TASHKENT STATE UNIVERSITY OF ECONOMICS

International journal of topics

INNOVATION SCIENCE AND TECHNOLOGY

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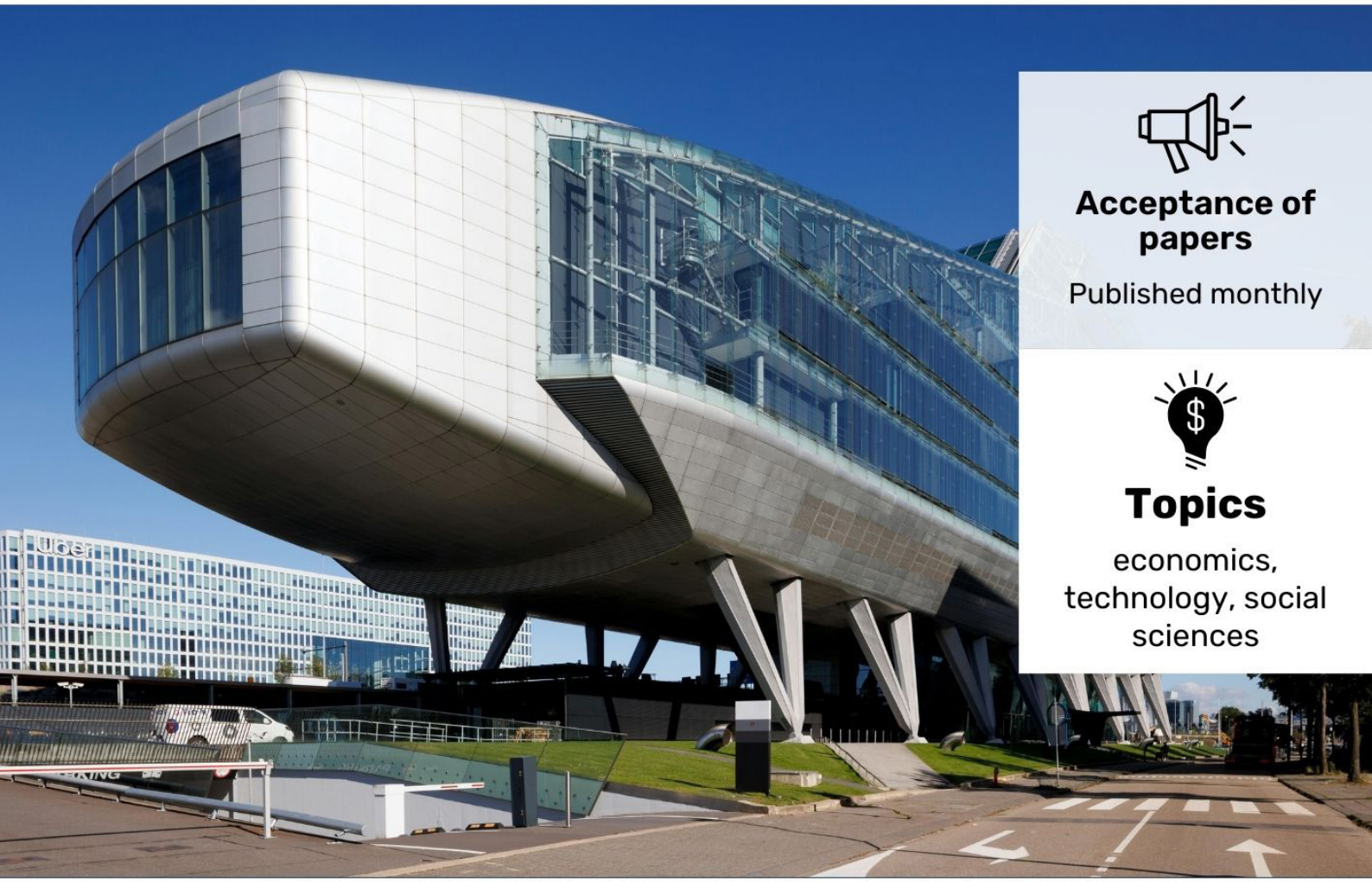
ISSUE 4

Acceptance of papers **APRIL, 2025**



Acceptance of papers

Published monthly

Topics

economics, technology, social sciences

ISSN 3060-5229

Visit the website
t.me/scopus_IST2100

Electronic publication, Issue 4. 65 pages.
Approved for publication on April 1, 2025.

