SV KDA Tool Kit

Version: 1.0
Date: 11Jun24

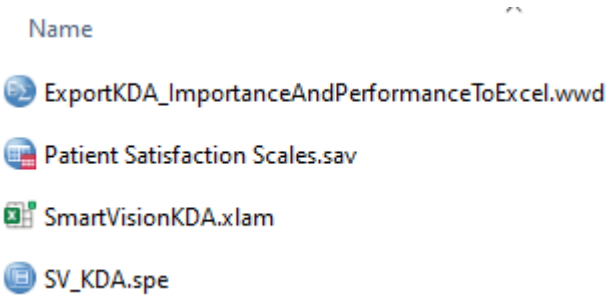
Requirements

- SPSS Statistics v29 or later
- R version 4.2.x or later

Installation and Configuration

Once you have downloaded the zip file from Smart Vision please unzip the files into an empty folder.

The current installation set consists of four files:



- **ExportKDA_ImportanceAndPerformanceToExcel.wwd** is an SPSS script that exports KDA output from IBM/SPSS Statistics to Microsoft Excel.

- **Patient Satisfaction Scales.sav.** This is the sample data file we use in the example session in the User section below.

- **SmartVisionKDA.xlam**. A Microsoft Excel macro add-in that we install into Excel as an add-on (see later)

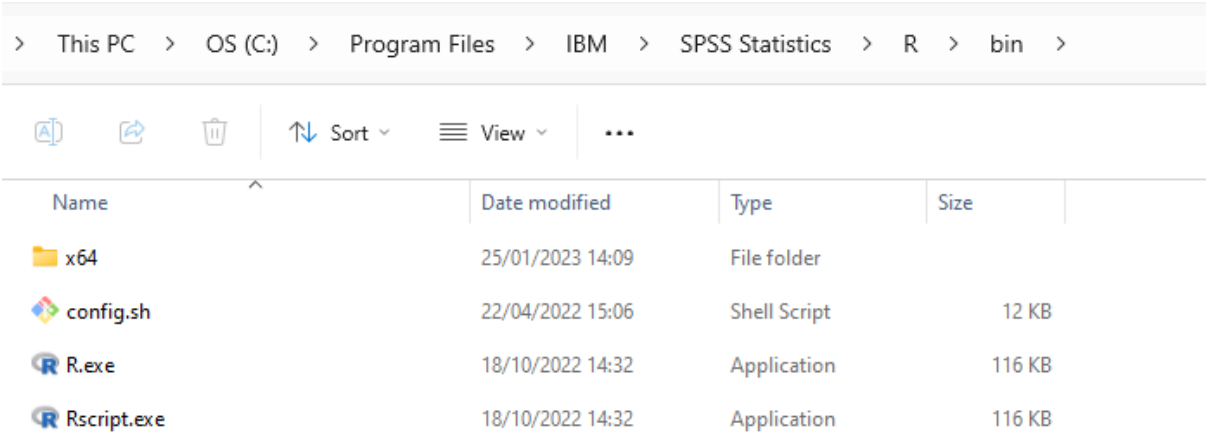
- **SV_KDA.spe**. An IBM/SPSS Statistics Extension bundle that runs Johnson's Relative Weight Analysis (RWA)

Install local SPE

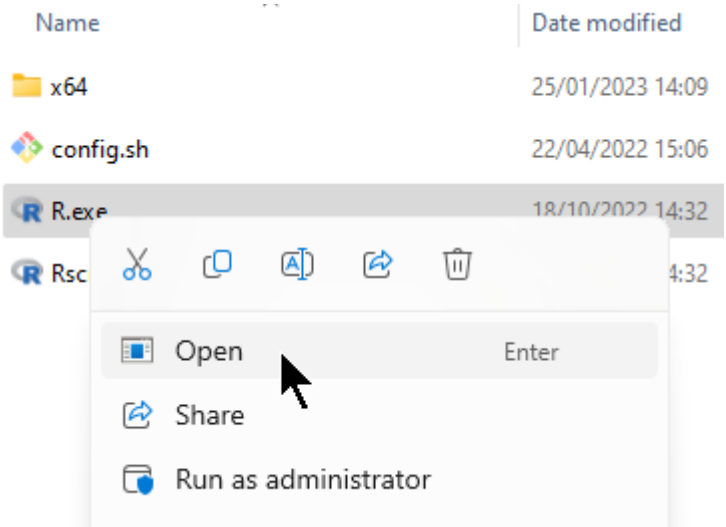
Install rwa into the R version SPSS is using.

Typically, R.exe is in the R bin folder in the directory where SPSS Statistics is installed. E.g. for SPSS Statistics v29, the default folder is:

C:\Program Files\IBM\SPSS Statistics\R\bin



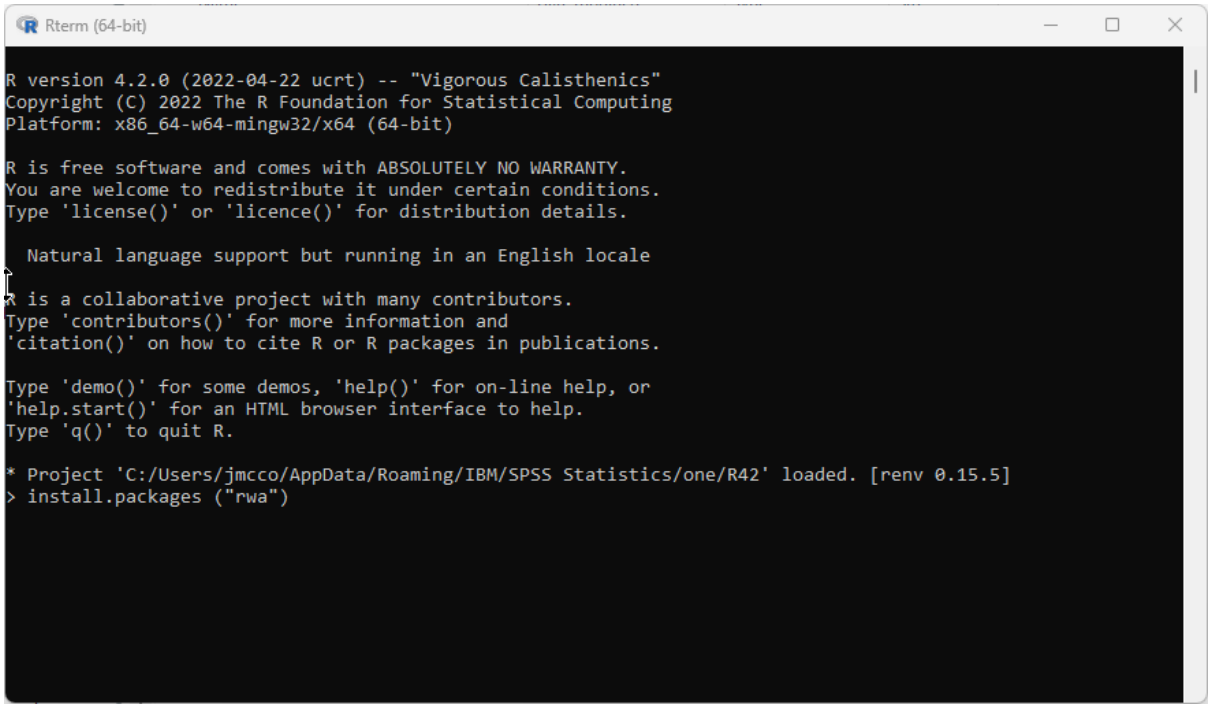
Right-click and Open R.exe:



Once R is open you can install **rwa** in one of two ways

1. With a single command:

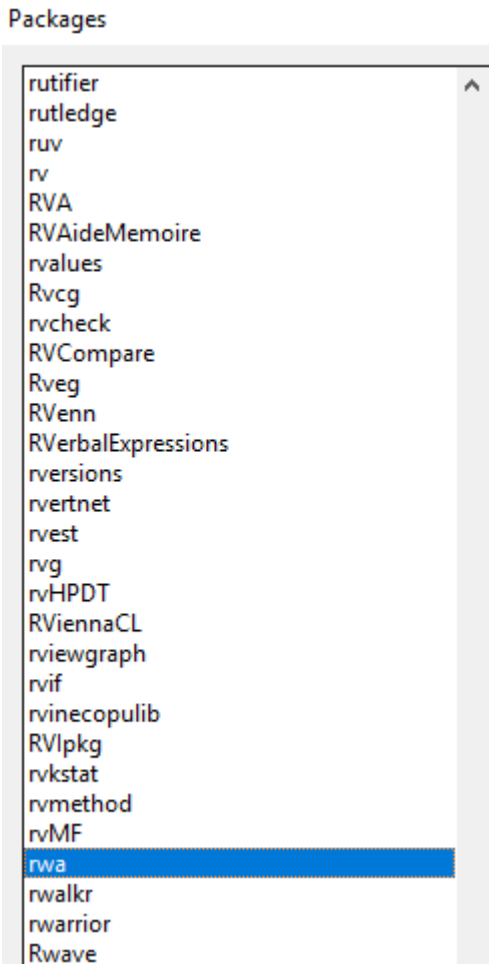
```
install.packages ("rwa")
```



2. With the **install.packages ()** command:

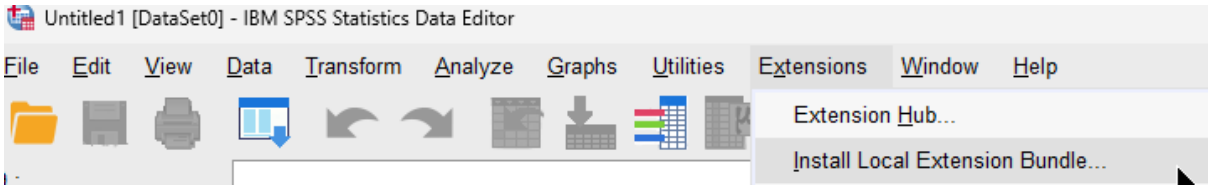
```
Install.packages ()
```

And pick **rwa** from a list of all available packages:

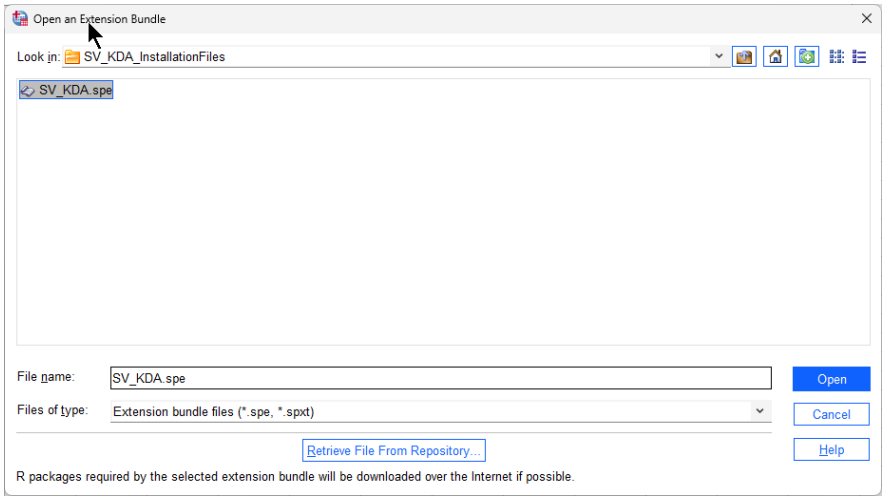


Install the local extension bundle.

