

USER GUIDE FOR SCPMS 1, 4 AND 5

This application has been developed by the laboratory Gemtex of the ENSAIT of Roubaix in the scope of the FDB_BModel project. The goal is to help the “Selection of relevant fabric suppliers and materials as well as garment makers in terms of technical parameters, cost, delay, stock, environmental footprint, recycling capacity, and transport conditions”.

O. Home page

When you arrive to the page of the simulation, you’ll have the choice between 3 different evaluations. SCPMS1 allows you to test the pertinence of suppliers and criteria and SCPMS 4 and 5 allows to attribute orders between different suppliers.

I. SCPMS 1

The goal of SCPMS1 is to evaluation the relevance of suppliers following criteria. The suppliers can be of different type, a factory, a country, etc. This evaluation is based on the importance of criteria choose by the user and the level of each suppliers in these different criteria.

After having clicked on the button “SCPMS 1”, a new window will appear. For launching the main evaluation, you’ve to click on the button “Multicriteria evaluation for suppliers.” You’ve also the possibility to test independently the evaluation of the suppliers and the criteria with the specific button. These 2 options works the same way as the multicriteria evaluation.

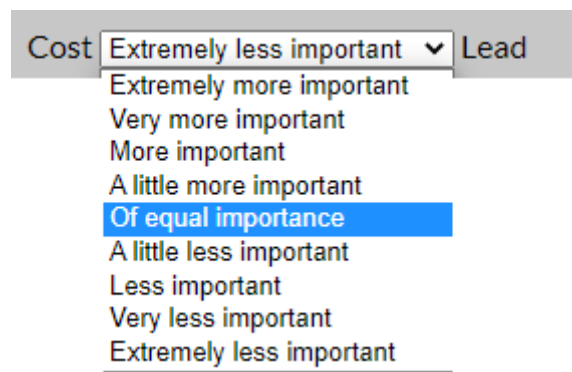
A. Operation

- 1) Choose the number and the names of the suppliers and criteria

As the suppliers evaluation, you've to choose the number of suppliers and criteria. Notice that you need at least 3 suppliers and contrary at the simple suppliers evaluation, 3 criteria. When you've done, click on the button “Choose suppliers and criteria names”. In the next page, you’ll have to enter the name of the suppliers and criteria and then click on the button “Choose relation between criteria”.

- 2) Relation between criteria

The same window as the criteria evaluation appears. You've to select the relation between each criterion. Please refer to the criteria evaluation part for more information. When you've chosen the relation between the criteria, click on the button “Choose levels of suppliers”.



In this example, we consider the relation between the “cost” and the “lead time”. If we consider the cost is more important, we have to choose “Very more important”, “More important” or “A little more important”. On the contrary, if the lead time is more important we have to choose “A little less important”, “Less important” or “Very less important”. If none of the two criteria is more important than the other, we choose “Of equal importance”.

3) Level of each supplier in each criterion

You've to select for each couple supplier/criterion the level of the supplier in this level.

	Criteria 1	Criteria 2
Suppliers 1	Fair	Fair
Suppliers 2	Very Poor Medium Poor	Fair
Suppliers 3	Poor	Fair
Plot results	Fair Good Very Good Excellent	

In this example, we consider the level of the “Supplier 1” in the “Criteria 1”. There are 7 values possibles. “Excellent” is better than “Very good” that is better than “Good”, etc. The worst value possible is “Very poor”, the best is “Excellent”.

When you've choose the value of each couple, click on the button “Plot results”. The best supplier will have the highest bar.

B. Example

In this example, we'll take in account 4 parameters with the following relations.

Criteria relation				
	Price	Quality	Lead time	Environment
Price		Less important	Of equal importance	Extremely less important
Quality			More important	A little more important
Lead time				A little less important
Environment				

The level for each suppliers in these criteria is given by the following table.

Suppliers levels				
	Price	Quality	Lead time	Environment
France	Very poor	Excellent	Excellent	Very good
Turkey	Fair	Good	Good	Fair
Morocco	Good	Fair	Good	Fair
China	Excellent	Medium poor	Medium poor	Medium poor

We choose the number of suppliers and criteria.

Number of suppliers	<input type="text" value="4"/>	<input type="button" value="Choose suppliers and criteria names"/>
Number of criteria	<input type="text" value="4"/>	

In the next page, we've to choose the names of the suppliers and the criteria.

