


Capturing Social Value using Ordinal Data, Gower Distance & Quality Point

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Introduction



Building design consideration based on the conventional business driver:

- the best profit,
- fulfill government technical policy, and
- provide environmental imperatives

(Vischer, 2008)

Building
Value

internal element

external element

physical condition

accessibility, facility, etc.

SOCIAL VALUE

An actionable concept and something that will positively impact stakeholders and broader society for better living

(Kuratko et al., 2017 and Watson et al., 2016).

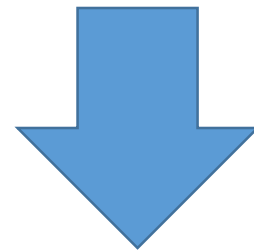
Problem Statement

A simple and practical approach using

Gower Distance

Gower (Dis)similarity index(es)

Clustering technique



To determine a fair rental price
& measure social value

Literature Review

Social value could be interpreted very widely due to the **subjectivity and nature of social value for each case building,**



ambiguity for the different auditors and the stakeholders

(Watts et al., 2018).

The Social Return on Investment (SROI) method, which involved the value of money as a measurement of social value.

(Watson et al., 2016) and (Bridgeman et al., 2015)

Using weights assigned to each attribute score



Obtaining the **Total Index**

(Sudibyanung & Dewi, 2019)

(Dis)similarity index and later extended to cover ordinal data



Calculating the distance on the interval, ratio scaled variables, **>> selecting the comparable building**

(Gower, 1971), (Podani, 1999), (Kauffmann & Rousseeuw, 1990, 2005), (D'Orazio, 2021), and (Rahim & Razali, 2018)

Sales comparison & **grid adjustment technique** in appraisal methodology

(Colwell et al., 1983)

