sozialbeziehungen.

Der Begriff „*Siedlungslandschaft*“ wird zumeist in vielen Wissenschaften benutzt, wie z.B. in der Kulturforschung, Geographie, Raumplanung oder der Geschichtsforschung und Archäologie verwendet. Dieser Begriff beschreibt die räumliche gleichzeitige Besetzung von Kulturlandschaften mit Gebäuden und Infrastrukturen in steter aber schwankend dichter Regelmäßigkeit [Denecke et.al., 2005: 16]. Es sei zu erwähnen: bei Denecke werden allerdings die städtischen Funktionen als Flächeninhalt noch als untergeordnet und unwesentlich ausgeschlossen und eine Kulturlandschaft angenommen.

Unter „*Siedlungslandschaften*“ versteht man auch in der fachlichen Literatur das, was heute gerne als urbane grüne Infrastruktur bezeichnet wird, wobei einige Wissenschaftler auch die Gewässer mit zur grünen Infrastruktur zählen, die für sie aber gleichzeitig auch ein eigenständiges Arbeitsfeld darstellen. Als „urbane grüne Infrastruktur“ werden dabei naturnahe und gestaltete Flächen verstanden, die so

geplant und unterhalten werden, dass sie im Hinblick auf Nutzbarkeit, biologische Vielfalt und Ästhetik ein breites Spektrum an Ökosystemleistungen erbringen.

Man muss zwischen „ländlichen“ und „städtischen“ Siedlungen unterscheiden. Das Hauptkriterium zur Beschreibung ländlicher Siedlungen ist die Gemeindegröße. Dieses Kriterium war und ist das klassische Verfahren zur Abgrenzung ländlicher und städtischer Siedlungen. An dieser Stelle ergeben sich europaweit gesehen extreme Unterschiede.

Ähnlich wie beim Begriff des ländlichen Raumes gibt es auch einige Hauptmerkmale, die ländliche Siedlungen versuchen zu charakterisieren. Zur spezifischen Unterscheidung von ländlichen gegenüber städtischen Siedlungen werden folgende Eigenschaften genannt:

- Merkmale ländlicher Siedlungen [Henkel, 2004: 36];
- größere Bedeutung traditioneller Sitten und Gebräuche (z.B. Dorffest, Dorfkerwe);
- größere Bedeutung des Vereinswesens für die soziale und kulturelle Integration des Dorfes;
- höhere Geburtenrate der dörflich-ländlichen Bevölkerung;
- ein eher „konservatives“ Wahlverhalten;
- größere „Kirchentreue“ und vergleichsweise höhere Kirchenbesuche;
- geringere Ausstattung des ländlichen Raumes mit Einrichtungen für - Gesundheit, Kultur, Bildung, Sport und Freizeit.

Trotz aller Definitionsbemühungen bleibt der Übergang zwischen ländlichen und städtischen Siedlungen in der Regel fließend. Gleichwohl gibt es zahlreiche Orte, die nicht als Dorf oder Stadt zu bezeichnen sind und somit eine individuelle Betrachtungsweise erfordern.

Im allgemeinen Sprachgebrauch hat sich außerdem der populäre Begriff des „Dorfes“ als Synonym für ländliche Siedlungen durchgesetzt. Einige Wortzusammensetzungen, wie Dorferneuerung, Dorfsanierung oder Dorfzerstörung belegen diese Einschätzung. Zusammenfassend werden ländliche Siedlungen, wie anfangs schon erwähnt, als diejenigen Siedlungen verstanden, die mit dem ländlichen Raum verbunden sind [Henkel, 2004: 37].

Mobilität, Wachstum und Verdichtung, Digitalisierung, gesellschaftlicher und wirtschaftlicher Wandel – alle diese Faktoren prägen die Siedlungslandschaft. Althergebrachte Definitionen von Stadt und Land, gängige Bebauungsmuster und Trennungen von Nutzungen funktionieren nicht mehr. In den Dörfern wird das Leben städtischer, in der Stadt umgekehrt entwickelt man Quartiere mit dörflicher Identität. Die Agglomerationen werden zu eigenständigen Zentren, die Industriegebiete werden zu Wohnorten, Freizeit, Arbeit und Wohnen vermischen sich zunehmend.

Als ländlicher Raum wird mithin oft der verstanden, wo man ländlicher Bebauung und ländlicher Siedlungsstrukturen ansichtig wird, einerlei welche Bevölkerung dort lebt, welche sozialen oder auch kulturellen Verhältnisse dort herrschen. Die baulichen Strukturen werden deshalb oft eindimensional als ein Indikator für Ländlichkeit herangezogen. Allenfalls sichtbare Elemente der Agrarlandschaft sind noch Indikatoren von ähnlicher Bedeutung in der Alltagswelt.



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## FAKTOREN UND BEDINGUNGEN DER BODENFRUCHTBARKEIT

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***Annotation.*** *Der Artikel untersucht die rationelle Verwendung der Bodendecke, die einer starken anthropogenen Einwirkung durch den Menschen ausgesetzt wird. Im Artikel werden die Abhängigkeit der Bodenfruchtbarkeit von ihrer Säure und die Zweckmäßigkeit der Düngung analysiert und beschrieben, um einen günstigen PH-Wert für den Boden zu erhalten. Große Aufmerksamkeit wird im Artikel den Einführungsauswirkungen der Düngemittel auf den menschlichen Körper gewidmet.*

***Schlagwörter:*** *die Bodendecke, die Bodenfruchtbarkeit, das Säuregehalt, das Düngemittel, die Nitrate, der Boden, die rationelle Nutzung von Landressourcen, die Landwirtschaft.*

Derzeit ist die Frage der rationellen Nutzung von Landressourcen sehr relevant. Anthropogene Aktivitäten der Menschen zerstören intensiv die Bodendecke: Etwa 2 Milliarden Hektar der Bodendecke auf dem Planeten sind anfällig für Abbau in verschiedenen Tiefen. Der wichtigste Beitrag zum Abbau leistet dabei die Wassererosion (etwa 56%), der Beitrag zur wind- und chemischen Zerstörung (28 bzw. 12%) ist auch signifikant. Insgesamt übersteigt die Fläche der degradierten Böden die Gesamtfläche der modernen Landwirtschaft, wobei die

Abbaurate in den letzten Jahren dramatisch zugenommen hat und etwa 7 Millionen Hektar pro Jahr ausmacht. Aus diesem Grund kann der Abbau des Bodens zur größten Ressourcenkrise unserer Zeit werden [Grechischkina, 2016].

Der Wert des Bodens als Hauptmittel der landwirtschaftlichen Produktion wird durch seine Haupteigenschaft bestimmt – die Fruchtbarkeit. Die Fruchtbarkeit ist die Fähigkeit des Bodens, die Bedürfnisse von Pflanzen unter allen Bedingungen zu erfüllen, die sie für normales Wachstum und Entwicklung benötigen (Wasser, Nährstoffe, Bereitstellung des Wurzelsystems mit der notwendigen Menge an Wärme und Luft usw.).

Meistens sind die Fruchtbarkeitsindikatoren des Bodens miteinander verbunden. Einige von ihnen sind grundlegend und bestimmen den Zustand aller Bodenprozesse: mineralogische und granulometrische Zusammensetzung, phytosanitärer Zustand des Bodens, organische Substanz. Die übrigen Indikatoren werden von den Hauptindikatoren abgeleitet und werden durch ihre Kombination bestimmt: die Aktivität der Bodenbiota, agrochemische und agrophysikalische Indikatoren [Gaidukowa, 2010].

Für viele Agrarkulturen ist eine neutrale oder leicht saure Reaktion der Bodenlösung am besten geeignet. Es gibt zwei Formen von Bodensäure. Die tatsächliche Säure ist der pH-Wert der Bodenlösung, der auf die Bodenmikroorganismen und direkt auf das Wurzelsystem einwirkt. Diese Art von Säure wird aus einem wässrigen Extrakt bestimmt.

Nach den tatsächlichen Säuregehaltswerten des Bodens werden die Säuren in folgende Kategorien unterteilt:

- neutral - pH 6,5-7,0;
- leicht sauer - pH 5,5-6,5;
- sauer - pH 4,5-5,5;
- stark saure - pH 3,0-4,5;
- leicht alkalisch - pH 7,0-7,5;
- alkalisch - pH 7,5-8,0;
- stark alkalisch - pH > 8,5.

Der potenzielle Säuregehalt ist der Säuregehalt der Lösung aufgrund der Menge an Austauschprotonen und Aluminiumkationen in der PPK. Es wird aus dem Wasser-Salz-Extrakt des Bodens bestimmt, in dem die folgenden Reaktionen auftreten:

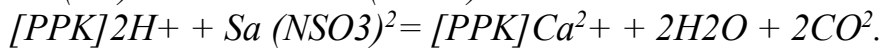
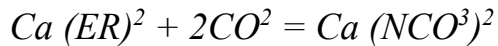
- $[PPK]H^+ + X1 [PPK]K^+ + NSl,$
- $[PPK]Al^{3+} + 3KCl [PPK]ZK^+ + AlCl^3,$
- $AlCl^3 + H_2O AlCl^2 + HCl.$

Der potenzielle Säuregehalt ist in zwei Arten unterteilt: hydrolytischen und austauschbaren. Der potenzielle Säuregehalt wird durch die Wechselwirkung des absorbierenden Bodenkomplexes mit neutralen Salzen ausgedrückt. Dieser Typ gilt als der schädlichste Säurentyp, der durch Wasserstoff- und Aluminiumionen repräsentiert wird. Bei der Interaktion von Böden mit neutralem Salz werden nicht alle Protonen dissoziiert, da das System ein dynamisches Gleichgewicht aufweist.

Die Essigsäure, als schwacher Elektrolyt, bindet fast alle Protonen fest, sowohl frei als auch fest mit dem absorbierenden Bodenkomplex verbunden. Daher

ist diese Art von Säure die Summe der tatsächlichen und potenziellen Säure [Zamotaewa, 2016].

In agronomischen Berechnungen werden die Kalkdosen bestimmt, die in den Boden eingeführt werden müssen, um die Versauerung (Kalkbildung des Bodens) zu reduzieren. In Gegenwart von Kohlendioxid wird Kalk in lösliches Bikarbonat umgewandelt und wird ohne Austausch von  $H^+$  absorbiert:



Man muss darauf achten, dass die wichtigsten Indikatoren für die Bodenernährung in ständiger Bewegung sind. Diese Transformationen treten kontinuierlich im Pflanzenorganismus auf, so dass im Zellsaft ständig ein bestimmter Anteil an Nitraten vorhanden ist. Ihr Gehalt im Boden zeigt an, dass die Pflanzen mit Nährstoffen versorgt werden.

In der Natur werden Nitrate gebildet, wenn die stickstoffhaltigen organischen Substanzen zerlegt werden. Sie gelangen zusammen mit Stickstoffdüngern (Nitraten) in den Boden. In den Pflanzenzellen werden Nitrate aus dem Boden zuerst in die Nitrite umgewandelt, dann in die Aminosäure und schließlich in die Proteine. Diese Transformationen treten kontinuierlich im Pflanzenorganismus auf, so dass im Zellsaft ständig ein bestimmter Anteil an Nitraten vorhanden ist [Ganzhara, 2010].

Wenn sie mit Nahrung in den Magen des Menschen gelangen, können diese Nitrate in die Nitrite umgewandelt werden, die in kleinen Dosen eine vasodilatatorische und krampflösende Wirkung haben, was zu einer Senkung des Blutdrucks beitragen kann. Um eine Kontamination von Boden und Grundwasser in der Nähe von Gewässern mit Nitraten und Nitriten sowie eine Verschmutzung der Atmosphäre mit Stickoxiden zu vermeiden, müssen die optimalen Anwendungsnormen von Stickstoffdüngern strikt eingehalten werden.

Die Nitrite-Salze von Salpetersäure sind ein Zwischenglied in der Kette der bakteriellen Oxidationsprozesse von Ammonium zu Nitraten (der Nitrifikationsprozess unter aeroben Bedingungen) und umgekehrt zur Wiederherstellung von Nitraten zu Ammoniak und freiem Stickstoff (Denitrifikationsprozess bei Sauerstoffmangel).

Ein hoher Nitritgehalt hat eine toxische Wirkung auf den menschlichen Körper. Natürliche Quellen für die Aufnahme von Nitriten in den Boden sind die biologischen Abbauprozesse organischer Substanz und die Verwendung von landwirtschaftlichen Düngemitteln ist künstlich.

Phosphor im Boden wird entweder in Form von organischen Verbindungen oder in Form von Mineralien gefunden, hauptsächlich aus Calcium-, Magnesium-, Aluminium- und Eisenphosphatsalzen. Es wurde im Laufe der Studie festgestellt, dass die Pflanzen nicht nur wasserlösliche, sondern auch in Säuren leicht lösliche phosphorhaltige Salze aufnehmen können. Das Vorhandensein von beweglichen Formen von Phosphor im Boden beeinflusst den Ertrag. Wenn der Gehalt an beweglichem Phosphor weniger als 10 mg pro 100 g Boden beträgt, so gibt es einen Mangel an Phosphor in den Pflanzen, bei einem Gehalt von 10-20 mg wird ein durchschnittlicher Grad an Phosphordünger erreicht. Mit einem Phosphorgehalt von über 20 mg sind Pflanzen ausreichend mit Phosphor versorgt.

Äußere Anzeichen eines Phosphormangels in Pflanzen äußern sich in der blau-grünen Farbe der Blätter. Die Ränder der Blätter sind nach oben gebogen und die Blätter sind kleiner, als sie sein sollten. Die Fortpflanzungsorgane bilden sich vorzeitig und haben keine Zeit, Biomasse zu gewinnen. Die Erhöhung des Phosphorgehalts im Boden wird durch die Verwendung organischer und Phosphordünger erreicht [Ilyasowa, 2015].

**Fazit.** Der Säuregehalt des Bodens spielt eine wichtige Rolle bei der Bestimmung seiner Fruchtbarkeit. Der optimale Säuregehalt für die meisten Agrarkulturen beträgt etwa 6-7 pH. Wenn der Boden zu sauer oder alkalisch ist, so kann dies die Verfügbarkeit von Nährstoffen für die Pflanzen verringern und die Aufnahme durch die Wurzeln erschweren. Dies kann zu einer Verschlechterung des Pflanzenwachstums und der Entwicklung sowie zu geringeren Erträgen führen. Daher ist die Aufrechterhaltung eines optimalen Säuregehalts ein wichtiger Aspekt für die Aufrechterhaltung der Bodenfruchtbarkeit.

Phosphor, Nitrate und Nitrite sind wichtige Nährstoffe für Pflanzen. Sie sind Teil des Prozesses der Photosynthese, der Regulierung des Wachstums und der Entwicklung von Pflanzen sowie der Bildung von Früchten und Samen. Die Einführung von Phosphor in den Boden verbessert das Wurzelsystem der Pflanzen, erhöht den Ertrag und stärkt die Pflanzen gegen stressige Bedingungen.

Eine übermäßige Nitrat- und Nitritaufnahme kann jedoch schädlich für die Fruchtbarkeit des Bodens und des menschlichen Körpers sein. Diese Substanzen können in den Boden eindringen und in unterirdisches und Oberflächenwasser gelangen, was zu einer Kontamination führt. Darüber hinaus kann der hohe Nitratgehalt in Lebensmitteln schädlich für die Gesundheit von Menschen sein, insbesondere für Kinder und schwangere Frauen. Dies kann zu einer Vielzahl von Erkrankungen wie Methämoglobinämie (blaues Lippensyndrom), Nierenschäden und beeinträchtigter Schilddrüsenfunktion führen.

Daher ist die Aufrechterhaltung eines optimalen Säuregehalts des Bodens und die korrekte Verwendung von Phosphor, Nitraten und Nitriten wichtig, um die Bodenfruchtbarkeit zu erhalten und negative Auswirkungen auf den menschlichen Körper zu verhindern. Richtlinien zur Agrartechnik und -sicherheit müssen berücksichtigt werden, um eine nachhaltige Entwicklung der Landwirtschaft und der menschlichen Gesundheit zu gewährleisten.

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## **ÖKOLOGISCHE ASPEKTE DER REINIGUNG VON KÜNSTLICHEN GEWÄSSERN DER WALDSTEPPENGELÄNDE (AM BEISPIEL VON ALEKSEWSKY BEZIRK BELGORODER GEBIET)**

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***Annotation.*** Im Artikel werden die Ergebnisse der ökologisch-chemischen Forschung des Zustandes der künstlichen Gewässerobjekten geschildert. Die durchgeführte Studie hat das Ziel die praktischen Aspekte der Reinigung von

*künstlichen Gewässern auf dem Gebiet von Alekseewsky Bezirk zu erforschen, die entstehende Reinigungsprobleme zu untersuchen und die praktischen Empfehlungen zur Verbesserung der Effizienz der Reinigung von Gewässern zu geben und zu begründen.*

**Schlagwörter:** *die Gewässer, künstliche Gewässerobjekte, die Verschmutzung der Gewässerökosysteme, die Stickstoffverschmutzung der Gewässerobjekte, die Struktur der Platzierung der künstlichen Gewässer, die Methoden zur Reinigung der künstlichen Gewässer.*

**Aktualität der Studie.** Das Trinkwasser ist ein wichtiges Element, das erforderlich ist, um die Existenz allen Lebens auf dem Planeten zu bewahren. Die Forschung des ökologisch-chemischen Zustandes der Gewässer ist relevant, da die Verschmutzung der Gewässerökosysteme eine Gefahr für alle Lebewesen und insbesondere für den Menschen darstellt. Keine Ausnahme ist in diesem Fall Alekseewsky Bezirk Belgoroder Gebiets, dessen Oberflächenwasser etwa 1% der Gesamtfläche des Bezirks nehmen. Sie werden sowie als Trinkwasser, sondern auch für verschiedene wirtschaftliche Bedürfnisse, in der Landwirtschaft, zur Erholung und Fischerei benutzt.

In den letzten Jahren wurden viele Teiche und stille Gewässer in ihren wesentlichen Zweck – die Bewässerung der landwirtschaftlichen Flächen nicht benutzt. In diesem Zusammenhang beobachtet man heutzutage die Tendenz zur Minderung der gesellschaftlichen Aufmerksamkeit für den korrekten technischen Betrieb der Teiche und Talsperren, insgesamt der Gewässer, das zu einem erhöhten Risiko von Unfällen, Verringerung der Sicherheit der hydrotechnischen Bauten führt.

**Objekt der Studie** ist die hydrochemische Zusammensetzung und äußere Struktur der Platzierung der künstlichen Gewässer.

**Gegenstand der Forschung** – die Methoden zur Reinigung der künstlichen Gewässer auf dem Gebiet von Alekseewsky Bezirk.

### **Einleitung**

Die Stauseen haben ein höheres Risiko für die Stickstoffkontamination mit Ammoniumsalzen, da sie nahe am Flussabfluss liegen. Die Nitrit-, Nitrat- und Ammoniumsalze werden in künstlichen Gewässern als Folge der Aktivitäten des Wirtschafts-, Viehzucht- und Landwirtschaftssektors am Ort gefunden. So gelangt der Ammoniumstickstoff in die Teiche und Stauseen zusammen mit den Lebensmitteln, Biomüll- und Bioabfällen.

Der Anstieg der Ammoniumsalze im Teich wird sowohl durch das Vorhandensein einer großen Anzahl von bewirtschafteten Flächen in seinem Einzugsgebiet als auch durch die intensive Nutzung dieses Wasserreservoirs als Erholungsort für die Einwohner von Alekseewky Bezirk erklärt. Der Nitratüberschuss ist hauptsächlich mit der Bebauung landwirtschaftlicher Wasserflächen und dem Vorhandensein von Filteranlagen verbunden.

Nitrite und Nitrate gelangen in die künstlichen Gewässer dank Düngemitteln, die auf die Felder eingeführt werden. Darunter wird in erster Linie Salpeter gemeint. Salpeter dringt durch den Boden in die Gewässer ein und oxidiert sie. In den meisten Fällen haben die Gewässer im Alekseewky Bezirk die gemischte Verschmutzung.

Abhängig von der Lage des Wasserobjekts und den bestimmten Wohngebieten gibt es verschiedene Arten von Verschmutzung [Yamaschkin, 2017].

### **Ergebnisse und Diskussion**

Die Anordnung von künstlichen Gewässern hat ihre eigene Regelmäßigkeit. Die Gewässer befinden sich in der Nähe von Flüssen. Die Teiche werden durch die Absperrung des Flussbettes geschaffen und befinden sich etwas weiter als die Stauseen. Die Stauseen werden mit Hilfe von Dämmen unterschiedlicher Höhe und Länge gebildet und liegen in der Nähe von Flüssen.

Basierend auf den Studien von W. A. Kurepina und A. G. Kornilow kann man schließen, dass die Teiche und Stauseen verschiedene Arten und Gehalt von Stickstoffverschmutzung aussetzen. Einige von ihnen werden von Ammoniumsalzen dominiert, die anderen von Nitriten und Nitraten. Die derzeit durchgeführten Maßnahmen zur Reinigung von künstlichen Gewässern können nicht intensiv sein, solange für alle Gewässer die gleichen Reinigungsmethoden angewendet werden [Kornilow, 2018, Kurepina, 2018].

Die alternative Lösung dafür ist die individuell gebildeten Naturbedingungen. Um eine Ammoniumkontamination von Gewässern zu verhindern, muss man die Filtrationsmethoden und die Oxidationsmitteln verwenden.

Als dringende Aufgabe der modernen künstlichen Wasserobjekte im Gebiet des Bezirks Alekseevsky gilt die Beschleunigung des Leerlaufprozesses. Um diese Aufgabe zu lösen, ist es notwendig, die Absicherung mit Ultrafiltrationsprozessen und Membrantrennung zu verwenden. Bei Gewässern, die sich in der Nähe von Siedlungsorten befinden, ist es ratsam Chlorierung, Umkehrosmose, Klinoptilolith und Erweichung zu verwenden.

Eine der weit verbreiteten Methoden zur Reinigung stickstoffhaltiger organischer Verbindungen ist die Extraktion. Mit der richtigen Auswahl von Extraktionsmitteln können mehr als 90% der Zielprodukte extrahiert werden [Schischkin, 2022]. In beträchtlichem Ausmaß ist es ebenso wahrscheinlich, die Adsorption in aktiviertem Winkel zu verwenden. Diese Reinigung ist für fast alle stickstoffhaltigen Verbindungen wirksam.

Eine weitere Methode ist die Reinigung der Teiche von Sedimenten. Diese Methode enthält eine ganze Reihe von Arbeitshandlungen. Der Bagger saugt die Bodenablagerungen mit Hilfe von Bodenspumpen auf und überträgt sie auf die Karten des Alluviums oder in die Geotubes. Diese Methode ist sehr effektiv, aber hat jedoch ihre Nachteile. Und zwar, die großen Flächen werden mit Alluviumkarten oder Geotubes besetzt. Dies zerstört das Ökosystem, stört das Wachstum von Pflanzen und verschmutzt das Ufer des Wasserreservoirs. Um das Becken wieder zu erhalten und zu erneuern, braucht man eine verstärkte Gewässer- und Bodenflußreinigung von verschiedenen Ablagerungen, die schwelende organische und organogene Komponenten erhalten. Die Ausgleichung der Sauerstoffzusammensetzung und der mikrobiologischen Selbstreinigungselemente des Beckens sind auch erforderlich [Alekseew, 2017].

Es sei erwähnt werden, dass es viele Methoden gibt, mit deren Hilfe die Stickstoffkontamination künstlicher Gewässer reinigen und verhindern könnte. Sie helfen die Wassertoxizität zu vermeiden und die Konzentration schädlicher

chemischer Verbindungen zu reduzieren. In fast allen Gewässern gibt es Stickstoffverschmutzung, die derzeit nicht vollständig beseitigt werden kann, und nicht nur durch die Reinigungsmethoden, sondern auch durch regulatorische und rechtliche Methoden.

Landwirtschaftliche Flächen und Unternehmen, die Produktionsabfälle reduzieren müssen, streben danach, die MPC zu mindern. Und die Bevölkerung muss für die Abfälle, die sie in die Umwelt bringen, verantwortungsvoller sein. Solche "sozial gerichteten" Methoden werden im Bezirk Alekseewsky als effektive Methoden ersehen, da sie es ermöglichen, das Umweltbewusstsein der Menschen zu erhöhen, so dass die Menschen beginnen, die Verantwortung für die Schädigung der Umwelt wirklich wahrzunehmen [Samoilowa, 2018].

Viele von chemischen, biologischen und physikalischen Methoden sind möglicherweise nicht immer gut für die Gesundheit der besiedelten Bevölkerung der Umgebung, so, zum Beispiel, die Chlorierung. Bei der Chlorierung muss man darauf achten, dass die Gewässer nach der Reinigung nicht wieder von Menschen kontaminiert werden. Daher ist die Verwendung der Methode - die Arbeit mit der Bevölkerung und die Verschärfung der regulatorischen und rechtlichen Rahmenbedingungen für Unternehmen, was der sicherste und effektivste Weg ist, um eine Stickstoffkontamination künstlicher Gewässer des Bezirks Alekseewsky zu verhindern [Ikonnikowa, 2019].

**Fazit.** Im Moment ist die Hauptquelle der Verschmutzung von künstlichen Gewässern des Bezirks Alekseewsky die Stickstoffverschmutzung. Diese Schlussfolgerung kommt anhand von Analysen der chemischen Zusammensetzung von Gewässern [Kornilow, 2018; Kurepina, 2018] und laut den vorhandenen Karten, die den Gehalt an Nitraten, Nitriten und Ammoniums Salzen schildern. Die Ammoniums Salze vorherrschen in der Nähe von Wohngebieten und Gebieten, die von Feldern besetzt sind.

Es gibt jedoch kein einheitliches Muster der Kontamination mit Nitriten, Nitraten und Ammoniums Salzen, alles hängt von der territorialen Zugehörigkeit des Objekts ab.

Die Hauptnutzer und Verbraucher von Wasserressourcen des Bezirks Alekseewsky sind Gebiete, die mit landwirtschaftlichen Aktivitäten beschäftigt sind.

Die Reinigung von künstlichen Gewässern erfolgt durch biologische, chemische und physikalische Methoden.

Basierend auf den Ergebnissen der Studie ist die wirksamste und effektivste Methode, um die gegenwärtige und weitere Verschmutzung künstlicher Gewässer im Gebiet von Alekseewsky Bezirk zu stoppen, eine strengere Haftung für die Verletzung von MPC und die illegale Entsorgung von Abfällen in Gewässer zu übernehmen.

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## SECTION 2 SOCIAL SCIENCES, ECONOMICS

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### CULTURAL ASPECT OF FASHION PHENOMENON ON THE EXAMPLE OF MODERN YOUTH

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**Abstract.** *The article examines the effect of fashion as a part of culture on young people. Various approaches of different scientists studying fashion as a cultural phenomenon are analyzed. Particular attention is paid to the influence of fashion on society and functions it performs in the youth culture.*

**Keywords:** *phenomenon of fashion, youth culture, values, identity, appearance.*

Fashion has always been an important aspect of human culture, affecting all sides of our vitality: appearance, manners, habits, lifestyle. It is considered to be a changeable and ephemeral phenomenon of culture, which is associated with maintaining and updating the appearance. Its characteristic property is dynamism, so it can really be considered as a process of variability of aesthetic patterns.

Fashion is not limited only by trends in clothing and accessories, it covers a wider horizon, which includes a variety of aspects of public life – economics, social relations, beliefs and cultural values. Fashion is especially significant in the context of youth culture, since it has become an integral element of it, reflecting the values and views of youth and influencing how young people perceive themselves and the world around them. Young people as a special socio-demographic group react vividly to fashionable manifestations of the time, which contributes to the formation of specific youth culture.

At the moment, there is no consensus on how to define the concept of "fashion", and it is given many meanings. It is the object of research in many

sciences: philosophy, cultural studies, art studies, history, psychology, sociology, economics. Within the framework of culturology, which integrates the knowledge of the above sciences, fashion is understood as a sign-symbolic system through which interpersonal and intergroup communication takes place [<https://www.dissercat.com/content/moda-kak-fenomen-kultury-i-sredstvo-sotsiokulturnoi-kommunikatsii>], as well as a socio-cultural phenomenon, which means that certain patterns of culture and behavior become popular in a certain society and time.

Fashion is present in various spheres of human existence. First of all, it is expressed in the design of a person's appearance and environment, and also in art, architecture, literature, science, speech behavior, etc. [<http://cult-lib.ru/doc/culture/encyclopedia-xx-vek/348.htm>]. The definition of the term "fashion" is given in the explanatory dictionary of D. Ushakov, where the author notes that it is "a set of habits, tastes, preferences of a given environment at a given time" [Ushakov, 1935-1940], thereby immediately pointing out the complexity of this phenomenon, its belonging to a specific time, its ability to complement the picture of life of a certain society.