THE SCIENTIFIC-POPULAR ELECTRONIC JOURNAL **"INNOVATION SCIENCE AND TECHNOLOGY"** HAS BEEN REGISTERED UNDER THE NUMBER **C-5669633** BY THE AGENCY FOR INFORMATION AND MASS COMMUNICATIONS (AOKA) OF THE REPUBLIC OF UZBEKISTAN, EFFECTIVE FROM OCTOBER 9, 2024.

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EXPRESSING THE AMOUNT OF MONEY IN WORDS IN UZBEK LANGUAGE FROM A NUMERICAL VALUE IN MS EXCEL

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Abstract: In this article, in order to prevent errors, save time, and increase the reliability of the document by automatically obtaining the verbal form of the amount recorded in numbers in financial documents, an algorithm for automatically expressing the numerical values of money entered by users in the Uzbek language using the capabilities of the Microsoft Excel program was developed. The UzbSumSY function is presented, prepared in the VBA programming language for automatically expressing the amount of money as a number in the Microsoft Excel program using Uzbek words.

Key words: amount of money in numbers, amount of money in words, Microsoft Excel, VBA programming language, automated function.

INTRODUCTION

In an era of rapidly developing information technologies, working with electronic documents—particularly the accurate and precise representation of financial data has become increasingly important. MS Excel is a widely used software tool that not only supports calculations but also enables the preparation of automated documents. In practice, there is often a need to convert a numeric amount of money into words. This requirement is essential in official documents (such as contracts, invoices, receipts, and payment orders) to ensure reliability and prevent errors.

LITERATURE REVIEW

Many specialists have developed user-defined functions (UDFs) using the VBA programming language to convert numbers into words in Excel. For example, the author of the website chandoo.org provides a VBA function capable of expressing numbers in words up to billions [10].

A.M. Yoqubov (2020), in his manual *"Information Technologies and Excel Practice"* [6], elaborates on the use of Excel in the Uzbek language and provides recommendations for developing automated functions using VBA. However, it lacks in-depth methodological research specifically on converting numbers to words. Sources [1]–[4], [8]–[9], as well as the book *"Excel VBA and Macros"* by B. Jelen and T. Syrstad (2019) [5], offer various automation techniques for users, including examples of using the SpellNumber function to convert numbers into words in English. While this function is widely used internationally, a fully adapted version in the

Uzbek language has not yet been developed.

According to official documents published by the Central Bank of Uzbekistan and the Ministry of Finance (e.g., payment orders and invoices), both numeric and word-based representations of monetary values are mandatory [7]. This increases the demand for automatic conversion of numbers into words in Excel. This article analyzes technical solutions for automatically converting monetary amounts in numerical form into words in MS Excel, assessing their advantages, drawbacks, and practical significance.

RESEARCH METHODOLOGY

In this study, an algorithm was developed using the capabilities of Microsoft Excel to automatically express user-entered monetary values in Uzbek words. The goal is to prevent errors, save time, and enhance the reliability of documents by generating a word-based version of the numeric sum in financial documents. The following methodological steps were taken to achieve this goal:

The Excel and VBA environments were prepared using MS Excel 2016 and later versions.

A function named UzbSumSY was developed in VBA to convert numbers into words in Uzbek.

An algorithm was designed to segment numbers into units, tens, hundreds, thousands, millions, and billions.

A text structure aligned with Uzbek orthographic rules was constructed.

The numeric value entered by the user is converted into text and displayed using the function.

ANALYSIS AND RESULTS

The study found that Excel's built-in functions do not support converting numbers into words, prompting users to rely on VBA. With specially written VBA functions (e.g., UzbSumSY), user-inputted numbers can be automatically converted into word form. For example, an input of 12500 results in the output: "o'n ikki ming besh yuz so'm 00 tiyin."