Suppliers	Criteria
<input type="text" value="France"/>	<input type="text" value="Price"/>
<input type="text" value="Turkey"/>	<input type="text" value="Quality"/>
<input type="text" value="Morocco"/>	<input type="text" value="Lead time"/>
<input type="text" value="China"/>	<input type="text" value="Environment"/>

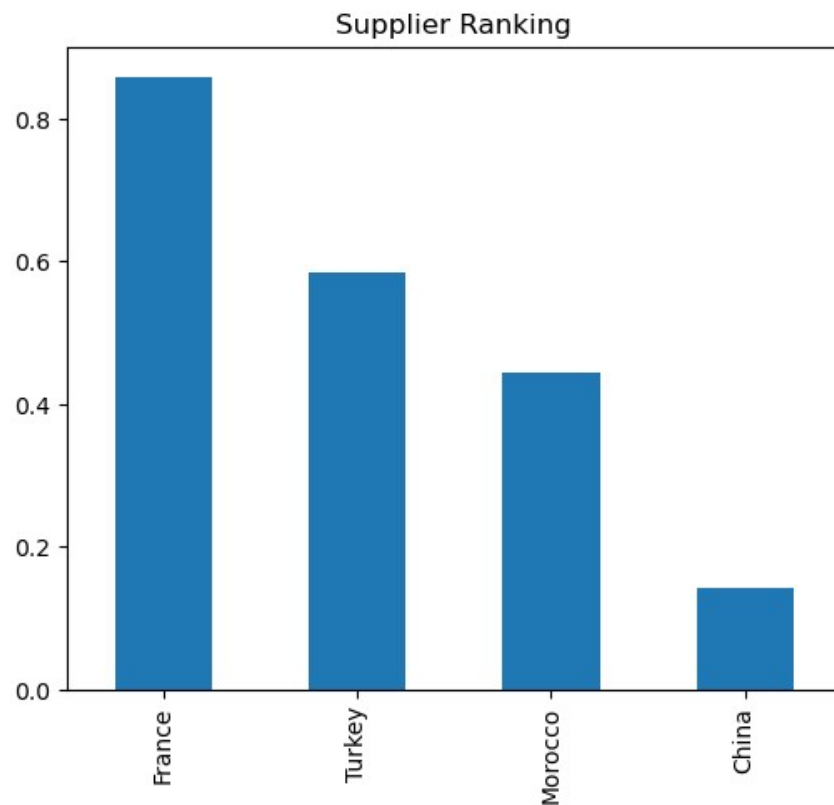
Now we enter the relations between the criteria.

Price	<input type="text" value="Less important"/>	Quality
Price	<input type="text" value="Of equal importance"/>	Lead time
Price	<input type="text" value="Extremely less important"/>	Environment
Quality	<input type="text" value="More important"/>	Lead time
Quality	<input type="text" value="A little more important"/>	Environment
Lead time	<input type="text" value="A little more important"/>	Environment

And the levels of the suppliers in each criteria.

	Price	Quality	Lead time	Environment
France	<input type="text" value="Very Poor"/>	<input type="text" value="Excellent"/>	<input type="text" value="Excellent"/>	<input type="text" value="Very Good"/>
Turkey	<input type="text" value="Fair"/>	<input type="text" value="Good"/>	<input type="text" value="Good"/>	<input type="text" value="Fair"/>
Morocco	<input type="text" value="Good"/>	<input type="text" value="Fair"/>	<input type="text" value="Good"/>	<input type="text" value="Fair"/>
China	<input type="text" value="Excellent"/>	<input type="text" value="Medium Poor"/>	<input type="text" value="Medium Poor"/>	<input type="text" value="Medium Poor"/>

Finally we can get the result of the evaluation.



II. SCPMS 4 and 5

The goal of SCPMS 4 and 5 is to attribute a list of orders between different suppliers following their cost and time of production and shipping. The difference between SCPMS 4 and 5 is that the 4 displays the result in a table and the 5 in a graphic, but the result will be the same.

A. Initialization

After having chosen the version you want to use, you'll have to choose what version you want to use:

- "Direct assignment and evaluation" that will give the state of the simulation when all the commands will be done and delivered. You can't interact with this simulation;
- "Simulation step by step" that will allow you to interact with the simulation.

After you've choose what you want to use, a new window will appear that describes what the evaluation does.

1. Simulation creation

For creating the simulation, you will need 2 files and a penalty value.

A screenshot of a simulation creation interface. It features three rows of input fields. The first row is labeled "Suppliers file" and contains a button "Choisir un fichier" and the text "Aucun fichier choisi". The second row is labeled "Orders file" and contains a button "Choisir un fichier" and the text "Aucun fichier choisi". The third row is labeled "Penalty" and contains a text input field with the value "10". Below these fields is a button labeled "SCMPS5".

- The supplier file in format JSON. The format is the following:

```
{ « Suppliers » : [ ([ id supplier, production unit cost, delivery cost, delay, unit production time,
                        delivery time])+ ] }
```

By default, delay has to be at 0. The id of each supplier has to be unique.