Reflections on different aspects of the fashion phenomenon were presented in scientific works by many cultural scientists. For example, according to the work of Roland Barthes [Barthes, 2003], fashion is a form of mass communication through which people try to stand out from the crowd; it supports social differences and creates a sense of social belonging due to various elements of appearance deliberately created by participants in the fashion industry. Baudrillard in many of his literary works speaks about fashion as it is a way of forming a system of social stereotypes, symbols and values that unites people and gives them a certain status in society [Baudrillard, 2000].

A significant contribution to the theoretical understanding of fashion was made by G. Simmel, who associated its existence with the need to satisfy the dual human need: to be different from others and to be like others [<http://cult-lib.ru/doc/culture/encyclopedia-xx-vek/348.htm>]. According to the research of P.A. Sorokin, fashion is not only a cultural phenomenon, but also a meaningful socio-cultural institution of modern society, with its functions, structure, forms [<https://www.dissercat.com/content/moda-kak-fenomen-kultury-i-sredstvo-sotsiokulturnoi-kommunikatsii>].

YU. M. Lotman considers fashion as one of the significant cultural phenomena, reveals its dynamic component [<https://www.dissercat.com/content/moda-kak-fenomen-kultury-i-sredstvo-sotsiokulturnoi-kommunikatsii>]. In his works on the semiotics of culture, the scientist notes that it can be an instrument of cultural dialogue [Lotman, 1992].

Analyzing various scientific points of view about fashion, it can be noted that it is a complex phenomenon that performs many functions in society, reflecting the level of its development, contributing to the differentiation and integration of society at the same time.

As it can be seen, the views of scientists regarding fashion and its assessment are not identical. Nevertheless, the theoretical analysis of the scientific works of

cultural researchers indicates the solidarity of scientists in the fact that fashion and youth culture are closely interrelated. To identify the axiological attitude of young people to the phenomenon of fashion it is necessary to define what is understood by the young culture. This phenomenon is closely interconnected with fashion, which reflects the value preferences of young people, constitutes means of communication, self-expression, translation of ideas and is an indicator of status. Recognition of this relationship allows to fully comprehend the manifestations of young culture, its role in society.

According to S.N. Ikonnikova, youth is a socio-demographic group, internally differentiated by a number of characteristics, "a complex, multidimensional and dynamic formation that constantly reproduces and changes the social structure of society" [Ikonnikova, 1998: 30].

S.I. Levikova notes that youth culture, or "subculture", is a partial, a relatively coherent cultural subsystem within the basic culture of society, cultivating the youth system of values, norms and forms of behavior, attitude to fashion, etc. [Levikova, 2004: 210]. Youth culture, on the one hand, is a kind of adaptation to the norms, values, lifestyle of society, and on the other – an attempt to change or adjust the old and create a new system of values, morality. This culture is often focused on solving the issues of identity and self-expression, deconstructing generally accepted, traditional standards and values, as well as creating innovative forms of social organization and resisting adult authority.

The most important function of fashion in relation to the young culture is that it serves as a tool of socialization and a way to identify with the reference group. Young people often use fashion as a way to show which social groups they belong to or what principles they adhere to, because participation in fashion is a specific kind of communication between people and the process of this communication consists in the conscious or unconscious transmission of any signals.

In modern conditions, fashion practices are more and more similar to artistic practices that need decoding for understanding [Mal'ceva, 2018: 85]. For example, identifying themselves with the Goth subculture, young people can dress up and use accessories that reflect the lifestyle adopted in this subculture, giving signals to others who share similar interests. Each subculture, as a rule, has its own unique stylistic code and a special approach to fashion, its own set of fashion trends that reflects the beliefs, values and norms of a particular subculture and does not allow it to be confused with others. For example, punk is not the same as gothic, and the culture of skateboarding is very different from the culture of hip-hop, because they are based on different principles from each other and, accordingly, differ visually. At the same time, fashion helps to build social boundaries between individuals and groups in the same ways that it unites and brings individuals and groups closer together. So, by choosing behavior and clothing which contain a message to others, an individual not only identifies himself with society or its separate group, but also protects his inner self from excessive curiosity or condemnation [Tolmacheva et al., 2018].

As a person changes and develops during socialization and life, so fashion trends replace each other, giving a person a set of tools to "frame" his renewed

personality that has gone through some stages of development. Most often, following trends are reserved for young people. It is not uncommon to see a mature person "stuck" in the period of youth, that is, a person who considers it beautiful and right to look like it was fashionable or common during his youth. In this sense, fashion itself seems to be a value, since it means relevance, modernity, timeliness and "proportionality", conformity to the present, the ability to feel it and the state of culture at the moment [Lyubimova, 1973]. The fashion functions are the most relevant for participants of youth culture who need to keep up to date in order to socialize and determine their place in the modern world.

Fashion is also means of self-expression and self-identification. In addition to the mentioned desire to join the reference group and declare yourself, it is important to follow certain fashion trends. It indicates a distinct level of awareness about high fashion. In this context, fashion is thought of as an integral part of culture at the level of a separate institution, exists as a particular (relatively closed) subculture. People can show interest and respect for certain designers or brands whose aesthetic tastes and ideas they share by their appearance. For these purposes, things and images that imitate the brand's DNA (a kind of code that defines it), design and stylistic techniques that the designer or brand uses in collections are used. Of course, with appropriate material wealth, an admirer of fashion as an art form is free to purchase branded clothing and combine it in a certain way, rather than looking for more affordable analogues that match the style of a favorite designer.

Among the youngsters there are those who demonstrate indifference to trends, choosing "unfashionable" silhouettes and the most inconspicuous things, not paying attention to the combination of items, or picking up a minimalist wardrobe, which will be difficult to accuse of irrelevance due to the fact that it is very neutral. Such a choice symbolizes a special position and a certain character of the owner. This way of dressing emphasizes seriousness, independence, detachment from the temporary and fleeting nature of fashion trends, but this position can be expressed in the opposite way – catchy "combinations of incongruous", shocking, based not on personal style, but on ostentatious indifference to trends.

In addition, young people often use fashion as a tool to convey political views, statements or ideology. Fashion trends serve as an expression of protest, are seen as rebellious or subversive, challenging social standards and authority. The most striking example is the subcultures of the second half of the XX century, for example, the hippie movement that emerged in the 1960s in the USA, and the punk culture that developed in the late 1970s in the UK, personified a revolt against socio-political events (hippies against the Vietnam War) and the existing political system as a whole (punks resisting the monarchy and advocating anarchy).

Close in scale and the most relevant example of the use of fashion as a translator of ideals and beliefs is the environmental movement, which gave rise to the so-called "ethical" or "sustainable" fashion. It is connected not so much with fashion provocations and slogans on clothes, but with a new look at the fashion industry. Eco activists choose wear-resistant and natural fabrics, do not disdain thrift stores and second-hand goods. They advocate the reorganization of production, for minimizing the harm caused to the environment, criticize the culture of

overconsumption, the level of which has increased significantly in postmodern society. Reusing of things, recycling of materials instead of destruction, course for durability are some of the main modern trends in the fashion industry, even if not the most influential due to the development and popularity of fast fashion.

Fashion trends and styles have always been constantly changing and evolving. However, with the development of social networks, consumption culture and "fast-fashion", fashion has become more accessible, and trends are changing at an even faster speed. This has also led to the fact that fashion has become a value criterion in youth culture. Young people are now judged by their fashion and stylistic choices, and this has become a way for them to determine their status and position in society.

Indeed, the most important aspect of fashion in youth culture is connected with the fact that it has become a symbol of social status, influence and power in youth culture. Young people often judge each other by the brands they wear, the style of clothing and accessories they choose. As a result, fashion becomes a way of dividing into classes in the youth culture and influences young people. It can also be a source of empowerment in youth culture, as it allows young people to create a personal and social identity, but also a source of limitations. Access to fashion often depends on the position in society, which also affects the ability to fully participate in fashion trends. Young people from wealthy families have free access to fashion trends, they have more opportunities. While the lower financial position of the young indicates difficulties in achieving the desired fashion "level".

Of course, fashion as a way of "framing" does not reflect a person so much that it is possible to accurately determine the personality and understand the inner world. It is not the only and main means of self-realization. Fashion can be a factor in the assertion of status and social status if a person is insufficiently realized in the professional sphere, in public relations. In other cases, participation in fashion is usually aimed at increasing one's attractiveness. Nevertheless, attractiveness, external qualities affect the first impression, which is very important in today's fast world, where the time allotted for evaluating and perceiving a person is constantly decreasing. In such conditions, fashion is a powerful way of self-realization and self-expression, aimed at favoring others, at self-affirmation in society and interpersonal relationships [Tolmacheva et al., 2018].

Young people tend to strive for everything new, including various kinds of inventions that allow them to move into the future, break away from the past, and oppose themselves to the older generation. Fashion meets these needs of the youth culture, as it encourages people to think outside the box and experiment with new styles, contributing to creativity. It allows self-expression, encourages innovation and experimentation. Fashion choice is an opportunity for some people to demonstrate their creativity and demonstrate the image they aspire to. It can be concluded that in this context, the value of fashion in the youth culture stems from its experimental and innovative nature, as well as the tools with which you can create a unique style, form a group and individual identity.

Thus, fashion plays a vital role as a value criterion of the youth culture. Youth is a period of searching for oneself, one's social role in society, a period of trial and error, phase of personality formation. Young people, as an active social group with

certain age, social, psychological characteristics, always react quickly, emotionally to the messages of the time, to fashion trends. Fashion is a form of communication that allows to express emotions, interests and beliefs, and broadcast them to others. This is a fundamental aspect of socialization and self-expression. Fashion is a criterion of youth culture, serving as a means of indicating values and identity. As a collective phenomenon, fashion is a big part of the formation of group identity through the creation of cultural codes. It translates public sentiment into the language of aesthetics and connects the individual with his cultural context. All these are integral components of the youth culture and the dynamics of modern society as a whole.

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UDK 007

## THE FUTURE OF TECHNOLOGY AND ITS IMPACT ON OUR SOCIETIES

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**Abstract.** *This research paper deals with the analysis of the evolution, developments and problems of technology as well as its impact on our societies. Technological revolution has been characterized by a huge number of changes and advancements that have transformed the quality of our lives and paved ways of improvements for new innovations. Technology has proven to be a major catalyst of change, development and economic growth. However, problems arising from these developmental changes of technology have caused a number of negative impact on human health in our society that have resulted in bigger risks and other health related problems. The history of technology dates back in the early 18<sup>th</sup> century where it was mainly recognized as a discipline which was determined by the*



*systematic approach of forming handicrafts. The stages of technological developments have revolutionized production processes in industries where machines have managed to replace human Labour.*

**Keywords:** *technology, society, development, information technology, robots, 3D printing, health.*

The existence of technology was first discovered during the Indo-European periods where it was commonly known as *tek*, and this practically meant the construction of wooden houses by weaving sticks together. In the early days of the Greeks, technology was also called *téchne* which meant knowledge of forming things that would not exist and which basically aligned itself with artificial things. In the 18th century in Germany, *technologie* began to be used and was described as a discipline determined by an approach which was systematic when making handicrafts and also introduction of industrial arts that existed as a form of elite systematic knowledge. By the 20th century technology had advanced and it came to be known as a science of the industrial arts and German engineers were the first to exploit the concept of *technik* or in a broader sense technology [Ager, 2020].

The evolution of technology can further be categorized into two directions: firstly as coming from mankind's activities and the requirement for rational use and secondly, as joint activities of people and way of organizing these activities. One of the main reasons for the occurrence or the evolution of technology was human desire to break the barriers that were linked with his nature and organization in particular so that the effects of natural organs were strengthened. In addition, stages of technological advancement were grouped into three: firstly, the era of manual technology which mainly focused on tools that consisted of manual labour and enabled production to be controlled by workers and capable labor force. Secondly, mechanization and machines era, the main production force consisted of machines and during this stage technological civilization and industrial societies were formed. Thirdly, automation era which started after the second half of the twentieth century and during this period machines replaced people from active participation in production. And this led to the rise of robots and other automated systems. Other possible divisions of technological eras were as follows. The technical era that could have existed from periods between 1000 to 1750 and this was based on the technology of water and wood; The paleo technical era (18th – 20th century) which was based on coal and iron complex; neotechnical era (currently going on ) which, uses electricity and alloys complex [<https://elearningindustry.com/the-evolution-of-technology-development>].

In the current modern world, the most and widely used type of technology and has evolved rapidly especially in medical research is known as 3D printing which can be defined as a digital model created through the transformation of an object by printing layers of materials so that a tangible model of that object is formed. 3D printing is basically defined as the creation of additional materials of a particular object. It is mainly used for forming copies of natural organs (not real organs) that validate proper drug dosages but also enables performing complicated surgical operations in medical research.

In industries such as education, schools and universities use 3D as a resource for projects and coursework, prototyping and learning. In addition 3D allows organizations to create their objects remotely. Bio printing which is another component of 3D printing is a computer-guided way of laying living cells and creating artificial living cells. In addition the modern era has seen the rise of technologies such as reproductive technology, television, satellites, computers, and etc. [<https://pressbooks.pub/anne1/chapter/the-modern-world-and-sts/>].

Another popular technology is nanotechnology which is the manipulation of matter on atomic, molecular and supermolecular scales. Nanotechnology could be used to manipulate the production of cars or the creation of new ones with new functions. For instance, in medical research nanorobots are being used to stop aging. Therefore, technological development has been viewed as an important symbol of development through scientific logic. The evolution of science, Technology and society studies clearly started in the early 1970s. Although, the negative and positive impact of Information technology on society and people is currently and largely talked about, as are the effects vary at different social levels such as international, national and organizational.

Society and Technology have both accepted each other, as a critical observation reveals that in the 19th century machines played a significant role in automation and modernization of society. The use of computers in the 20th century were mainly accepted and used because of the ability to reduce manpower. However, the era of technology has given rise to societal problems where it has made society to become real and materialize it into a real sociality and therefore making a society. Technology has proven to have affected many areas of life as an independent action. It has affected society by deregulating Labour relations where interest of an employer's activities are influenced such that the industrial process becomes integrated thus forming a social economic system.

On the other hand technology has allowed current political and social orders to manifest. In addition, new technologies have the capability to increase productivity, cost saving and work saving. In an enterprise, when production levels do not change, then it leads to reduction in manpower where management would be required to demand control and centralization of the decision making authority. Not only that, management would be required to identify weak structures in technology and to invest in human competency. Industries therefore, are recommended to investigate the elements of macro structures that must be developed in autonomous reflex systems that can become standardized and show societal conceptions from which they have come from in order to allow employers and employees to work and react similarly [Katsikides, 2018].

In the medical field, certain medical organizations, are using social media to enhance collaboration and improve communication among patients and workers. However the negative impact of screens on our eyes leaves much to be investigated. Many individuals suffer from eye problems after screen time for several hours. This problem can be solved by reducing screen time or reading a book. The effects of technology on human and mental health could be large because it reduces performance levels during multitasking as compared to someone focusing on one

task at a time. For example, a person multitasking can have difficulty to filter relevant information and waste time searching for new information because he or she lost focus on another task. And listening to very loud music on phones could also lead to hearing loss among young adults. In addition, research reveals that the longer a person sits in front of a computer or TV the higher the chances of dying younger even if he or she does some kind of sports activity. Another study conducted in 2015 revealed that women who sat in front of their gadgets more than six hours a day were 37% more likely to die during the time studied than those who sat fewer three hours per day.

The future of technology lies in robots and these are mechanized tools created to perform tasks with more accuracy and speed. Today robots are used because of their intelligence, accuracy and extreme vitality to do assignments consistently without any flaws. The military for example, is using robots under difficult conditions that are actually hazardous for people to manage by themselves. Robots are also being used in providing security through video feed and facial recognition. In medical research robots are being used to perform heart surgery.

Not only that, self-driving cars are among the emerging technologies using robotic systems. “In recent years, more and more deep learning-based solutions have been presented in the field of self-driving cars and have achieved outstanding results” [Ni et al., 2020: 2]. A number of huge enterprises in collaboration with the scientific research institutions all over the world are striving towards making self-driving cars safer and more reliable. Tesla, Google, Apple, Audi, Nissan, BMW and a lot more have invested in the field [Greenblatt, 2016]. These cars are already equipped with sensors and are able to detect speed limits, traffic lights and signs.

In conclusion, technology is defined as the application of scientific knowledge for practical purposes in an industry. The evolution of technology which began as a science of industrial arts has transformed into more complex technological products and devices that have become vital to human life. Even though, it has proven to have both positive and negative effects on society. Technology has proven to be very important in our day to day lives, although it comes with a number of risks especially related to mental and health problems. As Christian Lous Lange says, “Technology is a useful servant but a dangerous master”. The future of technology lies in robotics which are the tools designed to perform tasks with more accuracy and speed. But the question is – will mankind give up all jobs to robots and stop living and dissolve into the digital world? Our lives are being transformed by the use of technology but will they be able to be lived by it.

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UDK 330

## **SOCIETY 5.0, OR SUPER SMART SOCIETY: THE MAIN GROWTH STRATEGY FOR JAPAN**

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***Abstract.*** *The article considers the main growth strategy of Japan, called Society 5.0, which was presented as a core concept in the 5<sup>th</sup> Science and Technology basic plan, adopted by the Japanese Cabinet in 2016. The concept of Society 5.0 is explained. Main prerequisites of creation of this strategy are described and key problems Japan should cope with during the implementation of Society 5.0 are also analyzed.*

***Keywords:*** *digitalization, digital economy, Japan, Society 5.0, sustainable development.*

Rapid developments in the search, collection, storage, manipulation and transmission of digital data by information and communication technology (ICT) are revolutionizing the way we work, learn and live. Due to increased connectivity, instant communication and established infrastructure systems, the rate at which new technologies get adopted by consumers is rising dramatically.

In the modern world new ideas and products can spread at speeds never seen before (see Fig. 1).

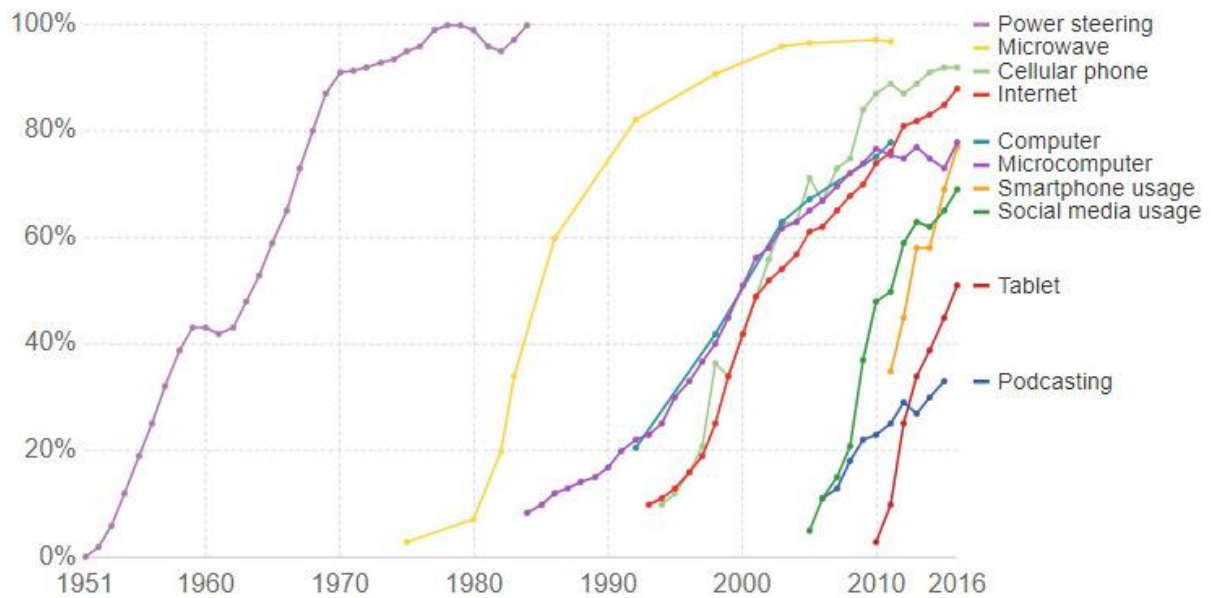


Figure 1. The rising speed of technological adoption [Visual Capitalist, 2018]

So, in recent years more and more inventions entered the market very quickly. Innovations of the 4<sup>th</sup> Industrial revolution, such as IoT, Big Data, AI, robotics, etc. has already brought significant changes to the process of industrial production. Japan took the idea of Industry 4.0, enlarged it and adapted the concept to its own needs.

That is how Society 5.0 was created.

The idea of Society 5.0 is that processes of informatization, digitalization and robotization should change not only the industrial sector, but society in general. Super Smart Society focuses not on digitalization itself, but on the fact that humans must remain central to the future development of the country.

Society 5.0 was presented as a core concept in the 5<sup>th</sup> Science and Technology basic plan, adopted by the Japanese Cabinet in 2016. This concept is created through the cooperation of Japanese Government and Keidanren (Japan Business Federation).

According to 5<sup>th</sup> Science and Technology basic plan, mankind had gone through several stages of social development (see Fig. 2). Society 1.0 is the Hunting Society, the main feature of which is coexistence of human and nature. Society 2.0 is the Agrarian Society based on agricultural cultivation and creation of first settlements. Society 3.0 is the Industrial Society built on the basis of Industrial Revolution and the start of mass production. Society 4.0 is the Information Society connected with invention of computers and information networks. The next stage is the Society 5.0, or Super Smart Society. It is a society based on a combination of cyber space – the information – and the physical space – the real world [Granrath, 2017].

The objective of Society 5.0 is to create human-centered society where individuals can appreciate a high quality of life paying little respect to their age, sex, dialect, area, etc.

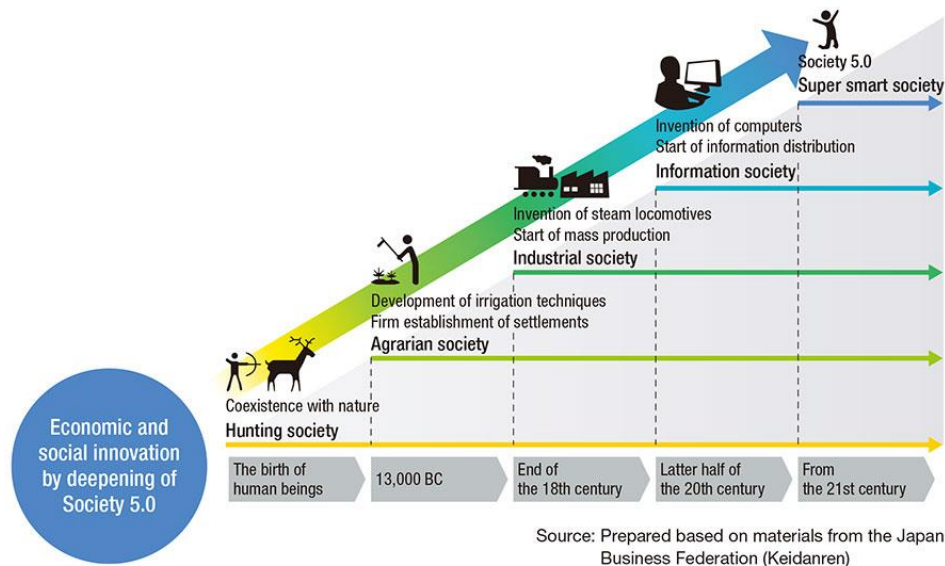


Figure 2. Stages of human social development [Fukuyama, 2018: 49]

Creation of this concept is caused by several challenges Japan should cope with these days. Firstly, it is aging of the population and shrinking labour force. The aging of Japan is thought to outweigh all other nations, with Japan having the highest proportion of elderly citizens. The dramatic aging of Japanese society as a result of low fertility rates and high life expectancy is expected to continue. Less people are able to work, consequently, long work hours have turned into an issue. Moreover, people may leave the workforce for reasons such as looking after their elderly relatives.

Computerization by man-made brainpower (AI) and mechanical technology is required to reduce the lack of labour force. Secondly, while tax revenues decrease, the consumer population becomes increasingly dispersed. Declining birthrate and aging of the population lead to a reduction in population density in regional cities and suburbs. Thus, basic infrastructure services, such as water, energy, education and medical services need to be provided to large, low populated areas. This results in higher infrastructure service costs [Ónday, 2019].

Another problem is there has been an undeniable increase in social and gender inequality in Japan. In 2015 Japan had a per capita income of 38,88 USD [GDP per Capita by Countries, 2017], which ranked it #22 among 188 countries and it ranked 17 in on the Human Development Index [Human Development Reports, 2017], yet its Gender Inequality Index rank was #21, relatively high for such a developed nation [United Nations Development Programme (UNDP), 2018]. This disparity between welfare achieved and gender inequality is caused by high power of gender norms and family values. The last but not the least challenge for Japanese society is environmental issues. The main point here is that transition to renewable energy requires to lower the price of the renewables and deliver low-cost energy to sparsely populated regional cities and suburbs.

Realizing a new economy and society will require breaking through several restrictions called “five walls” (see Fig. 3). The first wall is the wall of the ministries and agencies which implies formulating national strategies and governmental support of the initiatives. The second wall is the wall of the legal system which

means developing laws toward implementation of innovative technologies. The third wall is the wall of technologies. The population should be ready for the effective use of digital technologies in different spheres of life. This requires certain knowledge and skills. To solve the problem, an education reform and an increase in information literacy are needed. The fourth wall is the wall of human resources which implies engaging of all citizens in the new economy and society. The fifth wall is the wall of social acceptance which means the public should accept this concept and support its implementation.

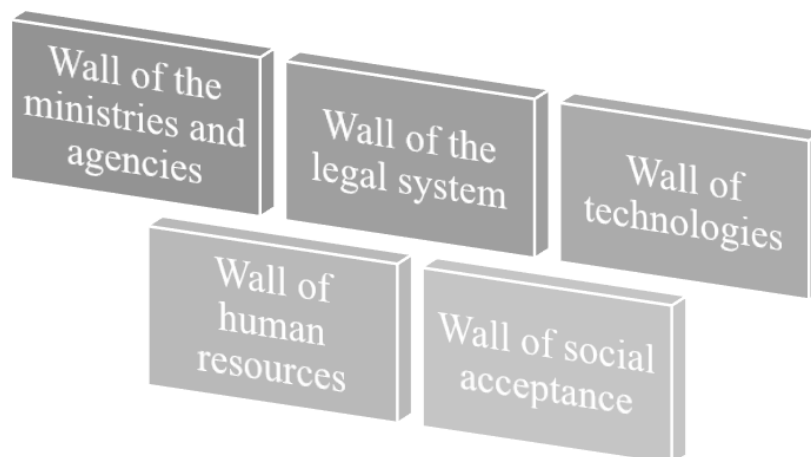


Figure 3. “Five walls” of implementing Society 5.0 concept [Harayama, 2017: 12]

Breaking through the walls listed above requires participation not only by experts but the society as a whole, especially women and young people. In other words, it is important to increase the number of people working under their own initiative and acting as game changers. To create such an environment and ecosystems not only government but also industry and academia are expected to play a leading role.

Finally, it may be concluded that Society 5.0 strategy is aimed to create a society where people enjoy life to the fullest. It is important that this concept is not restricted only to Japan, as its objectives are equivalent to those of the United Nations’ 2030 Agenda and Sustainable Development Goals (SDGs) as its core. The frameworks and technologies created while implementing Society 5.0 in Japan would contribute to resolving social challenges worldwide.

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UDK 821.521

## JAPANESE COMICS MANGA AS A MEDIA COMMUNICATIVE PHENOMENON

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***Abstract.*** *The article deals with Japanese manga comics from the point of view of modern media communications. The history of the emergence and development of manga is briefly described, its stylistic features are considered. More attention is paid to the media communicative features of manga, its influence on other modern media and its interaction with them.*

***Keywords:*** *comics, communication, manga, media, mass media.*

Manga is an integral part of the popular culture of modern Japan. "Without knowledge of the manga phenomenon, it is difficult to truly understand Japan and its people" [Katasonova, 2012: 59]. Manga (漫画, マンガ) f., fold. – Japanese



comics, sometimes called komikku (コミック) [Ivanov, 2001: 230]. The author of the manga is called a mangaka.

It is unambiguously impossible to translate the word "manga". Manga is often translated as "caricature" or "grotesque", "strange (or funny) pictures" [Ivanov, 2001: 11; Katasonova, 2007: 70–81]. The literal translation is "funny pictures". In turn, "The hieroglyph man consists of the characters "water" + "expand"; the hieroglyph ga means "picture", "drawing". Previously, this combination had the meaning of "flood", now it means "inexorably", as well as "accidentally", "involuntarily" [Denisova, 2014: 1].