Open SPSS Statistics, navigate to the Extensions menu, and Install the **Local Extension Bundle…**



Navigate to the folder where you unzipped the installation files and select the **SV_KDA.spe**.



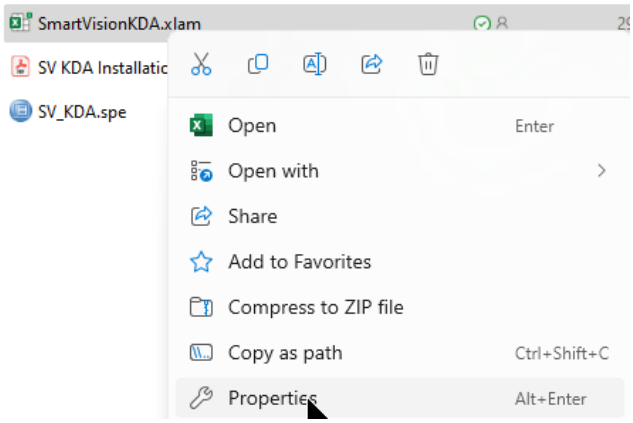
Add the Excel macro add-in.

Trusting the .xlam file

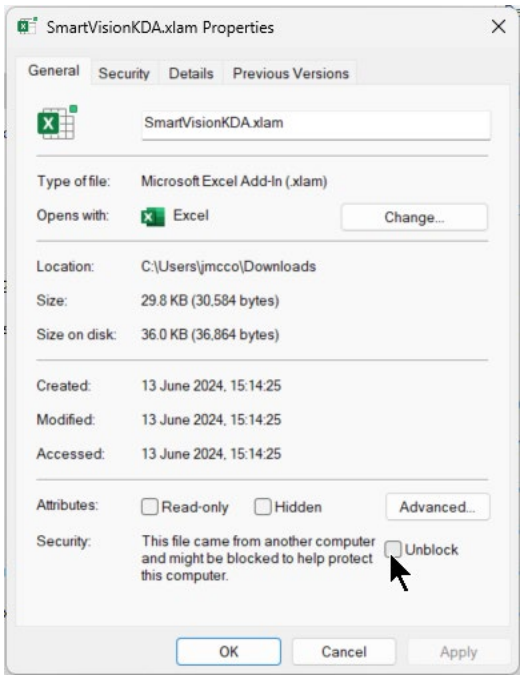
Because this file originated on the internet you will probably need to to unblock it.

If you open Windows Explorer and navigate to the directory in which you saved the files.

Right-click on the file and select **Properties**.



Click to check the relevant box to **Unblock** the file:



Excel security settings

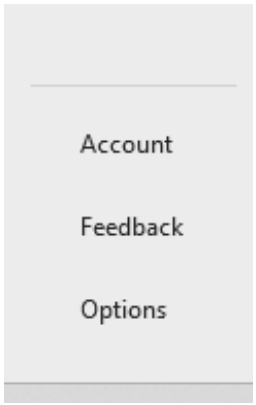
Depending on your local security settings, you may also need to “trust” the **SmartVisionKDA.xlam** file before adding it to Excel:

Trusted documents - Microsoft Support

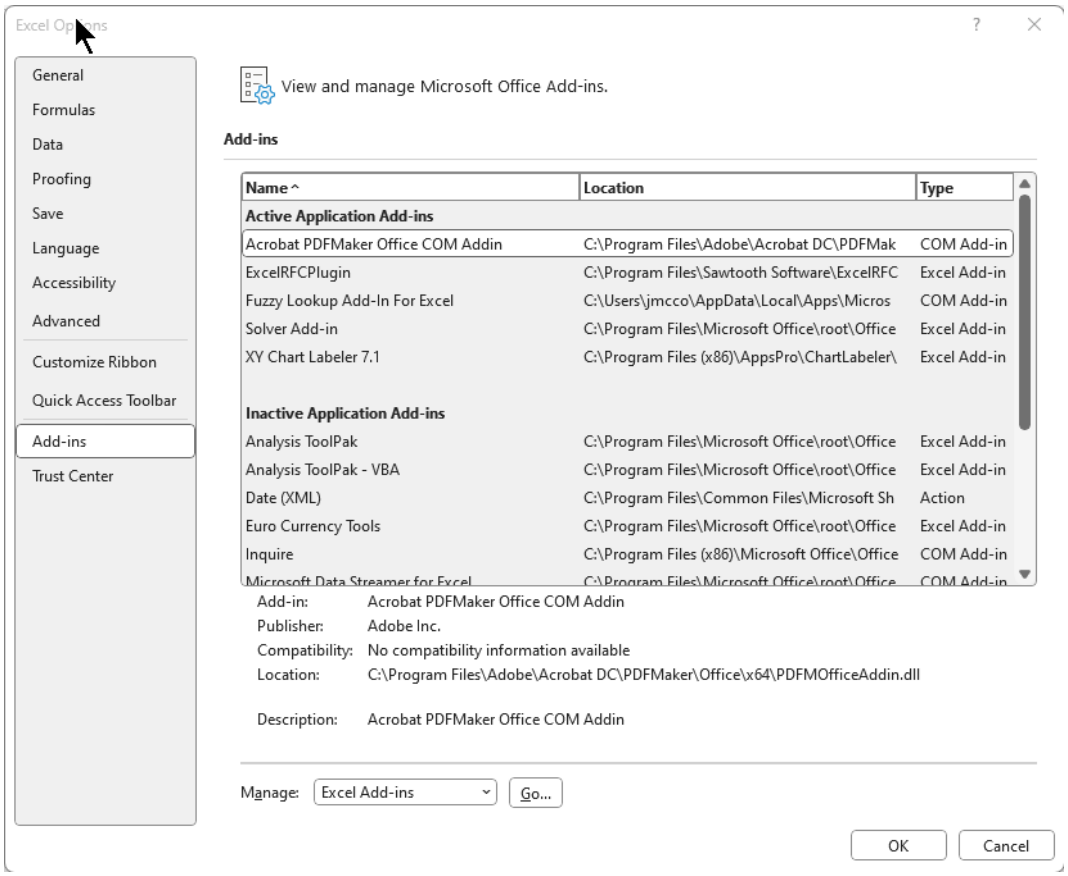
We would also recommend

Adding the add-on

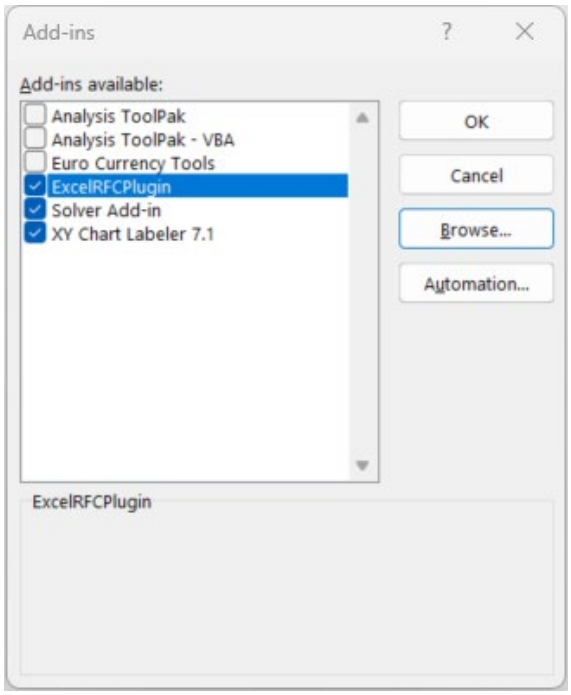
With Excel open, click on the file menu and select Options from the bottom of the menu



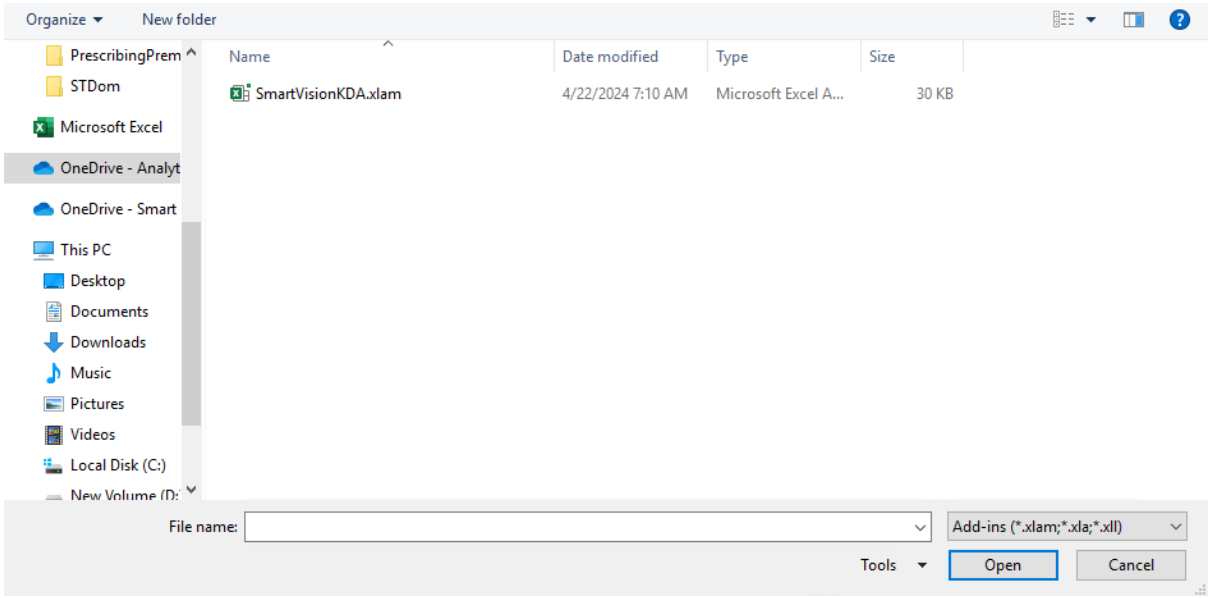
Click **Add-ins** on the left and click the **Go…** button at the bottom of the **Add-ins** dialog



You should see the current **Add-ins** list.