It is crucial that the conversion correctly identifies units, tens, hundreds, thousands, millions, and billions and adheres strictly to the orthographic norms of the Uzbek language (e.g., writing "yigirma uch ming" instead of "yigirma uchming"). The developed VBA functions can be imported as modules and reused across different documents.

Step 1. Launch the MS Excel application (Figure 1).

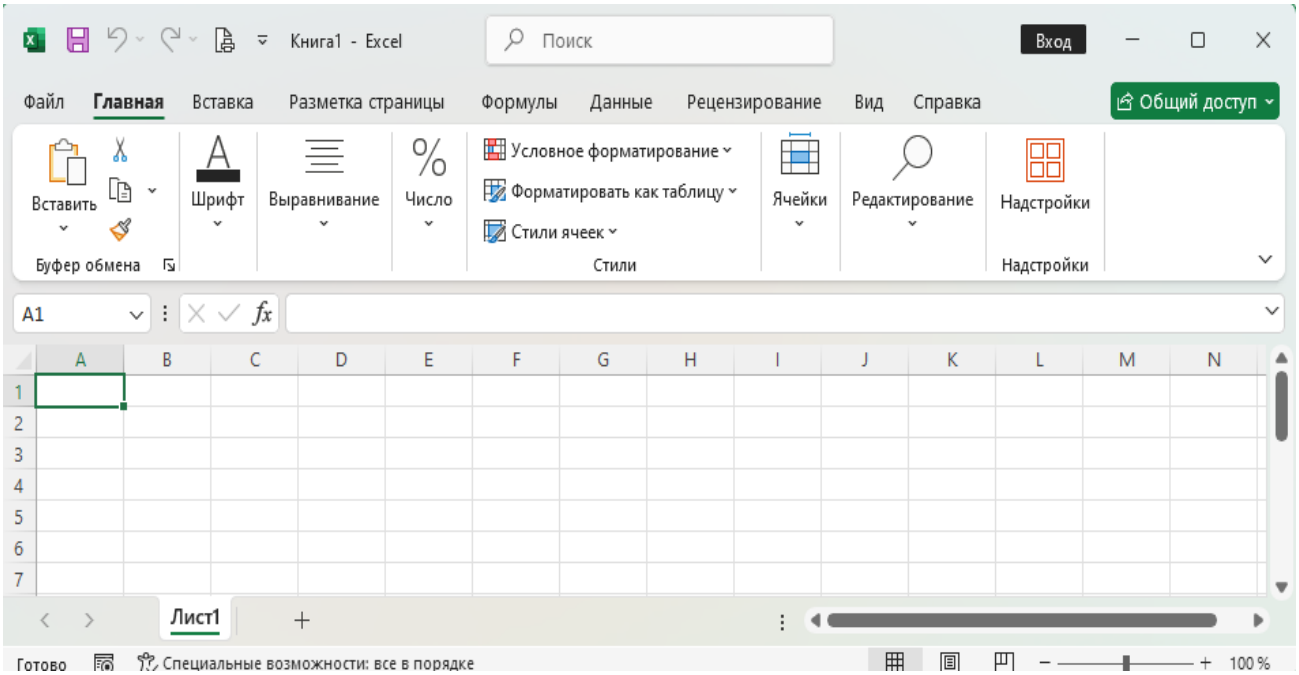

Figure 1. General view of the MS Excel interface.