The history of the emergence of manga, not only as a concept, but also as a cultural and media communicative phenomenon, still causes serious discussions. Within the framework of this article, we will limit ourselves to a brief overview of the two main approaches to studying the history of the appearance and development of manga. The first one, the traditionalist one, claims that manga is, if not purely, then definitely in many ways a national phenomenon, rooted in traditional Japanese culture. The second one, the Western one, quite clearly and reasonably states that manga is the result, if not of the purely direct influence of Western mass culture, then at least the result of a serious and deep mix of both cultures. Note that each of these approaches has its own evidence base, but, both rather do not contradict each other, but complement each other, making it clear that manga, having deep roots in the national Japanese culture in its modern form, arose, having experienced a serious influence Western pop culture, primarily American.

Manga in its present form was formed in Japan in the period after the end of World War II. Today, like decades ago, manga, for the most part, are black-and-white comics printed on cheap and thin paper. But there are exceptions. Typically, manga is published in manga magazines that come out weekly, biweekly, or monthly. Such magazine is focused on its target audience, which is determined primarily by sex and age. Each new chapter of a manga (series) published in such magazines consists of 15-25 or more pages. The most popular series are reprinted as separate manga volumes – tankōbon, containing about 200 pages. Both weekly collections and tankōbons are printed with color covers, and popular manga series are given the right to publish a color spread.

Manga is considered a national treasure in Japan. It is read by absolutely all Japanese, regardless of their sex and age. This is explained not only by the targeting of manga and the fact that manga are visually pleasing and attractive stories for the eyes of readers with a catchy and intriguing, interesting plot, but also by the fact that Japanese traditional culture has several its own characteristics, associated primarily with methodology of national writing and reading. The Japanese language is difficult to write, remember and read. Even in the early Middle Ages, almost all Japanese texts began to be supplemented with accompanying pictures that described the main content of the text. Almost everyone, even illiterate people, could understand such pictures. That's why Japanese traditional culture has always paid great attention to the fine arts and calligraphy skills.

This attitude of the Japanese towards manga, its popularity is a clear example of the attitude towards comics in different countries of the world. "If the European

intellect perceives the transition from text with illustrations to pictures with captions, i.e., to comics, as a sign of decline, then from the point of view of the classical Far Eastern tradition, the decline is indicated precisely by the collapse of a single semantic space – literature into textual and graphic components" [Katasonova, 2012: 59].

Unlike Western comics, manga is a kind of cry from the author's soul. A detailed disclosure of the inner world of each of the characters in the story gives the reader the opportunity to look at the story through the eyes of the protagonist. Such stylistic devices as close-ups and large shots, vividly depicted emotions and half-empty, and often completely empty backgrounds help to reduce the distance between the reader and the character and better involve the reader in the story. When we do not see the frames filled with visual information, we ourselves think out the missing elements, thereby becoming involved in what is happening. There is a state of unity between the hero and the reader.

Another style feature of the manga that helps the reader to better focus on the story is its black and white format. The absence of a bright and colorful palette not only keeps the reader's attention from reading, allowing him to concentrate on the story itself, but also gives him a wide scope for imagination in terms of the color scheme of characters, backgrounds, and effects.

However, it is fair to say that all the above style features of the manga are largely due to the format of its release: the need to draw more than twenty pages every week dictates its own rules of work. With such intensive work, the mangaka and his assistants are physically simply unrealistic to detail each frame in detail.

Comics – American (European to a lesser extent, but this process also applies to them) – are serious players in the market of brands of media images [Dmitrieva, 2016: 55 p]. This statement is also true for the manga.

Speaking about manga as a media today, it is difficult to overestimate its influence on other modern media. Manga, to one degree or another, not only influenced the emergence, formation, and development of a few modern industries, but also formed completely new cultural, social and at the same time media phenomenon. Thanks to the manga, "a whole business area has been formed and is actively developing, including the production of so-called related products (starting with children's toys – the heroes of favorite tapes) and the widespread use of anime in the production of advertising products for adults, especially in the service sector" [Katasonova, 2012: 8]. It is largely thanks to manga that such already world-famous cultural phenomenon as anime and cosplay have arisen and developed for a long time.

Japanese game cinema has fully adopted the aesthetics, storylines, and even editing and compositional features of manga. Foreign cinema has also been influenced by manga and anime. "It is enough to name the work of the world-famous directors of the Wachowski brothers, who have repeatedly admitted that they created their famous "Matrix", trying to reproduce in the cinema the Japanese anime "Ghost in the Shell", the fundamental basis for which, in turn, was the manga "Division Armor" created by Shiro Masamune.

Another modern derivative of manga is the video games. Manga gave rise to a new, commercially successful genre of computer games in the "Online" system, called MMORPG (Massive multiplayer online role-playing game). "This genre attracts, on

the one hand, people who are traditionally passionate about computer games, on the other hand, those who are in principle indifferent to classic computer games but tend to stay in the virtual universe and meet like-minded people there" [Katasonova, 2007: 70]. The great popularity of this genre is also largely determined by its visual and stylistic component. In fact, it is directly borrowed from Japanese manga and anime style.

Manga is actively used as an educational medium. In Japan, the practice of publishing study guides in the form of manga has long been common. Such manga manuals are quite in demand not only in Japan, but also in other countries of the world, and this is understandable: the visual method of storytelling, unlike textbooks, is accessible and, most importantly, quickly explains the difficult and rather voluminous educational material.

At the same time, many Japanese teachers and psychologists are sounding the alarm about the wide spread of both mass culture and the main modern medium – the Internet. Of particular concern today is the replacement of the reader's culture with a screen one, where not only a flat image prevails, but also a flat perception: not going deep. The distribution of manga in Japan, in their opinion, results in the formation of flat thinking, because the artistic image is replaced only by its conditional projection, the stereotypical designation of a particular character. The very bulk of the thought process comes down to operating with pictures. They believe that schoolchildren who devote their free time to looking at pictures in comics not only lose the skill of real reading, but also unlearn how to freely express their thoughts and feelings, and then, to some extent, lose the very ability to think deeply, expand and experience.

It can be concluded that manga is used almost everywhere: in the election programs of political parties, and instructions for using everyday appliances – there are no boundaries of what is permitted [Katasonova, 2012: 59]. Unfortunately, manga is taken seriously only in its homeland - in Japan. Outside of Japan, manga is still not considered as a high literature and promising media. In the modern media space, manga, unfortunately, continues to be associated with entertaining reading. The problem of piracy and scan late has an extremely negative impact on the commercialization of manga and its monetization as a media. All the above does not allow foreign specialists in advertising and PR to successfully use manga as an effective tool for advertising and media communications.

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UDK 712.3

## THEORETICAL ASPECTS OF GLOBALIZATION

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***Abstract.*** This article examines the theoretical aspects of globalization, a process that has a profound impact on the global economy, culture and society. Globalization is a complex system of international relations in which nation States, transnational corporations and international organizations interact with each other. Theoretical approaches to globalization include different views such as neoliberalism, structuralism, constructivism, and Marxism. The article analyzes the

*key concepts and theories related to globalization, and their impact on the modern world.*

**Keywords:** *globalization, theoretical aspects of globalization, world economy, culture, society.*

### **The concept, essence and main features of globalization**

The term "globalization" is one of the most commonly used in the modern theory of international relations. In particular, it plays a crucial role in differentiating the concepts of world and global politics [Alyabyeva, 2019].

Globalization is understood as a process of integration of the national economy with the global economy. It integrates the national economy and business and boosts the economic, socio-cultural, demographic, political, technological and environmental interdependence of various places around the world.

The driving force of globalization is international trade, investment, information technology and the free market economic system. This gave the domestic market global competition [Aleshkovsky, 2021].

Globalization promotes interdependence between countries because it assumes that no country can have all the necessary products and services on its own. International trade/sales are encouraged, but government intervention has no stopping effect. Basically, globalization includes:

- The economic interdependence of the countries of the world;
- Integration of national economies into one global economy, and national business into a global business;
- Free movement of goods and services across borders;
- Free movement of capital, workforce and technology across national borders;
- Integration of culture, technology, values and management;

Globalization is not a single static process. This happens at different levels of intensity, depending on the country and the season.

In general, globalization has the following features:

- constant transformation and development;
- creation of commercial blocks;
- social, economic and political integration;
- increased international capital flow;
- creation of multinational companies;
- reducing barriers (social, political and economic);
- reduction of travel time distances;
- high speed of information transfer.

Types of globalization:

The main types of globalization that affect all others are:

#### 1. Economic globalization

Today we can have a snack at the KFS or take a ride in a Volkswagen. These products of American and German origin are respectively available, they can be easily found and bought on the Russian market.

That's what economic globalization does: it takes us to other countries, even though we are not actually there – or, if we want, it brings other countries to us. This became possible only thanks to economic blocs and agreements, the emergence of multinational corporations (the mentioned products, although of foreign origin, are produced here) and achievements in the field of communications and transport [Boyak, 2018].

## 2. Globalized information

The advent of the Internet has allowed the exchange of ideas and information at a speed never seen before. The news comes in real time. Everyone can know and follow what is happening on the other side of the world at the same time as the people who live there.

The Internet fits perfectly into a globalized market. Today, we can buy a product, for example, in China, and deliver it to our home, while the entire purchase and payment process is carried out via the Internet.

## 3. Cultural globalization

Another very important aspect of globalization is culture. The Internet allows us to attend classes in any language with native-speaking teachers at home. The popularization of air travel and the reduction of migration barriers (which, of course, vary from country to country) make it possible to ensure a large flow of people to different parts of the world [Boychenko, 2018].

So, in careful considering, globalization turns out to be a complex phenomenon associated with a number of difficulties. The impact of globalization is felt most strongly when it comes to identity, whether it is an individual or a community. Although globalization can have positive effects, this phenomenon needs to be critically assessed to ensure that its negative effects are understood, studied and effectively addressed. Given the various aspects related to globalization, it is easy to conclude that there is no single way to study such a complex phenomenon as globalization.

### **The history of globalization of the world economy**

Globalization is not a new phenomenon. Today's globalization has gone through various stages that began in ancient times. People have always moved from one place to another for the purpose of trading. They exchanged goods, skills and ideas with other people from history.

Here are some examples:

**The Silk Road:** Throughout history, Eurasia has been one of the important lines of communication and trade connecting with China. This route or path is now called the Silk Road. While trading, people shared their knowledge, ideas, culture and beliefs along the way.

Traders walking along this road are connected not only with trade, but also with intellectual and cultural exchange. Silk was a more expensive and luxurious product that was traded between East and West along this road. Besides silk, many products were traded, such as fabrics, spices, grains, vegetables, fruits, etc.

**Spice trade:** The spice trade was conducted from the 7th to the 15th centuries by Islamic merchants in the Middle East. Islamic merchants traded spices from the Middle East to East Asia. The main purpose of this trade was to spread the Islamic

religion. As a result of this initiative, we can see a country like Indonesia, whose population is Muslim majority.

Spices were the predominant product of the Islamic trade. The spice trade was mainly carried out by sea, and in the Middle Ages they were very focused on international trade.

The era of research: The XV - XVIII centuries were the era of research. During this time, European studies have connected East and West. It is believed that Columbus' discovery of America marked the beginning of the path of modern globalization.

At this time, the focus was on three things:

#### 1. Christianity

Christianity represents Western civilization. Based on this view, Western society has sought to spread its religion around the world and has achieved many successes.

#### 2. Civilization

Christianity was one of the means of spreading Western civilization all over the world. If we look at the countries of Africa and Asia, we will see that there are many areas where Christianity is especially popular. Although their ethnicity is different.

Western civilization is perfect, and the rest of religion and culture are barbaric. To validate this idea, they imposed their culture on these backward countries.

#### 3. Commerce

Stages in the history of globalization:

The first phase of globalization began mainly from the 19th century and lasted until the outbreak of the First World War, that is, until 1914. As a result of the Industrial Revolution, Great Britain influenced the world through its trade. Inventions such as steam engines and industrial looms have provided accelerated trade around the world. Global trade began in the true sense of this period.

Before this stage, the growth rate of world trade averaged 3% per year. However, after the industrial Revolution, world trade increased by 6%, and then increased by 14%. During this time, trade in these countries, in addition to England, France, Portugal, and the United States, has increased significantly. But England was everywhere. In other words, England has gained a huge advantage at this stage of globalization. Then came the First World War (1914), and all countries closed their borders again. Global trade has fallen again.

The Great Depression: After the First World War, gradual changes took place in each country, and world trade became limited. The result was a recession, which was also called the Great Depression.

The recession began in 1929 and ended at the end of the 1930 decade. This is a prolonged and widespread recession of the twentieth century. In the 20th century, the Great Depression was used as an example of the collapse of the world economy. The recession in the United States began after the stock market crash on September 4, 1929. Later, on October 29, 1929, this news spread to the world stock market, known as "Black Tuesday".

Global GDP declined by about 15% between 1929 and 1932. In some economies that recovered in the mid-1930s, the impact of the Great Depression on the economies of many countries continued until the outbreak of World War II. Then, after the Second World War, world trade practically stopped. However, this is not the end of globalization [Bandurin, 2018].

After the Second World War, another new chapter of globalization began under the leadership of the United States, and world trade increased again. This time, the "iron curtain" divided the whole world into two parts – the United States was in the lead at one end, and the USSR at the other. But in 1989, the Iron Curtain collapsed, and globalization received a rapid boost.

The EU's free trade and the rapid growth of U.S. trade in the early 1950s helped strengthen the global economy. On the other hand, the USSR increased its global trade in a similar way to the United States, but using centralized planning rather than free trade. This time, the global economy is returning to its old rhythm. Exports will increase again to 14% of world GDP, which was achieved in 1914.

Since the collapse of the Soviet Union, free trade has spread all over the world. The World Trade Organization was established to promote free trade around the world.

The world in which we now live is actually the fourth phase of globalization. The Internet is now the main driving force of globalization. Now we are talking more about the digital economy, such as e-commerce, digital services, 3D printing and so on.

However, negative globalization is also expanding, such as the adverse effects of climate change on Earth, cross-border cyber-attacks, terrorism, etc.

Thus, the globalization of the world economy has a long history, from ancient times to the present day. During this time, globalization manifested itself in various forms, including trade, strengthening economic, political and cultural ties between States. Modern globalization, which began at the end of the 20th century, is characterized by rapid information exchange and growing interdependence between different countries and regions of the world.

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## SECTION 3 CHEMICAL AND BIOLOGICAL SCIENCES

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### HEALTH BENEFITS OF POMEGRANATE: *PUNICA GRANATUM*

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**Abstract.** *The present paper deals with the effects of pomegranate on the human body studied in different aspects. The paper presents the results of the study and states that Punica granatum has been used to treat a variety of ailments in the Gulf region and near South for hundreds of years. It is used in cardiovascular disorders, diabetes mellitus, antimicrobial activity, GI disorders, prevents anemia, enhances digestion, encourages with bone repair, better for fertility treatments, strengthen digestive situation, and relieve pain.*

**Keywords:** *health, health benefits, pomegranate, Punica granatum, medicinal plant.*

#### **Introduction**

For hundreds of years, Punica granatum has been used to cure a range of illnesses throughout the Gulf area and the adjacent South. This has been used to cure diseases including lesions and holiday stomach ache [Zarfeshany et al., 2014]. Punica granatum extract includes antioxidants such as anthocyanin and pelagic acid, as well as gallic acids and flavonoids like Quercetin, which help to prevent diabetes, heart disease, osteoarthritis, and poor knees, as well as different forms of cancer [Gil et al., 2000; Newman et al., 2007; Ercisli et al., 2011].

#### **Punica granatum's Health Benefits**

##### **1.1. Cardiovascular Disorders**

Punica granatum is cardio protective. Hardening of the arteries, one of the leading risk factors for heart disease, has been shown to be reduced. It reduces the risk of blood vessel blockage, which may result in reduced blood supply to the heart and brain [Bhowmik et al., 2013].

Punica granatum juice reduces artery abnormalities and inflammation in heart patients. It prevents vital fluid from coating and forming deep vein thrombosis. This acts as a fluid attenuator, allowing uncontrolled fluid circulation in the veins [Holland et al., 2009].

Punica granatum extract contains a high concentration of polyphenol antioxidants. Furthermore, recent research in mice and human models has shown that it has anti-atherogenic, anti-hypertensive, and anti-inflammatory properties. High blood pressure would be the most common disease in human clinical treatment. It is also found as a comorbidity with heart disease and diabetes, and the majority of patients do not appear to be receiving treatment. Pomegranate juice reduces systolic blood pressure by inhibiting enzyme degradation of serum angiotensin [Hashemi et al., 2010].

### **1.2. Diabetes Mellitus**

Although Punica granatum juice contains refined sugar, it does not raise blood glucose levels in the same way that other fruit juices do [Newman et al., 2007]. Punica granatum juice scavenges free radicals in the body and helps to prevent the onset and progression of diseases such as cancer. Its high antioxidant content boosts leukocytes' ability to remove toxins from the body and promotes a healthy, long-lasting immune system [Lansky and Newman, 2007]. Because of its potential to inhibit cancer growth, pomegranate fruit has been shown to be useful in the treatment of several human prostate cancers. It aids in the activation of pro-apoptotic proteins (Bax and Bak) while inhibiting anti-apoptotic proteins (BclxL and Bcl 2). Furthermore, pomegranate fruit extract inhibits NFB development and cell feasibility in prostate cancer cell lines, it has been shown to inhibit the development of NFB and cell feasibility in prostate cancer cell lines. Polyphenols found in sour juice and pomegranate oils have been shown to inhibit the growth of LNCaP (epithelial cell line derived from human prostate cancer), PC 3 and DU145 human prostate cancer cells. Changes in cell phase length and apoptosis induction were responsible for these differences. Furthermore, oral treatment of pomegranate fruit extract to nude mice implanted with androgen-sensitive CWR22RV1 cells reduced serum prostate-specific antigen [PSA] levels and prevented tumor growth. Furthermore, the recent improvements in NFIB performance throughout androgen dependence on androgen autonomy in the LACP4 [Malik et al., 2005; Rettig et al., 2008].

### **1.3. Antimicrobial Activity**

Punica granatum juice contains anti-microbial and anti-viral properties that fight against viruses and bacteria. It aids in the reduction of microorganisms discovered in the mouth, which is a major cause of cavities and anaerobic bacteria infections [Yamasaki et al., 2006].

### **2.4. GI Disorders**

Punica granatum juice is used in the treatment of diarrhea and dysentery because it performs an important function in the production of enzymes that aid digestion [Chauhan et al., 2008].

### **2.5. Prevents Anemia**

Anemia is a condition characterized by deficiency of red blood cells in the body. Remarkably, Punica granatum juice contains a lot of Fe, attempts to fix the neutrophil deficit throughout the body, if any [Bhowmik et al., 2013].

### **2.6. Enhances Digestion**

Punica granatum juice is used in stomach problems. This juice increases appetite and could even influence thirst. It also relieves urinary tract infection and helps to ease the urination. Punica granatum improves digestion [Pan et al., 2019].

## **2.7. Promotes Bone Healing**

Punica granatum juice promotes bone healing. Thus it is extremely important for people who suffer from osteoarthritis, a serious illness defined by a collapse of the soft tissue of the joint [Liu et al., 2017].

## **2.8. Role in Fertility Treatments:**

Punica granatum juice extract is used in pregnancy period. This is a rich source of minerals and supplements. Folic acid, for example, would be an important part of a prenatal diet. Punica granatum juice's anti-inflammatory properties help to maintain a healthy blood flow, which is essential for the embryo's proper development. Potassium extract use may also help to avoid future muscular cramps, which are closely linked to delivery [Zeweil et al., 2013].

## **2.9. Relieve Pain**

The anti-inflammatory effects of Punica granatum are derived from its significant vitamin C levels, which helps regulate asthma, sore throat, cough and wheezing [Hadipour Jahromy and Mozaffari Kermani, 2010].

## **2.10. Benefits of *Punica granatum* in Skin Problems**

Punica granatum juice might be a hidden pill for healthy, colorful and young skin [Pacheco-Palencia et al., 2008]. Many biological problems, such as photo-aging and skin cancer, are caused by infrared radiation from the sun. These photons cause DNA damage, protein oxidation, and metalloproteinase matrix activation. One study looked into the effects of pomegranate juice extract and oil on mediated UVB damage. On the other hand, topical therapy with 10 micromol / L ellagic acid reduced the production of pro-inflammatory cytokines IL 1 and IL 6. Stirring lymphocyte invasion in the intercellular space of SKH 1 hairless UVB susceptible rodents has been prevented for eight weeks [Syed et al., 2006].

A diet rich in Punica granatum juice can help to delay the aging efficiency by eliminating appearance of wrinkles on the face due to continual sun exposure. It also helps maintain skin tissue repair and inhibits redness and dark spots [Al-Muammar and Khan, 2012].

Punica granatum juice is very good for dry skin. Its tiny crystal mass absorbs highly into the epidermis and provide sufficient skin moisture and water intake to the skin. It relieves dryness and skin redness. Punica granatum juice is beneficial for oily and pimple prone skin too. Application of Punica granatum juice on oily skin prevents the outbreak of pimples and controls the production of sebum [Albrecht et al., 2004].

Punica granatum is even considered to prolong an existence of the erythrocyte involved in the formation of cartilage and hemoglobin which stabilize the epidermis and inhibit the spread of age spots. Erythrocyte and hemoglobin provide stability to the skin when the filaments of collagen and elastin decompose, the skin starts to develop a sloppiness that causes creases and wrinkles. Pomegranate is also quite helpful for softening the tone of the skin. Having a glass of Punica granatum juice every day gives the skin a fair and radiant color [Barman et al., 2011; Raganathan et al., 2019].

Punica granatum contains anthocyanin and hydrolyzed tannic acid having powerful pro-oxidizing agent - pro-tumor-encouraging properties. The polyphenol booster found in Punica granatum prevents the development of skin cancer [Aslam et al., 2006]. Punica granatum helps to protect the epidermis and dermis by promoting the regrowth of skin cells and enabling the blood flow of healing skin [Bhansali, 1990].

Absorbing Punica granatum contains chemicals that protect the skin from free radical damage caused by UV damage, cancer, and sunburn. Punica granatum oil includes the antioxidant ellagic acid, which can help to prevent skin cancer by interacting with skin malignancies. [Akhtar et al., 2015]. Punica granatum can prevent sun damage-related hyperpigmentation, age spots, fine lines, and wrinkles [Lan et al., 2017]. Punica granatum can help skin seem tighter, smoother, and more young by slowing the ageing process and producing more elastin and collagen [Klein, 2011].

### **Degenerative Joint Disease**

The most common aspects as inflammation were osteoarthritis and its major systemic crippling knee disease, which may influence the joint function and satisfaction throughout existence of clients. It is often controlled through anti-inflammatory molecules like IL 1 and TNF- $\alpha$  [Hadipour Jahromy and Mozaffari Kermani, 2010]. Many people around the world can be affected with stiff joints inflammation. Essential mediators of Stiff joints pathogenesis are TNF- $\alpha$ , IL 1  $\beta$ , MCP1, overexpression nitric oxide tyrosine [iNOS] and COX 2 active products of p38 MAPK and NF- $\kappa$ B. Pomegranate extract has been shown to minimize the occurrence and duration of collagen-induced arthritis in the mouse. The incidence of arthritis, rheumatoid arthritis and IL 6 was considerably diminished in the Punica granatum sample given to rodents [Georgiev and Angelov, 2019].

### **Fungicide**

As the sensitivity of bacteria to fungicide drugs increases, herbal medicines were regarded as potential tools. Punica granatum was generally accepted for its antimicrobial activity. Strong peel powder of Punica granatum has been shown to have a high inhibition of *Candida albicans* growth. Punica granatum extracts mostly on *Candida* genome yeast have been shown to cause disease in the immuno-suppressor host. Methicillin-resistant *Staphylococcus aureus* [MRSA] and other methicillin-resistant bacteria *Staphylococcus aureus* [MSSA] [multiple resistant cure] generates a toxin called pantothenic leucocidin [PVL] that can develop to PVL resistance, which can lead to increased morbidity and death. The combination of pomegranate peel extract with Cu [II] ions has been shown to have enhanced antibacterial action against extracted MSSA, MRSA, and PVL. *Escherichia Coli* is one of the most common etiological bacteria in urinary tract infections. Ethanol extract has been found to have strong antibacterial action against *E.coli* [Kahramanoğlu et al., 2018; Srinivas, 2013].

### **Senile Psychosis**

Hartman et al. have shown that mouse fed with Punica granatum juice have fifty percent fewer reactive aggregation of A $\beta$  42 and oligomers throughout the hippocampus, that could be known to improve senile psychosis [Fotuhi et al., 2009].

### **Cicatrization**

The use of Punica granatum fluid as well as flowers displayed a substantial decrease throughout the injury site and improved another well-organized collagen, fibroblast and very few inflammatory responses. Abilities of accelerated acute wounds and period of wound contraction, collagen and protein production were documented in hydro alcoholic Punica granatum extract [Amri et al., 2017].

## Conclusion

*Punica granatum* has been utilized for therapeutic uses in the Gulf region and near South for hundreds of years. It has a lot of health benefits as cardiovascular disorders, diabetes mellitus, antimicrobial activity, GI disorders, prevents anemia, enhances digestion, strengthen digestive situation, and relieves pain. Also, *Punica granatum* is used in a range of pathologies as skin problems, anti-aging advantages, and suited for all skin types, helps to treat wounds, and that enhances the skin texture. However, *Punica granatum* is used in facial treatment also for beautiful face, in protecting skin leukemia, regenerate cells, defend from the heat, control aging, and generates glowing look. There are many other benefits of *Punica granatum* in degenerative joint disease, atrophic rheumatism, fungicide, senile psychosis, miasma, and in cicatrization.

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## **MODERNE ANSÄTZE ZUR MIKROBIOLOGISCHEN KONTROLLE VON ANLAGEN IN EINEM BIOTECHNOLOGISCHEN UNTERNEHMEN**

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***Annotation.*** *In diesem Artikel wird das Problem der Überwachung von Geräten in einem Biotechnologieunternehmen behandelt. Man beschreibt die Anwendung verschiedener Schnelltest-Systeme, die es ermöglichen, ein schnelles Ergebnis über den hygienischen Zustand der Ausrüstung in der Produktion zu erhalten. Die erhaltenen Daten der Untersuchung können weiterverwendet werden, um eine Reihe von Maßnahmen führen, um den Zustand der Produktionslinien und die Qualität der durchgeführten präventiven Maßnahmen in den Unternehmen der Lebensmittelindustrie zu überwachen. Die beschriebenen Methoden können auch zur Kontrolle des Rohstoffs und des Endprodukts benutzt werden. Nach den Ergebnissen*

der gemachten Vergleichsversuche können die Testsysteme als beschleunigte Methoden zur Kontrolle der mikrobiologischen Kontamination angesehen werden.

**Schlagwörter:** die Express-Überwachungsmethoden, die Ausrüstung von biotechnologischen Unternehmen, die Bakterien der *E. coli*-Gruppe, die ATP-Ebene, RLU, mikrobiologische Kontrolle der Anlagen im biotechnologischen Unternehmen.

Die Lebensmittelprodukte, die bei der Verletzung von Hygienevorschriften hergestellt werden, können eine Gefahr für den Verbraucher darstellen. Schädlich sind dabei saprophytische, pathogene und toxische Mikroorganismen. Um eine Infektion des fertigen Produkts auszuschließen, werden alle Produktionsprozesse durch eine Reihe von Normen und Vorschriften geregelt [Tulkowa, 2016].

Die klassischen Methoden der hygienischen Kontrolle zur Identifizierung sind ziemlich langwierig, oft sind sie kostspielig und erlauben es nicht, die Produktionslinie im Moment zu kontrollieren. Für die schnelle Kontrolle wurden viele Testsysteme entwickelt, die die Durchführung von Schnelltests zur mikrobiologischen Kontrolle von Geräten, Rohstoffen, Sauberkeit der Produktionsräume, Händen und Kleidung des Personals sowie des fertigen Produkts ermöglichen [Batsukowa, 2011].

Das Ziel der vorliegenden Studie besteht darin, die modernen Ansätze zur mikrobiologischen Kontrolle von Anlagen von biotechnologischen Unternehmen zu finden und zu testen.

Bei der Untersuchung der Oberfläche der Ausrüstung werden die Proben mit einem Kratzen oder Abwaschen von einer bestimmten Fläche entfernt. Die Probenahme wurde an verschiedenen Stellen der Produktionslinie durchgeführt. Die nachfolgende Abbildung 1 zeigt eine schematische Darstellung der Produktionslinie und der wichtigsten Produktionsobjekte [Kowalewa, 2015].