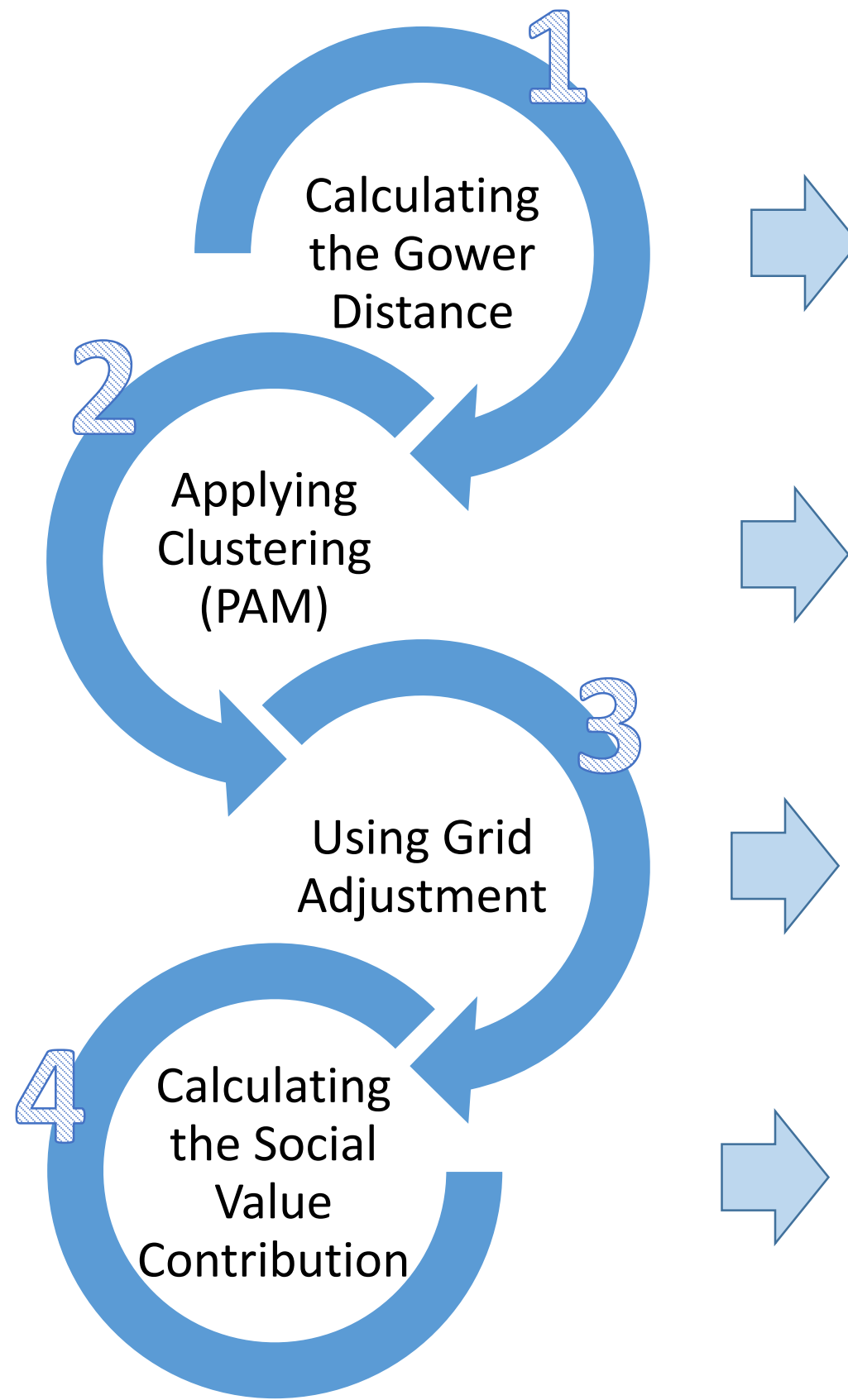
Data

Weight	20%	15%	15%	15%	15%	10%	10%	100%	
Building	Attribute #1	Attribute #2	Attribute #3	Attribute #4	Attribute #5	Attribute #6	Attribute #7	Total Index	Rental Price (IDR/m ²)
Building 01	4,0	4,5	3,0	4,0	4,0	3,5	1,0	3,58	180.000
Building 02	5,0	4,0	4,0	4,5	5,0	4,0	3,0	4,33	250.000
Building 03	5,0	5,0	3,0	4,0	4,0	3,5	1,0	3,85	185.000
Building 04	3,0	3,0	3,0	1,0	3,0	2,0	2,0	2,50	130.000
Building 05	5,0	4,0	4,0	4,0	4,0	4,0	2,0	4,00	250.000
Building 06	3,0	3,0	3,0	3,0	2,0	2,0	4,0	2,85	140.000
Building 07	5,0	5,0	3,0	3,0	5,0	3,5	1,0	3,85	165.000
Building 08	5,0	4,0	4,0	4,5	5,0	4,0	2,0	4,23	250.000
Building 09	4,0	5,0	3,0	3,0	4,0	4,0	3,0	3,75	225.000
Building 10	5,0	4,0	3,0	2,0	3,0	3,0	1,0	3,20	130.000
Building 11	5,0	4,0	4,0	4,0	5,0	3,5	1,0	4,00	250.000
Building 12	5,0	5,0	4,0	4,5	5,0	4,0	3,0	4,48	200.000
Building 13	4,5	4,0	4,0	4,0	5,0	4,0	2,0	4,05	220.000
Building 14	4,5	4,0	3,0	3,5	5,0	4,0	2,0	3,83	180.000
Building 15	4,0	5,0	3,0	3,0	5,0	3,5	1,0	3,65	190.000
Building 16	5,0	5,0	4,0	4,5	5,0	4,0	4,0	4,58	275.000
Building 17	4,5	4,0	4,0	4,0	5,0	4,0	3,0	4,15	225.000
Object of Study	3,0	3,0	3,0	3,0	3,0	3,0	5,0	3,20	

Data Source: Susan KJPP office

Proposed Methodology

Weight	20%	15%	15%	15%	15%	10%	10%	100%	
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Building 03	5,0	5,0	3,0	4,0	4,0	3,5	1,0	3,85	185.000
Building 04	3,0	3,0	3,0	1,0	3,0	2,0	2,0	2,50	130.000
Building 05	5,0	4,0	4,0	4,0	4,0	4,0	2,0	4,00	250.000
Building 06	3,0	3,0	3,0	3,0	2,0	2,0	4,0	2,85	140.000
Building 07	5,0	5,0	3,0	3,0	5,0	3,5	1,0	3,85	165.000
Building 08	5,0	4,0	4,0	4,5	5,0	4,0	2,0	4,23	250.000
Building 09	4,0	5,0	3,0	3,0	4,0	4,0	3,0	3,75	225.000
Building 10	5,0	4,0	3,0	2,0	3,0	3,0	1,0	3,20	130.000
Building 11	5,0	4,0	4,0	4,0	5,0	3,5	1,0	4,00	250.000
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The Gower Distance (Dissimilarity index) with Podani's extension → Finding the similarity