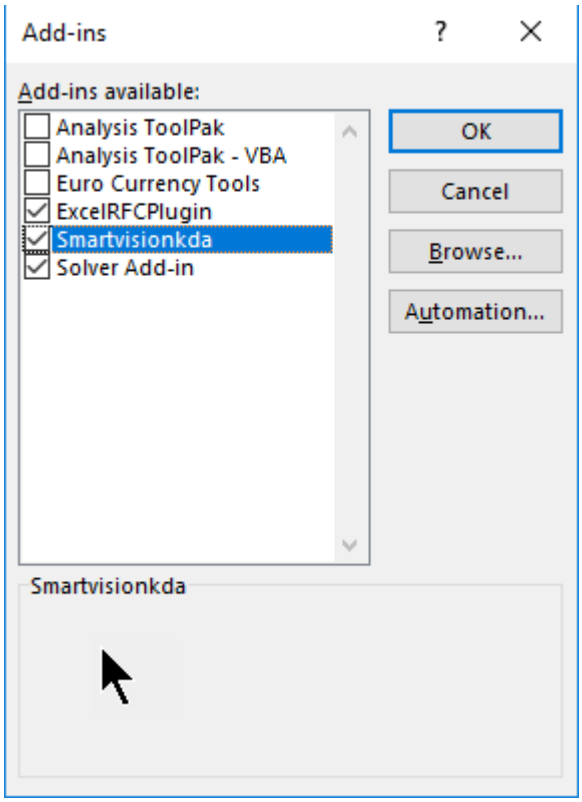


Click the **Browse…** button.



Navigate to the installation folder and select to **Open** the **SmartVisionKDA.xlam** file.

When you click **OK,** this should now appear in the **Add-ons** list.



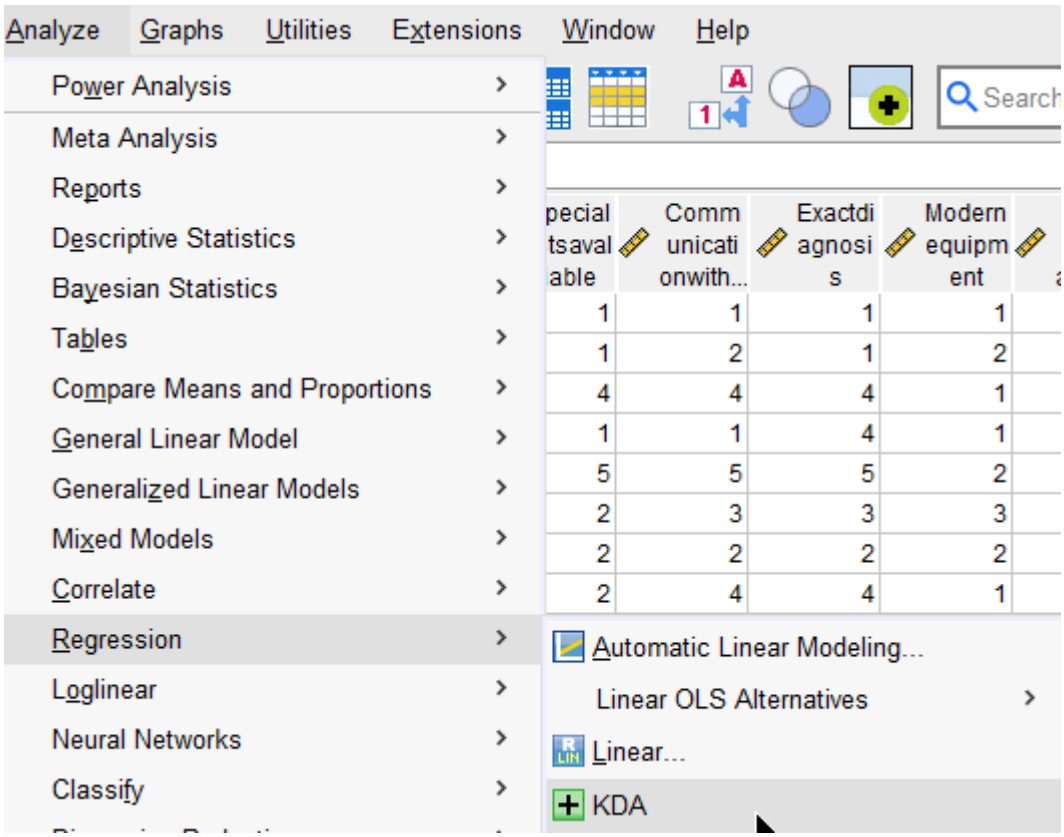
Using the kit

Example data

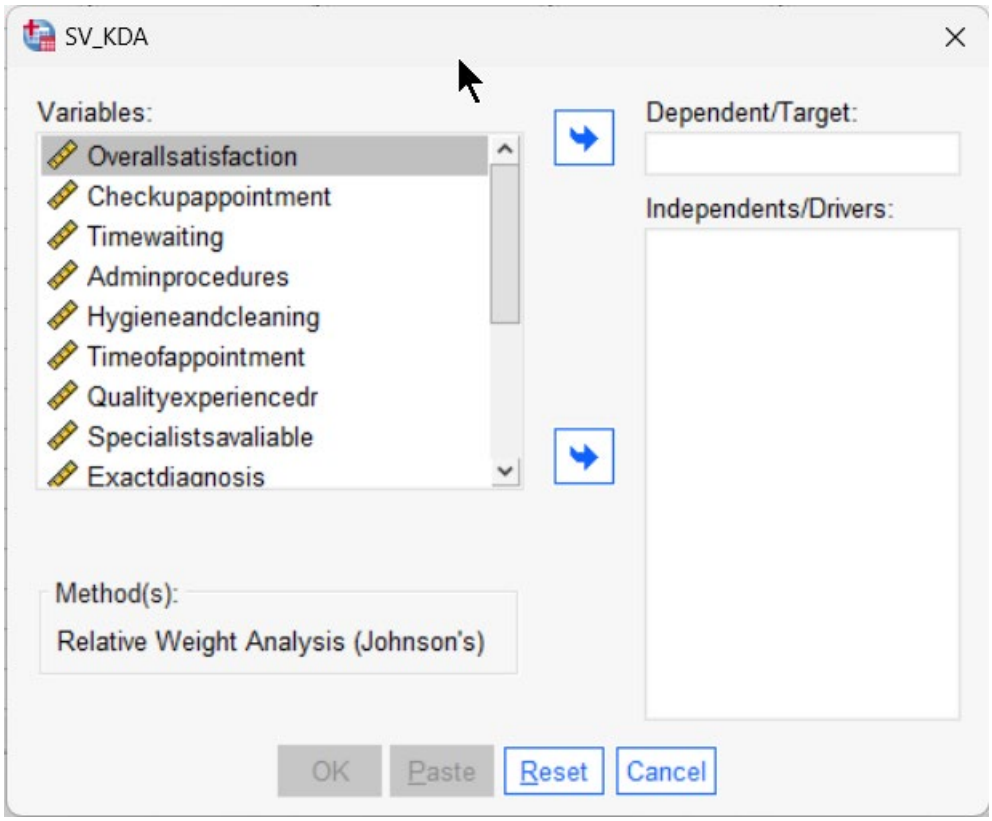
To follow the example session, we recommend opening the **Patient Satisfaction Scales.sav** file in the installation folder.

Running an RWA KDA

The additional SV dialog to run Johnson's RWA should have been installed in the **Analysis>Regression** menu:



The dialog should open:

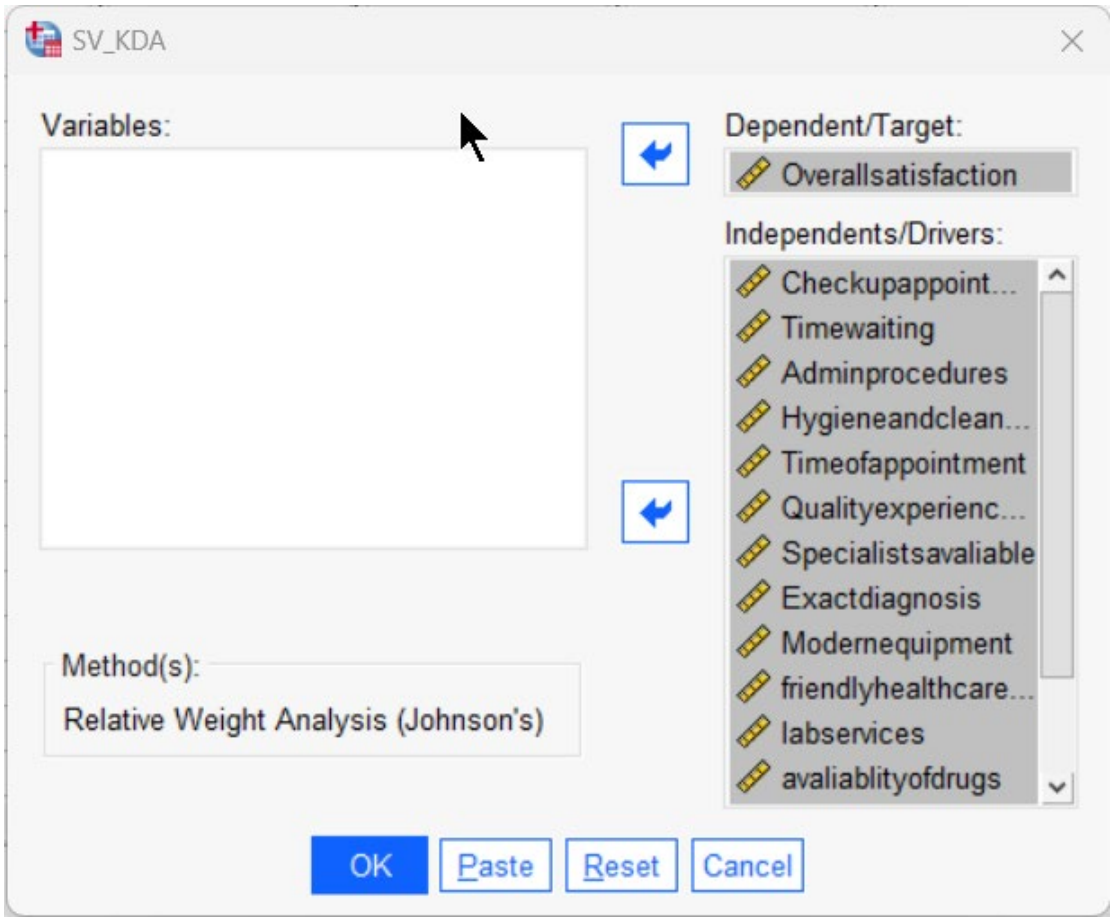


By typical SPSS standards, this dialog is relatively simple.

As the dataset name suggests, this a patient satisfaction survey which has:

- An **Overallsatisfaction** variable will be the target for our KDA.
- A number of candidate driver (independent) variables including **Waiting Time**, **Hygiene** and **Cleaning**, etc.

We can select the **Dependent** and **Independent** variables in the usual way:



We can choose to **Paste** the corresponding syntax.

For this example, we choose to click **OK,** and we should see the following output:

SV KDA Summary

	Summary
Dependent Variable	Overallsatisfaction
R Squared	0.6335
Number of Cases	453
Number of Valid Cases	452

In the summary table, we can see that we have a “respectable” R Square value (0.63 when rounded)

We also see that we lost 1 case from our original data set. Most likely, this is due to missing values.

Relative Weight Measures

	Importance
Checkupappointment	.052
Timewaiting	.059
Adminprocedures	.050
Hygieneandcleaning	.025
Timeofappointment	.063
Qualityexperiencedr	.122
Specialistsavaliable	.127
Exactdiagnosis	.178
Modernequipment	.043
friendlyhealthcareworkers	.133
labservices	.033
avaliablityofdrugs	.028
waitingrooms	.034
hospitalroomsquality	.021
parkingplayingroomscaffes	.032

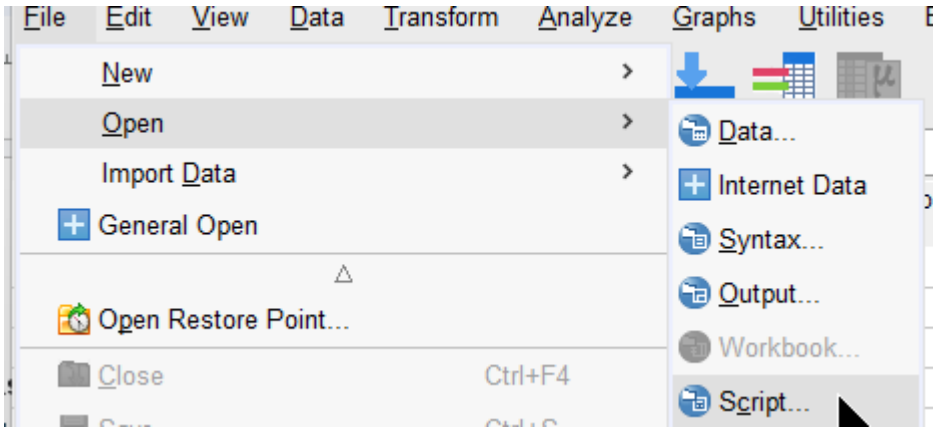
Importances sum to 1 (=100%)

The following table contains the KDA importances.

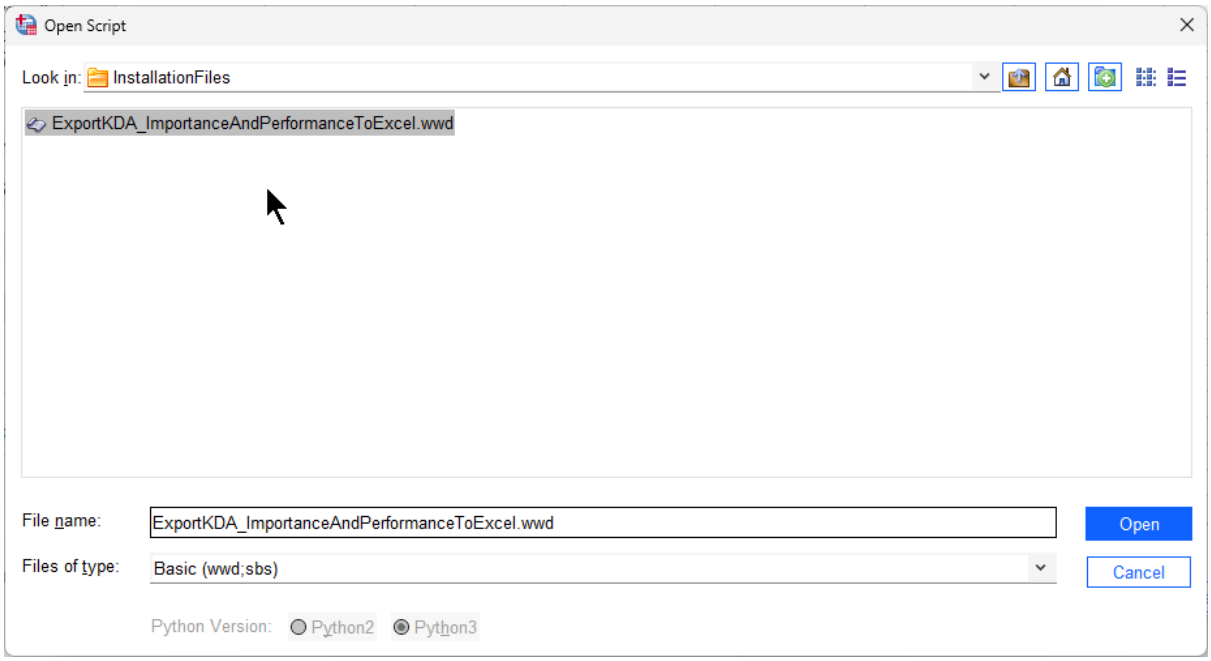
They sum to 1, and we will convert these decimals to percentages shortly. We can already say that the strongest driver of overall patient satisfaction is **Exactdiagnosis** at 0.178 (17.8%).

Sending Importances and Performances to Excel

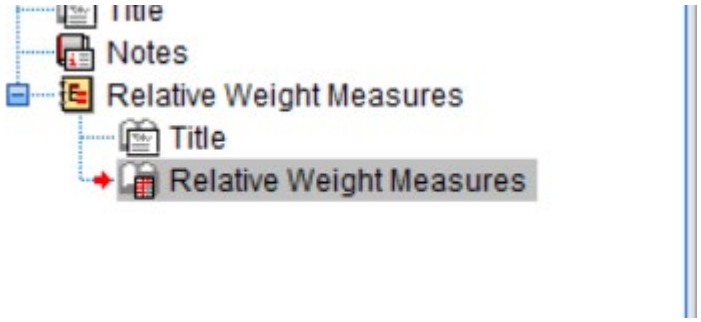
Select File>Open>Script…



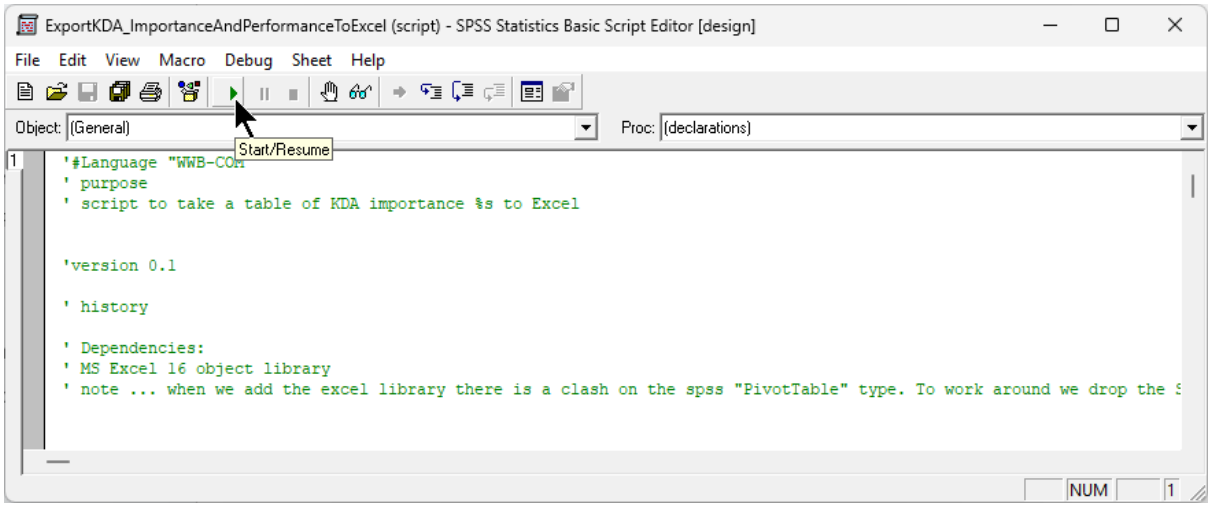
Navigate to the folder where you saved the SPSS Script and select to **Open** that file …



To use the script, we return to the output window and make sure that the KDA Importance table (“Relative Weight Measures”) is selected in the Output Viewer:



Now we can switch back the script that we opened and click the **play** button to send this table to Excel.