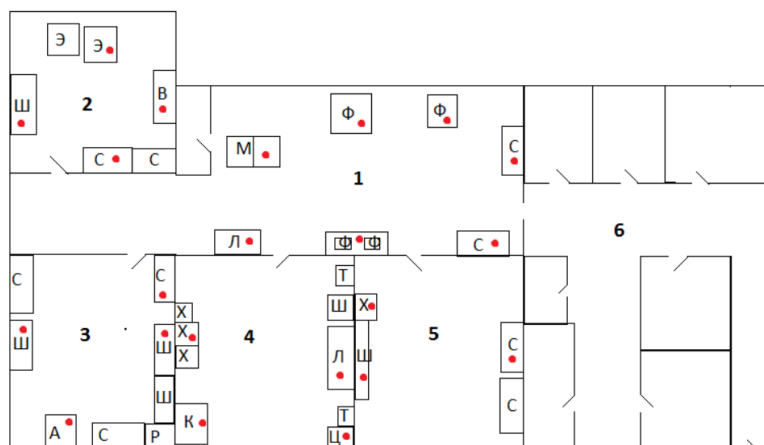


Abb. 1. Diagramm der Produktionslinie

**Die Deutung der Abbildung:** 1. Fermentationsraum; 2. Extraktorraum; 3. Autoklave; 4. Museum; 5. Apparatenraum; 6. andere Räume; III – Schrank; C – Tisch; X – Kühlschrank; Φ – Fermenter; M – Waschmaschine; Л – Lamina; Т – Nachttisch; Ц – Zentrifuge; K – Schaukel (Shaker); P – Spüle; A – Autoklave; Э – Extraktor; B - Abzugshaube.

Die Probenahmestellen sind in der Abbildung mit roten Punkten gekennzeichnet. Die Arbeit enthält die Ergebnisse nicht aller Studien. Folgende Objekte werden für die



Beschreibung ausgewählt: Fermenter (Fermentationsraum), Extraktor (Extraktorraum), Tisch (Autoklavenraum), Kühlschrank (Apparatenraum).

Die Waschungen wurden mit sterilen, angefeuchteten Wattestäbchen durchgeführt. Die Abspülung von den Wändenoberflächen und der Ausrüstung wurde von einer Fläche von 100 cm<sup>2</sup> genommen. Weitere Untersuchungen unter Verwendung von Schnelltestgeräten wurden gemäß den Anweisungen für jeden von ihnen durchgeführt.

Jede Art von Überwachung wurde gemäß den Anweisungen durchgeführt, die den Testsystemen von den Herstellern beigelegt wurden. Vor der Durchführung der mikrobiologischen Kontrolle wurde jedes Mal eine Hygieneuntersuchung der Räumlichkeiten durchgeführt.

Für die Untersuchung wurden die Proben verwendet, die von den Arbeitsflächen des Labors entnommen wurden. Nämlich sind das die Proben von der Oberfläche des Fermentierungsraums, des Extraktorraums, des Tisches im Autoklavenraum, des Kühlschranks in dem Apparatenraum.

Die Testsysteme Rapid 20E, *Api Listeria* und RAPID-ENTERO - 200 wurden verwendet, um das Vorhandensein von Enterobakterien und Bakterien der E. coli-Gruppe in den Produktionsstätten von *KMAFAnM* (das Kennzeichen der allgemeinen Bakterien-Wachstumsdichte, d.h. (die Anzahl der mesophilen aeroben und optionalen anaeroben Mikroorganismen) zu bestimmen. Der Zeitpunkt der Studie war bei Rapid 20E und der *Listeria Api* identisch.

Die während der Studie durchgeführte Analyse der Ergebnisse ergab, dass die Korrelation zwischen den Werten der wichtigsten mikrobiologischen Indikatoren – Bakterien der E. coli-Gruppe, *KMAFAnM*, ATP und Enterobakterien auf den Oberflächen, die mit den hergestellten Produkten in Kontakt kommen, erreicht wurde.

In der Tabelle 1 wird gezeigt, dass das Niveau der Indikatoren vor der Sanierung wie folgt war:

1. *KMAFAnM*  $2,6 \cdot 10^6 - 3,5 \cdot 10^7$  KOE/ml.
2. Bakterien der E. coli-Gruppe -  $4,5 \cdot 10^3 - 9,4 \cdot 10^4$  KOE/ml.
3. Enterobakterien -  $3,7 \cdot 10^4 - 7,2 \cdot 10^5$  KOE/ml.
4. ATP - 24 000...84 000 RLU.

Tabelle 1

Verhältnis *KMAFAnM*, Bakterien der E. coli-Gruppe, Enterobakterien und Gesamt-ATP vor der Desinfektion

dasObjekt	№ Proben	<i>KMAFAnM</i> ml	Bakterien der E. coli-Gruppe KOE/ml	Enterobakterien KOE/ml	ATP-Niveau, RLU
Fermentationsraum	1	$(3,6 \pm 0,3) \times 10^6$	$(7,1 \pm 0,6) \times 10^3$	$(3,7 \pm 0,4) \times 10^4$	41 000
	2	$(4,8 \pm 0,4) \times 10^6$	$(5,5 \pm 0,7) \times 10^3$	$(7,2 \pm 0,8) \times 10^4$	56 000
	3	$(3,4 \pm 0,2) \times 10^7$	$(8,2 \pm 0,9) \times 10^4$	$(3,2 \pm 0,4) \times 10^5$	84 000
Extraktorraum	1	$(4,2 \pm 0,3) \times 10^6$	$(2,9 \pm 0,4) \times 10^4$	$(7,8 \pm 0,9) \times 10^4$	24 000
	2	$(3,7 \pm 0,2) \times 10^6$	$(4,5 \pm 0,6) \times 10^3$	$(3,8 \pm 0,5) \times 10^4$	25 000
	3	$(3,1 \pm 0,3) \times 10^7$	$(9,4 \pm 1,1) \times 10^4$	$(5,5 \pm 0,7) \times 10^5$	56 000
Tisch	1	$(4,5 \pm 0,4) \times 10^6$	$(7,2 \pm 0,8) \times 10^3$	$(4,8 \pm 0,6) \times 10^4$	31 000
	2	$(4,7 \pm 0,3) \times 10^6$	$(8,4 \pm 0,9) \times 10^3$	$(5,5 \pm 0,7) \times 10^4$	37 000
	3	$(2,6 \pm 0,2) \times 10^7$	$(5,2 \pm 0,7) \times 10^4$	$(7,2 \pm 0,9) \times 10^5$	34000
Kühlschrank	1	$(3,5 \pm 0,3) \times 10^7$	$(4,9 \pm 0,6) \times 10^4$	$(5,8 \pm 0,7) \times 10^5$	75 000

Die zweite Messung auf den Oberflächen des Fermentierungsraums, des Extrakorraums, des Tisches und des Kühlschranks wurde nach Desinfektionsmaßnahmen durchgeführt.

Wie aus der Tabelle 2 ersichtlich wird, hat sich die Anzahl der Mikroorganismen nach der Behandlung signifikant verändert:

1. Der *KMAFAnM* -Niveau ist nach der Sanierung auf  $0,2 \times 10^3 - 0,9 \times 10^3$  KOE / ml gesunken.
2. Bakterien der *E. coli*-Gruppe wurden nach der Sanierung praktisch inaktiviert, mit Ausnahme von Proben vom Fermenterraum.
3. Die Anzahl der Enterobakterien beträgt  $2,1 \times 10 - 7,8 \times 10^2$ . Als Ergebnis anhand dieser Daten kann man schließen, dass die im Unternehmen vorhandenen Desinfektionsmethoden verfeinert werden müssen.
4. Der ATP- Niveau ist auf 160 – 510 RLU gesunken.

Tabelle 2

Verhältnis von *KMAFAnM*, Bakterien der *E. coli*-Gruppe, Enterobakterien und Gesamt-ATP vor der Desinfektion

dasObjekt	№ Proben	<i>KMAFAnM</i> ml	Bakterien der <i>E. coli</i> -Gruppe KOE/ml	Enterobakterien KOE/ml	ATP-Niveau, RLU
Fermenterraum	1	$(0,6 \pm 0,05) \times 10^3$	nicht gefunden	$(0,7 \pm 0,1) \times 10^1$	240
	2	$(0,7 \pm 0,1) \times 10^3$	$(3,8 \pm 0,4)$	$(2,3 \pm 0,3) \times 10^2$	220
	3	$(0,7 \pm 0,1) \times 10^3$	$(3,7 \pm 0,5)$	$(7,7 \pm 0,9) \times 10^2$	510
Extraktorraum	1	$(0,9 \pm 0,1) \times 10^3$	nicht gefunden	$(2,1 \pm 0,5) \times 10^1$	170
	2	$(0,2 \pm 0,2) \times 10^3$	nicht gefunden	$(6,2 \pm 0,7) \times 10^1$	250
	3	$(0,8 \pm 0,1) \times 10^3$	nicht gefunden	$(7,8 \pm 0,9) \times 10^2$	470
Tisch	1	$(0,7 \pm 0,1) \times 10^3$	nicht gefunden	$(5,7 \pm 0,7) \times 10^1$	160
	2	$(0,6 \pm 0,1) \times 10^3$	nicht gefunden	$(8,5 \pm 0,9) \times 10^1$	430
	3	$(0,5 \pm 0,3) \times 10^3$	nicht gefunden	$(3,7 \pm 0,5) \times 10^1$	280
Kühlschrank	1	$(0,7 \pm 0,1) \times 10^3$	nicht gefunden	$(4,3 \pm 0,6) \times 10^2$	410

Die Tabelle zeigt, dass es eine direkt proportionale Beziehung zwischen der Anzahl der mesophilen aeroben und optional anaeroben Mikroorganismen und dem ATP-Niveau in den untersuchten Proben gibt.

**Fazit.** Die verwendeten Schnelltestmethoden können als modern angesehen werden, um das Ergebnis in kürzerer Zeit zu erhalten, was bedeutet, dass sie den Prozess an jedem Punkte kontrollieren können. Diese Methoden können auch zur Kontrolle des Rohstoffs und des Endprodukts verwendet werden.

Nach den Ergebnissen der durchgeführten Vergleichsversuche können die Testsysteme als beschleunigte Methoden zur Kontrolle der mikrobiologischen Kontamination in der biotechnologischen Produktion angesehen werden.

Die Analyse mit Hilfe von Schnellsystemen ermöglicht es, innerhalb weniger Stunden ein Ergebnis zu erhalten, ohne zusätzliche Bakterienkulturen zu säen und Hilfsmittel und Materialien zu verwenden

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UDK 612.39

### PREVENTION OF OBESITY IN ADOLESCENCE

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**Abstract.** *The article presents a description of preventive measures that allow a teenager to lead a healthy lifestyle, and, therefore, reduce the risk of morbidity. The study was conducted with the aim of theoretically substantiating the need to prevent obesity during teenage years. Special attention is paid to the fact that the negative elements of life are also recognized by doctors as one of the factors of obesity. The article reveals issues related to the organization of proper nutrition, which reduces the risk of chronic diseases. Based on the analysis of modern data, the work shows the negative impact of smoking on adolescents. At the same time, advertising of the food industry plays an important role in this aspect as well.*

**Keywords:** *obesity, overweight, teenager, smoking, advertising, proper nutrition, sport.*

The World Health Organization estimates that over a billion people are overweight worldwide. Obesity is a problem even in countries where most of the population is constantly hungry, and in industrialized countries it has long become a serious aspect of public health. This severe risk factor for cardiovascular disease significantly increases the likelihood of morbidity and mortality. This complex issue can arise even in childhood. It is better to start to take control of health before diseases onset.

### **Review of the state of the problem of obesity in adolescents.**

The current state of the problem of obesity in adolescents is of interest. Knowledge of modern aspects of the condition of the obesity issue allows informing adolescents about the need for a healthy lifestyle, which will reduce the risk of their morbidity. At the same time, the problem of childhood obesity has not been sufficiently studied. There is a lack of generalizing scientific works using metaanalysis and the level of evidence for existing recommendations for the prevention of children obesity is quite low [Vitebskaya, 2009: 15].

The latest data taken from the World Health Organization's site boosts the relevance of the issue: "Prevalence of obesity for children more than doubled over the last two decades" [<https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-obesity-setting-the-global-agenda-event-4-march-2021>]. All of the above indicates that the problem of adolescents overweight is relevant today even more than ever.

Among the main reasons for the sharp increase in weight, first of all, it is worth highlighting the imbalance between the energy expended and the food consumed. Excess calories that enter the body and are not consumed by it are converted into fat, which is accumulated in the fat "depots" of the body. This leads to an increase in body weight and disruption of the functioning of many body systems. According to O.V. Lerman, Yu.V. Lukina, N.P. Kutishenko, S.Yu. Martsevich, "the main cause of alimentary-constitutional obesity is an energy imbalance with a predominance of caloric intake over energy expenditure of the body" [Lerman et al., 2019: 28].

Negative elements of modern life are also recognized by doctors as one of the factors of obesity: a sedentary lifestyle, the use of sugar, and easily digestible carbohydrates, in particular from soda drinks, fruit juices, can be the main factor contributing to the development of obesity.

Along with this, the problem of proper nutrition requires special attention. A healthy diet helps teenagers grow and develop properly, which reduces the risk of chronic diseases, including obesity. In the short term, poor nutrition can be stressful and disabling, and over time can cause the development of certain diseases and other health problems. Thus, obesity is currently considered as a chronic metabolic disease, manifested in the adolescent body that causes an increase in its weight, mainly due to excessive accumulation of adipose tissue.

The causes of overweight are varied. By regularly overeating, a teenager exposes himself to obesity, restricts physical activity and a sedentary lifestyle, one of the factors contributing to the development of obesity. The main causes of the widespread progression of obesity, according to T.I. Romantsova, “changes in nutritional patterns, decreased physical activity, and urbanization” [Romantsova, 2011: 7]. Increasing physical activity and promoting healthy eating are cornerstones of the prevention and treatment of obesity.

Obesity is associated with the increased risk of smoking and frequent smoking in adolescents. In Russia, more than 15 percent of the average 13-15 years old smoke, although ten years ago the figure was 12 percent, the Ministry of Health reports, citing polls by VTSIOM and the Public Opinion Foundation. According to the results of surveys, on average, children start smoking at the age of 13, and the dependence on smoking in this group of adolescents is formed a little later - at the age of 15 [<https://rg.ru/2018/10/24/v-rossii-vyroslo-chislo-kurilshchikov-sredi-podrostkov-i-studentov.html>].

It should be emphasized that motivation is paramount to weight change, and physical activity is a factor in achieving sustained weight loss in a teenager. Obesity has a major impact on the health and self-esteem of adolescents and increases the risk of serious illness.

Self-esteem in overweight adolescents can change under social pressure. Ironic statements negatively affect self-esteem, cause complexes and further exacerbate the problem. They may compare themselves to other people and strive to be like them, for example, “normal weight” models, artists, or more popular peers. It is for this reason that the pursuit of self-esteem is the motivation for weight loss. Everyday sports, special exercise, proper nutrition and strong intrinsic motivation keep weight stable.

Social influence is a factor in the values of adolescents and the foundations of the immediate environment. Adolescents are inherently inherent in such a property as imitation, through which socialization occurs. In this regard, the teenager follows the norms and values of the company that he is in. And, if a cult of food is inherent for peers, the absence of the habit of leading a healthy lifestyle, then a teenager, following the example of his peers, will grow up the same. Peers affect almost every aspect of teen life, such as taste for music and clothes, to more serious ones, such as poor lifestyles.

There is a scientific consensus that the role – its structure, diet and habits, and socioeconomic status – is one of the most important in the development of obesity worldwide. Family eating habits and food choices are decisive factors that develop in adolescents. Parents' approach to food and their food choices are key factors in adolescent eating habits and taste preferences.

It is also generally recognized that food industry advertising is aimed at promoting unhealthy foods to teens. Advertising and other forms of marketing of food and drink to teens are widespread throughout the world and are marketing teens' eating habits, purchase requests and consumption patterns. Much of this marketing can increase the risk of being overweight.

As a result of studying various sources, the authors came to the conclusion that the problem of overweight among adolescents has plagued humanity for almost all of its history, and, despite persistent attempts to find a panacea for obesity, it has not yet been possible to overcome this disease with the help of the "super pill". A sedentary lifestyle, unhealthy diet, bad habits, lack of motivation, low self-esteem in a teenager can cause excess weight. In the article, the authors also focus on the role of the immediate environment, family, persons, whose values are shared by the teenager. The foregoing allows to conclude that knowledge of modern problems of obesity will inform adolescents about the need for a healthy lifestyle, which will reduce the risk of their morbidity. The prospect for solving this problem opens up the study of techniques that will help to get rid of excess weight effectively.

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## SECTION 4 LEGAL SCIENCES

UDK 347: 195.21

### PERSÖNLICHE FONDS ALS NEUE ART DER JURISTISCHEN PERSON

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***Annotation.*** *In diesem Artikel wird die kürzlich in die Gesetzgebung eingeführte Form einer juristischen Person untersucht – die Personenstiftung. Die Vorteile von persönlichen Mitteln und ihre möglichen positiven Auswirkungen auf die Erbschaftsinstitution in der Russischen Föderation werden in folgender Studie aufgezeigt und analysiert. Es werden von den Autoren die Unterschiede zwischen Privatvermögen und ähnlichen Organisations- und Rechtsformen betrachtet und beschrieben.*

***Schlagerwörter:*** *persönliche Fonds, juristische Person, die Erbschaftsfonds, die Erbschaftsinstitution, die Personenstiftung, Trust, Bürgerliches Gesetzbuch.*

Die innerstaatliche Gesetzgebung wird regelmäßig immer wieder aktualisiert. Ein solcher Prozess ist notwendig, da er ermöglicht, auf neue Bedürfnisse der Gesellschaft zu reagieren und gesetzliche Normen an moderne Anforderungen anzupassen.

Eine von diesen bedeutenden Aktualisierungen erfolgte vor relativ kurzer Zeit, als im Bürgerlichen Gesetzbuch der Russischen Föderation im März 2022 eine neue Organisations- und Rechtsform eingeführt wurde –persönliche Fonds. So kann gemäß dem Artikel 123.20-4 des Bürgerlichen Gesetzbuches der Russischen Föderation als einen persönlichen Fond: „eine einheitliche gemeinnützige Organisation, die für einen bestimmten Zeitraum oder auf unbestimmte Zeit von einem Bürger oder nach seinem Tod von einem Notar gegründet wurde, der das ihm von diesem Bürger übertragene Vermögen oder das von diesem Bürger geerbte Vermögen nach Maßgabe der von ihm genehmigten Verwaltungsbedingungen verwaltet“ anerkennen [Grashdanskij kodeks Rossiyskoy Federatsii (tschast pjerwaja) ot 30 nojabrja 1994 g. № 51-FZ].

Der Gesetzgeber hat außerdem festgelegt, dass der Erbfond als Unterart eines Personenfonds fungieren kann, d. h. eines, das nach dem Tod des Bürgers von einem Notar erstellt wurde, sofern ein entsprechendes Testament vorlag.

Die Analyse der einschlägigen Fachliteratur zum Thema der Studie hat gezeigt, dass unter Wissenschaftlern die Einführung von Regelungen zum Personenfonds in das Gesetz überwiegend positiv eingeschätzt wurde. So hebt W. W. Kosarewa die folgenden Vorteile eines persönlichen Fonds hervor:

- Es wurde so die Möglichkeit einer flexiblen Festlegung des Szenarios geschaffen, nach dem das Eigentum und Unternehmen vererbt werden.

- Es wurden die Bedingungen geschaffen, die es ermöglichen, das Vermögen vor der Zwangsvollstreckung zu schützen, was zu zusätzlichen Garantien für Familienangehörige sowie andere Erben führt.

- Es wurden damit die Bedingungen geschaffen, um die Möglichkeit zu gewährleisten, die Streitigkeiten zwischen verschiedenen Erben zu verhindern, insbesondere in Fällen, wenn mehrere von Familienangehörigen einen Pflichtanteil an der Erbschaft haben [Kosarewa, 2022: 30].

Yu.W. Swerdlowa äußert sich ihrerseits auch positiv über die Schaffung persönlicher Fonds und weist dabei auf deren Vorteile hin:

- Bisher wurden die genauen Parameter der Steuern in Bezug auf persönliche Mittel noch nicht bekannt gegeben.

- Die Vermögenswerte, die in einem Privatfond liegen, sind vollständig vor der Vermögensteilung infolge einer Scheidung geschützt.

- Das Eigentum an persönlichem Fondsvermögen ist vertraulich [Swerdlowa, 2023: 43].

Man vertritt im Artikel außerdem den Standpunkt, dass sich persönliche Gelder positiv auf das aktuelle Umfeld auswirken können. Ihr Zweck besteht im Kerne darin, die Bedingungen für den Besitz und die Vererbung von Betriebsvermögen sowie persönliches Eigentum zu schaffen. Gleichzeitig entsprechen die im Privatfond befindlichen Vermögenswerte und das Eigentum nicht nur den Interessen der Erben selbst, sondern auch der Person, die das Ganze besitzt.

A. N. Kapustin führte eine detaillierte Vergleichsstudie der Neuheiten der russischen Gesetzgebung im Bereich der Regulierung persönlicher Gelder mit der Gesetzgebung westlicher Länder durch, in denen die Praxis der Existenz dieser Art von juristischen Personen schon seit langer Zeit besteht. Der Wissenschaftler kam zum Schluss, dass das in Russland übernommene Modell die meisten Ähnlichkeiten mit dem in Deutschland seit 1896 geltenden Modell aufweist. Daher sind in beiden Ländern auf gesetzlicher Ebene keine klaren Ziele festgelegt, für die ein persönlicher Fond geschaffen werden kann [Kapustin, 2022: 58].

In der Russischen Föderation ist es gemäß den Bestimmungen von Artikel 123.20-5 Absatz 1 des Bürgerlichen Gesetzbuches der Russischen Föderation erlaubt, persönliche Mittel zu schaffen, die das Vorliegen von Bedingungen voraussetzen, die die Übertragung von Eigentum an Dritte aus dem unbestimmten Personenkreis ermöglichen. Dabei können auch die konkreten Umstände genannt werden, deren Eintritt für die Durchführung einer solchen Übermittlung erforderlich ist.



Ein unbestimmter Personenkreis kann einzelne, besonders gefährdete Bevölkerungsgruppen einschließen, die unter bestimmte Kriterien fallen. So kann eine Privatstiftung auch gemeinnützige Aktivitäten durchführen. Auf dieser Grundlage kann man den folgenden Schluss ziehen, dass die Differenzierung der Mittel in persönliche und gesellschaftlich nützliche Mittel keineswegs durch die Ziele bestimmt wird, für die sie geschaffen werden. So hat die Organisations- und Rechtsform der juristischen Person eine zentrale Bedeutung.

Da die persönlichen Fonds schon lange nicht mehr existieren, führt das in der Praxis zu Missverständnissen hinsichtlich der Abgrenzung zu anderen Organisations- und Rechtsformen. Die häufigsten Probleme treten in diesem Zusammenhang bei der Unterscheidung zwischen Treuhandverwaltung und Privatfonds auf. Bei beiden handelt es sich um die Werkzeuge, mit denen eine bestimmte Person ihr Vermögen schützen und für deren Sicherheit sorgen kann. Doch trotz der großen Ähnlichkeit der beiden betrachteten Begriffe weisen sie dennoch eine Reihe wesentlicher Unterschiede auf. Das offensichtlichste davon sind die Gründe, warum eine persönliche Grundlage und Vertrauen geschaffen werden.

Ein persönlicher Fond wird mit dem Ziel gegründet, von den Anlegern die Gewinne zu erwirtschaften. Bei der Gründung eines Trusts hingegen wird eine Vereinbarung getroffen, wonach alle Vermögenswerte im Namen des Begünstigten gehalten werden. Gleichzeitig hat der Begünstigte das Recht, die Rückgabe seines Vermögens zu verlangen.

Ein persönlicher Fond hat immer einen Eigentümer, der ein speziell für diese Rolle ernannter Manager ist, während ein Trust niemandem gehört und als unabhängige juristische Person fungiert.

Der letzte wichtige Unterschied besteht darin, dass ein Privatfond im Falle des Todes des Eigentümers in einen Erbfond umgewandelt werden kann [Rudik, 2022: 33]

**Fazit.** Zusammenfassend kann man aus dieser Studie schließen, dass die gesetzliche Konsolidierung einer neuen Art von juristischer Person – eines persönlichen Fonds – einen recht positiven Einfluss auf die wirtschaftliche Situation in Russland haben kann.

Die Rechtswissenschaftler äußern sich positiv über die Wirksamkeit persönlicher Fonds und weisen auf eine Reihe von Vorteilen hin, die diese im Vergleich zu anderen Organisations- und Rechtsformen haben.

Die Schaffung persönlicher Fonds wird in gewissem Maße eine Deoffshorisierung im Land ermöglichen. Man geht davon aus, dass das Vorhandensein einer solchen Möglichkeit für Einzelpersonen dazu beitragen wird, die Vermögenswerte innerhalb der Russischen Föderation zu behalten und deren Export ins Ausland in einer solchen Situation zu verhindern.

So ermöglichen die Erbfonds eine gewisse Verbesserung des Erbschaftsverfahrens, indem unnötige Streitigkeiten zwischen Erben vermieden werden.

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UDK 341.1

## THE INTERACTION BETWEEN THE INTERNATIONAL AND NATIONAL HUMAN RIGHTS PROTECTION SYSTEMS

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**Abstract.** *Based on the study of human rights issues, the article raises the issues of interaction between the international and national systems of human rights protection. The reports of the Russian Ombudsman for Human Rights for 2017-2019 are analyzed. The author identifies some problems of the human rights theme and proposes ways to solve them.*

**Keywords:** *international law, human rights, freedom, discrimination, European Court of Human Rights, remedies, international cooperation.*

The modernity brings the international level of human rights protection to the new level and hence the challenges, which are associated with it. It is important to mention that human rights work is a factor that can guide states to join forces in the face of urgent global challenges.

Recognizing, respecting and protecting human rights is within a domestic responsibility of states. In addition, Russian Federation is not an exception here, as is stated in Article 2 of the Constitution of the Russian Federation [<http://www.pravo.gov.ru>]. The provisions of Part 4, Article 15 of the Constitution have legalized the interaction between international law and the domestic law of Russian Federation. The principles and norms of international law and international treaties have become an integral part of the legal system of the Russian Federation.

From the reports of the Commissioner for 2017-2019 the incessant problems of Crimean residents, the emergence of threats to human rights on a planetary scale, interethnic conflicts, mass statelessness and political manipulation, etc. are deduced. [<https://ombudsmanrf.org>].

In the Commissioner's Report for 2020, it was mentioned that the employees of Sputnik (Estonia) could have the criminal prosecution if they do not terminate their employment contracts with the Russia Today news agency. This behavior can be explained by the fact that in 2014 the European Union imposed sanctions against a number of individuals and legal entities because of the events in Ukraine. This situation became the reason of a general uproar. The Constitution guarantees the freedom of speech and the right to information in Estonia by (Articles 44-46) [[http://genadiafanassjev.blogspot.com/2015/02/blog-post\\_46.html](http://genadiafanassjev.blogspot.com/2015/02/blog-post_46.html)] and Article 10 of the Convention for the Protection of Human Rights and Fundamental Freedoms. Therefore, we can say that the actions of the Estonian authorities do not comply with constitutional norms and international principles.

The very fact that these problems in the area of the violations of human rights are mentioned in the Russian Ombudsman reports attracts the attention of plenipotentiaries to resolve cases on the merits. Although a lot of states are developing in a human-centered way, however, the human rights situation is not perfect.

The misrepresentation of international law in national legislation is yet a problem. Moreover, some states still make discriminatory provisions in their laws.

In Mauritius, for example, there is an immigration law, which says that if a foreigner marries a Mauritian woman, he has to apply for a permit to stay in Mauritius, and it can be refused. However, if a foreigner is married a Mauritian man, she automatically acquired the right to become the resident of Mauritius. The Human Rights Committee considers that these government regulations violate article 5 (d) of the International Convention on the Elimination of All Forms of Racial Discrimination. "(d) of article 5 of the 1965 International Convention on the Elimination of All Forms of Racial Discrimination. [Mezhdunarodnaya konvenciya..., 1965].

It should be mentioned that, on June 5, 2020, the UN experts denounced the current cases of racially motivated hate lynchings in the US. The experts emphasized that the US announcement of 1 June 2020 about the use of armed forces against demonstrators says of the use of legal instruments against people of African origin. According to the experts, the use of tear gas against peaceful demonstrators who have not broken the law is questioned as to its legality. They also recalled the recommendations of the 2016 report, which stated that police killings of unarmed African-Americans are "only the tip of the iceberg that demonstrates racial bias in the justice system".

All states should interpret human rights provisions equally without exception and taking into account linguistic, cultural, religious and other specificities. The 1993 Bangkok Declaration formalized the theses of cultural relativism[<http://hrlib.kz>]. Article 8 of this document declares that human rights are universal and should be considered as a dynamic and evolving process "taking into account the significance of national and regional particularities and various historical, cultural and religious backgrounds". However, in Article 16 we see a politically controversial approach, referring to the land of Israel, including Jerusalem, as occupied Arab territories.