Silhouette width → Defining the best cluster number

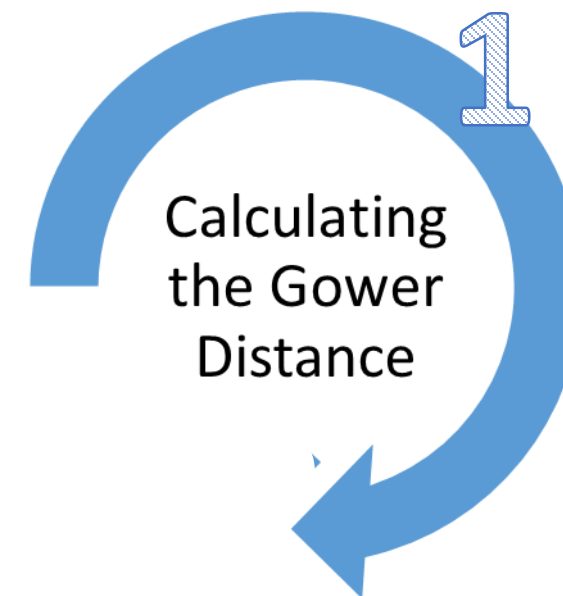
Clustering → Grouping the building

Estimating fair rental (market) price

$$V_{SV} = \frac{\sum_{i \in SV} w_i S_i}{\sum_{j \in SVUCV} w_j S_j}$$

Proposed Methodology

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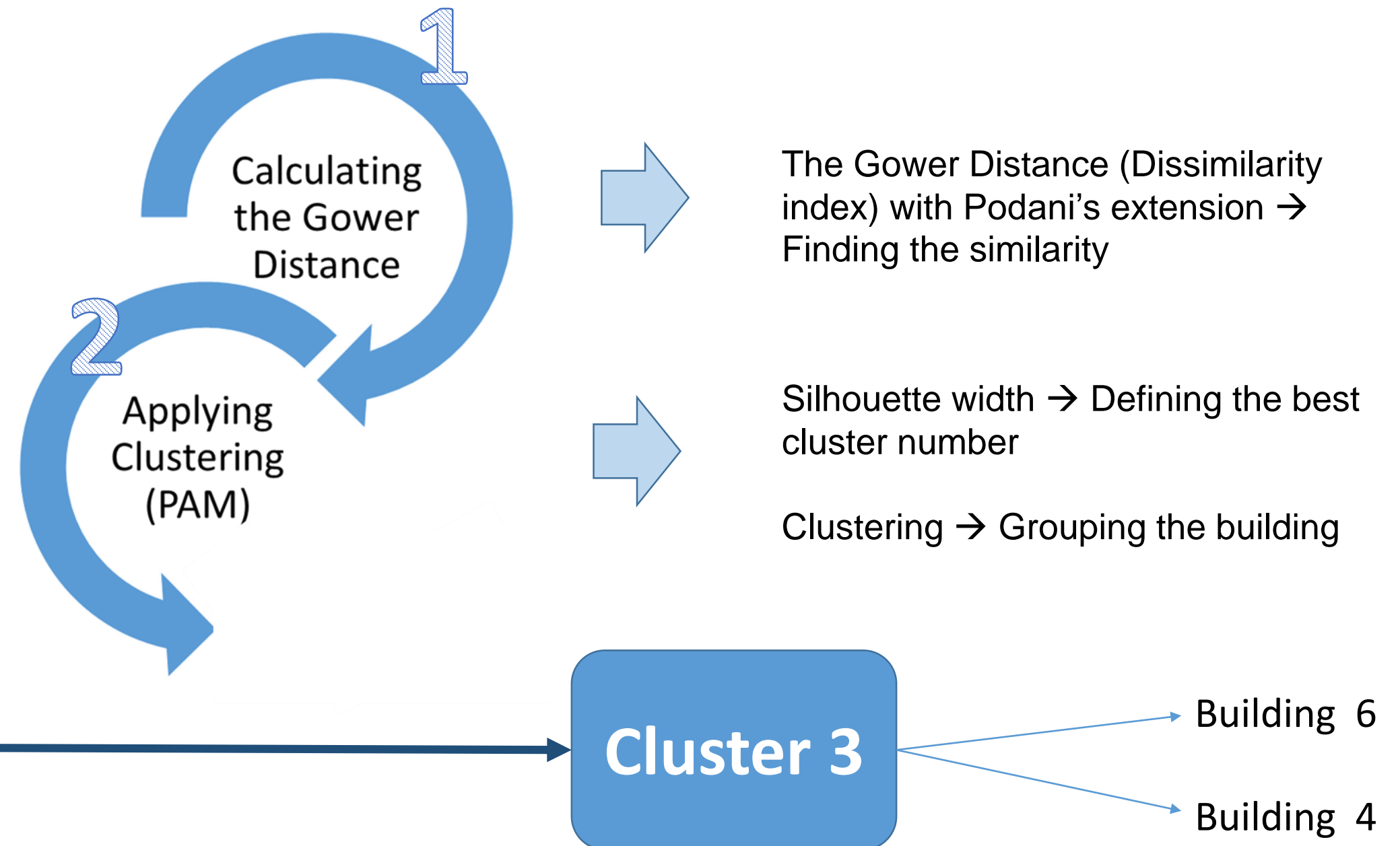