Excel will open and the **Driver** (variable) names, **Importance** and **Performance** values are pasted into a new Excel workbook.

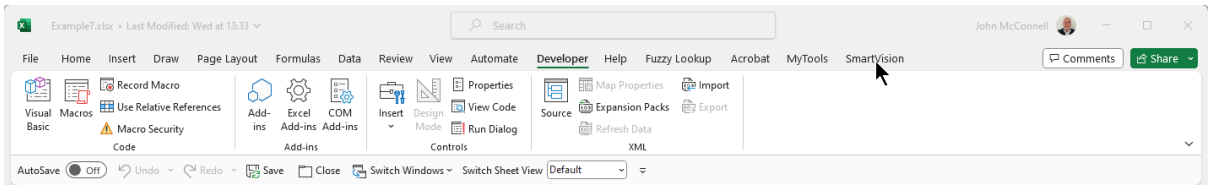
	A	B	C	D
1	Driver	Importanc	Performance	
2	Checkupappointment	5%	2.6	
3	Timewaiting	6%	2.5	
4	Adminprocedures	5%	2.6	
5	Hygieneandcleaning	3%	2.8	
6	Timeofappointment	6%	2.6	
7	Qualityexperiencedr	12%	2.9	
8	Specialistsavaliable	13%	2.7	
9	Exactdiagnosis	18%	2.8	
10	Modernequipment	4%	2.5	
11	friendlyhealthcareworkers	13%	2.8	
12	labservices	3%	2.8	
13	avaliablityofdrugs	3%	2.8	
14	waitingrooms	3%	2.7	
15	hospitalroomsquality	2%	2.7	
16	parkingplayingroomscaffes	3%	2.7	
17				

Note that the script also calculated the **Performance** numbers for each.
At the moment, these are the mean values for each of the drivers. We will shortly add an option to use “top n box” performance numbers.

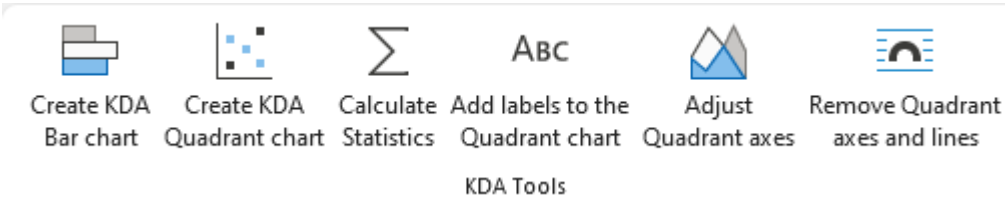
Using the SV KDA add-in to create and format Excel charts

The custom SmartVision ribbon

As a direct result of adding the SmartVision add-in (see earlier), we should now see a new SmartVision ribbon on your Excel menu.



This ribbon currently has six tools:



Some tools, e.g. **Create KDA Bar chart,** work in isolation.

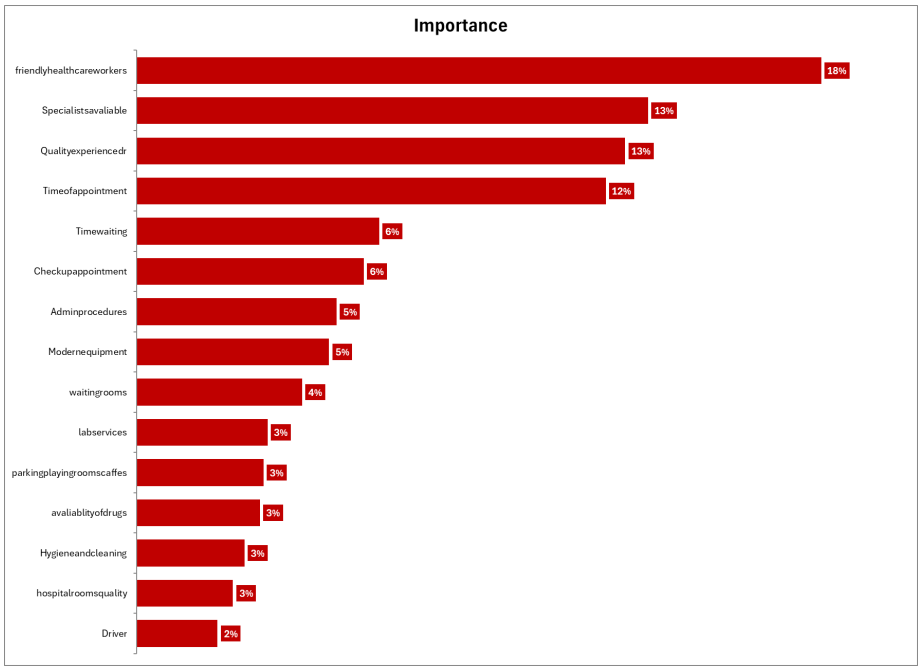
The other macros relate to the KDA Quadrant chart. They are all optional, and some are interdependent.

Create KDA Bar chart.

This tool will generate a familiar bar chart of **Importances**.

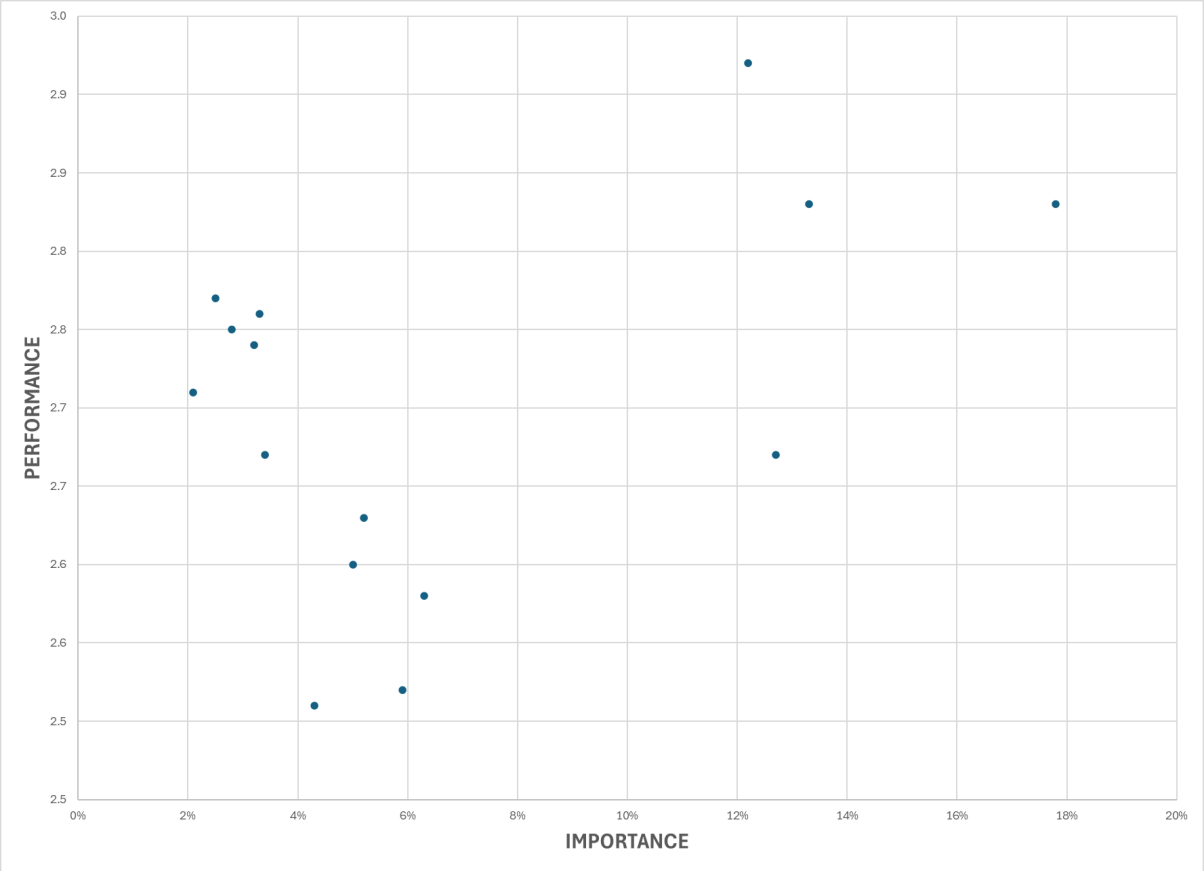
Selecting that macro and clicking run will add a new sheet **chKDA_BarChart.**

This tool sorts the data on the main sheet so that the bars ranked from highest to lowest importance are ranked from highest importance to lowest importance in the chart:



Create KDA Quadrant chart.