It is very important to decrease the legal illiteracy of people with regard to international human rights remedies. Due to Article 34 of the Convention for the Protection of Human Rights and Fundamental Freedoms an individual, a group of individuals or a non-governmental organization may lodge a complaint with the European Court of Human Rights if they are victims of a violation of the Convention right. It is a fact that the major part of the citizens are not fully aware of the level of protection, which give them the Convention for the Protection of Human Rights and Fundamental Freedoms.

It is possible to make such a conclusion from the fact that a large number of complaints which are sent from Russia to the European Court of Human Rights (hereinafter the ECHR) do not pass level of the admissibility, while violations of rights are indeed stated at the international level.

Thus, the number of appeals received according to statistics for 2017, was 11,618. However, 6,889 complaints were considered inadmissible. There is a trend towards an increase in admissible and substantiated complaints. For example, already in 2018 up to 60% of justified complaints were received [<https://euroclaim.ru/rossiya-i-espch-statistika>].

At this stage, it is important to take into account the international cooperation of states, which has to show results in the future. Even more, this thesis was legalized as far back as 1970 in the Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States [Deklaraciya o principah..., 1996]. It emphasizes that cooperation is an obligation of states.

All States parties to international agreements should consistently build their own national human rights system, as well as make a significant contribution to ensuring the credibility of international human rights institutions guided by the human rights priorities established at the international level.

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## WAYS TO PREVENT BANKRUPTCY OF COMMERCIAL BANKS IN RUSSIA

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**Abstract.** *The article analyzes the financial condition of commercial banks in the Russian Federation and discusses the main ways to prevent their bankruptcy. Based on the results of this analysis, this article examines ways to prevent bankruptcy of Russian commercial banks and draws a conclusion about the most effective of them. Special attention is paid to the role of the Central Bank in avoiding this procedure.*

**Keywords:** *commercial banks, bankruptcy, banking system, banking activities, reorganization, financial recovery, the Central Bank of the Russian Federation.*

Over the past decade, commercial banks in the Russian Federation have faced significant difficulties that threaten their ability to meet their obligations. The latest of such difficulties was the pandemic of a new coronavirus infection (COVID-19) that has swept the whole world, the sanctions policies of foreign countries towards the Russian Federation, changes in exchange rates, a decrease in real incomes of the population and a decrease in gold and foreign exchange reserves.

In such realities, many commercial banks are forced to undergo bankruptcy proceedings. The term “bankruptcy” itself, based on the meaning of Art. 2 of the Federal Law of October 26, 2002 No. 127-FZ “On Insolvency (Bankruptcy)” means the established inability of the debtor to satisfy the claims of creditors. Paragraph 4 of Chapter IX of the above law is devoted to the peculiarities of bankruptcy of financial organizations. According to data from the Central Bank of the Russian Federation (hereinafter referred to as the Central Bank of the Russian Federation), as of October 1 of the last year, 349 credit institutions are in the process of liquidation, of which 317 are undergoing bankruptcy proceedings [<https://cbr.ru>].

The most protected from bankruptcy are banks with a large amount of capital, however, history remembers the collapse of the Inkombank in 1998, which was one of the largest banks in the country, being in the top 5 banks in Russia and the top 1000 banks in the world.

As a general rule, government bodies do not have the right to interfere in the activities of commercial banks, which follows from the provisions of Art. 3 of the Federal Law of December 2, 1990 No. 395-1 “On Banks and Banking Activities”. At the same time, the functioning of the entire banking system and economy depends on the reliability and stability of the work of commercial banks, which necessitates the implementation by the state of measures aimed at preventing the bankruptcy of such banks. This implementation is expressed in the legislative regulation of certain legal relations, as well as in measures aimed at preventing bankruptcy and implemented, for example, by the Central Bank of the Russian Federation or the Deposit Insurance Agency (DIA).

In a situation where commercial banks carry out their normal activities and do not show signs of bankruptcy, ways to prevent such bankruptcy are implemented by the commercial banks themselves and consist in independently improving their financial position. In this regard, this article discusses ways to prevent bankruptcy during the period of activity when signs of bankruptcy already exist. The use of methods determined by the legislator will help restore solvency and prevent bankruptcy and liquidation of a commercial bank.

Legislatively, measures to prevent bankruptcy of credit institutions are enshrined in Art. 189.9 of the Federal Law of October 26, 2002 No. 127-FZ “On Insolvency (Bankruptcy)”. Among such measures are the following: financial rehabilitation of a credit organization (“rehabilitation”), appointment of a temporary administration and reorganization of a credit organization [Federal'nyj zakon ot 26.10.2002 No. 127-FZ].

Rehabilitation, i.e. financial recovery is the main measure to prevent bankruptcy of a commercial bank. Depending on the importance of a commercial bank and the possible consequences of its bankruptcy for the economy, such a measure can be applied either independently by the bank or with the participation of the Bank of Russia or the DIA.

Since 2008, the Russian Federation has used the so-called “credit mechanism”, which consists of attracting DIA investors to purchase shares (shares) of a bank in a volume sufficient to control such a bank, as well as issuing loans to the DIA on special conditions that facilitate the bank’s obtaining proceeds from the placement of borrowed funds. Relatively recently, in 2017, a new mechanism was developed that provided for the participation of the Bank of Russia in the financial recovery procedure. This mechanism consists of the Bank of Russia using funds from the Banking Sector Consolidation Fund to acquire shares in banks, provide subsidized loans, buy out property and provide other financial assistance to banks undergoing resolution procedures. The Bank of Russia manages the funds of the Fund through a special legal entity - LLC Management Company of the Fund for Consolidation of the Banking Sector.

The appointment of a temporary administration to manage a credit institution, in turn, represents the introduction into the management of the bank of a special management body appointed by the Bank of Russia for the purpose of carrying out a financial analysis of the bank, ensuring its continuous functioning and applying other procedures to prevent bankruptcy. A distinctive feature of such a measure as a temporary administration, according to I.S. Mikhailenko, is its “coercive nature”

[Mikhailenko, 2002]. As in the case of reorganization, such powers can be assigned to LLC "UK FCBS" or GC "DIA".

A.G. Guznov notes that the use by the Bank of Russia of such a coercive measure as the appointment of a temporary administration “has as its main goal the suppression of encroachment on the interests of third parties and public interests, the restoration of normal opportunities for the exercise of the rights of creditors and depositors, eliminating the threat to the stability of the banking system” [Guznov, 2005]. Reorganization of a credit organization is a measure aimed at minimizing losses of bank assets, which consists of preserving the latter as a result of a merger, annexation, division, separation or transformation with another commercial bank. Such a procedure, in our opinion, should be considered not so much as a procedure aimed at preventing bank bankruptcy, but as a way to prevent significant negative consequences for the banking sector of the economy, creditors and bank depositors.

In addition to the above-mentioned ways to prevent bankruptcy in the process of commercial banks carrying out their normal activities, procedures are also implemented in relation to them that can be characterized as a preventive way to preclude bankruptcy. Such procedures are inspections by the Bank of Russia. The main purpose of the Bank of Russia’s inspections of commercial banks is to assess on-site the general condition of the bank or certain areas of its financial condition, possible prospects for its activities, as well as to identify actions that threaten the interests of creditors and depositors [Instrukciya Banka Rossiiot 25.08.2003 N 105-I]. However, it should be noted that inspections often do not lead to the desired effect, since commercial banks take all measures in their power aimed at communicating positive information about their financial position.

In conclusion, it should be noted that measures enshrined at the legislative level to prevent the bankruptcy of commercial banks ultimately often lead to a reduction in the number of private banks. Thus, recently there has been a tendency towards an increase in banks with state participation and the merger of small banks with larger and financially stable ones through reorganization procedures. In this regard, among the procedures considered, the most preferable for commercial banks, in our opinion, is the reorganization procedure and the issuance of loans on special terms carried out within its framework. As a result of such a procedure it is possible to save the commercial bank itself.

The trend towards a decrease in the number of small commercial banks can be changed by the actions of the banks themselves, which should have a focus on attracting customers and, as a result, profit. The favorable existence of these commercial banks, in our opinion, seems possible through state support from the Central Bank of the Russian Federation, expressed in targeted financial assistance in the form of targeted loans or in the provision of tax and legislative breaks that can reduce the financial burden on such banks and increase their competitiveness.

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## LEGAL REGULATION OF DIGITALIZATION AND AUTOMATION OF PUBLIC ADMINISTRATION IN THE RUSSIAN FEDERATION

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***Abstract:*** *The article analyzes the main approaches to determining the forms of legal regulation. Digital information technologies force the state to switch to*

*digital management systems. The issue of regulating the digitalization of public administration remains unexplored to this day.*

**Keywords:** *processes, digitalization, government, digital law, public administration, legal regulation.*

Management finds a place in almost all spheres of society: in biology, technologies, legal system, etc. A large number of different forms of management indicates the versatility and complexity of this concept, indicates its uniqueness and diversity of personality. Various perspectives on the study of the term "management" allow each scientist to define it in his own way, thereby expanding and deepening the concept.

Legal, economic, political and social processes are increasingly moving to the management of their sphere with the help of digital technologies. The 21st century is rich in changes in public life in digital reality and increasingly demonstrates the need for responses to the needs of a digital society. The universal desire for a "digital transition" creates the need for a developed and holistic regulatory framework for the activities of digital law.

The background of public administration includes the study of Russian statehood in different historical periods, the system of state bodies, reforms and counter-reforms of public administration. It's also important to look closely at the advancement of the civil service and its organization, the role of individual statesmen, as well as the system of laws.

The transition to real digital technologies in the modern economy, business, and social sphere creates an intense longing for their comprehensive legal regulation. The transition to real digital technologies in the modern economy, business, and social sphere creates a strong need for their comprehensive legal regulation. Legal researchers have been dynamically discussing the problems of interaction and interconnection of the processes of transition to digital law for a long time.

The scientific work presents an analysis of domestic concepts of the phenomenon of "transition to digital" and legal regulation of technologies. The aspects of the state project "Legal regulation of the digital economy", designed to implement digital technologies into government activities, are often analyzed in the works of modern legal scholars. It is impossible not to note the level of external and internal influence of new federal projects on improving lives of each citizen in regions, society and the individual as a whole.

The normative regulation of digital activity is the primary task before the introduction of digital policy into the lives of the people of our fatherland. This is necessary because of the complete interference of digital services in our lives. All human actions are performed through communication or telecommunication nowadays. Considering the issue of regulating the judicial system the system of non-governmental bodies providing preventive proceedings, where the process of digitalization and the creation of digital automatic systems is in full swing, is also essential.

Regulation of the digitalization by law of public administration is aimed at creating a positive legal and organizational environment for the high-qualified development and application of digital technologies in government agencies. It

includes regulatory legal acts defining the rules, principles and mechanisms for the exploitation of digital resources in domestic public administration.

T.N. Mikheeva, in her work analyzing of the legal foundations of digitalization in the Russian Federation, notes that "there is a forecast of more productive communication of the state and citizens through digital information exchange, where there are neither temporal nor spatial boundaries" [Mikheeva, 2019].

The Constitution should also guarantee the basic human right to switch to digital form or refuse it. Many scientists emphasize on the need to include in the text of the Constitutional norms to control the path of digitalization of modern social processes [Konstituciya Rossijskoj Federacii, 1993].

The legal regulation of local governments in the area of digitalization and automation of public administration can be rightfully considered controversial. E. A. Farikova writes that "federalism in Russia is traditionally considered to be characterized by a two-tier system of government: federal and regional (subject of the Russian Federation)". Legal scholars write on this issue that at the level of local government, the legislation of the Russian Federation does not provide for the separation of powers, therefore, the allocation of executive power. At the same time, certain people underline that "local self-government in its constitutional consolidation is a kind of "third" level of Russian federalism." This means that the federal center can and should equally rely on both the subjects of the Russian Federation and municipalities in order to keep the latter in line with a unified state policy. It seems that local self-government nevertheless goes beyond the framework of public administration and the subject of regulation of administrative law, forming an independent branch of municipal law. In this regard, municipal legal regulation does not form the level of regulatory administrative and legal regulation [Farikova, 2020].

The first group includes legislative acts on digitalization and digital transformation, defining the basic principles and strategic goals of digitalization of public administration, as well as mechanisms for their implementation. The second group is defined by regulatory legal acts those directly protect the digital space and personal data of citizens of the Russian Federation. The third group can be defined by regulatory legal acts that establish certain digital procedures, for example, procedures for digital signature or submission of electronic documents. The fourth group regulates special digital state relations, for example, in the area of state secrets in term of development of digital sphere, access to classified information. The last group refers to the regulations governing the rules for the use of databases and information systems provided for open public access. Digitalization and public administration as separate processes are controlled by the norms of public law.

These and other groups of normative legal acts form the legal foundation for the digitalization of public administration, providing legal protection, adjusting the processes of introduction and using of technologies in the public sector. The regulatory legal framework is an essential component of any institution of law, consolidating its basic principles of activity, rights and obligations, limits of authority, etc. The system of legal regulation of digitalization and automatization should analyze the sources of Russian and international law.

The research on the legal regulation of a particular branch of science should begin with a review of the norms of the Constitution of the Russian Federation. Article 17 states: "In the Russian Federation, the rights and freedoms of man and citizen are recognized and guaranteed in accordance with the generally recognized principles and norms of international law and according to current Constitution." Article 18 stipulates that "the rights and freedoms of man and citizen are directly applicable. They determine the meaning, content and application of laws, the activities of authorities (both legislative and executive), local governance and are provided with justice." Correspondingly, the legislator is faced with the question of what should the "constitutional right to digitalize state management processes" be interpreted as.

The Constitution should also guarantee the basic human right to switch to digital form or refuse to use it. Many scientists emphasize the need to include in the Constitution norms on the digitalization of social processes taking place in modern society. Also, the fundamental provisions of the basic Russian law in the subject of public administration should be considered the provisions on the executive branch as one of the branches of government.

The State Administration regulates the Code of Administrative Offences in conjunction with federal laws and by-laws. Of course, the very purpose of the existence of public services points out the level of responsibility within the framework of the legal system. All regulatory and legal regulation of public administration is tied to the relationship between state and municipal authorities. In turn, the law only defines the limits and limitations of authority. The purpose of digitalization or public administration is not formulated in legislative acts. The main tasks and fundamental functions can be traced from other sources.

There is a huge regulatory framework of codes in Russia, one of them is the Code of Administrative Violations of the Russian Federation, which regulates administrative legal relations. Discussions are currently underway to make significant changes to the text of this law, which will relate to administrative responsibility [Kodeks Rossijskoj Federacii ob administrativnyh pravonarusheniyah, 2001].

There is a system of legislative acts regulating public administration issues:

1) Federal Law № 58-fz on 05/27/2003 "On the Civil Service System of the Russian Federation", that sets the public service system of governance;

2) Federal Law № 414-fz on 12/21/2021 On the General Principles of the Organization of Public Power in the Subjects of the Russian Federation, establishing the system of executive bodies in the subjects of the Russian Federation;

3) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation in Connection with the Improvement of Public Administration in the Field of control over the Turnover of Narcotic Drugs, Psychotropic Substances and Their Precursors and in the field of migration" on 07/03/2016 № 305-fz;

4) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation in connection with the Improvement of Public Administration in the field of combating corruption" on 11/21/2011 № 329-fz;

5) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation in Connection with the Improvement of Public Administration in the Field of State Registration" on 04/29/2008 № 54-fz;

6) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation regarding the Improvement of Public Administration in the Field of official Statistical Accounting" on 07/29/2018 № 272-fz;

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8) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation in Connection with the Improvement of Public Administration in the field of Customs affairs" on 06/26/2008 № 103-fz;

9) Federal Law "On Amendments to the Code of Administrative Offences of the Russian Federation in Terms of Improving the Efficiency of State (Municipal) Property Management" on 11/28/2015 №. 344-fz;

10) Federal Law "On Amendments to Certain Legislative Acts of the Russian Federation and Invalidation of Certain Legislative Acts of the Russian Federation in Connection with the Implementation of Measures to Improve Public Administration" on 06/29/2004 №. 58-fz.

The regulatory and legal regulation of digitalization and automation processes is handled by the federal executive authority - the Ministry of Digital Development, Communications and Mass Media of the Russian Federation, which is headed by the Government of the Russian Federation [Vorobyov, 2021].

The legal basis of the processes of digitalization of modern society are the following normative legal acts:

1) Federal Law "On Personal Data" on 07/27/2006 № 152-fz;

2) Federal Law "On experimental legal regimes in the field of digital innovations in the Russian Federation" on 07/31/2020 № 258-fz;

3) Decree of the Government of the Russian Federation dated 10/24/2011 № 861 "On Federal State information systems providing the provision of state and municipal services (functions) in electronic form" (with the "Regulations on the Federal State Information System "Federal Register of State and Municipal Services (Functions)", "Rules of Conduct of the Federal State information system "Federal Register of State and Municipal Services (Functions)", "Regulations on the federal state information system "Unified Portal of State and Municipal Services (functions)", "Requirements for regional portals of state and municipal services (functions)", "Regulations on the Federal State information System "Unified System for the provision of state and municipal services (services)").

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Federal constitutional laws are excepted as the next level of legal regulation of digitalization and automation of public administration in the Russian Federation. Federal Law № 4 on 11/06/2020-Federal Law "On the Government of the Russian Federation" is the basic law governing public administration, as it defines the position and status of the highest executive authority – the Government of the Russian Federation.

There is a certain hierarchy of the legislative system in the Russian Federation. Any study of the legal regulation of a particular institution of law begins with an analysis of the norms of the Constitution of the Russian Federation. The Constitution has a major legal impact. Another thing to note is that this basic law establishes the necessity to upgrade the regulatory framework and attract new technologies to improve the legal system through the usage of digital technologies.

The laws should specify the basic fundamental principles of activity, guarantees of rights and freedoms, the status of public authorities, the place of international legal acts in the system.

E. A. Farikova notes that "In circumstances of Russian federalism, the allocation of regional legislative regulation of administrative legal relations is becoming relevant. For example, on the territory of the Krasnodar Territory, in addition to the Charter as the leading normative legal act establishing the foundations of public administration in the region, there are special laws regulating various types of administrative legal relations, for example, the Law of the Krasnodar region on July 17, 2003 № 608-KZ "On Administrative Offenses" [Farikova, 2020]. In science, there is also a form of legal governance of public administration, which is called individual directed to a certain circle of people.

Analyzing the normative legal regulation of public administration, E. A. Farikova notes that "individual regulation can be carried out by state bodies, for example, courts, other public authorities and their officials (subordination regulation). Within the framework of subordination regulation, it is customary to distinguish individual judicial and legal regulation and individual administrative and legal regulation. The first is characterized by the regulation of relations by the courts (for example, the consideration and resolution by the court of a case of an administrative sanction), and for the second, respectively, by administrative authorities."

The following problems are typical for the regulation by law of the digitalization of public administration. It should begin with the fact that the law lacks basic concepts that denote the terminology of information processes in public administration. An ordinary problem, of course, is the lack of trained personnel who could work with instructions and internal orders in the sphere of digitalization. Another challenge is the importance in ensuring the accessibility of digital technologies to all people in Russian society. Due to the differences in the level of

digital competence of citizens and access to the Internet, there is a danger of creating digital inequality. Governments should develop and implement special programs and initiatives helping to improve digital literacy and ensuring access to digital resources. Ethics and fairness in the application of digital technologies in public administration is also an important challenge.

It should also be noted that the general beginning of the issue of regulation of digital technologies has already been defined and fixed in the Civil Code of the Russian Federation. The law meets modern realities, therefore, many technical digital procedures have been developed to facilitate the processes of transactions, contracts, and traditional customs of legal relations. The legal issue of the place of responsibility in public digital management remains unresolved. There is absolutely no digital technology security system, and legislation on accountability for delicto in the field of digitalization of state and administrative management has not been developed. This stage of the development of public administration in general, there is a transition from e-government to digital based on the activities those are carried out to guarantee the accessibility of public services.

In conclusion, we can say that the process of digitalization and automation of public administration has a large regulatory framework, the development of which is a priority activity of the executive authorities of the Russian Federation. Meanwhile, the legislator should be attentive to the lack of a single conceptual apparatus in the legal acts of public administration, to uniform methods to the legal regulation of individual digitalization processes, as well as to the public nature of the management industry, where it is necessary to consider various approaches to regulating activities.

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## SECTION 5 COMPUTER SCIENCES

UDK 003.295.1

### ENCODING/DECODING OF CHARACTERS ACCORDING TO MORSE CODE

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**Abstract.** *This article discusses ways to encode/decode characters according to Morse code. Encryption of information has become a reality in the modern world; therefore, "Morse code" is still a common method of data transmission, since signal transmission and reception devices are very simple and reliable.*

**Keywords:** *information, Morse code, encryption, encoding, decoding, symbol, text.*

The XXI century is an informational century; therefore, information is considered the main resource in it. Currently, we are already using the fourth information age, which appeared at the end of the last century – the invention of microprocessor technology (computers, gadgets) and computer networks.

Morse code is an alphabet in which letters are encoded using Morse code. Morse code, "Morzyanka" (The code began to be called Morse code only from the First World War) the method of sign coding (representation of letters of the alphabet, numbers, punctuation marks and other symbols by a sequence of signals, for example, long and short: "dashes" and "dots").

Information encryption has become a reality in the modern world. Hundreds of millions of messages, phone calls, large amounts of computer and telemetry data are transmitted via encrypted communication channels. It becomes clear: keeping secrets in the modern world has become a necessity.

Encoding is the representation of the source information in a different form by converting a certain sequence of bits or certain characters. Widely used for storing or transmitting data. In this case, the forward conversion is called encoding, reverse decoding [Kultin, 2007: 240].



To encrypt data, you need to know the rules for writing codes (information symbols). The concept of encoding is related to the conversion of messages into a combination of characters, taking into account codes.

In order to make the message incomprehensible, it is encrypted according to a certain rule, which is agreed in advance between the sender of the message and its recipient. So the addressee, having received the message, can apply the encryption rule to it in reverse order, after which its meaning will become clear [Singh, 2006: 447].

"Morse code is not intended at all to make it difficult to read a message, but to facilitate its transmission" [Singh, 2006: 447]. To encode/decode characters, according to Morse code, we will use the C++ programming language.

Microsoft Visual Studio 2019 was chosen as the implementation environment. For the convenience of working with the application being developed, the Win32 API was selected, which is included in the Microsoft Visual Studio application program. The Win32 API (Windows API) is a C-based platform for creating Windows applications.

Since Microsoft Visual Studio does not support Russian in the console, you will need to use the `set locale ()` function. In general, this function looks like this: `set locale ( , ““);`

Where the constant parameter is written before the comma. The most popular constant is `LC_ALL`. After the comma, in quotation marks, the name of the locale is written. For example, `RU`.

First, let's start developing the algorithms that we will need for the further successful operation of our program. First, you need to connect the header files (directives) that we need to work with, as well as connect the namespace. The `#include` directive connects the programs necessary for libraries to us. Listing No. 1 shows 3 header files.

The first header file is `iostream`, which connects the I/O library. The second header file is `string`, which is needed to work with strings. The third header file is `Windows.h`, which contains many definitions of data types, macros, function prototypes, classes, etc. The fourth header file is `fstream`, it includes a set of classes, methods and functions that provide an interface for reading/writing data from/to a file.

#### Listing 1 - Connecting header files and a standard namespace.

```
#include <iostream>
#include <string>
#include <Windows.h>
#include <fstream>
using namespace st.
```

Before declaring the global function `main()`, in which the program will be executed, you need to create a file with the extension `.txt`, full name in my case - `Morze.txt`. After declaring a global function, we create an object of the `fstream` class to work with the data in the file. Listing No. 2.

#### Listing 2 – Connecting a class to work with a file.

```
string fail = "Morze.txt";
fstreammz;
mz.open(fail, fstream::in | fstream::out);
```

Next, we do a check to open the file using the comparison operator if, else. If the file does not open, the user will see a text notification about it. Listing No. 3.

#### Listing 3 – checking file opening.

```
if (!mz.is_open()) {
    cout<< "File opening error!" <<endl;
}
else {...}
```

If the file is opened, the program will prompt you to choose one of the following actions: "writing data to a file" and "reading data from a file". The first action is to write the data to a file, the user will be asked to do it in one of the languages: "Russian" or "English". To perform this action, a class with methods and variables for organizing work with strings will help us. Listing No. 4.

#### Listing 4 – Language selection.

```
string language;
cin>>language;
if (language == "Russian") {...}
else if (language == "English") {...}
else {
    cout<< "There is no such language";
}
```

After selecting the language, the text is entered, which will be encoded in Morse code. Listing No. 5.

#### Listing 5 – Text input.

```
String text;
getline(cin, text);
mz<< text << "\n".
```

Its further translation into Morse code occurs by using the switch operator. Each entered element is compared according to Morse code and then placed in a file Morze.txt . Here is a fragment of partial character encoding. Listing No. 6.

#### Listing 6 – Text encoding.

```
for (int i = 0; i<text.length(); i++) {
    switch (text[i]) {
        case 'A': mz<<".- "; break; case 'B': mz<< "-... ";
    }
}
```

After writing data to a file, the user selects the second item - "reading data from a file". Listing No. 7.

#### Listing 7 – Reading data from a file.

```
else if (deistvie == 2) {
    cout<< "Чтение данных из файла:" <<endl;
    char Z;
    while (mz.get(Z)) {
        text = "";
        cout<<Z;
    }
}
```

After the program has been written, you can proceed to testing. During the testing of the application, no errors were found in the operation of the program. The program meets the user's requirements. Thus, it is possible to translate texts into Morse code that are different in size and symbolic content.

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UDK 004.048

## APPLICATION OF NEURAL NETWORKS IN VARIOUS ACTIVITIES

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***Abstract.*** *This article presents key examples of neural network applications across practical domains. The most successful artificial intelligence technologies are presented in the paper. The authors introduce information about limitations of neural network functionality as well.*

***Keywords:*** *neural network, artificial intelligence, application, value, technology.*

**Introduction.** Presently, there is a multitude of artworks and images generated by artificial intelligence. The capability to create diverse articles, abstracts, and even prose, emulating the poetic style of various renowned authors, has become feasible. Neural networks have also ventured into the creation of movie scripts, offering the ability to generate scripts within a matter of hours with minimal

effort. However, the question arises as to whether such endeavors can be classified as true creativity when derived from fragments and clichés of existing texts. While an unequivocal answer to this question remains elusive, the progress in artificial intelligence development is poised to positively impact various aspects of human life.

**Main Part.** An artificial neural network (ANN) constitutes both a mathematical model and its software implementation, constructed upon the organizational and functional principles observed in biological neural networks—networks of nerve cells within a living organism. This conceptualization originated from the examination of processes occurring in the brain, endeavoring to replicate and model these intricate mechanisms. The earliest pursuit in this direction was undertaken by W. McCulloch and W. Pitts [Frolov, 2016].

Despite the apparent simplicity on the surface, the utilization of neural networks in the realm of creativity poses complexities. Many artists vehemently oppose the integration of neural networks in art, fearing potential obscurity due to the rapid advancement of artificial intelligence. It possesses the capability to replicate the style of any artist or author, a feature that invokes controversies surrounding plagiarism. The question of condemning artificial intelligence for plagiarism arises. Despite the lingering challenges in working with this system, its efficiency in terms of time far exceeds that of nearly any artist willing to provide their work to a client.

However, the ominous portrayal of artificial intelligence in popular discourse is an exaggeration. Historical parallels, such as the advent of the camera, foretelling the extinction of artists as a profession, did not materialize. Instead, a new profession, that of the photographer, emerged. Photography enabled artists to augment their skills through accurate imagery. Similar narratives unfolded with the invention of the graphics tablet, initially anticipating the eclipse of traditional artists and their work. Contrarily, it led to the emergence of new branches in creative activity that often coexist. This is the anticipated outcome from the integration of neural networks in creativity – enabling photographers and artists to expand their skills through precision in imagery.

Neural networks have garnered significant practical significance in the domains of printed text recognition and plagiarism control. Artificial intelligence excels in translating handwritten text into a printed format, though some challenges persist, particularly in managing diverse handwriting styles. Nevertheless, the application of artificial intelligence in typing and text verification remains a promising and practically significant offshoot.

Furthermore, these technologies find widespread application in economic calculations. Artificial intelligence is adept at classifying and analyzing time series through the approximation of complex non-linear functions. Various models of neural networks exhibit superior accuracy in identifying patterns in the stock market compared to regression models [Zlobin, 2011].

ANN technologies exhibit promising prospects in addressing various challenges related to simulating and predicting managerial behavior, as well as forecasting risks associated with loan issuance. In this context, neural networks play a crucial role in mortgage lending, predicting the potential bankruptcy of bank customers, and

identifying fraudulent transactions in credit card usage. These systems are even utilized to rank clients for loans with fixed payments [Miller, 2018].