Step 2. Launch the VBA environment by pressing the keyboard shortcut Alt + F11. Then, move the cursor to VBA Project (Book1), right-click to open the context menu, and select Insert → Module (Figure 2):

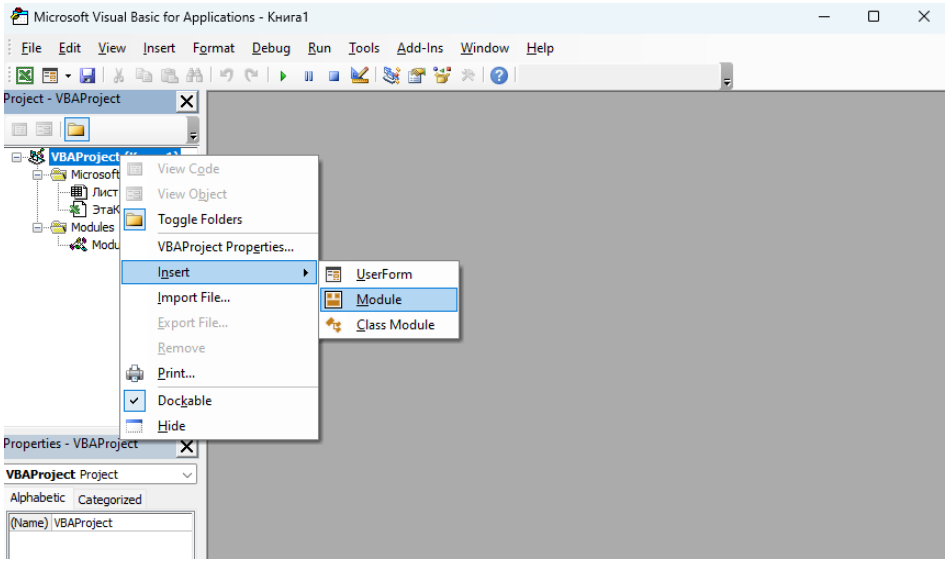

Figure 2. General view of the Microsoft VBA environment.

Step 3. A window for entering code will open (Figure 3):

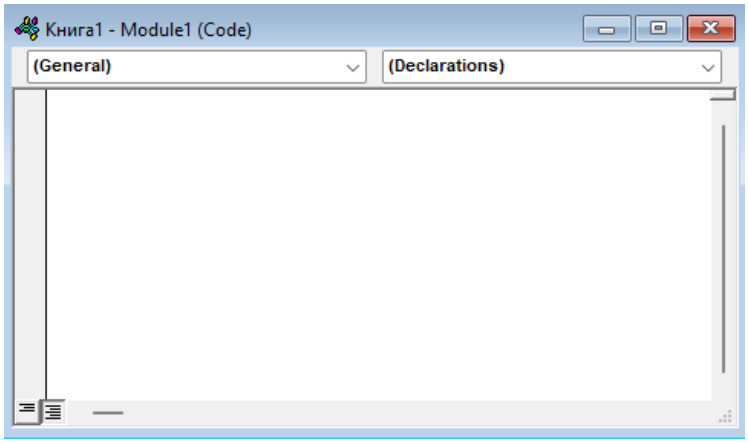

Figure 3. Code input workspace in the VBA environment.

Step 4. Enter the “convert a given monetary amount from numbers to words” code into the code input workspace shown in Figure 3 (Figure 4):

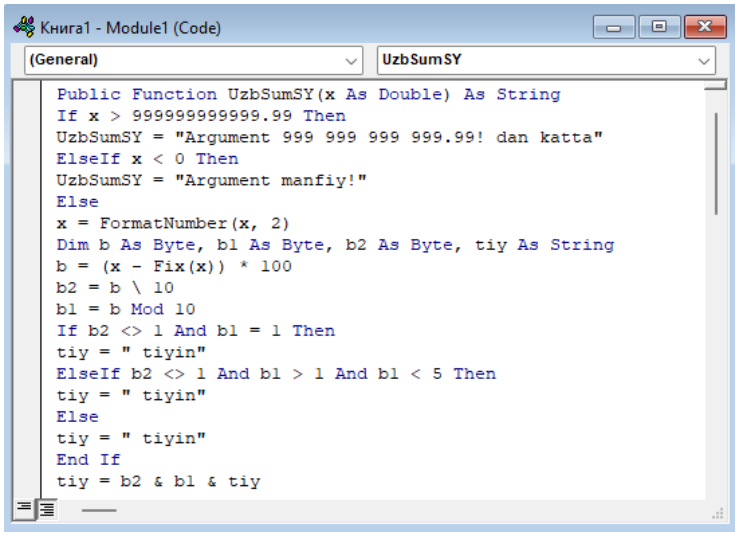

Figure 4. View of the code input workspace after entering the “Convert a given monetary amount from numbers to words” code.