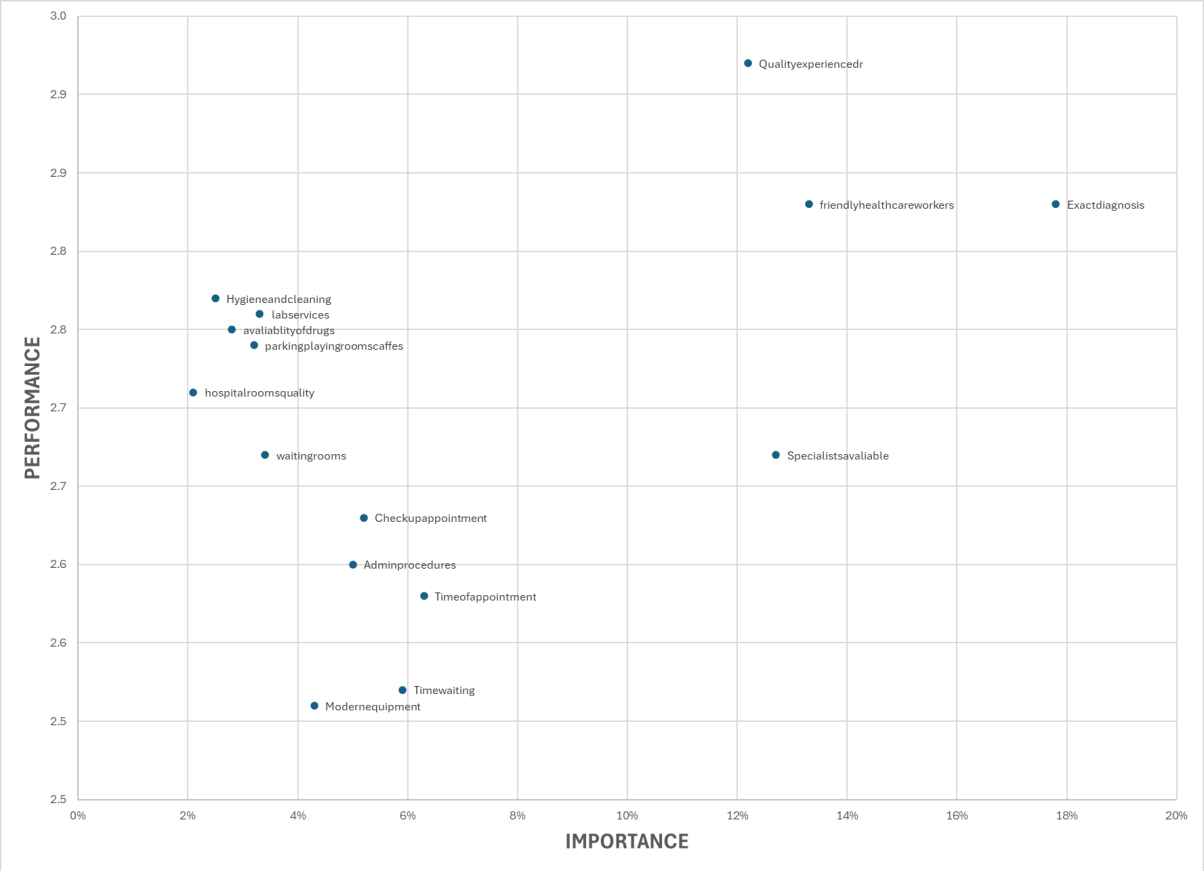
This tool creates the first version of the **Importance** v **Performance** quadrant chart



We can optionally customise the quadrant chart in several ways from here with the other tools.

Add labels to the Quadrant chart.

This tool takes the driver labels from column A and adds them to the chart:



Calculate Statistics

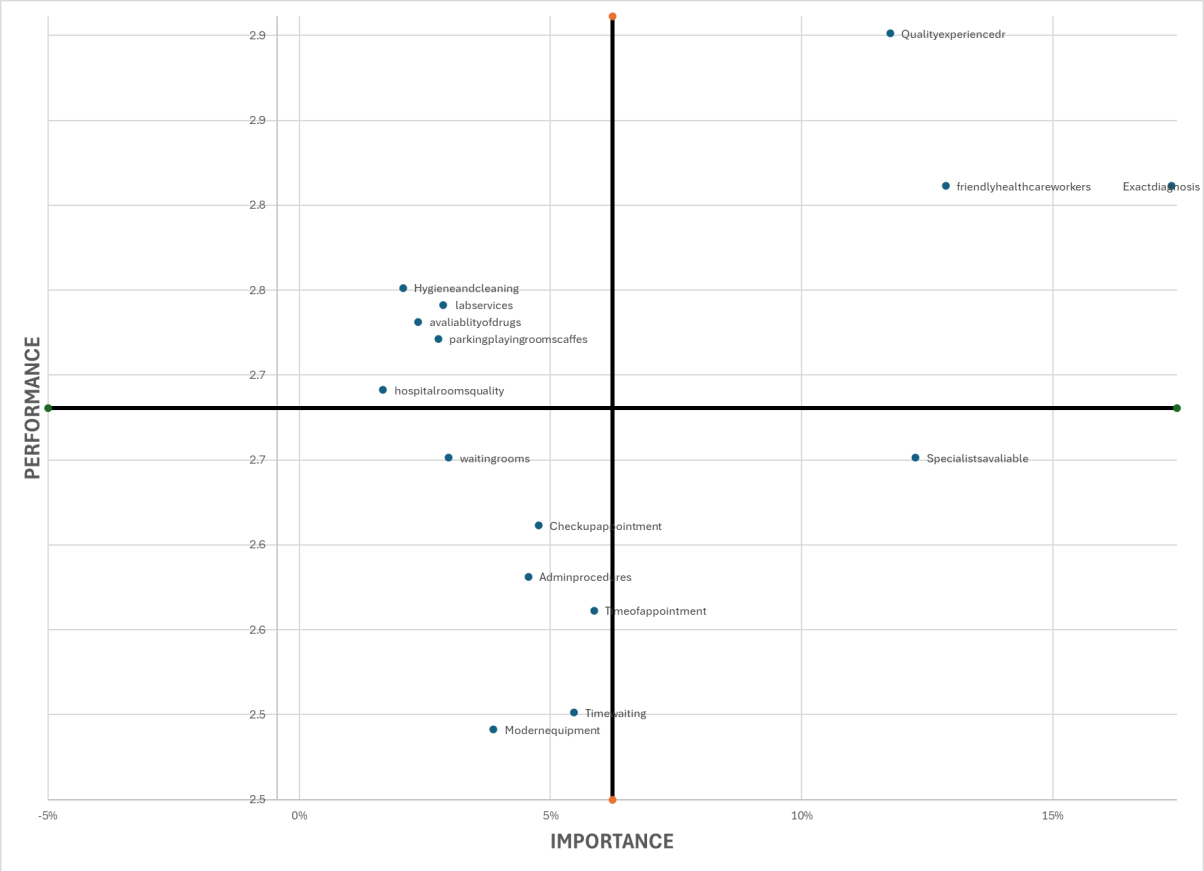
This tool is a means to an end. It creates summary stats for the other tool so that they can customise the chart further.

A	B	C
Driver	Importance	Performance
Checkupappointment	5%	2.6
Timewaiting	6%	2.5
Adminprocedures	5%	2.6
Hygieneandcleaning	3%	2.8
Timeofappointment	6%	2.6
Qualityexperiencedr	12%	2.9
Specialistsavaliable	13%	2.7
Exactdiagnosis	18%	2.8
Modernequipment	4%	2.5
friendlyhealthcareworkers	13%	2.8
labservices	3%	2.8
avaliablityofdrugs	3%	2.8
waitingrooms	3%	2.7
hospitalroomsquality	2%	2.7
parkingplayingroomscaffes	3%	2.7
Mean	7%	2.7
Min	2%	2.5
Max	18%	2.9

Adjust Quadrant axes

This tool uses the summary stats created by the **Calculate Statistics** tool to adjust the axes in the Quadrant chart.

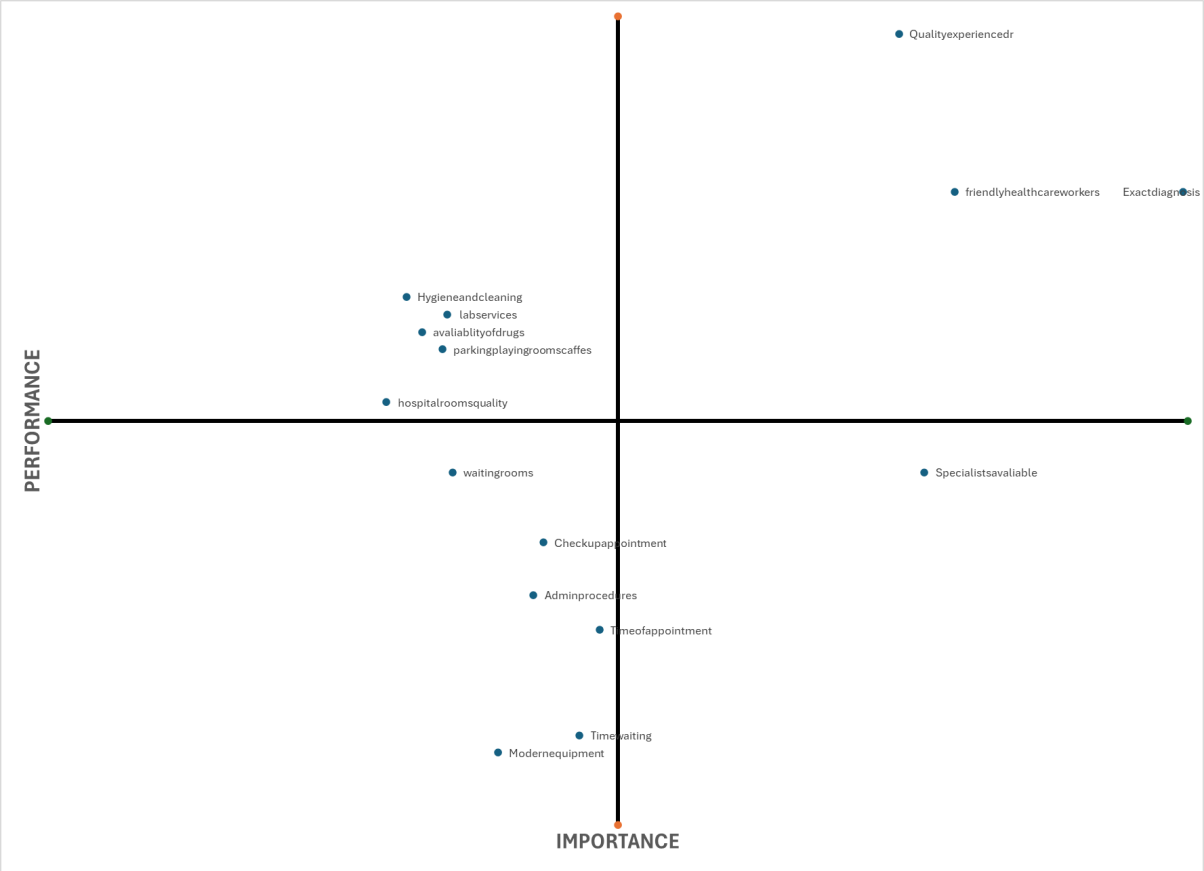
It centres both axes on the mean values for Importance and Performance and adds thicker lines at the mean values on both axes.