AI tools supporting software development are proliferating, with several available for free. Prominent technology companies integrate these tools as plugins. For example, Facebook employs a recommendation service to enhance code quality and address bugs. Additionally, IBM Mono2Micro and the Application Modernization Accelerator (AMA) provide application architects with tools for transforming and reusing legacy applications.

In 2021, Microsoft announced the integration of artificial intelligence technologies with its Power Fx programming language, a key component in developing applications on the Power Platform. This integration allows Microsoft users to create programs with minimal programming requirements.

In July 2021, Rospatent registered a program designed to recognize and analyze virtual reality objects using artificial intelligence, actively employed in creating Sber software products in Russia, as indicated by departmental materials. However, AI products for software development exhibit certain disadvantages. Initial use of these tools may reduce team productivity, requiring specific skills and knowledge for effective implementation, as demonstrated by departmental records.

AI facilitates mobile app developers in expanding their user base by automating specific algorithms. For instance, AI can analyze user behavior, predict future actions, and adjust accordingly. This capability enables programmers to swiftly implement changes in new versions of applications. The increasing popularity of artificial intelligence in developing operating systems and user interfaces aligns with the proliferation of smart devices. The growing demand for affordable mobile apps that offer personalized experiences creates additional opportunities for artificial intelligence to function as a personal virtual assistant, recording multiple user actions. Developers can promptly respond to user needs with artificial intelligence providing critical feedback [Ahmed, 2021].

Machine learning emerges as an effective means of applying AI to healthcare, provided sufficient training data and a short-term goal for a specific problem exist. This approach enables informed decisions for physicians and patients based on available data. Successful applications of artificial intelligence in healthcare include:

- One of the promising areas of its application is the analysis of sleep quality using electroencephalography (EEG). This approach not only enables the classification of different stages of sleep but also facilitates a more in-depth analysis of parameters associated with sleep quality. The utilization of neural networks in the analysis of EEG data opens up new prospects for accurately determining sleep patterns, identifying disorders, and offering personalized recommendations to enhance sleep and overall well-being.

- Reducing the anxiety of pregnant women and ensuring early diagnosis of pathologies in both the mother and the baby by constant health monitoring.

- NuMedii providing artificial intelligence for drug discovery technology, utilizing AI and BigData to expedite the discovery of new drugs based on available biomedical data and understanding the links between drugs and diseases at a system level.

- Studying the effectiveness of medical equipment and drugs using BigData and deep learning technologies to aid in choosing the best options for equipment and drugs for a given branch of medicine.
- Chatbots for customer service facilitating initial diagnosis and answering patient queries regarding payment for services, prescriptions, and replenishment of medicines.
- AI-based applications simplifying document-related tasks in healthcare settings. Technologies such as intelligent automation and robotic process automation can automate reporting and routine tasks.
- The Internet of Medical Things and AI allow the creation of applications designed to monitor various physiological parameters, ensuring good health quality. The primary purpose of these applications and devices is to quickly identify malfunctions in the functioning of organs or systems of the body, facilitating self-correction or prompting a visit to a doctor [Kakhi, 2022].

However, it is crucial to acknowledge that the application of such technologies is not universally viable, as it is associated with specific challenges and disadvantages. The necessity for an extensive number of observations to create an acceptable model is a norm, often requiring a vast amount of data that is not readily available. For instance, in the production of a seasonal product, historical data from previous seasons alone is insufficient to predict the next season. It is imperative to process data on product style, sales policy, customer loyalty, and more. Even with a reasonably stable product forecast based on monthly sales reports, accumulating a comprehensive set of historical data for a minimum period of 50 months is extremely challenging. Sales planning for a seasonal product further complicates matters, necessitating data collection for each season. With a shortage of various data types, the neural network operates in conditions of incomplete awareness, resulting in significant calculation errors [Khawrin, 2023].

**Conclusions.** In conclusion, it is evident that artificial intelligence is extensively employed across diverse domains where the human mind may fall short in memorizing vast datasets or swiftly processing information. Nevertheless, the current state of these technologies is marked by numerous shortcomings that can only be addressed through continuous refinement over time. At this juncture, neural networks are rapidly evolving in numerous directions, indicating a future where they will overcome existing limitations. However, it is essential to recognize that human involvement remains the cornerstone of artificial intelligence.

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## ASTRONOMER'S HANDBOOK FOR COUNTING STARS

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***Abstract:*** *The article discusses one of the many challenges of astronomy in terms of information technology and presents some ideas on one of the possible solutions for the home market – the creation of the reference book for the accounting of stars in the form of a computer application. Its main structural features and components have been identified and described as well as their interrelations. The paper presents the infological model of the database for the project announced.*

***Keywords:*** *astronomy, database, handbook, star, space.*

Merriam-Webster Dictionary gives the following definition of astronomy: “the study of objects and matter outside the earth's atmosphere and of their physical and chemical properties” [Merriam-Webster.com Dictionary]. A more detailed definition is provided in the general knowledge English-language encyclopaedia Britannica: “science that encompasses the study of all extraterrestrial objects and phenomena. Until the invention of the telescope and the discovery of the laws of motion and gravity in the 17th century, astronomy was primarily concerned with noting and predicting the positions of the Sun, Moon, and planets, originally for calendrical and astrological purposes and later for navigational uses and scientific interest” [Evans et al., 2023].

Astronomy has accompanied humankind since ancient times. “A breathtaking view of the stars on a clear night is reason enough to explain why early astronomy was infused with magic and divinity. Perhaps the first star catalogs were attempts to understand the gods better and so predict what the future held. However, another human attribute, a love of patterns, was soon a driving force, and astronomers from Mexico to China began to codify the heavenly orchestration of lights across the night’s sky.” [Jackson, 2012: 7]. Astronomy was born at the very moment when, at the dawn of humanity, our ancient ancestors learnt to notice and see the persistent connections between natural phenomena, such as the rhythm of seasons and the movement of stellar bodies in the sky [Jackson, 2012: 10].

Astronomy is considered to be an observational science. “It differs from virtually all other science disciplines in that it is not possible to carry out experimental tests in the laboratory. Instead, the astronomer can only observe what he sees in the Universe and see if his observations fit the theories that have been put forward” [Morison, 2008: 1]. Astronomy is one of the oldest sciences, and the astronomer’s main tool has always been an eye. First it was a naked eye, then the telescope-armed eye [Surdin, 2012: 12]. The fact that this science is observational, fundamentally distinguishes it from all natural sciences. In astronomy, direct experiments are almost impossible, we can only observe remotely, passively, and this changes the methodology of work and the emphasis of development (for example, the invention of telescopes). However, it must be recognised that direct investigations of objects in the Solar System by means of space planetary probes became possible in XX century, being rare and expensive, and therefore unaffordable for some countries [Surdin, 2012].

Since observations are the most important thing, a randomly snatched astronomer is engaged in processing observations. The observations themselves can take place quickly: digital sources allow people to get an image in seconds, but after it needs to be processed, which requires very complex algorithms and a lot of time.

As first that we can see in the sky and in space are stars, the space exploration should start with them. Stars are one of the objects for astronomer’s observation. The process of evolution of such cosmic bodies requires constant observation, so that even the future of the Sun can be predicted.

By examining the most significant attributes of stars and drawing comparisons among them, scientists have managed to uncover elusive insights into their spatial distribution, formation processes, evolutionary changes, and ultimate fates once they've depleted their energy reserves. Each star belongs to a certain type, but may change it over time.

According to thermodynamics, the temperature of a black body can be determined by measuring the wavelength at its radiation’s peak. A black body at 3 K will peak at a frequency of  $3 \cdot 10^{11}$  Hz, while one at 6000 K will emit green light. At a temperature of  $10^6$  K, the emitted radiation falls within the X-ray range. The wavelength intervals correspond to the different colours observed in the optical range [Ishkhanov et al., 2019].

Changes in the internal structure are caused by changes in the chemical composition due to the course of nuclear reactions in the star. Because of this, the



molecular weight, density, and therefore the equation of state change, by recalculating which we change the entire internal structure of the star. Using this data, it is possible to calculate the behaviour of the star.

Storage is needed for all the collected data. In this case, information about the stars is contained in the reference books. They come in two types, electronic and paper.

The most popular electronic reference is Tycho2. It is only available to US universities. It has an up-to-date database with information about stars and their characteristics. We cannot use this option and, unfortunately, we have no analogues available for university students.

It is important to develop an application that will have all the necessary reference materials for educational institutions with the Department of Astronomy. For implementation, we suggest to use PostgreSQL as it is open to our market and has all modern technologies. To create an interface and work with the database, one would choose 1C, since this is the home product and the configurator structure already obtains all the necessary objects such as directories and data registers.

We need an observation diary, with which you can record the events of each object. To describe events, we need such explanatory characteristics as the colour of the star, spectral class, type, telescope from which the image was obtained, chemical composition, date of the event.

When working with the database, the user should be able to view:

- a list of objects;
- surveillance diary entries;
- reference books.

When working with the database, an astronomer should be able to enter or change the following information in the database:

- an object of observation;
- a recording of the observation diary;
- a directory.

When working with the database, an astronomer should be able to:

- display a list of objects of observation for a certain period of time;
- find entries in the observation diary of a certain object of observation with the ability to filter by a certain period of time.

The following eleven entities for the database have been identified as significant and prioritised:

- Colour
- Diary
- Telescope
- Organisation
- Type of telescope
- Type of stars
- Star
- Constellation
- Spectral class of stars
- Chemical elements
- Chemical composition of stars

The above stated categories allow us to construct the following infological model.

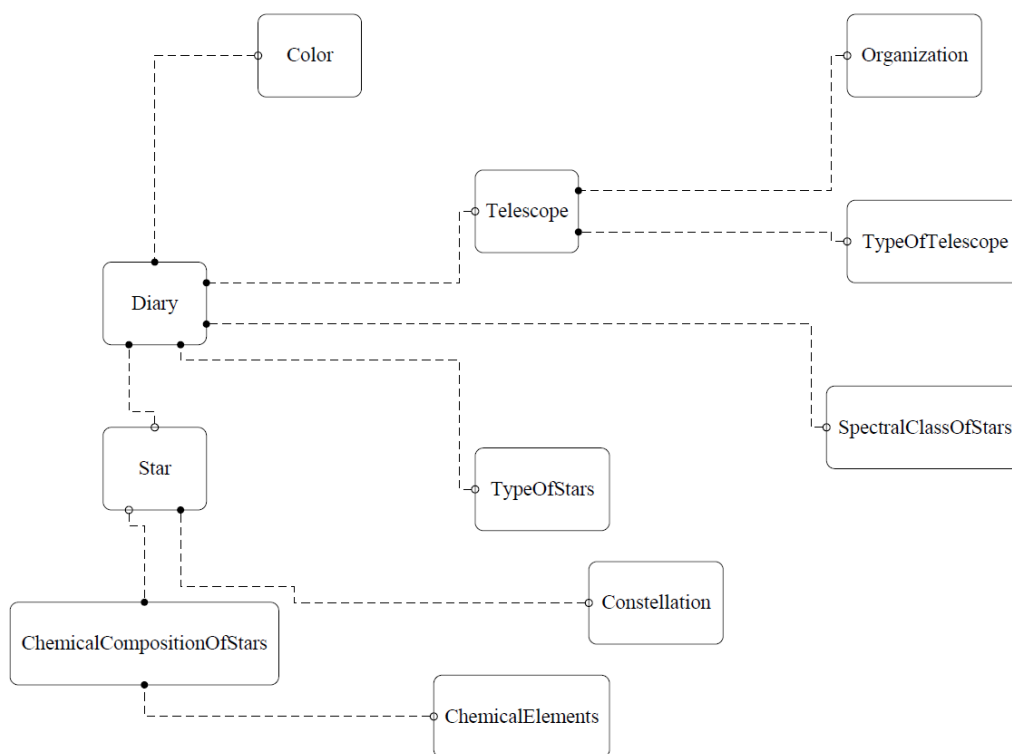


Figure 1. Database Infological Model

The final product will be a computer application with minimal requirements for systems with access to an up-to-date database and an interface for changing data. Having developed such an application, one can delve into other branches of astronomy like comets and planets and nebulae and much more, add analytical functions and the construction of mathematical models with further forecasting and analysis.

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## SECTION 6 MATHEMATIK SCIENCES

UDK 517.9

### COMPARATIVE ANALYSIS OF THE EFFICIENCY OF SOLVING SYSTEMS OF LINEAR ALGEBRAIC EQUATIONS BY THE METHOD OF SIMPLE ITERATIONS AND THE SEIDEL METHOD

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**Abstract.** *The article discusses the efficiency of using the method of simple iterations and the Seidel method in solving systems of linear algebraic equations. On the basis of examples of solving a system by two methods, an assessment of the accuracy of calculations is carried out. Next, a comparative analysis of the results is carried out and a conclusion is formed.*

**Keywords:** *iterative methods, system of linear equations, iteration, Seidel method, simple iteration method, approximation vector.*

Each person during his life is faced with the solution of mathematical problems. Calculating the amount of change in a store, planning your own time, or calculating the debt on a receipt - all this is a prime example of algebraic problems in everyday life.

As is already known from the course of linear algebra: a huge number of problems from all branches of mathematics are reduced to solving systems of linear equations.

A system of linear algebraic equations (SLAE) [Barrett, 1994:] is a union of  $n$  linear equations, each of which contains  $k$  variables (Figure 1). The number of unknowns will not always match the number of equations in the system.

$$\begin{cases} a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n = b_1 \\ a_{21}x_1 + a_{22}x_2 + \dots + a_{2n}x_n = b_2 \\ \dots \\ a_{m1}x_1 + a_{m2}x_2 + \dots + a_{mn}x_n = b_m \end{cases}$$

Figure 1. An example of a SLAE

Methods for solving systems of linear algebraic equations are divided into direct and iterative. The straight lines give an algorithm by which one can find the exact solution of systems of algebraic equations. Iterative - based on the use of a repetitive process and allow you to get a solution as a result of successive approximations.

The most commonly used and widespread iterative methods are the method of simple iterations and the Seidel method. In fact, they are equivalent, but they have some differences, which we will discuss next.

The purpose of this article is to consider the differences between the method of simple iterations and the Seidel method, through their software implementation, as well as, based on a comparative analysis of the program, to identify the most effective way to solve SLAE by the iterative method.

First, consider the method of simple iterations. For general systems, the identity  $m=n$  must hold, where  $m$  is the number of equations in the system, and  $n$  is the number of unknowns. Before using this method, you need to make sure that the system of equations is normal. If the system is predefined ( $m$  less than  $n$ ) or redefined ( $m$  greater than  $n$ ), it must be transformed.

The calculation formula of the simple iteration method (1):

$$x^{(n+1)} = Bx^{(x)} + d \quad (1)$$

Let's consider the course of the solution on a specific example. Figure 2 shows the SLAE to be solved by simple iteration.

$$\begin{cases} x_1 = 0.21x_1 + 0.12x_2 - 0.34x_3 - 0.16x_4 - 0.64 \\ x_2 = 0.34x_1 - 0.08x_2 + 0.17x_3 - 0.18x_4 + 1.42 \\ x_3 = 0.16x_1 + 0.34x_2 + 0.15x_3 - 0.31x_4 - 0.42 \\ x_4 = 0.12x_1 - 0.26x_2 - 0.08x_3 + 0.25x_4 + 0.83 \end{cases}$$

Figure 2. Given SLAE

We take the value  $\varepsilon = 10^{-3}$  as an indicator of accuracy.

We choose the initial approximation. For example, the vector of the right side (2):

$$x^{(0)} = \begin{pmatrix} -0,64 \\ 1,42 \\ -0,42 \\ 0,83 \end{pmatrix} \quad (2)$$

Thus, the first iteration will look like:

$$\begin{aligned} x_1^{(1)} &= 0,21 * (-0,64) + 0,12 * 1,42 - 0,34 * (-0,42) - 0,16 * 0,83 - 0,64 = -0,594 \\ x_2^{(1)} &= 0,34 * (-0,64) - 0,08 * 1,42 + 0,17 * (-0,42) - 0,18 * 0,83 + 1,42 = 0,868 \\ x_3^{(1)} &= 0,16 * (-0,64) + 0,34 * 1,42 + 0,15 * (-0,42) - 0,31 * 0,83 - 0,42 = -0,3599 \\ x_4^{(1)} &= 0,12 * (-0,64) - 0,26 * 1,42 - 0,08 * (-0,42) - 0,25 * 0,83 + 0,83 = 0,2101 \end{aligned}$$

Approximations to the solution are calculated in a similar way. To get an answer, let's run the program in Microsoft Visual Studio, and for clarity, we'll display a form on the screen.

As you can see in Figure 3, the result was obtained, as well as the number of iterations  $k=8$ .

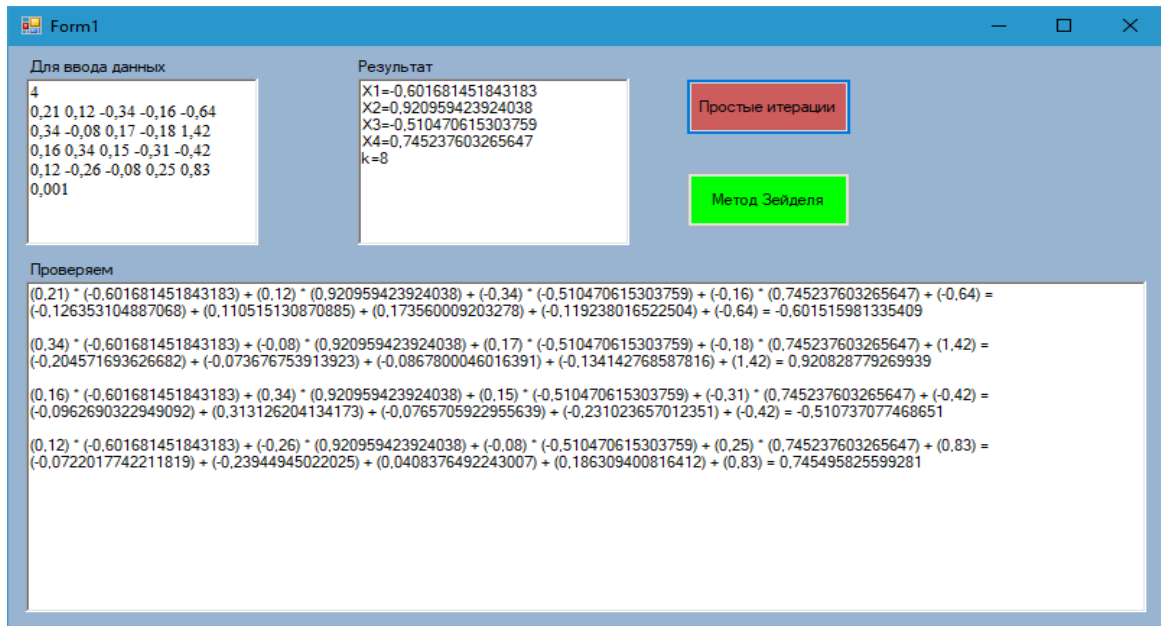


Figure 3. Software implementation of the simple iteration method

Let's move on to the Seidel method. At its core, the Seidel method is a modification of the simple iteration method, which is why they are considered equivalent. However, the difference between them lies in the fact that when calculating the next  $(n + 1)$  - th approximation to the unknown  $x_i$  for  $i > 1$ , the already found  $(n + 1)$  - th approximation to the unknowns  $x_1, x_2, \dots, x_{i-1}$ , rather than the  $n$ -th approximation, as in the method of simple iterations [Buatois, 2009: 205].

Consider the course of the solution by the Seidel method on the example of the SLAE in Figure 2. The value  $\varepsilon = 10^{-3}$  will be taken as the accuracy index.

The first iteration will look like:

$$\begin{aligned} x_1^{(1)} &= 0,21 * 0 + 0,12 * 0 - 0,34 * 0 - 0,16 * 0 - 0,64 = -0,64 \\ x_2^{(1)} &= 0,34 * (-0,64) - 0,08 * 0 + 0,17 * 0 - 0,18 * 0 + 1,42 = 1,2024 \\ x_3^{(1)} &= 0,16 * (-0,64) + 0,34 * 1,2024 + 0,15 * 0 - 0,31 * 0 - 0,42 = -0,113584 \\ x_4^{(1)} &= 0,12 * (-0,64) - 0,26 * 1,2024 - 0,08 * (-0,113584) - 0,25 * 0 + 0,83 = \\ &= 0,44966272 \end{aligned}$$

The second iteration will look like:

$$\begin{aligned} x_1^{(2)} &= 0,21 * (-0,64) + 0,12 * 1,2024 - 0,34 * (-0,113584) - 0,16 * 0,449662 - 0,64 = - \\ &= 0,66343947 \\ x_2^{(2)} &= 0,34 * (-0,66343947) - 0,08 * 1,2024 + 0,17 * (-0,113584) - 0,18 * 0,449662 + \\ &+ 1,42 = 0,917050 \\ x_3^{(2)} &= 0,16 * (-0,66343947) + 0,34 * 0,917050 + 0,15 * (-0,113584) - 0,31 * \\ &0,449662 - 0,42 = -0,370786 \\ x_4^{(2)} &= 0,12 * (-0,66343947) - 0,26 * 0,917050 - 0,08 * (-0,370786) - 0,25 * 0,449662 + \\ &0,83 = 0,42920147 \end{aligned}$$

Further calculation will proceed in a similar way. The condition  $|r^{(k)}| < \varepsilon$  can serve as a criterion for terminating the process. To get an answer, let's run the program in Microsoft Visual Studio, and for clarity, we'll display a form on the screen.

In Figure 4, you can see the result, as well as the number of iterations  $k=7$ .

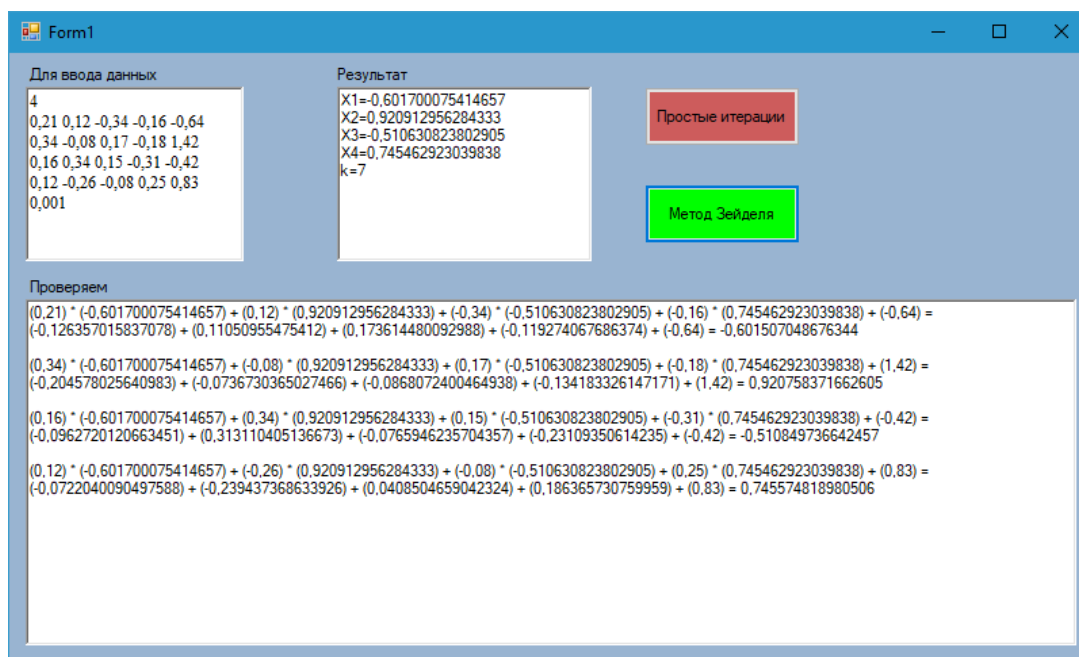


Figure 4. Software implementation of the Seidel method

We turn to a comparison of the two iterative methods for solving SLAE considered above.

As you can see in Figures 3 and 4, a more accurate, approximate value is indicated in Figure 4, that is, when using the Seidel method, and a smaller number of iterations was also indicated than in the simple iteration method.

The main advantage of the Seidel method is that the calculation of the approximation vector at the current iteration is performed using the data obtained at the current iteration, while the simple iteration method uses the data obtained at the previous iteration.

Thus, based on the described difference and the calculations performed, it can be concluded that the Seidel method will have better convergence in comparison with the method of simple iterations, since it is characterized by the use of approximations that are obtained during the process and are closer to the final result.

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UDK 517.443

## COMPUTERANALYSE VON SPEKTRALEN EIGENSCHAFTEN DER MODIFIZIERTEN DISKRETEN FOURIER-TRANSFORMATIONEN

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**Annotation.** *In diesem Artikel handelt es sich um mathematische Methode auf dem Gebiet der Fourier-Analyse, und nämlich um die diskrete Fourier-Transformation und ihre Modifizierung. Der Autor des Artikels beschreibt die Ergebnisse der Untersuchung von einer Reihe der Transformationen, die die klassische diskrete Fourier-Transformation verallgemeinern. Die Verallgemeinerung erfolgt dank der Permutationen von komplexen Wurzeln von Eins. Im Artikel werden die Ergebnisse der Berechnungen von Transformationsparametern präsentiert und einige Hypothesen aufgestellt, die einer weiteren Prüfung bedürfen.*

**Schlagwörter:** *die diskrete Fourier-Transformation, die DFT-Matrix, die MDFT, das Spektrum, der Eigenwert, der Eigenvektor, die Kryptographie, die Primitivwurzel, die Vielfachheit.*

Die diskrete Fourier-Transformation (DFT) ist ein der bekanntesten und praxisorientierten Instrumente, das in der Regel dazu dient, nicht-periodische Signale in ein kontinuierliches Spektrum zu zerlegen. Die DFT findet eine weite Anwendung in nächsten Bereichen: Elektrodynamik und Optik, Kodierungstheorie und Kryptographie, Analyse des Kommunikationssystems, Algorithmen der Informationskomprimierung und Computertomographie usw.

Die Bedeutung von DFT lässt sich nicht hoch genug überschätzen. Ihre Wichtigkeit für Anwendungen besteht darin, dass die Aufgaben der DFT-Berechnungen, der zyklischen Faltung von Folgen, der Multiplikation großer Zahlen oder Polynome im Wesentlichen gleichwertig sind.

Es ist wichtig zu bemerken, dass auch sogenannte schnelle DFT-Algorithmen vorliegen, in denen die Anzahl notwendiger Operationen im Vergleich zur herkömmlichen Berechnung auf Grund der Optimierung der Reihenfolge von Operationen reduziert wird. Am bekanntesten sind die Algorithmen von Cooley und Tukey, Goode, Rader und so weiter [Blejchut, 1989; Noden, Kitte, 1999; Nussbaumer, 1985].

Die DFT wird durch eine quadratische Matrix mit „n“ Zeilen und „n“ Spalten definiert, deren jedes Element mit der folgenden Formel berechnet werden kann:

$$f_{kj} = \frac{1}{\sqrt{n}} \exp\left(-i \frac{2\pi kj}{n}\right), \quad 0 \leq k \leq n-1, \quad 0 \leq j \leq n-1.$$

So wird die DFT-Matrix ohne Normierungsfaktor wie folgt zusammengesetzt: Die erste Zeile und Spalte bestehen lediglich aus Einsen. In der zweiten Zeile befinden sich die Wurzeln aus der komplexen Eins n-ten Grades in ihrer natürlichen Anordnung, also gegen den Uhrzeigersinn. Die folgenden Zeilen stellen aufeinanderfolgende Potenzen der zweiten Zeile dar. Wenn man keine Rücksicht auf den Normierungsfaktor nimmt, so ergibt sich eine Vandermonde-Matrix.

Als Beispiel kann man die DFT-Matrizen mit  $n = 3$  und  $n = 4$  betrachten. In diesem Fall werden diese Matrizen wie folgt aussehen:

$$F_3 = \frac{1}{\sqrt{3}} \begin{pmatrix} 1 & 1 & 1 \\ 1 & -\frac{1}{2} + \frac{\sqrt{3}}{2}i & -\frac{1}{2} - \frac{\sqrt{3}}{2}i \\ 1 & -\frac{1}{2} - \frac{\sqrt{3}}{2}i & -\frac{1}{2} + \frac{\sqrt{3}}{2}i \end{pmatrix}, \quad F_4 = \frac{1}{2} \begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & -1 \\ 1 & -i & -1 & i \end{pmatrix}$$

Obwohl die DFT ziemlich verbreitet ist, haben einige mit ihr verbundene Standardaufgaben Eigenschaften, die einem weiten Kreis von Spezialisten unbekannt sind. Nehmen wir zum Beispiel eine Aufgabe, die mit dem Finden des Spektrums von DFT für jeden beliebigen n-Wert verknüpft ist. Die Lösung von dieser Aufgabe lässt sich nicht in Grundleitern verfolgen, und deswegen wird die Aufgabe als nichttrivial eingestuft.