The “Convert a given monetary amount from numbers to words” code is as follows (this code should be directly copied and pasted into the code input workspace):

```
Public Function UzbSumSY(x As Double) As String
  If x > 999999999999.99 Then
    UzbSumSY = “Argument 999 999 999 999.99! dan katta”
  ElseIf x < 0 Then
    UzbSumSY = “Argument manfiy!”
  Else
    x = FormatNumber(x, 2)
    Dim b As Byte, b1 As Byte, b2 As Byte, tiy As String
    b = (x - Fix(x)) * 100
    b2 = b \ 10
    b1 = b Mod 10
    If b2 <> 1 And b1 = 1 Then
      tiy = “ tiyin”
    ElseIf b2 <> 1 And b1 > 1 And b1 < 5 Then
      tiy = “ tiyin”
    Else
      tiy = “ tiyin”
    End If
    tiy = b2 & b1 & tiy
    Dim y(1 To 4) As Integer, i1 As Byte
    For i1 = 1 To 4
      x = Fix(x) / 1000
      y(i1) = (x - Fix(x)) * 1000
    Next
    Dim Text(1 To 4) As String, i2 As Byte, y1 As Byte, y2 As Byte, y3 As Byte
    Dim Text0 As String, Text1 As String, Text2 As String, Text3 As String, Text4 As String
    For i2 = 1 To 4
      y1 = y(i2) Mod 10
      y2 = (y(i2) - y1) / 10 Mod 10
      y3 = y(i2) \ 100
      Text1 = Choose(y3 + 1, “”, “bir yuz “, “ikki yuz “, “uch yuz “, “to‘rt yuz “, “besh yuz “, “olti yuz “, “yetti yuz “, “sakkiz yuz “, “to‘qqiz yuz “)
      Text2 = Choose(y2 + 1, “”, “”, “yigirma “, “o‘ttiz “, “qirq “, “ellik “, “oltmiş “, “yetmiş “, “sakson “, “to‘qson “)
      If y2 = 1 Then
        Text3 = Choose(y1 + 1, “o‘n “, “o‘n bir “, “o‘n ikki “, “o‘n uch “, “o‘n to‘rt “, “o‘n besh “, “o‘n olti “, “o‘n yetti “, “o‘n sakkiz “, “o‘n to‘qqiz “)
      Else
        Text3 = Choose(y1 + 1, “”, “bir “, “ikki “, “uch “, “to‘rt “, “besh “, “olti “, “yetti “, “sakkiz “, “to‘qqiz “)
      End If
      If y2 <> 1 And y1 = 1 Then
        Text4 = Choose(i2, “so‘m “, “ming “, “million “, “milliard “)
      ElseIf y2 <> 1 And y1 > 1 And y1 < 5 Then
        Text4 = Choose(i2, “so‘m “, “ming “, “million “, “milliard “)
      ElseIf y1 = 0 And y2 = 0 And y3 = 0 Then
        Text4 = Choose(i2, “so‘m “, “”, “”, “”)
      Else
        Text4 = Choose(i2, “so‘m “, “ming “, “million “, “milliard “)
      End If
      Text(i2) = Text1 & Text2 & Text3 & Text4
    Next
    If y(1) + y(2) + y(3) + y(4) = 0 Then
      Text0 = “nol so‘m “ & tiy
    Else
      Text0 = Text(4) & Text(3) & Text(2) & Text(1) & tiy
    End If
```

```
    UzbSumSY = Replace(Text0, Left(Text0, 1), UCase(Left(Text0, 1)), 1, 1)
  End If
End Function
```

Step 5. Close the window shown in Figure 2.

