

# ADVANCED USE OF MS EXCEL FOR BUSINESS ANALYSIS

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## 1. ABSTRACT

In this paper we introduce a new course called Advanced Use of MS Excel for Business Analysis. In this course we start very briefly with the basics of Excel, and then we continue with more advanced topics. We give an introduction to the macro language of Excel, i.e. the Visual Basic for Applications (VBA), as well. This is especially useful for special situations for which the built-in functions of Excel doesn't provide easy or even any solution.

## 2. INTRODUCTION

Information technology became the part of our everyday life. Without considering the advantages of the Internet, we use word processors for writing letters, spreadsheets for economic calculations, etc. It is especially true for economists, who require not only user-level knowledge, but advanced understanding as well, including some programming skills.

In contrast to more rigid decision support solutions, the versatility and ease of use helped MS Excel to become the bread and butter of daily managerial decision support solutions. Particularly for ad-hoc analysis of limited datasets it provides an excellent alternative to more complex and expensive software packages. Both graphing and statistical add-ins exist to further increase the quality of performance (e.g. XLSTAT).

In the name of an ancient predecessor applications of Excel, Lotus 1-2-3, the number "1" represented spreadsheet management, "2" represented diagrams, and "3" the database management. Since that time spreadsheet management applications have much more features, like the analyser tools as an example. These programmes are very popular today, obviously not that much as word processors, but no doubt that many people use them.

Considering the above mentioned facts it is obvious that teaching the usage of spreadsheet applications in general is very important. Now we are concentrating a special field of spreadsheet management that is the advanced use of MS Excel for

Business Analysis, which can be very useful in the field of finance, business analysis, etc.

## 3. SYLLABUS

In the beginning of the proposed course we will give a short introduction to the basics of Excel, which will be followed by more advanced topics that can be applied in business analysis. At the end of the course students will get acquainted with the fundamentals of Excel VBA, as well, that is the macro language of MS Excel.

### 3.1 First steps – the basics of Excel

In the first part of the course the advanced usage of the user interface will be introduced, that will enable students to navigate in Excel tables very efficiently. When students got familiar with the basics, then they will learn different data types (like currency, date) that can format the entered values.

Students will understand a very important part of Excel that is to differentiate the relative and absolute references. These references behave differently when copied and filled to other cells. Relative references change when a formula is copied to another cell, while absolute references, on the other hand, remain constant, no matter where they are copied.

There are different Edit operations in Excel, where students can not only copy and paste cells, but they can create series, delete contents, etc. After copying data, they can use the Paste Special command on the Edit menu to paste specific cell contents or attributes such as formulas, formats, or comments from the Clipboard into an Excel worksheet. Students can also use Paste Special to paste a link to Excel data or data from another program, such as Microsoft Word or a Lotus 1-2-3 spreadsheet.

After that students will make calculations using formulas and functions. A formula is an expression which calculates the value of a cell. Functions are predefined formulas and are already available in Excel. Finally in this chapter the basic math operations using formulas will be introduced.

### 3.1.1 Formatting numbers

Excel provides many options for displaying numbers as percentages, currency, dates, and so on. We will teach how students can customize a built-in number format to create their own, if the provided ones do not meet the user's needs. To create a custom number format, it is worth selecting one of the built-in number formats as a starting point. Students can then change any one of the code sections of that format to create their own number format.

Students can format not only the numbers in Excel's cells, but they can use conditional formatting, as well, that enables them to highlight cells with a certain colour, depending on the cell's value.

### 3.1.2 Protecting workbooks, worksheets and cells

Students will learn which ways Excel provides to protect a workbook. They can require a password to open the workbook, a password to change data, and a password for changing the file's structure—adding, deleting, or hiding worksheets. To prevent users from accidentally or deliberately changing, moving, or deleting important data from a worksheet or workbook, they can protect certain worksheet or workbook elements, with or without a password. Students can remove the protection from a worksheet as needed. Worksheet and workbook element protection will be differentiated with workbook-level password security. Element protection cannot protect a workbook from users who have malicious intent. For optimal security, students should protect their whole workbook file by using a password. This allows only authorized users to view or modify data in the workbook. Excel allows users to protect the contents of specific cells in a worksheet. In doing so, they can choose whether users are allowed to select or edit a cell or range of cells, insert or delete rows or columns, alter formatting, sort and filter, among other options.