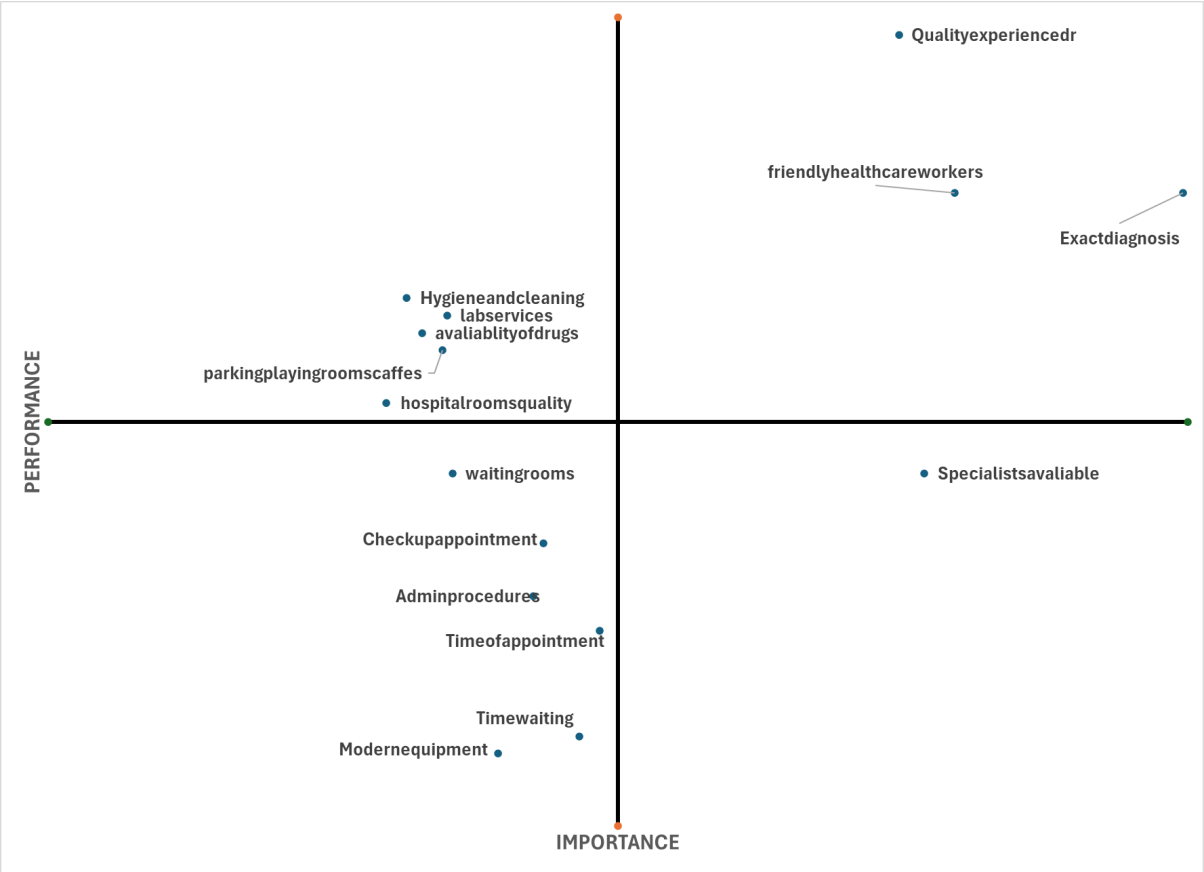
In some cases, and the above is a good example, leaving the axes in place may clutter the visual.

Remove Quadrant axes and lines

The tool removes the axes and lines to leave us with a cleaner visual:



From this point we can of course make our own aesthetic tweaks e.g. by reformatting and de-cluttering the labels.



We discuss the methodologies and interpretations in a separate document. But we can see here that we are doing well and need to **maintain** our performance on 3 of the 4 most important drivers (the top right quadrant).

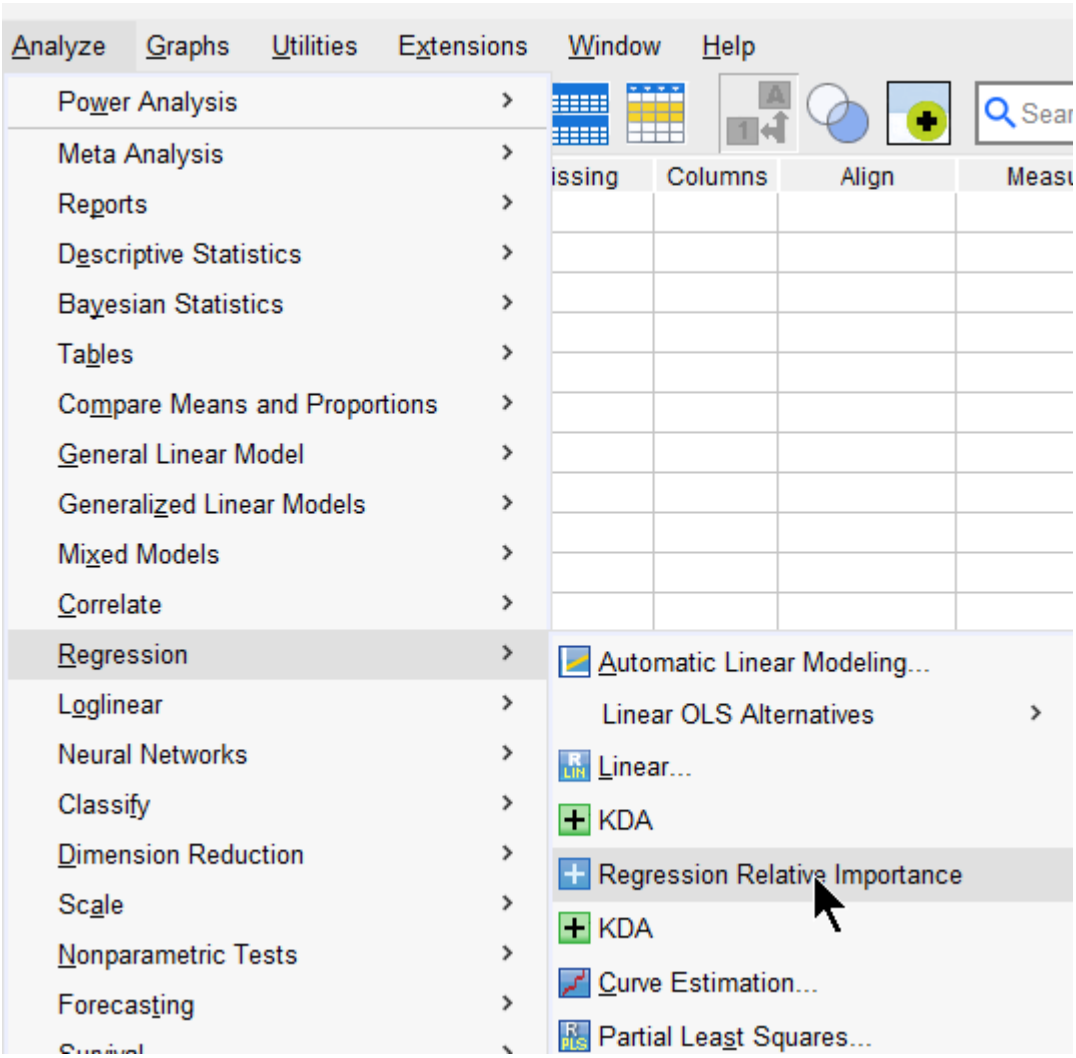
Specialistsavailable, in the bottom right quadrant, is the 3rd strongest driver with the most performance “headroom” to improve overall satisfaction.

Using the KDA tools with a Shapley Value Regression

Arguably, the most common KDA method in use today is Shapley Value Regression..

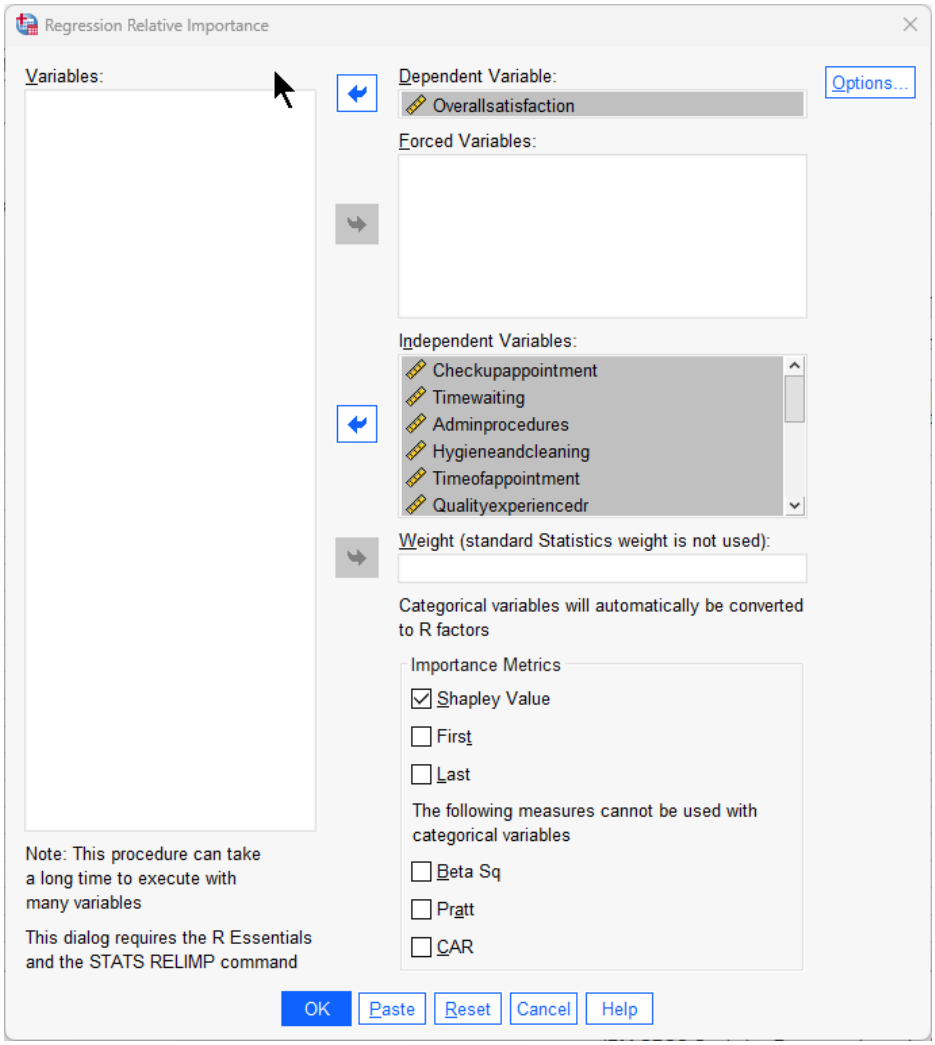
Shapley Value Regression has been available in another IBM/SPSS Statistics plug-in for several years.