Now, let's review how to check the result of the completed work. In the MS Excel workspace, enter the **=** sign into cell **B1**, and activate the **"Insert Function"** option (Figure 5). Its window will open, and from the opened window, select from the **"Category"** section.

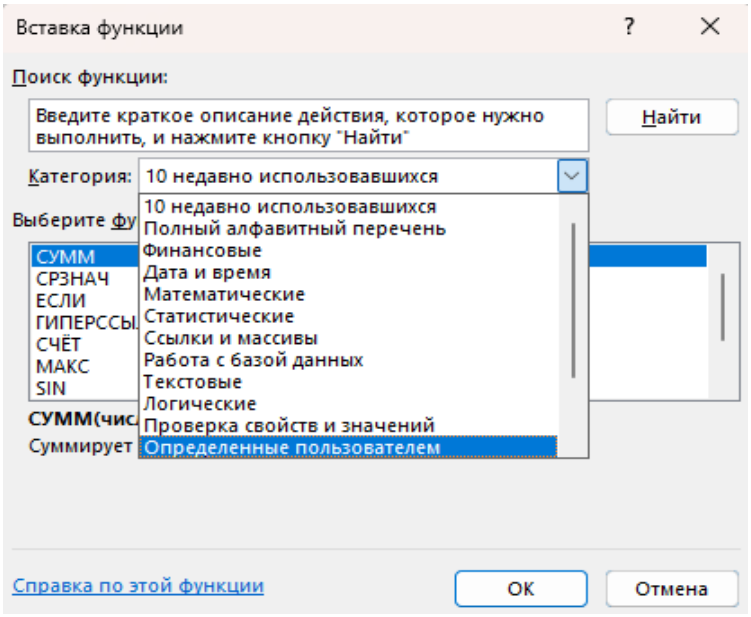

Figure 5. Function Insertion workspace.

From the opened context menu, activate **"User Defined"**, then select **UzbSumSY** from the newly opened window and click the **OK** button (Figure 6).

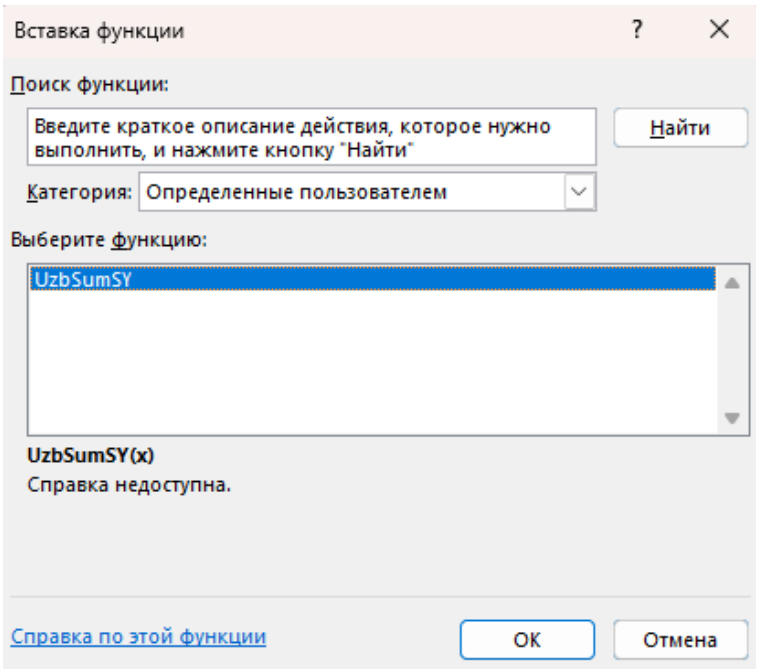

Figure 6. Active functions in the "User Defined" category.

The formula =UzbSumSY() appears in cell B1, and the function argument input window opens. In the field labeled **X** within the opened window, select cell **A1**, then click the **OK** button (Figure 7).

