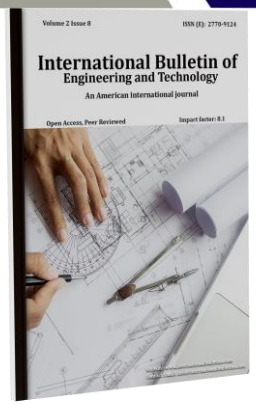


# USING MS EXCEL VBA TO SOLVE ECONOMIC PROBLEMS

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**Annotation**. This article consists of material solving economic problems using Excel and Visual Basic for Application (VBA). The main purpose of the article is to gain practical skills in solving economic problems using Excel VBA. That is, the article describes ways to solve some economic problems.

**Keywords**. MS EXCEL, VBA, Sheets, Economics, IF, FOR, Range, Employees, average, salary.

## INTRODUCTION

EXCEL is one of the most famous spreadsheet programs, it can be said without exaggeration that its possibilities are almost inexhaustible. Personally, I consider such programs to be one of the most powerful and flexible tools available for the computer today. The possibilities of EXCEL are very high. Word processing, database management - the program is so powerful that in many cases it surpasses specialized programs - editors or database programs. Such a variety of functions can be confusing at first, rather than force them to be put into practice. But as you gain experience, you begin to appreciate the fact that the limits of EXCEL's capabilities are hard to reach [1].

The purpose of this article is to compile a document in the Microsoft Excel environment that includes programs written in the Microsoft Visual Basic language that solve the tasks, for example, accrual of bonuses in the form of commissions and additional payments, accrual of bonuses under certain conditions, inventory management model, the problem of optimal investment, tasks for building a matrix and calculating the amount, finding paper cutting and a database. In detail Algorithms for solving problems, all macros and modules used in the program are described, in other words, descriptions of the input and output data of the document, a description of the most important variables used in the program are given[2].

Microsoft Visual Basic for Application is a combination of one of the simplest programming languages and all the computing capabilities of such a multifaceted system as Excel. With VBA, you can easily and quickly create a variety of applications without being a programming specialist. VBA contains a relatively powerful graphical environment that allows you to visually design screen forms and controls. In general, Visual Basic for Application makes it easy to solve many different economic problems[3].

## RESULTS and DISCUSSIONS

To solve problems, you will need user-defined functions in addition to standard Excel functions. In Excel VBA, a user-defined function is created in a worksheet named VBA module and can then be manipulated using the Function Wizard. Created on the sheet of the module, you can enter the text of the program. In addition, if you need to create a macro in the

program, you need to enter the Microsoft Visual Basic environment by pressing the Alt + F11 key combination[4].

All variables in VBA have a type. The type indicates what the variable can store: an integer, a string, a date, and so on.

| Data type | Size of memory | Range |
|---|---|---|
| Boolean | 2 bytes | True/False |
| Integer | 2 bytes | -32768 до32768 |
| Long | 4 bytes | -2,147,483,648 до 2,147,483,648 |
| Date | 8 bytes | From January 1st to December 31st |
| Array | Depends on the size and type of elements | |
| Object | 4 | |
| String | 10+ string length | Any specific |
| Currency | 8 | Object |
| Variant | Depends on the content of the variable | From 0 to 2x10^9 |

MS Excel has standard user functions for working with arrays and matrices:

- Count— The number of numbers in the array
- CountA— Number of array elements
- Sum— Sum of array elements
- SumProduct— The sum of products of array elements
- SumSQ— Sum of squares of array elements
- SumVmY2— Sum of squared differences of elements of two arrays
- SumX2mY2— The sum of the differences of the squares of the elements of two arrays
- Mmult – product of two matrices
- Minverse - inverse matrix
- Transpose - transposed matrix
- MdeTerm – matrix determinant

One of the basic concepts of VBA is an object. An object contains a list of methods that are applicable to it, and methods are what you can do with an object, so an object is a program element that has its own display on the screen, contains some variables that define its properties, and some methods for managing the object[5]. There are many built-in objects in VBA, for example:

- Range - range of cells (can include only 1 cell)
- Cells - cell coordinates
- Sheet - sheet
- WorkSheets - worksheet
- DialogSheets - dialog box

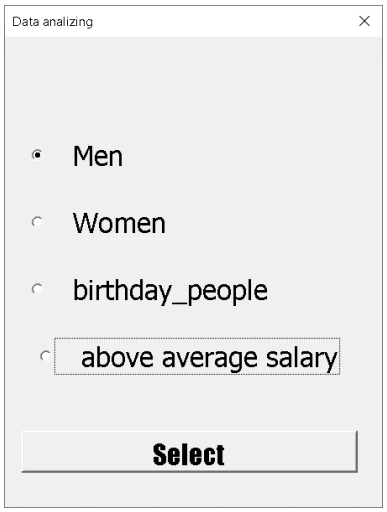
Objects belonging to a group of similar objects organize sets. For example, all worksheets in a workbook form a set called WorkSheets. The syntax for setting the value of an object property is as follows: Object.Property=Expression. For example, WorkSheets("Sheet1").Range("B1").Value=999.