### 3.1.3 Names in Excel

Students can create a named range or a named constant and use these names in their formulas. This way they can make their formulas easier to understand. The topics that will be covered are as follow:

- naming cells
- giving names to ranges
- managing cell or range names

## 3.2 Behind the basics – for business analysts

### 3.2.1 Diagrams

Diagrams have special importance in business analysis. Good created and formatted charts can help people and businesses make decisions based on the impact that the images provide. Data analysis on charts is done using graphics that present pictures. In addition to the pictures, students can add words, also called labels to indicate what the pictures represent. In the frame of this course students will learn how to create basic diagrams and how to format them.

Students can format diagrams in a different way if they copy markers on the diagrams. Very useful analysis tool is the trend line, where users can select among many different diagram types the one which gives the best approach by using the R-square.

### 3.2.2 Special functions for business analysis

There are many different functions in Excel that can be used for business analysis. First of all the financial functions like Future Value (FV) and Present Value (PV) of an investment, Interest Payment (IPMT) for an investment or loan, Payment on the Principal (PPMT) for an annuity or loan, Interest Rate per period (RATE), Net Present Value (NPV), Internal Rate of Return (IRR) can be used. Then we will show several statistical functions like those that returns the average of its arguments (AVERAGE), that counts how many numbers/values/blank cells are in the list of arguments or range (COUNT, COUNTA, COUNTBLANK), that meet the given criteria (COUNTIF), maximum/median/minimum value in a list of arguments (MAX, MEDIAN, MIN), and variance based on a sample (VAR). Excel comes with multiple Lookup and Reference functions that let students find matching values. Excel's VLOOKUP function is excellent when they want to find a value in a table based on a lookup value. Students will learn those functions in Excel that can be used for calculating the interest rate of an investment loan, or annuity based on a series of regular periodic cash flows.

### 3.2.3 Data Consolidation

The main purpose of data consolidation is that the collected data can be easier refreshed or updated. To summarize and report results from separate worksheets, students can consolidate data from each separate worksheet into a master worksheet. The worksheets can be in the same workbook as the master worksheet or in other workbooks. During data consolidation,

students are assembling data so that they can more easily update and aggregate it on a regular or ad hoc basis.

#### 3.2.4 3-D references

In certain business analysis tasks 3-D references, that refers to the same cell or range on multiple sheets, seem to be very useful. A 3-D reference is a convenient way to reference several worksheets that follow the same pattern and cells on each worksheet contain the same type of data, such as when you consolidate budget data from different departments in your organization.

#### 3.2.5 Forms

If in certain business analysis tasks users want to get special inputs (like answering Yes/No questions, selecting answers from a list, providing continuous or discrete values, etc.) forms can help a lot. To prepare students for applying these tools, they have to be acquainted with the following form elements:

- Check Box
- Option Button
- List Box
- Spin Button
- Scroll Bar

#### 3.2.6 Subtotals

The Excel SUBTOTAL function returns the subtotal of the numbers in a column in a list or database. This is very effective in business analysis, while students have to provide the code of the calculation method, that Excel will perform automatically. The syntax for the Microsoft Excel SUBTOTAL function is SUBTOTAL (method, range1, [range2, ... range\_n] ), where *method* is type of subtotal to create and can be a value ranging from 1 - 11 that includes hidden values or a value ranging from 101 - 111 that ignores hidden values in the calculation. For example if *method* = 9 then SUBTOTAL will summarize the selected range which includes hidden values in the calculation. When method is 101, then SUBTOTAL will calculate the average, where hidden values will be ignored in the calculation.