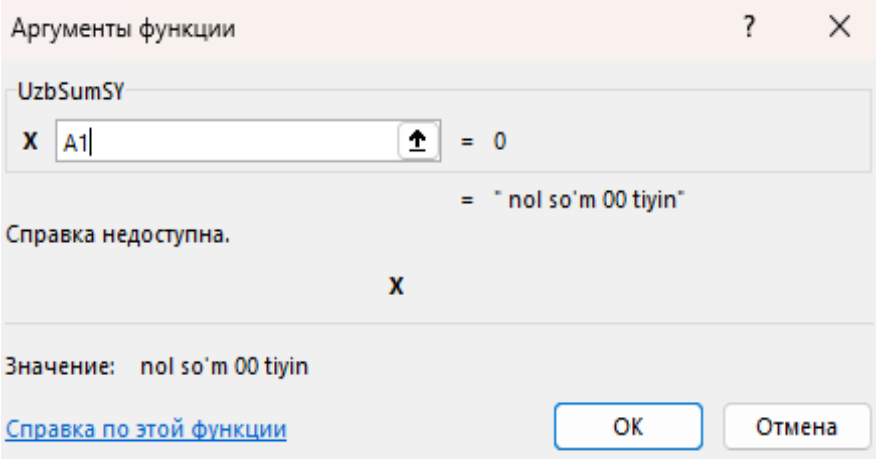

Figure 7. Function argument input window.

If we enter the number **12,500** into cell **A1**, the corresponding written form of the number will automatically appear in cell **B1**, i.e., *"o'n ikki ming besh yuz so'm 00 tiyin"* (twelve thousand five hundred soums and 00 tiyin). If we enter the number **54,801.75** into cell **A2** and autofill cell **B2** using the same formula as in cell **B1**, cell **B2** will display the text *"ellik to'rt ming sakkiz yuz bir so'm 75 tiyin"* (fifty-four thousand eight hundred one soums and 75 tiyin) (Figure 8)

	A	B
1	12500	o'n ikki ming besh yuz so'm 00 tiyin
2	54801,75	ellik to'rt ming sakkiz yuz bir so'm 75 tiyin

Figure 8. Result of the UzbSumSY() function.

To express a given numerical amount of money in words, it is no longer necessary to repeat the previous manual steps. Instead, it is sufficient to use the =UzbSumSY() function in the desired cell.

When the MS Excel file is saved with macro support (as an *.xlsm file), the UzbSumSY() function will remain active in that file. If, upon opening the file, a prompt appears asking whether to enable or disable macros, it is essential to enable macros to ensure functionality.

Analysis results show that for MS Excel users—especially financiers, accountants, economists, and specialists who prepare legal documents—writing numbers in words is a factor that increases the reliability of documents. Such automated processes reduce human error and significantly save processing time. However, existing VBA codes may not always fully comply with the grammatical and stylistic norms of the Uzbek language, and users are required to have skills in working with the VBA editor to utilize them. n the future, it will be necessary to develop a fully adapted universal module based on phonetic and grammatical standards for the Uzbek language.

CONCLUSION AND RECOMMENDATIONS

In conclusion, it has been identified that: writing monetary amounts in words is required for financial documents (invoices, payment slips); expressing amounts in words enhances the formality and legal validity of documents; there are currently insufficient open-source solutions available online for converting numbers into words in the Uzbek language; variations and dialectal differences in writing numbers in Uzbek create challenges for establishing a unified system; although Excel has a built-in function for converting numbers to text, it does not fully support the Uzbek language; most Excel users prefer manually writing the amount in Uzbek, which leads to errors; while VBA coding enables the conversion of numbers into words in Uzbek, it is not convenient for all users.

To address these issues, it is recommended to create Excel templates that allow the automatic conversion of numbers into words; to develop a certified Excel tool for use in government institutions, banks, and accounting systems; to develop open-source projects in the Uzbek language and make them available to all users; to establish standardized writing rules based on literary Uzbek and develop modules accordingly; to develop special VBA functions that convert numbers into text in Uzbek; to create special Excel add-ins that minimize

human error; and to create opportunities for users to easily integrate VBA-based modules with a user-friendly interface into Excel.

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Proofreader: Zokir ALIBEKOV

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