- The orders file in format JSON. The format is the following:

```
{ « Order » : [ ([ id order, quantity, order price, expected delivery date ])+ ] }
```

The id of each order has to be unique.

- The value of the penalty of late. It's the cost of late by unit of time. For example, if a command is delivered with a late of 5 units of time and the penalty it's 10, the total cost of the late will be 50.

When you have chosen the files and the cost penalty for late delivery, please click on the button “SCPMS4” or “SCPMS5” following what you want to use. Please to wait a little the time the calculation be done.

2. Reload a simulation

If you've downloaded the file from a simulation, you've the possibility to reload a previous simulation in using the “Load SCPMS4/5 old data” option.

You've also the possibility to reload a previous simulation.

Old data file

3. Files creation

You can create a file in choosing the option “Create file” below. In the next page, you've to choose the number of suppliers or orders you want to create. And it's done, click on the button of the type you want to create.

You can create suppliers or orders file thanks. Please choose how many suppliers or orders you want to create and click on the wished button.

Suppliers file creator

Orders file creator

For the suppliers file :

- Id : unique id for the supplier.
- Production unit cost : the cost for make producing one unit.
- Delivery cost : the cost of the delivery.
- First available date : when the supplier will be able to start the production of new units.
- Production unit time : the time for producing one unit

- Delivery time : the time for delivering a command.

For the orders file :

- Id : an unique id for each order.
- Quantity : the quantity to produce for this order.
- Order price : the value of the order.
- Expected delivery time : the moment when the orders are expected to be delivered.

B. Result in a table (SCPMS 4)

1) Detailed data

This window displays what supplier will take care of each order. In this example, the supplier 11 will take care of the order 111 (that it's currently doing) and after 118, 119, 119 and 116 in this order. (The orders that are/will be done first are on the right.)

Suppliers data, current time = 0							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	116; 127; 119; 118	111	None	46	0.0	0.0%	0.0
12	128; 122; 129	123	None	28	0.0	0.0%	0.0
13	114; 130	113	None	18	0.0	0.0%	0.0
14	121; 120; 125; 117	115	None	50	0.0	0.0%	0.0
15	124; 126	112	None	26	0.0	0.0%	0.0
Mean					0.0	0.0%	0.0

The different elements displayed are :

- id: the id of the supplier;
- Next orders: the orders that the suppliers will do after the current time;*
- Current order: the order currently done by the supplier at current time;*
- Orders done: the orders done by the supplier at current time;
- Time: the time necessary for doing all the orders;
- Profit: the profit done for each supplier;
- %Late: the rate of commands done that has been done in late;
- Mean late: the mean late for the commands done by the suppliers.

*In the direct result mode, these columns don't exist.

Under this stats, you've also the means for all the suppliers.

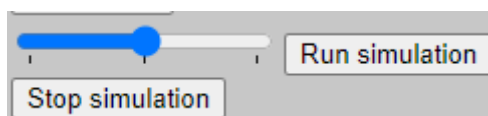
You've the possibility to hide or show the oldest value with the button "Hide/show old orders", the value before indicate since how much time at least the commands have to be over for being hidden.

2) Manage the simulation time (step by step only)

When the window appears, the time is at 0. You can change directly the time in modifying the value in entry at the left of “Change time” and clicking on the button.

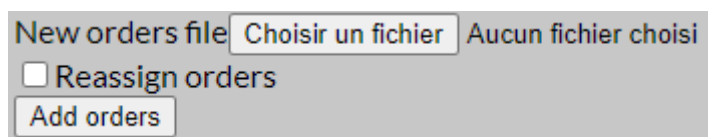


You can also choose to run the simulation step by step, from anytime you want. You just need to choose the speed and then click on the button “Run simulation”. If you want to stop it, click simply on the button “Stop simulation”. You can change the speed with the slider on the bottom right. By default the speed is to 2, a speed of 1 will be slower and a speed of 3 faster. It correspond to the time each step will last in second. However the simulation can slow down the time to update all the data.

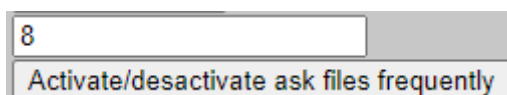


3) Add new orders (step by step only)

You’ve the possibility to add orders whenever you want, but you’ve to stop the simulation before. You’ve to choose the file that contains the new orders. If you select the option “Reassign orders”, the orders that haven’t been done yet. Please wait a little the time the calculations are done before the simulation is updated.

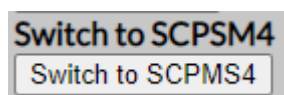


If the option “Ask files frequently” is activated, a new page will be opened at the chosen frequency, there you’ll have to enter a new file of order. If you don’t want to add a file, you can click on the button “Continue without adding orders”.