#### 3.2.7 Pivot Tables

*Pivot table* is one of the most powerful features of *Excel*. A *pivot table* allows users to extract the significance from a large, detailed data set, and if required, diagrams can be made of that.

*Excel pivot tables* are especially useful for business analysis. Pivot tables can be used to sum-

marize, analyse, explore and present their data. It means for example, that one can take the sales data with columns like salesman, region and product-wise revenues and use pivot tables to quickly find out how products are performing in each region.

Students can analyse data in one or multiple tables, and create interactive and visual reports that can be shared with the stakeholders.

#### 3.2.8 Database Management in Excel

Excel provides multiple features for organizing and managing data, so students can ensure that data is entered correctly and the calculations and formulas are valid. Data organization features enable them to sort, filter, and group and outline data so that they can focus on the key parts of their data.

Validation features ensure that data is correct, that it is entered in the proper format, and that formulas are working correctly, all of which are incredibly important for maintaining accurate records. Using data validation, students can control the data types they written in the cells.

#### 3.2.9 What-If Analysis Tools

What-If Analysis tools in Excel [1], [2] allows students to try out different values (scenarios) for formulas. This feature can help them experiment and answer questions with their data, even when the data is incomplete.

Three kinds of what-if analysis tools that come with Excel will be introduced: scenarios, data tables, and Goal Seek. Scenarios and data tables take sets of input values and determine possible results. A data table works only with one or two variables, but it can accept many different values for those variables. A scenario can have multiple variables, but it can accommodate only up to 32 values. Goal Seek works differently from scenarios and data tables in that it takes a result and determines possible input values that produce that result.

In addition to these tools, students – after installing add-ins – can perform what-if analysis, such as the Solver. The Solver add-in is similar to Goal Seek, but it can accommodate more variables. Students can also create forecasts by using the fill handle and various commands that are built into Excel. For more advanced models, students can use the Analysis Pack add-in.

```
Function CtoF(Celsius As Double)
On Error GoTo Error
CtoF = Celsius * 9 / 5 + 32 'Celsius-Fahrenheit
Exit Function
Error:
CtoF = "Error..."
On Error GoTo 0
End Function
```

Figure 1.  
VBA code

Optimisation models can be created and solved using Solver. Students can find the optimal value of the target cell by giving several varying cells, and boundary conditions.

### 3.2.10 Integrative section

The final exercise leads students through the most commonly used scenarios in management decision making situations. The exercise will be based on a company selling products and revolves around the company making predictions about sales figures. Participants receive raw data that has to be imported, checked for inconsistencies and data errors. Once cleaned, with the use of predictive tools (e.g. linear regression), participants have to answer specific questions from the management. This allows participants to see the various MS Excel functionalities in a process flow commonly employed in enterprises.

### 3.3 Programming Excel (VBA)

In some cases the built-in functions of Excel doesn't provide all the features that can be required in certain business analysis tasks. In other cases the feature is available, but not user friendly enough. In both cases writing VBA (Visual Basic for Application) programmes for Excel can help [3], [4] (see Fig.1. as an example). The most important topics that should be covered in the frame of this course are as follows:

- Recording macros
- The basics of VBA
- Events
- Application object
- Add-ins
- Forms
- Error handling
- Functions

### 4. SUMMARY

In this paper a new course, called Advanced Use of MS Excel for Business Analysis has been introduced. We started with the basics of Excel, where we have described some formatting, protecting and naming methods. After that we continued with some aspects of diagrams, special functions for business analysis, and with some more advanced topics. Among them we dealt with data consolidation, 3-D references, Forms, Subtotals, Pivot Tables, Database Management, and with the What-If Analysis tool. At the end of the paper we provided the most import topics of Excel programming.

The introduced course will be extended with a PDF textbook, and a SCORM-based distant learning material. We hope that this English language course will start soon at Dennis Gabor College.

### 5. REFERENCES

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- [4] Kovalcsik Géza: *Az Excel programozása*, ComputerBooks, Budapest, 2010
- [5] <http://office.microsoft.com/en-us/excel-help/available-chart-types-HA001034607.aspx>
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