Es ist gut bekannt, dass die vierte Potenz von DFT die identische Transformation ist und als Eigenwerte nur die Zahlen " $\pm 1, \pm i$ " annimmt. Die Hauptschwierigkeit liegt an der Berechnung der Vielfachheit dieser Zahlen. Indem man eine Analogie mit einer kontinuierlichen Fourier-Transformation zieht, für die diese vier Werte gleichberechtigt sind, kann man zu einer überaus plausiblen Annahme kommen, dass zumindest für die Dimensionen  $n = 4m$  die Eigenwerte auch gleichberechtigt sind und daher der Vielfachheit  $m$  entsprechen.



Tabelle 1

Vielfachheit von Eigenwerten der DFT-Matrix

n	1	i	-1	-i
2	1	0	1	0
3	1	0	1	<b>1+</b>
4	<b>2+</b>	<b>1+</b>	1	0
5	2	1	1	<b>1+</b>
6	2	1	<b>2+</b>	1
7	2	<b>2+</b>	2	1
8	<b>3+</b>	2	2	1
9	3	2	2	<b>2+</b>
10	3	2	<b>3+</b>	2
11	3	<b>3+</b>	3	2
12	<b>4+</b>	3	3	2
13	4	3	3	<b>3+</b>
14	4	3	<b>4+</b>	3
15	4	<b>4+</b>	4	3
16	<b>5+</b>	4	4	3
17	5	4	4	<b>4+</b>
18	5	4	<b>5+</b>	4
19	5	<b>5+</b>	5	4
20	<b>6+</b>	5	5	4
21	<b>6</b>	5	5	<b>5+</b>

Die Berechnungen im Fall  $n = 4$  widerlegen diese Annahme jedoch. Hier haben die Werte  $-1$  und  $i$  die Vielfachheit 1, der Wert  $1$  – die Vielfachheit 2 und der Wert  $-i$  fällt überhaupt aus dem Spektrum. All das bricht die Symmetrie, die der kontinuierlichen Fourier-Transformation innewohnt.

Aus der Tabelle 1 geht hervor, dass die Ungleichheit des Spektrums bei  $n = 4$  auftritt, wenn man die anfänglichen Dimensionen  $n = 2$  und  $n = 3$  verwirft, und dann erhöht sich die Vielfachheit um Eins.

Die Endwerte der Vielfachheit von Spektrum punkten sind in der folgenden Tabelle angegeben.

Tabelle 2

Allgemeine Formeln von Issai Schur für die Vielfachheit der Eigenwerte

n	1	i	-1	-i
4n	<b>n+1 (+)</b>	n	n	n-1
4n+1	n+1	n	n	<b>n (+)</b>
4n+2	n+1	n	<b>n+1 (+)</b>	n
4n+3	n+1	<b>n+1 (+)</b>	n+1	n

Dieses Ergebnis wurde für beliebigen  $n$  im Jahre 1921 vom berühmten Mathematiker Issai Schur erreicht [Berndt, Evans, Williams, 1998; Schur, 1921]. Der

Schwerpunkt des Beweises ist die Tatsache, dass es zum Finden der angegebenen Vielfachheiten notwendig ist, die berühmten quadratischen trigonometrischen Summen von Gauß zu berechnen, die an sich die Spuren der DFT-Matrix sind [Gauß,1959].

Johann Carl Friedrich Gauß hat ungefähr 10 Jahre gebraucht, um eine exakte Formel für die quadratischen trigonometrischen Summen zu erstellen. Er sagte: "Selbst die Lösung vieler schwieriger Problemen der Zahlentheorie dauerte nicht so lange wie die jahrelange Arbeit an diesem Problem" [Gauß,1959].

Das Ausschreiben von Eigenvektorsätzen für die DFT-Matrix stellt oft eine Herausforderung dar. Wie man das macht, wird in der Literaturquelle [Bernd, Evans, Williams, 1998; Matveev, 2001] gezeigt. Aus dieser Quelle kann man einige unkomplizierte Algorithmen schöpfen, die das Finden von Eigenvektoren erheblich vereinfachen.

Der Wunsch, diese Arbeit zu schreiben, entstand aus Beobachtung, dass die DFT-Matrix unter Verwendung von der altbekannten Methode erstellt wird. Nehmen wir zum Beispiel den Fall  $n = 4$ . So werden die Wurzeln vierten Grades von Eins auf dem komplexen Zahlenkreis in solch einer Reihenfolge liegen:  $1; i; -1; -i$  (gegen den Uhrzeigersinn). Aber das bedeutet nicht, dass wir die Werte nicht miteinander vertauschen können. Daher sind auch alle anderen Möglichkeiten der Anordnung der Wurzelgleichmaßen möglich, was eine Vielzahl verschiedener neuer diskreter Fourier-Transformationen ergibt.

Lassen wir uns eine Menge von Wurzeln  $n$ -ten Grades von Eins betrachten, die auf beliebige Art und Weise  $r = (r_1, r_2, \dots, r_n)$  angeordnet sind. Unter Verwendung der Permutation „ $r$ “ der Menge von Einheitswurzeln erstellen wir eine DFT-Matrix, die wir als die Matrix der modifizierten Fourier-Transformation (abgekürzt mit MDFT-Matrix) bezeichnen. Die MDFT-Matrix mit Dimension  $n \times n$  sieht wie folgt aus:

$$F_r = \frac{1}{\sqrt{n}} \begin{pmatrix} 1 & 1 & \dots & 1 \\ r_1 & r_2 & \dots & r_n \\ r_1^2 & r_2^2 & \dots & r_n^2 \\ \dots & \dots & \dots & \dots \\ r_1^{n-1} & r_2^{n-1} & \dots & r_n^{n-1} \end{pmatrix}$$

Es ist klar, dass wir im Endeffekt eine Vandermonde-Matrix ohne Berücksichtigung des Multiplikators erhalten. Die Anzahl unterschiedlicher Permutationen kann mit Hilfe von Fakultät berechnet werden. Wenn eine Matrix  $n \times n$  Elemente enthält, wird die Anzahl von Permutationen als  $n!$  berechnet. Somit mit  $n = 4$  ergeben sich 24 verschiedene MDFTs, mit  $n = 5$  – 120 Transformationen.

Das Ziel unserer Arbeit ist, die spektralen Eigenschaften der neuen modifizierten Fourier-Transformationen zu untersuchen. Von besonderem Interesse sind für uns insbesondere Transformationen für  $n = 4m$  mit einem symmetrischen Spektrum (für  $n = 4$  mit einem einfachen), bei denen alle Eigenwerte die gleichen Vielfachheiten haben. Das gilt nicht für gewöhnliche DFTs in irgendeiner

Dimension. Solche Transformationen mit einem symmetrischen Spektrum sind in gewissem Sinne natürlicher als die übliche DFTs, da sie ihrem kontinuierlichen Analog hinsichtlich der Gleichheit der Spektrum punktenäher kommen. Es lässt sich nicht ausschließen, dass sich solche MDFTs aufgrund ihrer einfacheren spektralen Eigenschaften in verschiedenen Rechenanwendungen als nützlicher erweisen können.

Anschließend wurden mithilfe eines Computerprogramms „Wolfram Mathematica“ Berechnungen von allen möglichen 24 MDFTs für  $n = 4$  durchgeführt, einschließlich der gewöhnlichen DFT. Solche modifizierten Transformationen sehen wie folgt aus:

- 1)  $r = \{1, i, -1, -i\}$  – die direkte Fourier-Transformation;
- 2)  $r = \{1, -i, -1, i\}$  – die gekehrte Fourier-Transformation;
- 3)  $r = \{-1, i, 1, -i\}$ ; 4)  $r = \{-1, -i, 1, i\}$ ; 5)  $r = \{i, 1, -i, -1\}$ ;
- 6)  $r = \{-i, 1, i, -1\}$ ; 7)  $r = \{i, -1, -i, 1\}$ ; 8)  $r = \{-i, -1, i, 1\}$ ;
- 9)  $r = \{1, -1, i, -i\}$ ; 10)  $r = \{1, -1, -i, i\}$ ; 11)  $r = \{1, i, -i, -1\}$ ;
- 12)  $r = \{1, -i, i, -1\}$ ; 13)  $r = \{i, 1, -1, -i\}$ ; 14)  $r = \{-i, 1, -1, i\}$ ;
- 15)  $r = \{-1, 1, i, -i\}$ ; 16)  $r = \{-1, 1, -i, i\}$ ; 17)  $r = \{i, -1, 1, -i\}$ ;
- 18)  $r = \{-i, i, 1, -1\}$ ; 19)  $r = \{-i, -1, 1, i\}$ ; 20)  $r = \{i, -i, 1, -1\}$ ;
- 21)  $r = \{i, -i, -1, 1\}$ ; 22)  $r = \{-i, i, -1, 1\}$ ; 23)  $r = \{-1, i, -i, 1\}$ ;
- 24)  $r = \{-1, -i, i, 1\}$ .

Aus Berechnungen grundlegender Parameter wie Eigenwerte, Eigenvektoren, Permutationsmatrizen usw. kann man erschließen, dass die überwiegende Mehrheit der MDFTs mit  $n = 4$  einfacher als die Standard-DFT aufgebaut ist, weil sie ein einfaches Spektrum haben. Aus den oben angeführten Berechnungsergebnissen folgt, dass nur vier Transformationen ein ganzzahliges Spektrum wie beim klassischen Fall haben. Sie entsprechen den Fällen, wenn die Wurzeln in der Permutation im Uhrzeigersinn oder gegen den Uhrzeigersinn auf dem Einheitskreis umrundet werden, ohne mit Primitivwurzeln zu beginnen. Die MDFTs, die mit einer Primitivwurzel beginnen, scheinen über einfachste spektrale Eigenschaften zu verfügen.

Während der Berechnungen wurde die Unitarität aller MDFTs für jeden beliebigen  $n$ -Wert bewiesen. Folglich liegen alle ihre Spektren auf dem Einheitskreis, und man erhält eine explizite Form der Umkehrtransformationen. Es lässt sich nicht schwer feststellen, dass alle MDFTs Produkte der gewöhnlichen DFT und der entsprechenden Permutationsmatrizendarstellungen. Es lohnt sich anzumerken, dass die hier betrachteten Matrizen in modernen schnellen Goode- und Rader-Algorithmen verwendet werden [Blejchut, 1989; Noden, Kite, 1999; Nussbaumer, 1985].

Es ist leider nicht gelungen, aufgrund der Komplexität der Beweise andere inhaltsreiche Ergebnisse über spektrale Eigenschaften für beliebige  $n$ -Wertefestzulegen. Unter Verwendung von einem Computer für geringe  $n$ -Werte wurden Anfangstransformationsgrade, Projektionen auf Eigenunterräume und Resolventen berechnet. Einige andere Tatsachen können durch die Aufstellung der folgenden Hypothesen dargelegt werden:

**Hypothese 1:** Für  $n = 4m$  stimmen alle Dimensionen der Eigenräume nur für MDFT nicht überein, die den zyklischen Permutationen entsprechen und nicht mit Primitivwurzeln beginnen.

Wenn die Hypothese zutrifft, dann wurde als Standard-DFT die schlechteste Variante in Hinsicht auf die Einfachheit der Spektrumstruktur gewählt.

**Hypothese 2:** Alle MDFTs bilden eine Basis aus reellen Eigenvektoren.

**Hypothese 3:** Die Hypothese behandelt ein Verfahren zur Konstruktion von Eigenvektoren. Nachdem die Vielfachheiten aller Eigenwerte und die entsprechenden Projektionen auf die Eigenräume berechnet wurden, können die Eigenvektorennach folgendem einfachen Algorithmus erhalten werden: man muss zuerst eine Basis wählen und dann auf Einheitsvektoren nacheinander mit allen Projektionen so oft wirkten, wie es erforderlich ist.

**Fazit:** Zusammenfassend lässt sich sagen, dass die diskrete Fourier-Transformation eine weite Anwendung in der Kryptographie hat. Basierend auf den in der Arbeit erzielten Ergebnissen, kann man eine Vermutung anstellen, dass die folgenden Verschlüsselungsalgorithmen existieren. Der Absender und Empfänger wissen im Voraus, welche der MDFTs beim Austausch verwendet werden, während sie einem imaginären Gegner nicht bekannt sind.

In Anbetracht dessen, dass es um eine riesengroße Anzahl von Permutationen  $n!$  geht, kann dieser Algorithmus nicht weniger sicher sein als Standardalgorithmen mit großer Schlüssellänge. Darüber hinaus erfordert diese Methode nur minimale Modifikationen bestehender Algorithmen und Programme, was darauf hinausläuft, problemlos eine MDFT-Matrix durch eine andere zu ersetzen.

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## SECTION 7 PEDAGOGICS AND METHODS

UDK 378.02

### MERKMALE DER MATHEMATISCHEN AUSBILDUNG DER STUDENTEN AN DEN UNIVERSITÄTEN DER SOZIALEN FACHRICHTUNG

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**Annotation.** *In Russland entwickelten sich intensiv in früher Zeit schon lange soziale Institutionen, deshalb besteht heute ein großer Bedarf nach Facharbeiter im sozialen Bereich. Man braucht zurzeit neue Arbeitskräfte, die fähig sind, komplizierte professionelle Aufgaben zu lösen, die nicht nur über Kreativität, sondern auch über mathematische Kenntnisse verfügen. In den Hochschulen und Universitäten in Russland studiert man nicht nur die Hauptfächer, sondern auch eine Reihe von allgemeinbildenden Studienfächern, unter denen auch mathematische Wissenschaften zu erwähnen sind. Im Artikel beschreibt man die Schwierigkeiten beim mathematischen Studium an der Universität, die die zukünftigen Fachleute im sozialen Bereich haben und zeigt man die Lösung dieses Problems.*

**Schlagwörter:** *mathematische Bildung an der Universität, soziale Arbeit, gesellschaftliche Institutionen, mathematische Wissenschaften für sozialen Bereich, Hochschulausbildung in Russland.*

Mathematische Wissenschaften bilden sich schon seit vielen Jahren. Auf diesem Grund muss man betonen, dass verschiedene dabei verwendeten Verfahren und Ressourcen, sich nicht nur ausgehend von Bedürfnis oder Praxis, sondern meistens auch getrennt vom Bereich und den Methoden ihrer Verwendung formten. Die Rechnungen in exakten Wissenschaften haben alle Chancen der Anwendung in neuen Bereichen, die für Leute früher nicht bekannt waren. So gibt die Multifunktionalität der exakten Wissenschaften eine besondere Möglichkeit ihrer Verwendung in verschiedenen Wissenschaften. Daraus folgt der

wichtige Standpunkt der Studentenausbildung – die Verwendung von exakten Berechnungen und Formeln in verschiedenen Bereichen des Wissens.

Wenn man die mathematischen Berechnungen in Betracht zieht, so kann man sie durch besondere Merkmale unterscheiden. Dazu gehören: 1) Idealisierung, Interesse nur an den bestimmten Eigenschaften des Gegenstands; 2) ihre strenge logische Schöpfung; 3) das Ausmaß der Anwendung.

Man kann sagen, dass das Wesen dieser Berechnungen das Objekt der Studie ist und auch eine Art ist, die Mathematik zu begreifen [Schastun, 2015]. Die Verwendung der mathematischen Berechnungen für Erscheinungen, die im bestimmten Zeitraum geschehen, resultiert sich darauf, dass man bei Erforschung der Gegenwartsprozesse kurzfristig von Gesetzmäßigkeit derer Natur abweichen kann und der Zahl diesen Prozessen die Aufmerksamkeit machen kann.

In verschiedenen Wissenschaften und praktischen Tätigkeiten verwendet man das gleiche Prozentverhältnis der mathematischen Berechnungen. Sie werden verwendet, um das Ausmaß der Kenntnisse und Fähigkeiten, die man im sozialen Bereich, in der Wirtschaft, in den Gesellschaftswissenschaften, in der Naturwissenschaft und im Alltag uns begegnen, herauszufinden. So zum Beispiel spielt die Mathematik eine wichtige Rolle in der Naturwissenschaft. Sie benutzt man breit in der Chemie (bei der Bezeichnung der Massenzahlen von den chemischen Elementen), in der Biologie (biologische Symmetrie), in der Geographie (die Messung von geografischen Objekten) usw.

Die ältesten Philosophen (Thales von Millet, Pythagoras, Xenophon) und die Pädagogen der Gegenwart stießen sich auf aktuelles Problem der Ausführung vom Zusammenhang der Wissenschaften. Sie wollten herauszufinden, wie man die mathematischen Berechnungen in den anderen Wissensgebieten verwenden können [Smirnowa, 2015].

Seit dem 19. Jahrhundert wurde dieses Problem in der pädagogischen Literatur behandelt (I.G. Pestalocci, Z. Zakkoto, A.I. Gercen, K.D. Uschinskij). Die Wichtigkeit der Forschung von mannigfaltigen Prozessen und Erscheinungen, sowie auch die Verwendung der Mathematiktheorie wurde in den Arbeiten dieser und anderer Gelehrten besonders betont. Nach ihrer Meinung hat der Anwendungsbereich der mathematischen Prozesse aber keine Grenzen.

In den wissenschaftlichen Werken von I.D. Zwerew und W.M. Monahow, die in das Problem der Verwendung von interdisziplinären Verbindungen mit den mathematischen Berechnungen eingeweiht haben, wurden verschiedene Lehrweisen, die Bestimmungen der Verbindungen, ihre Funktion und Klassifikation betrachtet [Nabiew, 2015].

Das erhöhte Interesse an Experten, die mathematische Fakultäten und Instituten absolvieren, besteht darin, dass sie die Formel und Theoremen, die Berechnungen und mathematische Texte nicht nur in Rahmen der Theorie oder Aufgaben aus den Lehrbüchern verwenden können, sondern ihr Wissen in realen Situationen, die im realen Leben entstehen, benutzen und anwenden können. Die Studierende können auch die Aufgaben mit Verwendung von Formeln der Wahrscheinlichkeitstheorie und mathematische Statistik machen, die Regeln für

die Verwendung von Berechnungen im Alltag entwickeln und verschiedene Aufgaben lösen [Egorova, 2015].

Als Beispiele sind folgende zu nennen:

*Beispiel 1.* Für die erfolgreiche Arbeit im Sozialbürgerhaus sucht man einen Fachmann/eine Fachfrau, der/die in diesem Bereich eine Ausbildung hat. Die Wahrscheinlichkeit aus Versehen ihn/sie nicht zu treffen ist 0,2. Wie hoch ist die Wahrscheinlichkeit, dass man mehr als 3 Versuche machen muss, um den Befragten zu finden?

*Beispiel 2.* Bei einem sozialpsychologischen Experiment wird eine Gruppe von 12 Personen (8 Männer und 4 Frauen) aufgefordert, sich in drei Gruppen aufzuteilen. Wie hoch ist die Wahrscheinlichkeit, dass in jeder Gruppe genau eine Frau gibt?

Die zwei obengenannten Beispiele sind unkomplizierte Beispiele, die man bei der Formulierung von Aufgaben der mathematischen Statistik wechseln kann.

*Beispiel 3.* Im Sozialbürgerhaus in der Abteilung für ältere und behinderte Bürger muss man die Statistik machen, um für eine bestimmte Gruppe die relevante Anzahl bestimmen. Mit der Wahrscheinlichkeit von 0,6 ist ein Mensch behindert, mit der Wahrscheinlichkeit von 0,7 ist er/sie ein Rentner/eine Rentnerin, und mit der Wahrscheinlichkeit von 0,4 ist er/sie ein behinderter Rentner/eine behinderte Rentnerin. Man muss die Wahrscheinlichkeit finden, da eine zufällig ausgewählte Gruppe von 22 Personen besteht aus: a) der gleichen Anzahl der Personen in jeder Gruppe; b) der Anzahl der Rentner, die dreimal so groß ist wie die Anzahl der Behinderten.

*Beispiel 4.* Soziologen brauchen ein Experiment durchzuführen und dafür stellten sie zwei Fragen an die volljährigen Bürger/Bürgerin auf der Straße, um die Abhängigkeit von Tabakkonsum und damit folgenden Gesundheitsprobleme festzustellen. Im Laufe dieses Experiment berücksichtigten die Soziologen die Optionen, die für die Überprüfung der Abhängigkeit von Tabakkonsum geeignet waren. Ein Mensch kann entweder rauchen oder nicht rauchen, ebenso kann eine rauchende Person Lungenkrankheiten haben oder nicht haben.

Infolge dieses Experiments wurde festgestellt, dass die Zahl der rauchenden Menschen, die Probleme mit Lungen haben etwa 43% beträgt. Insgesamt rauchen circa 75% der Befragten. Ausgehend von der durchgeführten Umfrage, konnten die Soziologen zur folgenden Schlussfolgerung kommen: die rauchenden Menschen haben die Lungenkrankheiten oder sie konsumieren überhaupt keine Tabakprodukte.

So können die Studierende, die die realen Aufgaben des soziologischen Inhalts lösen, nicht nur primäre berufliche Kenntnisse und Fähigkeiten, sondern auch den Überblick in den Berufen des soziologischen Bereichs erweitern. Sie bekommen die Möglichkeit nicht nur bestimmte Gesetzmäßigkeiten herausfinden, sondern auch alle notwendigen Schlussfolgerungen zu ziehen, die bei Fachleuten der sozialen Hinrichtung von hohem Wert sind.

**Fazit.** Die Studiengebiete, die Berechnungen mit Elementen der Wahrscheinlichkeitstheorie und der mathematischen Statistik verwenden, sind

die wichtigsten und fruchtbarsten Abschnitte für die Anwendung mathematischer Methoden bei der Ausbildung von Fachleuten im sozialen Bereich.

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## ОТ СТРАТЕГИЙ ПРЕПОДАВАНИЯ К СТРАТЕГИЯМ ИЗУЧЕНИЯ ИНОСТРАННОГО ЯЗЫКА

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**Аннотация.** Статья посвящена рассмотрению особенностей организации учебного процесса по дисциплине «Иностранный язык» в рамках университетской программы с точки зрения применения стратегий обучения (*teaching strategies*) в зависимости от индивидуальных психофизиологических качеств обучающихся. Имеющийся арсенал методических приемов и методов, позволяющий эффективно вовлечь студентов в иноязычную коммуникацию, обеспечивает возможность разработки индивидуальной программы изучения иностранного языка для каждого студента академической группы. На основе эффективно «работающего» подхода студента к конкретному заданию по определенному аспекту языка (грамматика, лексика, произношение) формируются навыки понимания иноязычной речи на слух и чтения иноязычного текста, письменной и устной коммуникации, а, следовательно, повышается мотивация к изучению языка и преодолевается неуверенность в иноязычном взаимодействии с другими студентами группы и/или преподавателем, направленном на решение коммуникативной задачи.

**Ключевые слова:** стратегия обучения, иностранный язык, иноязычная коммуникация, психофизиологические особенности, когнитивные процессы.

## FROM ENGLISH TEACHING STRATEGIES TO LEARNING ONES

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**Abstract.** The article is devoted to the peculiarities of the organization of the educational process on the "Foreign Language" university programme considering the application of the teaching strategies depending on the individual psycho-physiological qualities of students. The available arsenal of methodical techniques and methods, allowing effectively involving students in foreign language communication, provides an opportunity to develop an individual foreign language

*learning programme for each student of the academic group. A student focusing on an effectively "working" approach to do a particular task on a specific language aspect (grammar, vocabulary, pronunciation), develop the comprehension skills and reading skills, as well as written and oral communication abilities. Consequently, the motivation for language learning is increased and uncertainty in foreign language interaction with other students of the group and/or the teacher, when solving a communicative task, can be overcome.*

**Keywords:** *teaching/learning strategy, foreign language, foreign language communication, psycho-physiological features, cognitive processes.*

Фокус современной методики организации процесса обучения иностранному языку сосредоточен на стратегиях обучения – учебных моделях, обеспечивающих верное определение конкретной результативности получения знаний индивидуумом посредством четкой структурированности учебного материала. Стратегия обучения предполагает использование в процессе обучения специальных процедур, как педагогом (teaching strategies), так и студентом (learning strategies) для продуктивной реализации образовательной деятельности в субъект-субъектном общении.

Целью исследования является рассмотрение современных стратегий обучения иностранному языку в целях определения наиболее эффективных путей формирования знаний студентов о системах изучаемого языка и развития навыков свободного владения иностранным языком в курсе преподавания/изучения дисциплины «Иностранный язык» в университете.

В соответствии с психолингвистическими и социально-конструктивистскими взглядами на обучение в целом (Н.К. Бондарева, Р. Эллис (R. Ellis), Р. Оксфорд (R. Oxford) и др.), преподавание и изучение языка рассматривается как:

– процесс активный, который может быть успешным только в том случае, если обучающийся прикладывает интенсивные умственные усилия для выполнения коммуникативных заданий;

– процесс интерактивный, который может быть усилен взаимодействием с другими студентами и/или с преподавателем.

Важно отметить, что совместная деятельность участников образовательного процесса, благодаря личностным качествам каждого, помогает облегчить и ускорить процесс обучения, сделать его наиболее понятным и эффективным для студентов.

При организации учебной деятельности студентов по овладению иностранным языком для реализации иноязычной коммуникации преподаватель предоставляет студентам полный арсенал стратегий, стараясь выяснить, какие из них эффективны для обучения и самообучения каждого индивидуума, руководствуясь личностными психофизиологическими особенностями.

Стратегии обучения иностранному языку в специальной литературе выделяют в несколько групп [Oxford, 1990]:

✓ Стратегии запоминания (Memorization strategies);

- ✓ Когнитивные (Cognitive strategies);
- ✓ Компенсаторные (Compensation strategies);
- ✓ Метакогнитивные (Metacognitive strategies);
- ✓ Аффективные (Affective strategies);
- ✓ Социальные (Social strategies).

Стратегии запоминания (Memorization strategies) – основаны на приемах, обеспечивающих запоминание и хранение новых знаний в памяти, а также быстрое извлечение при необходимости. Овладение стратегиями запоминания основывается на создании мысленных связей (например, запоминание новых выражений в контексте) и использовании ассоциаций (картинок, изображений, звуков, ощущений), что достигается путем регулярного тщательного повторения в процессе просматривания материала, составления новых примеров с выражениями или грамматическими конструкциями по изучаемой теме, развешивания необходимых карточек со словами для запоминания по квартире в местах, доступных для обозрения.

Эффективным способом запоминания признано подкрепление нового слова действием, например жестом или телодвижением, на котором основан метод полной физической реакции – Total Physical Response (TPR).

Когнитивные, мыслительные стратегии обучения (Cognitive strategies) – предполагают понимание, интерпретацию и воспроизводство новых феноменов в английском языке для обеспечения осмысленного обучения. В основе данных стратегий – практика и повторение, анализ и сопоставление – например, анализ нового выражения: из каких слов/компонентов состоит, что чем можно заменить; повторение новой модели или конструкции, составление новых словосочетаний по этой модели и использование их в новых вариантах контекста, выполнение упражнений и заданий без предварительного объяснения и тренировки языковых явлений (Task-based learning) [Бондарева, 2023].

Повторение языкового материала для последующего использования облегчает запись в виде графиков и таблиц (Mind mapping), структурирование знаний посредством записи заметок или использования визуальных подсказок для сопровождения нового материала, создание презентаций. В системе обучения в процессе чтения и рассказывания (Reading and Storytelling) грамматика не играет столь важной роли по сравнению с пониманием слов, поскольку студенты изучают язык в живом общении. Они слышат слова снова и снова в разных контекстах и разных готовых грамматических формах. Основное внимание уделяется заучиванию словарных слов (например, существительных, глаголов, прилагательных) и фраз в процессе постоянного/регулярного повторения. Таким образом, студенты не только учатся без особых усилий, но и, определенно, получают удовольствие.

Компенсаторные стратегии (Compensation strategies) – помогают студенту общаться и выражать свои мысли на английском языке, несмотря на недостаток и/или отсутствие каких-то знаний, конкретных слов и конструкций (knowledge gaps). Для продолжения устной или письменной коммуникации

студент прибегает к применению аккуратных, информированных догадок, основывающихся на рассуждении (*guessing intelligently*). Важно отметить, что преодоление языковых ограничений не мешает иноязычной коммуникации в случае, если нужное, но неизвестное слово студент заменяет синонимом, перефразирует или объясняет другими способами (*circumlocution*).

Метакогнитивные стратегии (*Metacognitive strategies*) – нацелены на контроль студентом собственного прогресса обучения, на организацию, планирование и оценку, как процесса, так и результатов *самообучения*. Студент сам определяет цели и задачи обучения, например, запомнить определенное количество новых лексических единиц за определенный отрезок времени и уметь использовать их в иноязычной коммуникации; овладеть техникой сохранения спокойствия во время коммуникативного акта.