Excel VBA also has the following loop statements:

1. For multiple execution of one statement or group of statements, use the FOR..NEXT loop statement
2. Do..While loop
3. Loop Do..Until

Let's consider some economic problems to be solved in the Excel VBA environment. When working with large tables, it is often necessary to select data that meets certain conditions. This is done using the Filter tool. In addition, using macros, you can also select data that meets frequently encountered conditions and this can be done using a form[7].

Example 1: Create a macro in which you can filter the data for the employees file using a form, overwriting the selected data on a new sheet. Form type:




The Click_CommandButton1 event handler code will look like this: Creating new sheets for data selection.

```
Private Sub CommandButtonl_Click()
Dim n As Integer, k As Integer
Dim i As Integer, j As Integer
Dim sum As Long, emp As Single
Sheets("employees").Activate
Sheets.Add before:=Sheets(1)
k = 1
```

The variable n calculates the number of rows in the table. The variable k is needed to number rows on a new sheet. Variables i and j are the numbers of rows and columns, respectively. When choosing Mans, patronymics are considered in the 4th column. If the patronymic ends with "ch", then it is a man, if it ends with "a", then it is a woman.

```
If OptionButtonl.Value Then
Sheets(1).Name = "Men"
Sheets("employees").Activate
n = Range("A2").CurrenrRegion.Rows.Count
For j = 1 To 9
Sheets(1).Cells(1, j).Value = Cells(1, j).Value
Next
```

```
For i = 2 To n
If Right(Cells (i, 4).Text, 1) =”ch” Then
k = k + 1
For j = 1 To 9
Sheets(1).Cells(k, j).Value = Cells(i, j).Value
Next
End if
Next
End If
If OptionButton2.Value Then
Sheets(1).Name = "Women"
Sheets("employees").Activate
n = Range("A2").CurrentRegion.Rows.Count
For j = 1 To 9
Sheets(1).Cells(1, j).Value = Cells(1, j).Value
Next
For i = 2 To n
If Right(Cells(i, 4).Text, 1) = "a" Then
k = k + 1
For j = 1 To 9
Sheets(1).Cells(k, j).Value = Cells(i, j).Value
Next
```

When selecting birthdays of the month, the month of birth and the current month are determined.

```
If OptlonButton3.Value Then
Sheets(1).Name = "birthday_people"
Sheets ("employees").Activate
n = Range ("A2 "). CurrentReglon. Rows. Count
For j = 1 To 9
Sheets(1).Cells(1, j).Value = Cells(l, j).Value
Next
For i = 2 To n
If Month(Cells(i, 7).Value) = Month(Date) Then
k = k + 1
For j = 1 To 9
Sheets(1).Cells(k, j).Value = Cells(x, j).Value
Next
End If
Next
End If
```

Selection of employees with salaries above average.

```
If OptionButton4.Value Then
Sheets(1).Name = "Above_avg_salary"
Sheets ("employees").Activate
```

```
n = Rance("A2").CurrentRegion.Rows.Count
For j = 1 To 9
Sheets(1).Cells(1, j).Value = Cells (1, j).Value
Next
sum = 0
For i = 2 To n
sum = sum + Cells(i, 9).Value
Next
emp= sum / (n - 1)
For i = 2 To n
If Cells (i, 9) .Value > emp Then
k = k + 1
For j = 1 To 9
Sheets(1).Cells (k, j).Value = Cells(i, j).Value
Nexr
End If
Next
End If
End Sub
```

**CONCLUSIONS**

Visual Basic for Applications (VBA) is a variation of the object-oriented Visual Basic programming language that is embedded in almost all office and many other applications. To use its capabilities you need from the main application. in which it is embedded, enter the VBA editor. In MS Office applications (Word, Excel. Acces, Power Point, etc.), this is done by pressing the key combination <Alt + Fll> or by selecting the Visual Basic command on the ribbon of the Developer tab. In both cases, the main VBA editor window will open. in which all actions are performed to create the code of programs and graphic objects of the VBA application. For Excel, program code can be entered in several places - in VBA worksheets in the Microsoft Excel Objects folder, in modules in the Modules folder, and in sections of the code window associated with the UserForm graphical object. To quickly launch a VBA program, use the function key <F5>[6].

The main purpose of the article is to teach the user the techniques of office programming for creating applications for processing tabular data in VBA while studying the basic structures and objects of the language, properties and methods of Excel objects for solving economic problems.

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