

Sustainability Assessment of Urban Systems

Exercise 8

02.04.2025

Work on the following questions/tasks together with your project partners. You may not have the time to answer all the questions today, but keep them in mind for your project work.

Feel free to use the Miro board to brainstorm: <https://miro.com/app/board/uXjVKb5GLhI=/>

1. Building the influence matrix for your own project

Assess the direct influence of each of your indicators on all other indicators in the system, with the help of the influence matrix. Use the following scale to do so:

0 meaning no direct influence,
1 meaning a moderate influence,
2 meaning a strong influence;

Inverse influence (i.e.. the more ..., the less ...) is indicated by a minus (-)

- A. Set up the matrix for your indicators, using a simple excel sheet or other table (for a generic example see figure 1); you may present the indicators according the main domain categories of your framework (e.g. environment, social, economic, ...)
- B. Fill the matrix individually; ask yourself how strong the influence of indicator 1 is on indicator 2, on indicator 3 etc. and whether this influence is positive or negative; make sure you have an argument ready for each influence;
- C. Discuss your matrix with your colleagues and come up with a consolidated version
 - o Do your results differ from the ones of your colleagues?
 - o If yes, why? Justify your choices together with your group and come up with a shared solution.

Fig.1 Generic example of influence matrix

→	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator n	ACTIVITY sum
Indicator 1	/					
Indicator 2		/				
Indicator 3			/			
Indicator 4				/		
Indicator n					/	
PASSIVITY SUM						

2. Creating the activity-passivity plot for your own project

Once you have agreed on the strengths of the direct influences of one indicator on another in your matrix, you can start creating your activity-passivity plot.

Follow the below steps to do so:

- A. Calculate the activity and the passivity sum for each indicator. For this, you only consider the absolute values (i.e. +/- does not matter);
- B. Then plot the indicators according to their passivity/activity (x-axis passivity sum, y-axis activity sum). You can draw the plots by hand, excel, R, or Python. Try to have the plots ready for next session;
- C. Based on their position in the quadrant of the influence grid, you can classify the indicators into active, ambivalent, indifferent, and passive indicators. This classification refers to their strength and role in sustainability assessment of your systems;
- D. Discuss with your colleagues what the results mean for your sustainability assessment and potential policy implications.

ANNEX – FOR INSPIRATION

For an example, you find below extract from a case study on housing by [Pagani et al. \(2020\)](#)
 [accessible for free through EPFL VPN]

a) The indicator list

CODE	INDICATORS	DEFINITION
RAO	Rent affordability	(Household income / Qualifying income) *100
IHO	Income spent on housing operation and maintenance	% of income spent by the final users on the operation (rent, consumption) and maintenance
EFO EFM	End energy footprint	Operation: energy (for heating) and electricity consumption per person per year. Materials: energy used to produce and manufacture the building materials
REO REM	Share of renewable energy	Operation and Materials: Renewable energy / Total energy used
WDE	Water demand	Litres of fresh water used per person per year in a household in the operation phase
CFO CFM	Carbon footprint	Operation: greenhouse gas emissions from the energy used in the operate phase. Materials: greenhouse gas emissions from the energy consumed in producing the building materials
FAO	Flexibility and adaptability	Possibility to redesign a percentage of the space to meet new needs, calculated as Flexible space / Size of dwelling * 100
SPO SQP	Space per person	Size of the dwelling / Size of household
SSO	Shared space	Shared space per person / Private space per person *100
VRO	Vacancy rate	Rate of vacancy of the dwelling
ICO	Indoor comfort	Thermal, acoustic, visual comfort, air quality
IAO IAP	Information and awareness	Actors having received information on sustainable practices / total actors
ASO ASP	Attitudes towards sustainability measures	Perceived value of information deriving from the compliance with values, preferences, aspirations, and goals