If it is already installed in your version of SPSS, you will find it in the **Regression** menu as part of **Regression Relative Importance**.

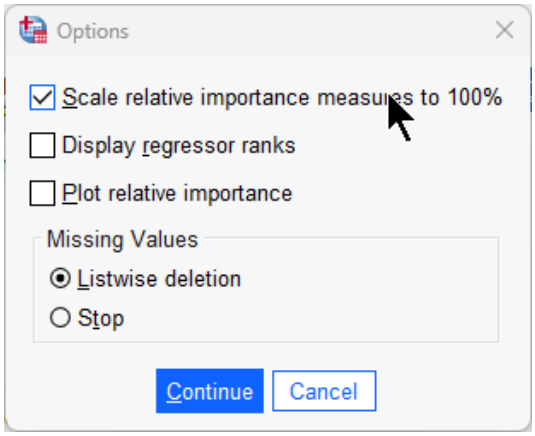


Repeating the same KDA with Regression Relative Importance

If we re-open our **Patient Satisfaction Scales.sav** file in IBM/SPSS Statistics and select Regression Relative Importance, we can specify the same analysis as above:

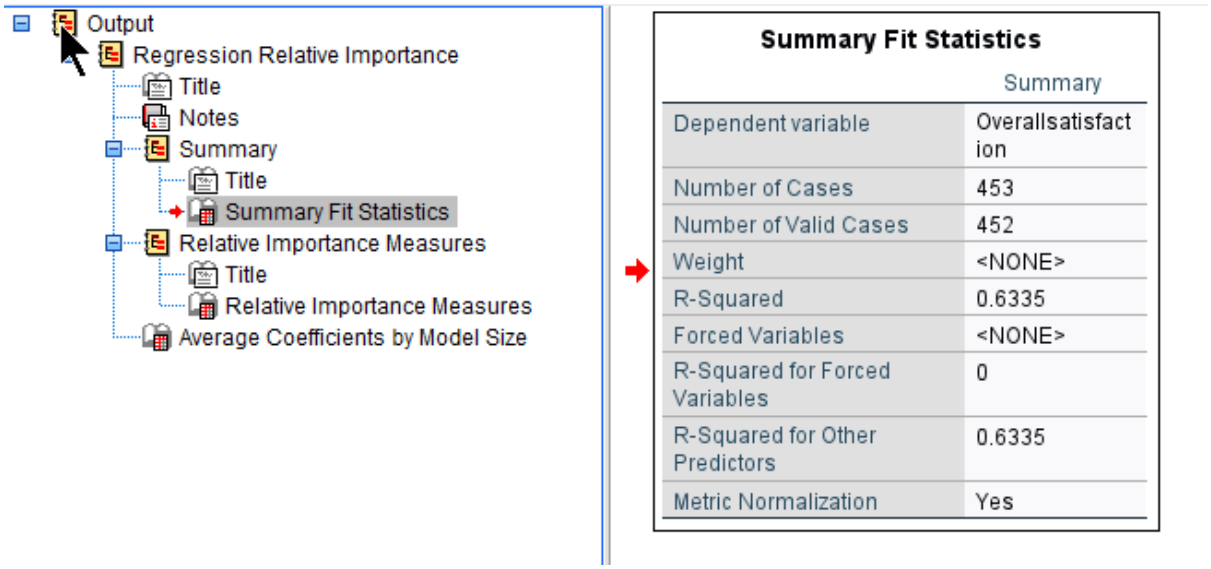


The **Shapley Value** is checked by default, but if we want to scale the result to 100% (the default in the RWA), then we need to click the **Options** button and check **Scale relative importance measures to 100%:**



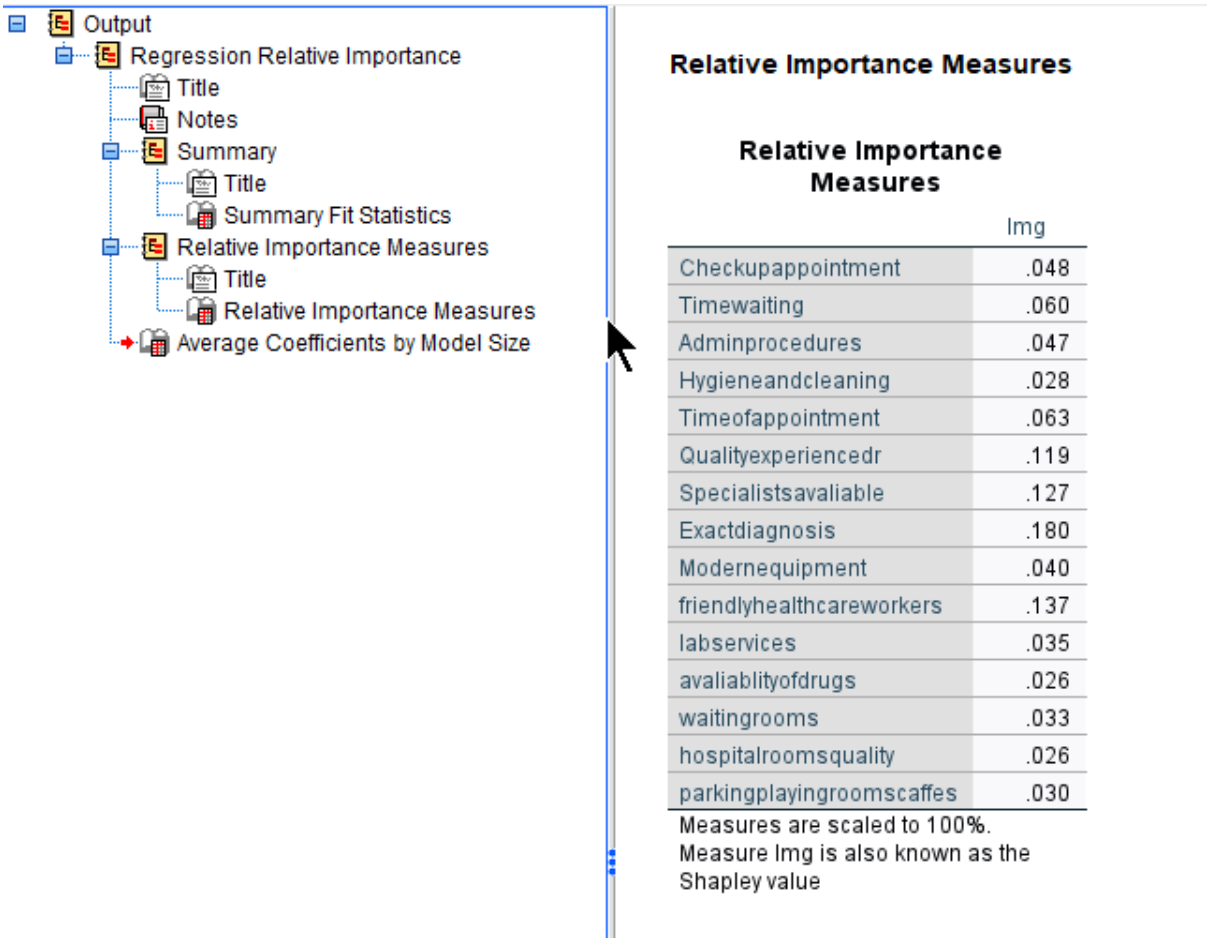
Click **Continue** and click **OK** (or **Paste**).

The specified analysis creates 3 output tables, 2 of which are similar to the RWA ones we saw earlier:



Summary Fit Statistics

	Summary
Dependent variable	Overallsatisfaction
Number of Cases	453
Number of Valid Cases	452
Weight	<NONE>
R-Squared	0.6335
Forced Variables	<NONE>
R-Squared for Forced Variables	0
R-Squared for Other Predictors	0.6335
Metric Normalization	Yes



At this point, we can repeat the steps described above in this document, starting with; **Sending Importances and Performances to Excel**

(Johnson's) RWA v Shapley

If we compare the two sets of results, we see that they are almost identical:

	A	B	C	D
	Driver	RWA Importance	Shapley Importance	Absolute difference
	Checkupappointment	5%	5%	0.20%
	Timewaiting	6%	6%	0.10%
	Adminprocedures	5%	5%	0.00%
	Hygieneandcleaning	3%	3%	0.50%
	Timeofappointment	6%	6%	0.30%
	Qualityexperiencedr	12%	12%	0.20%
	Specialistsavaliable	13%	13%	0.30%
	Exactdiagnosis	18%	18%	0.20%
	Modernequipment	4%	4%	0.30%
	friendlyhealthcareworkers	13%	14%	0.70%
	labservices	3%	4%	0.70%
	avaliablityofdrugs	3%	3%	0.20%
	waitingrooms	3%	3%	0.40%
	hospitalroomsquality	2%	3%	0.90%
	parkingplayingroomscaffes	3%	3%	0.20%

Why, then do we have two methods that, generally speaking, will generate the same output?

There is a clue on the main dialog for the Shapley analysis:

> Note: This procedure can take a long time to execute with many variables

Shapley is very compute-intensive. As the note says, generating output can take many minutes when we have more variables, e.g. 15 or so. If we are working against a deadline and need to generate a number of KDAs (e.g., by different demographic breaks),

Moreover, we can hit a point (somewhere around 20 variables) when the computational resource required by Shapley is not doable on most PCs/laptops.