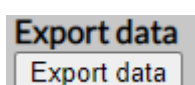
4) Switch to SCPMS4/5 (step by step only)

You’ve the possibility to switch between SCPMS4 & 5 in clicking on the button “Switch to SCPMS4/5”. The parameters of the simulation won’t change (but it’ll stop).



5) Export data (step by step only)

You’ve the possibility to export the data of the simulation for using it later.



Example:

For this example we'll simulate a complete work week (5 days). Each day lasts 8 and we'll ask a new file at the end of the day. All the orders undo will be reassigned. After the first time is displayed, we activated the "Ask files frequently".

Suppliers data, current time = 0							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	None	115	None	10	0.0	0.0%	0.0
12	114	112	None	24	0.0	0.0%	0.0
13	None	113	None	12	0.0	0.0%	0.0
14	None	111	None	8	0.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					0.0	0.0%	0.0
All the commands are displayed.							
A new file will be asked in 8.							

We run the simulation for 8 turns and a new window will open.

New orders file tuesday.json
 Reassign order

We choose the Tuesday's file orders and we check the "Reassign order option". Then, we click on "Add new orders". We'll see the orders appear (order between 121 and 125).

Suppliers data, current time = 9							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	125; 122	115	None	24	0.0	0.0%	0.0
12	124	114	112	30	210.0	0.0%	0.0
13	123	113	None	26	0.0	0.0%	0.0
14	None	121	111	32	170.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					380.0	0.0%	0.0
All the commands are displayed.							
A new file will be asked in 7.							

Now we continue until the moment to enter Wednesday's commands.

Suppliers data, current time = 17							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	131; 132; 133	125	122; 115	58	140.0	0.0%	0.0
12	134; 124; 135	114	112	44	210.0	0.0%	0.0
13	None	123	113	26	-45.0	0.0%	0.0
14	None	121	111	32	170.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					475.0	0.0%	0.0
All the commands are displayed.							
A new file will be asked in 7.							

The Thursday's orders.

Suppliers data, current time = 25							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	132; 144; 141; 134; 145	133	125; 122; 115	88	150.0	33.33%	1.33
12	142; 131; 143	135	114; 112	72	140.0	50.0%	3.0
13	124	123	113	32	-45.0	0.0%	0.0
14	None	121	111	32	170.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					415.0	28.57%	1.43
All the commands are displayed.							
A new file will be asked in 7.							

The Friday's ones.

Suppliers data, current time = 33							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	134; 131; 132; 144; 155	133	125; 122; 115	88	150.0	33.33%	1.33
12	154; 151; 145; 152; 153	135	114; 112	78	140.0	50.0%	3.0
13	141; 143	142	124; 123; 113	80	-140.0	66.67%	6.33
14	None	None	121; 111	32	370.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					520.0	40.0%	2.9
All the commands are displayed.							
A new file will be asked in 7.							

And the situation at the end of the week.

Suppliers data, current time = 40							
id	Next orders	Current orders	Orders done	Time	Profit	%Late	Mean late
11	134; 131; 132; 144	155	133; 125; 122; 115	88	210.0	50.0%	1.75
12	154; 151; 145; 152	153	135; 114; 112	78	275.0	33.33%	2.0
13	141; 143	142	124; 123; 113	80	-140.0	66.67%	6.33
14	None	None	121; 111	32	370.0	0.0%	0.0
15	None	None	None	0	0.0	0.0%	0.0
Mean					715.0	41.67%	2.67
All the commands are displayed.							
A new file will be asked in 8.							

C. Results as a graphic (SCPMS 5)

1) Presentation

Each suppliers is represented by a lane. Each lane is divided in three part. In the left part there is the command that the suppliers has to do. In the middle part, there is the command that the supplier is currently doing. And finally in the right part there are the commands that are done.

	116 20	127 25	119 18/19	118 16/11	111 12/7
		128 28	122 18/19	129 26/13	123 22/5
			114 16/21	130 29/13	113 12/9
	121 20	120 19	125 25	117 15/19	115 16/15
			124 23	126 17/19	112 15/13

The first number of each command correspond to its id. On the second line, there is always the expected delivery time. For the commands done, there is a second number on the right that indicates when the command has been finished. If the command was done in time, it's in green, if it was in late, it's in red. In the case the command is done but not delivery yet, there are two others color. If the command is in yellow, the command isn't in late, but we can't be sure it will be delivered in time. In orange, that means the command is already in late.

2) Management of the simulation (step by step only)

The simulations works like the table version, please refer to this part for knowing how to use it.

D. Graphs

You can show the graphics of the profit, mean late and rate late in clicking on the button “Show graphics”. However, it considerably slows down the simulation, so be aware about that.