b) The influence matrix

		ENV			ECON			SOC							
		EFO	REO	WDO	CFO	RAO	IHO	FAO	SPO	SSO	VRO	ICO	IAO	ASO	Activity
ENV	EFO. End energy footprint	0	0	2	0	1	0	0	0	0	0	0	0	0	3
	REO. Share of renewable energy	0	0	0	-2	0	-2	0	0	0	0	0	0	0	4
	WDO. Water demand	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	CFO. Carbon footprint	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECON	RAO. Rent affordability	0	0	0	0	0	0	0	0	0	-2	0	0	0	2
	IHO. Income spent on housing operation and maintenance	0	0	0	0	0	0	0	0	2	0	0	0	0	2
	FAO. Flexibility and adaptability	0	0	0	0	0	0	-1	0	-2	1	0	0	0	4
	SPO. Space per person	2	0	0	0	-1	1	0	-1	0	0	0	0	0	5
SOC	SSO. Shared space	-1	0	-1	0	1	-1	0	1	0	0	0	0	0	5
	VRO. Vacancy rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ICO. Indoor comfort	2	0	0	0	0	0	0	0	0	-2	0	0	0	4
	IAO. Information and awareness	-1	0	-1	-1	0	0	0	-1	1	0	0	0	1	6
	ASO. Attitudes towards sustainability measures	-2	0	-2	0	0	0	1	-2	1	0	0	0	0	8
	Passivity	9	0	4	5	2	5	1	5	3	8	1	0	1	

Appendix 16.A Impact matrix of the selected indicators related to the operation phase

c) The resulting activity-passivity plot

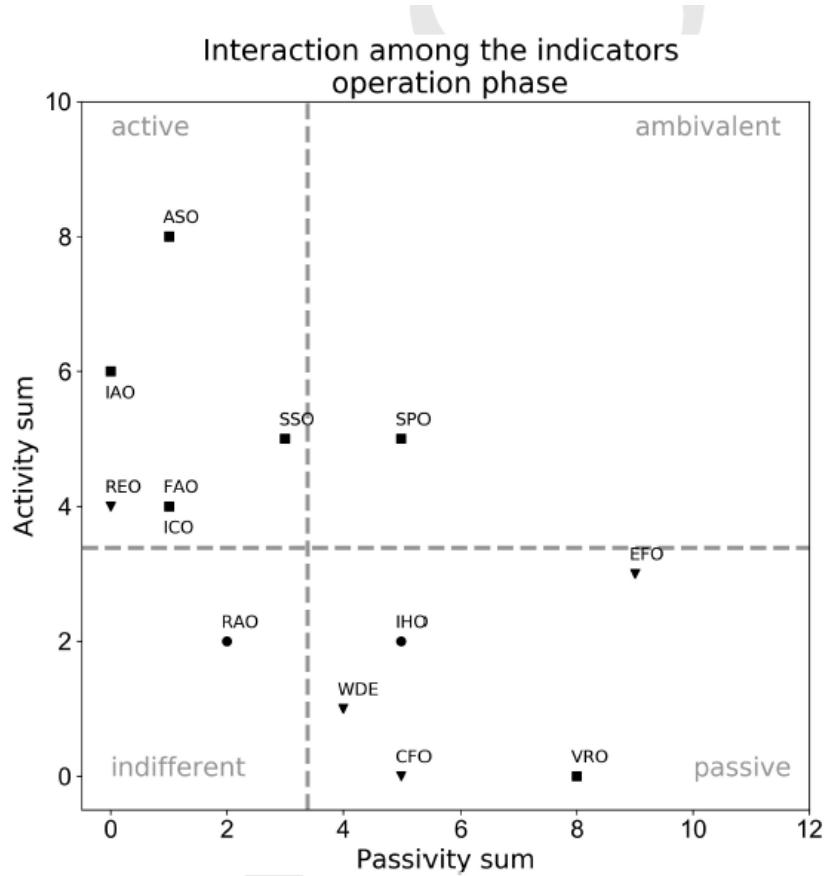


Figure 16.6 Influence grid of the indicators related to the operation phase. Codes correspond to the indicators as shown by Table 16.3. Triangle symbols represent environmental indicators, dot symbols economic indicators, and square symbols social indicators. The two dotted-lines axes cross at the average value of the activity and passivity of the indicators. Source: authors