Основная стратегия корректирования процесса обучения – мониторинг, который направлен на самостоятельное отслеживание студентом своих успехов по заранее определенным критериям для максимального использования имеющихся ресурсов, т. е. «обладать интуитивным (имплицитным) знанием и метаязыковым (эксплицитным) знанием для корректирования внутреннего или внешнего продукта речи» [Ellis, 1986: 176-180]. По сути, мониторинг – это не коммуникативная стратегия, а стратегия производства продукта речи.

Аффективные стратегии (*Affective strategies*) – это способы, применяемые студентом для контролирования и управления своими эмоциями, подбадривание самого себя, связаны с эмоциональным отношением к языку и процессу обучения, мотивацией. Так, чтобы снизить волнение студента можно включить музыку или пошутить. Для преодоления негативных эмоций студенту можно поделиться своим мнением с преподавателем и/или одноклассниками. В целях самомотивации (выучил словосочетания по изучаемой теме) можно поощрить себя чем-то вкусным или приятным времяпрепровождением.

Социальные стратегии (*Social strategies*) – это способы взаимодействия с другими людьми на изучаемом языке, которые обеспечивают необходимость общения посредством обращения с вопросами типа: *I'm sorry, I haven't got it; Could you clarify?* Социальные стратегии обеспечивают студенту возможность попросить о помощи для прояснения задачи более продвинутого человека в английском, помогают развивать эмпатию и навыки межкультурной коммуникации и взаимопонимания.

Таким образом, выбор стратегий обучения (*teaching strategies*) из существующего в методике арсенала непосредственно зависит от педагога и его индивидуального стиля в преподнесении информации по учебной дисциплине «Иностранный язык», вместе с тем, учитываются личные психофизиологические характеристики студента, что, в конечном счете, трансформируется в определенную стратегию *самообучения* (*learning strategies*) для реализации иноязычной коммуникации.

Дидактическая значимость стратегий обучения (*teaching strategies*) иностранному языку заключается в предоставлении студентам возможности

овладеть новым языком в результате самостоятельного выбора средств и методов по индивидуальному предпочтению (learning strategies), т. е. студенты становятся автономными создателями познавательной продуктивной иноязычной коммуникативной деятельности. В процессе самообучения студент может сам выбрать стратегии, менять их, планировать, управлять и контролировать процесс производства иноязычных высказываний с точки зрения успешности, что помогает достичь эффективности и отличного результата при изучении иностранного языка для реализации иноязычной коммуникации в реальном мире.

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## ИСПОЛЬЗОВАНИЕ ТЕХНИКИ "ПИРОГА" ДЛЯ МОТИВАЦИОННОГО КОНТРОЛЯ ПРИ ИЗУЧЕНИИ ИНОСТРАННОГО ЯЗЫКА У СТУДЕНТОВ УРОВНЕЙ А1 И А2

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*Аннотация.* В данной статье рассматривается возможность осознанного контроля студентами уровней А1 и А2 своих мотивов при изучении иностранного языка вне языковой среды. Теория мотивационного контроля позволяет выявить структурные компоненты систем мотивации и принципы их взаимодействия. Техника "пирога" позволяет провести сравнительный анализ "общей" и "индивидуальной" мотивационных структур, обеспечивая осознанность и контроль в процессе изучения иностранного языка.

*Ключевые слова:* мотивация, мотивационный контроль, техника "пирога", осознанность, развитие личности.

# USING THE "PIE" TECHNIQUE FOR MOTIVATIONAL CONTROL WHEN LEARNING A FOREIGN LANGUAGE WITH STUDENTS OF A1 AND A2 LEVELS

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**Abstract.** *This article examines the possibility of conscious control by students of A1 and A2 levels of their motives when learning a foreign language outside the language environment. The theory of motivational control allows us to identify the structural components of motivation systems and the principles of their interaction. The "pie" technique allows for a comparative analysis of "general" and "individual" motivational structures, providing awareness and control in the process of learning a foreign language.*

**Keywords:** *motivation, motivational control, the "pie" technique, awareness, personal development.*

Вопрос мотивации в изучении иностранного языка вне языковой среды является особенно актуальным для обучающихся на начальных уровнях усвоения иностранного языка, таких как А1 и А2. Зачастую основными мотивами, побуждающими к изучению иностранного языка, являются возможность общения с иностранцами, чтение книг и просмотр фильмов на иностранном языке или получение желаемой должности, требующее владения иностранным языком. Но часто, даже при условии регулярных занятий, студенты уровней А1 и А2, не обладая еще достаточными навыками восприятия устной речи, испытывают трудности при просмотре фильмов и, не обладая большим словарным запасом, вынуждены тратить много времени на перевод при чтении, а общение на иностранном языке сводится к использованию простых фраз и умению понять собеседника в знакомой ситуации.

Уровень В1, для которого характерно самостоятельное владение языком, т.е. умение хорошо говорить и понимать речь на слух и выражать свои мысли, по расчетам методистов Кембриджа, требует 150-200 часов курсов плюс около 200-250 часов занятий дома. Таким образом, от обучающихся требуется поддерживать заинтересованность на протяжении длительного срока, не получая быстрой реализации своей главной цели – "заговорить на языке".

Осознанность целей выступает основным отличием процесса изучения иностранного языка от изучения родного языка. Л.С. Выготский, при сравнении изучения родного и иностранного языка, подчеркивал, что если усвоение родного языка происходит "неосознанно и ненамеренно", то

усвоение иностранного – "начиная с осознания и намеренности" [Выготский, 2004]. "В первом случае раньше возникают элементарные, низшие свойства речи, и только позже развиваются её сложные формы, связанные с осознанием фонетической структуры языка, его грамматических форм, с произвольным построением речи. Во втором случае раньше развиваются высшие, сложные свойства речи, связанные с осознанием и намеренностью, и только позже возникают более элементарные свойства, связанные со спонтанным, свободным пользованием чужой речью" [Выготский, 2004].

Как формируется мотивация? Побуждение к действию для достижения определенных целей исходит из наших личностных интересов и потребностей, определяемых психофизиологическими свойствами. В чем проявляется мотивация? В активности, вызванной побуждениями, определяющими направленность личности. Поведение человека всегда мотивировано. В психологии мотивация определяется как "совокупность психических процессов, которые придают поведению энергетический импульс и общую направленность" [Психология, 2009]. В основе вопроса причин поведения индивида лежит вопрос мотивации. Таким образом, осознанность мотивов является важным фактором в процессе достижения поставленных целей, позволяющим контролировать этот процесс и выстраивать наиболее подходящую траекторию для его осуществления.

Теория мотивационного контроля Д. Хайленда использует обратную связь в качестве контроля соотнесенности структурных компонентов систем мотивации с принципами их взаимодействия. Как базовый принцип контроля используется обратная связь: некоторый критерий соотнесения, представляющий собой идеальное представление или цель, сравнивается с перцептивным входом, т.е. состоянием "здесь и сейчас", и "различие между ними служит для исполнителя действия сигналом, обозначаемым термином "обнаруженное отклонение". Данное отклонение побуждает исполнителя уменьшить расхождение между критерием соотнесения и перцептивным входом" [Психология, 2009].

Уточним понятие перцептивного входа, его можно охарактеризовать как "воспринимаемый и существенный с точки зрения исполнителя действия аспект среды, или информация о текущем состоянии дел. Выделяются три типа перцептивного входа: 1) некоторый аспект окружающей (внешней) среды; 2) информация о собственных действиях; 3) информация из внутренней среды (чувства, мысли, состояния)" [Психология, 2009].

Для того, чтобы человек эффективно управлял действием, он нуждается в информации, которая бы соответствовала его критериям. "Если человек располагает диагностической информацией, то он может с той или иной степенью отчетливости оценить расхождение между критерием соотнесения и перцептивным входом, которое в теории мотивационного контроля называется обнаруженным отклонением. Роль обнаруженного отклонения состоит в том, что оно придает поведению избирательность (направленность) и энергетизирует его" [Психология, 2009]. Обнаруженное отклонение – это своего рода мотивация, которая появляется уже в ходе выполнения действия.

Обнаруженное отклонение побуждает уменьшить, минимизировать расхождение между параметрами входа и выхода [Психология, 2009].

В теории мотивационного контроля выделяются "четыре типа критерия соотнесения: конечное состояние, скорость продвижения к цели, определенный тип действия и определенная эмоция или другой аспект психического состояния" [Психология, 2009].

Итоговое состояние часто выступает конечной целью человека, к которой он стремится. При этом, определяя конечное состояние, используют временной параметр. Действие также можно контролировать "по темпу продвижения к цели. ... Особенно важную роль критерий соотнесения типа темпа продвижения к цели приобретает в тех случаях, когда конечную цель определить затруднительно или вообще не представляется возможным. ... Критерий соотнесения по типу действия касается не конечного состояния и даже не темпа продвижения к цели, а самого характера действия. Люди часто делают что-то не только и не столько ради достижения некоторой цели в узком смысле слова, но и ради самого процесса деятельности. Им нравится сам процесс, они стремятся к выполнению определенного типа действий" [Психология, 2009]. Так как человеку очень интересны его собственные психические состояния и эмоции, он стремится к их обнаружению при совершении изменений во внешней среде или в своих взаимоотношениях с ней.

Техника "пирога" [Бек, 2018] поможет сделать цели изучения иностранного языка более наглядными и очевидными для студентов начальных уровней. Эта техника также полезна в ситуациях проведения самооценки и рефлексии.

Для начала рисуем круговую диаграмму и обсуждаем цели, которые обычно люди ставят перед собой, изучая иностранный язык.

### ***Why do we learn English?***

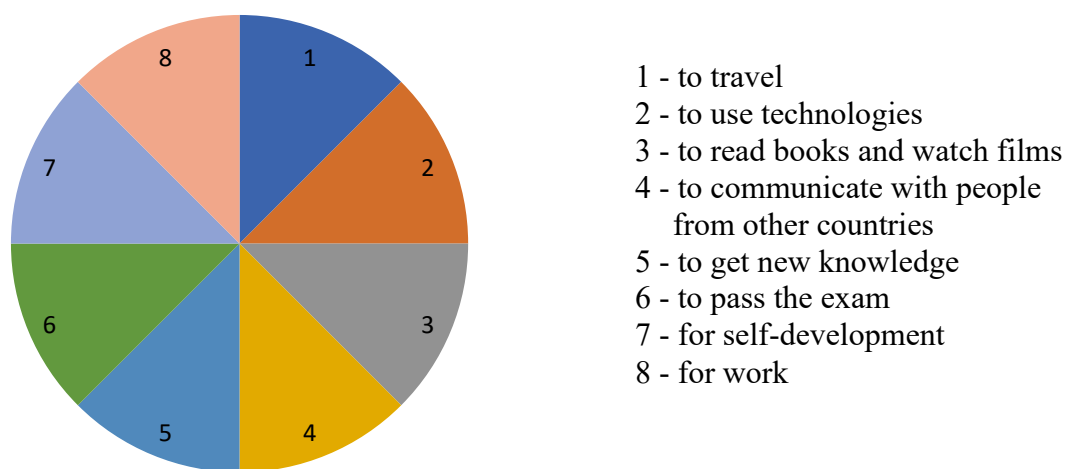


Рисунок 1. Использование круговых диаграмм для постановки целей (техника «пирог»)



В качестве примера приведем работу группы студентов 1 курса института экономики и управления на семинаре психологической самодиагностики "Am I motivated?". В начале семинара студенты обсудили важность получения высшего образования в современном мире и изучение иностранного языка как неотъемлемой части этого образования. Следующим этапом было обсудить цели и мотивы изучения иностранного языка. Среди основных мотивационных факторов были названы следующие: английский язык изучают для личностного развития; для будущей профессии; для путешествий в другие страны; чтобы понимать фильмы, песни и книги на языке оригинала; для развития навыков общения; потому что это часть программы, и учить приходится обязательно; так как это полезная мозговая деятельность; и, наконец, это просто модно, и сам английский язык лёгкий для изучения.

Мы выделили 8 факторов, отвечающих на вопрос "Why do we learn English?" – "Почему мы изучаем английский язык?" (рис.1):

- 1) to travel – для путешествий;
- 2) to use technologies – для использования технологий (для того, чтобы быть в курсе современных технических новинок вообще и быть способным разобраться в устройстве той или иной вещи, от прибора до программного обеспечения);
- 3) to read books and watch films – для чтения книг и просмотра фильмов на языке оригинала;
- 4) to communicate with people from other countries – для общения с людьми из разных стран (английский – язык международного общения);
- 5) to get new knowledge – для получения новых знаний (быть в курсе новостей из разных сфер деятельности по всему миру);
- 6) to pass the exam – для того, чтобы сдать экзамен по дисциплине;
- 7) for self-development – для саморазвития (изучение иностранного языка помогает развивать когнитивные функции мозга и положительно влияет на психическое здоровье);
- 8) for work – для работы.

Следует отметить, что эти факторы в общем соответствуют выделенным Э.А. Вертоградской потребностям при изучении иностранного языка, а именно:

- "1) потребность в коммуникации в иноязычной среде;
- 2) потребность в получении информации;
- 3) потребность в более глубоком познании действительности, отдельные характеристики которой особым образом зафиксированы в значении разных языков;
- 4) потребность в эстетическом переживании образного и понятийного богатства слова" [Вертоградская, 2004].

Далее в ходе практической работы студентам нужно сделать индивидуальную диаграмму, которая бы отражала их личные мотивы в изучении иностранного языка, опираясь при этом на исходную диаграмму, рассмотренную ранее. Предложим разделить "пирог" на неравные части,

соответствующие их личным потребностям, и, взяв весь пирог за 100%, высчитать долю частей "пирога" в процентном соотношении.

Вопрос мотивов и степени мотивированности обучающихся к изучению иностранного языка важен не только для них самих, он также представляет значимость для преподавателя, поскольку помогает диагностировать сформированность мотивации группы и в дальнейшем учитывать эти психолого-педагогические особенности в выстраивании работы в группе. Таким образом, следующим этапом рассмотрим, как выявленные мотивы представлены в группе в целом. Для этого попросим каждого студента группы поделиться результатами составления индивидуальной диаграммы с распределением процентных соотношений по выделенным нами заранее факторам.

### ***Why do we learn English?***

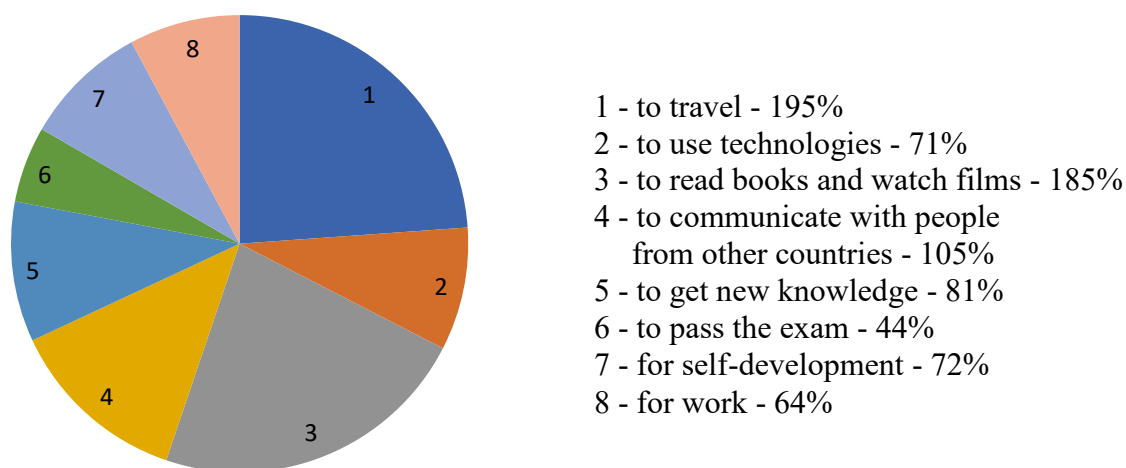


Рисунок 2. Сумма процентов по каждому из выделенных факторов в структуре мотивации группы

Рассмотрим результат проведенной работы. После суммирования процентов по каждому фактору (рис. 2) выяснилось, что тройку лидеров наиболее популярных мотивов для освоения языка в этой группе студентов составили: английский для того, чтобы путешествовать, для чтения книг и просмотра фильмов на языке оригинала и для общения с людьми из других стран. На четвертом месте – изучение английского языка для получения новых знаний. Знание иностранного языка для использования технологий и для саморазвития являются примерно одинаково привлекательными мотивами для студентов этой группы. Наименее популярным был фактор обязательности при сдаче экзамена по предмету, когда язык – часть учебной программы, что говорит о том, что студенты в целом в группе не воспринимают его «навязанным», и выбор изучения языка осознается ими как собственный. Полученные результаты позволяют говорить о степени сформированности осознанного мотивированного подхода к изучению иностранного языка у

студентов данной группы, а также о том, что обучающиеся достаточно заинтересованы в изучении иностранного языка, ставят цели на пути своей работы и готовы предпринимать действия по их достижению.

Таким образом, использование техники "пирог" позволяет нам через осознанность своих целей обеспечить рациональный контроль мотивации обучающихся. Осознанность процесса обучения позволяет нам вносить изменения не только в интеллектуальную сферу обучающегося, но и в психическое развитие его личности. Мы видим, что интерес студентов к учебной деятельности успешнее формируется при условии осознанного контроля мотивов, что особенно важно для обучающихся начальных уровней (A1 и A2) при изучении иностранного языка вне языковой среды. Знание мотивов изучения иностранного языка студентов в группе позволяет преподавателю выстраивать и организовывать учебную деятельность с наибольшей эффективностью, а также поддерживать и развивать мотивацию студентов по мере изменения степени усвоения языка.

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## SECTION 8 PHILOLOGY

УДК: 811.112.2

### ВИДЫ ВАРИАЦИЙ НОМИНАТИВНЫХ ФРАЗЕОЛОГИЧЕСКИХ ЕДИНИЦ В НЕМЕЦКОМ ЯЗЫКЕ

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**Аннотация:** В представленной статье рассматриваются варианты номинативных фразеологических единиц немецкого языка и выявляются их основные типы. Приводятся примеры с константной и константно-вариантной зависимостью компонентного состава. Выделяются лексические, грамматические и квантитативные варианты признаки.

**Ключевые слова:** фразеологизм, вариативность, немецкий язык, номинации, компонентный состав.

### TYPES OF VARIATIONS OF NOMINATIVE PHRASEOLOGICAL UNITS IN THE GERMAN LANGUAGE

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***Abstract.** The presented article examines the variants of nominative phraseological units of the German language and identifies their main types. Examples are given with constant and constant-variant dependence of the component composition. Lexical, grammatical and quantitative variant features are distinguished.*

***Keywords:** phraseology, variability, the German language, nominations, the component composition.*

В современном лингвистическом пространстве под влиянием новых направлений в языкознании фразеология рассматривается под призмой междисциплинарных явлений. На смену привычным сравнительно-историческим и структурным способам исследования единиц языка, в том числе и фразеологических единиц, приходят новые направления в лингвистике. Выгодные позиции занимают работы, исследующие устойчивые сочетания слов с коммуникативно-прагматической точки зрения, а также в дискурсивно-когнитивном аспекте. Таким образом, при смене лингвистических парадигм неустанно меняется и система воззрений на язык под влиянием культурно-исторического развития общества. Со времени исследования фразеологического состава немецкого языка Ф. Зейлером в начале XX века произошли серьёзные изменения.

Фразеологические единицы, несмотря на такие признаки как воспроизводимость и целостность компонентов, как и любые языковые единицы подвержены разного рода изменениям. Модификации фразеологизмов были предметом нашего исследования в ранней работе, где целью было выявить «основные тенденции различных вариаций идиоматических выражений в живой речи на современном этапе развития немецкого языка» [Сопова, Раздабарина, 2021: 113].

А.А. Ануфриева и Е.В. Пивоварова в своей работе предлагают «определение особенностей вариаций компонентного состава синтаксических фразеологизмов немецкого языка и установление типов синтаксических конструкций, обладающих наибольшим лингвокреативным потенциалом» [Ануфриева, Пивоварова, 2023: 53].

Изменения словарной формы фразеологизма вызывают интерес у лингвистов, сферой деятельности которых являются разные языки. В нашем случае, конечно, обратим внимание на изменения компонентного состава фразеологизмов немецкого языка, представляющих собой номинативные образования. Необходимо отметить, что наряду с графически заметными вариациями устойчивые словесные комплексы подвержены и семантическим изменениям, которые можно наблюдать либо в конкретной контекстной ситуации, либо проследив этимологию фразеологизма на разных временных этапах его применения в речи. Оттенки значения, а также приобретение другого значения также, хотя и редко, наблюдается в языке.

Рассмотрим в рамках данного исследования номинативные фразеологические единицы немецкого языка, для которых характерна вариативность. За основу возьмём структурно-семантическую характеристику фразеологизмов известного английского лингвиста А.В. Кунина [Кунин, 1972:

12-13]. В их состав входят фразеологические единицы со структурой подчинительного или сочинительного словосочетания и обороты со структурой придаточного предложения, как с определяемым словом, так и без него, обладающие номинативным значением.

Исследуя фразеологические единицы английского языка, автор даёт определение устойчивости фразеологизмов. «Устойчивость ФЕ основана на свойственных ей различных типах инвариантности, т.е. неизменяемости тех или иных элементов при всех нормативных изменениях» [Кунин, 1972: 7].

Рассмотрим номинативные фразеологизмы, которые можно заменить словом, значение которого совпадает с ФЕ. В данной статье на примере немецкого языка рассмотрим группу субстантивных фразеологизмов с различной зависимостью компонентов, в рамках которой существуют фразеологические единицы с константной и константно-вариантной зависимостью компонентного состава.

Константная зависимость элементов фразеологизма наблюдается в устойчивых словосочетаниях типа: *blaue Bohnen* (русск. солдатские пули), *junges Gemüse* (русск. ребята, детвора, молодёжь); *langer Laban* (русск. верзила, дылда, каланча); *blinder Passagier* (русск. Безбилетный пассажир, «заяц»); *unser Herrgots Esel* (русск. олух царя небесного); *fauler Strick* (русск. лентяй, лежебока); *derböse Feind* (русск. чёрт (эвф.)); *frommer Betrug* (русск. святая ложь, ложь во спасение); *seinböser Geist* (русск. его злой гений, т.е. человек, оказывающий на кого-то дурное влияние); *höhere Gewalt* (русск. форс-мажор, обстоятельство, которое невозможно предотвратить или устранить).

В составе фразеологизмов с константной зависимостью компонентов встречаются много имён собственных, а также библеизмов: *David und Goliath* (русск. Давид и Голиаф, т.е. маленький и большой); *Chorder Rache* (русск. хор фурий, т. е. хор, олицетворяющий месть богов в античной трагедии); *David und Jonathan* (русск. закадычные друзья [библ.]); *das jüngste Gericht* (Страшный суд [религ.]).

Полная константность компонентного состава фразеологизмов не рассматривается как их обязательный признак. Если появляется вариант, проявляющие черты схожести в семантическом плане, или же совпадающий по стилистическим признакам или синтаксическим параметрам, то наиболее распространённый среди номинативных ФЕ константный тип зависимости компонентов становится константно-вариантным. Далее систематизируем примеры фразеологизмов, для которых характерна константно-вариантная зависимость составных элементов. В пределах рассматриваемой группы фразеологизмов выделим следующие варианты признаки:

**1. Лексические**, которые тождественны по качеству и количеству значений, стилистическим и синтаксическим параметрам, а также существует общий лексический инвариант, незначительно отличающийся составом лексем. В данном типе вариантов могут взаимозаменяться:

*Существительные*: *das ist ein Tropfen auf einen heißen Stein* (тж. *ein Tropfen ins Meer*) (русск. это капля в море); *Jacques lächelte im stillen. Drei Millionen waren im Petroleumgeschäft nichts als ein Tropfen auf einen heißen Stein, was wollte er damit anfängen?* (B. Kellermann, “Die Stadt Anatol”) (здесь и

далее приведены примеры из фразеологического словаря Л.Э. Биновича); Tun und Treiben (oder: Tun und Lassen) – а) образ жизни; = житьё-бытьё.

Примерами взаимозаменяемых существительных могут также быть: ein ungewaschener Mund (тж. ein ungewaschenes Maul) – хулигатель; Abschaum der Gesellschaft (или der Menschheit) – подонки, отбросы общества, отребье человечества; ein Sprung ins Dunkle (тж. ins Ungewisse – риск, рискованное предприятие.

Как видим, в представленных примерах взаимозаменяются в большинстве своём синонимы или же слова из ассоциативного ряда: Gesellschaft↔Menschheit, Mund↔Maul, Spitzen↔Stützen...

*Прилагательные: bötmische (тж. spanische) Dörfer* – нечто непонятное, тёмный лес, «китайская грамота»: *Latein und Griechisch waren ihm, wie man zu sagen pflegt, bötmische Dörfer (W. Hauf, "Der Affe als Mensch")*;

К ним также относятся: das ist eine schöne (или heillose) Wirtschaft! Ну и порядки!; ein alter (или schlauer) Fuchs – старая (хитрая) лиса; eine komische (или wunderliche) Haut – чудак;

*Предлоги:*

– alle Mann an (или auf) Deck! [мор.] – Все наверх! (команда); Gewehr auf (или über)! – на плечо! (команда).

Предлоги могут опускаться: Weisheit (auf) der Gasse – избитая истина.

В анализируемом материале встречаются примеры, в которых двойное отрицание kein замещается двойным предлогом weder...noch: kein Fischkein Fleisch (тж. Weder Fisch noch Fleisch) – ни рыба ни мясо; ни то ни сё.

**II. Грамматические**, которые могут иметь разноструктурные варианты. Рассмотрим некоторые из них на примерах субстантивных фразеологизмов.

1. Замена сложного существительного двумя (или несколькими) корневыми существительными: «Der Sturm im Wasserglass (или im Glase Wasser) – буря в стакане воды: Im übrigen geht es hier wieder her wie Anno 1850. Der Arbeiterverein spaltet sich in allerlei Parteien – hie Most, hie Rakkow – und wir haben Mühe genug, uns nicht in diese Betriebe hineinzerrren zu lassen. Lauter Stürme im Glase Wasser, die für die dabei Beteiligten einen teilweise recht guten Einfluß haben mögen, indem sie zu ihrer Fortbildung beitragen, aber für den Gang der Welt ist es ziemlich gleichgültig, ob hundert deutsche Arbeiter hier sich für diese oder jene Seite aussprechen (F. Engels, Brief an J.Ph. Becker)» [Бинович: 1995].

Замена препозитивного определения постпозитивным определением: die Elysäischen Gefilde (тж. die Gefilde Elysiums, die Gefilde der Seligen) – Елисейские поля, Элизиум (Элизей), поля блаженных (в античной мифологии поля блаженных – место пребывания душ умерших).

Иногда может меняться число имени существительного: dickes Geld (тж. dicke Gelder) – [разг.] большие деньги.

**III. Квантитативные** варианты фразеологических единиц, которые образуются путём урезания или добавления компонентов. Причём, чаще встречаются данные варианты в произведениях художественной литературы при авторском употреблении фразеологизмов в контексте.

Примеры квантитативных вариантов демонстрируют, что и полная, и усечённая формы фразеологической единицы употребляются в современном

немецком языке: «alle Welt (тж. Gott und alle Welt) – все, весь мир, все люди: Wir haben alle Welt von uns reden ans machen. Er ist Gott und aller Welt schuldig; ein (ganz) eignes Haus – большой чудак: Sehen Sie, meine Herren, mein Freund Krippenstapel ist ein ganz eignes Haus. Alltags nennt er mich Herr von Stechlin, ... und wenn er ärgerlich ist, nennt er mich gnädiger Herr! (Th. Fontane, “Der Stechlin”)» [Бинович].

К ним относятся: der Augen und des Fleisches Lust – чувственные наслаждения; Freund Hein (mit der Hippe) – смерть (с косою); ein Gefühl wie Weihnachten (und Ostern) – прекрасное чувство; gebranntes Kind (scheut das Feuer) – тот, у кого был плохой опыт (обжёгся на чём-то), (но пытается избежать подобной ситуации).

Среди основных вариантов фразеологизмов выделяются лексические, грамматические и квантитативные. Так, рассматривая вариативность субстантивных фразеологических единиц, можно отметить, что им свойственны:

- модификации корневой семы;
- квантитативные преобразования;
- замена местоположения определения;
- вариативность предлогов.

Все перечисленные виды вариантности служат признаком раздельнооформленности фразеологической единицы, поскольку изменения касаются состава элементов фразеологизма. Как отмечал А.В. Кунин, характерной чертой большинства субстантивных фразеологизмов является отсутствие у них лексического синонима. В отличие от лексического синонима, если он существует, которым является обычно слово нейтральной окраски, фразеологическая единица всегда эмоционально-экспрессивна и представляет собой семантическое единство компонентов.

Различные варианты ФЕ существуют в языке и легко узнаваемы в речи. При появлении варианта номинативных ФЕ в языке наиболее распространённый среди них константный тип зависимости компонентов становится константно-вариантным.

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