- Building 6
- Building 4
- Building 9
- Building 10
- Building 1

Building	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
GD with weight	0,410	0,707	0,593	0,168	0,652	0,108	0,583	0,732	0,383	0,380	0,693	0,807	0,635	0,455	0,450	0,782	0,610
Similarity	0,590	0,293	0,407	0,832	0,348	0,892	0,417	0,268	0,617	0,620	0,307	0,193	0,365	0,545	0,550	0,218	0,390

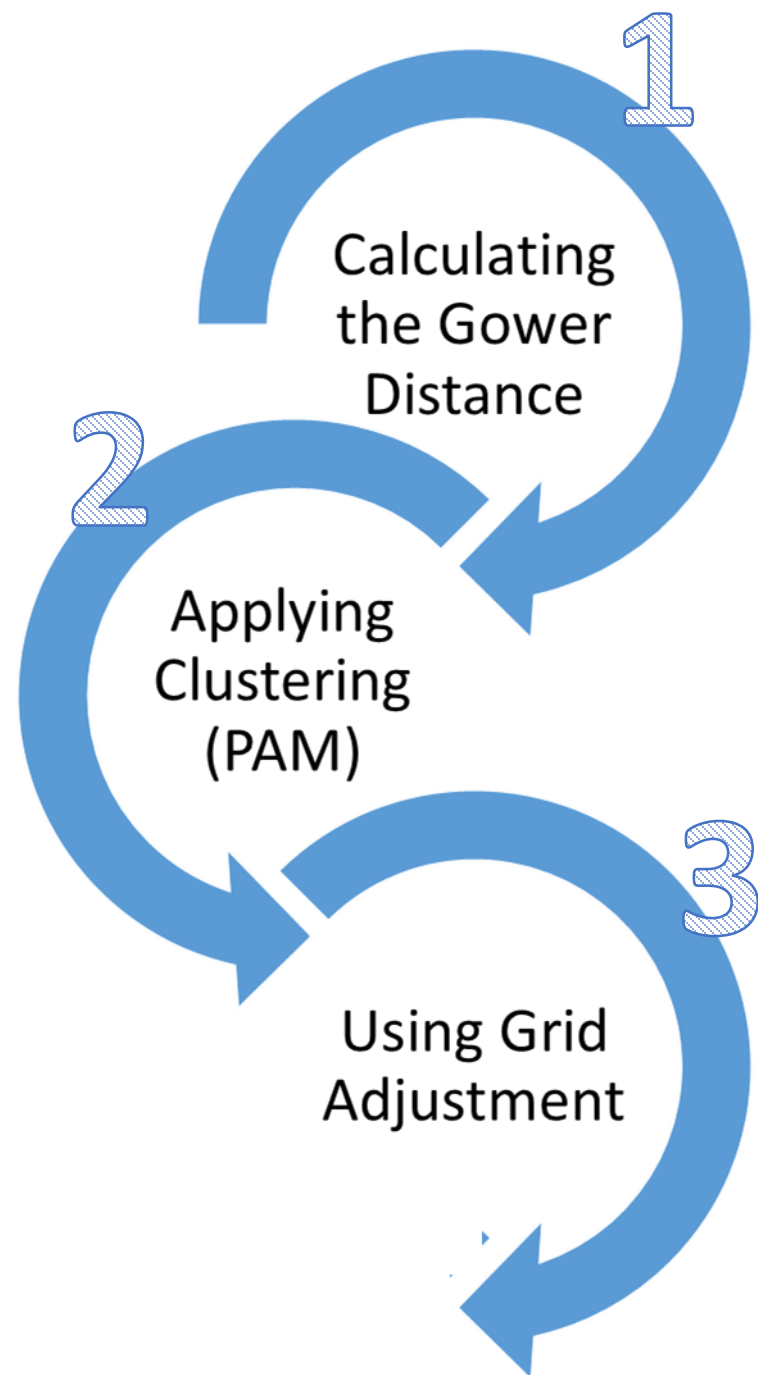
Proposed Methodology

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Similarity	0,590	0,293	0,407	0,832	0,348	0,892	0,417	0,268	0,617	0,620	0,307	0,193	0,365	0,545	0,550	0,218	0,390
PAM Clustering	1	2	1	3	2	3	1	2	1	1	2	2	2	1	1	2	2

Proposed Methodology



to produce the estimated fair market rental price.

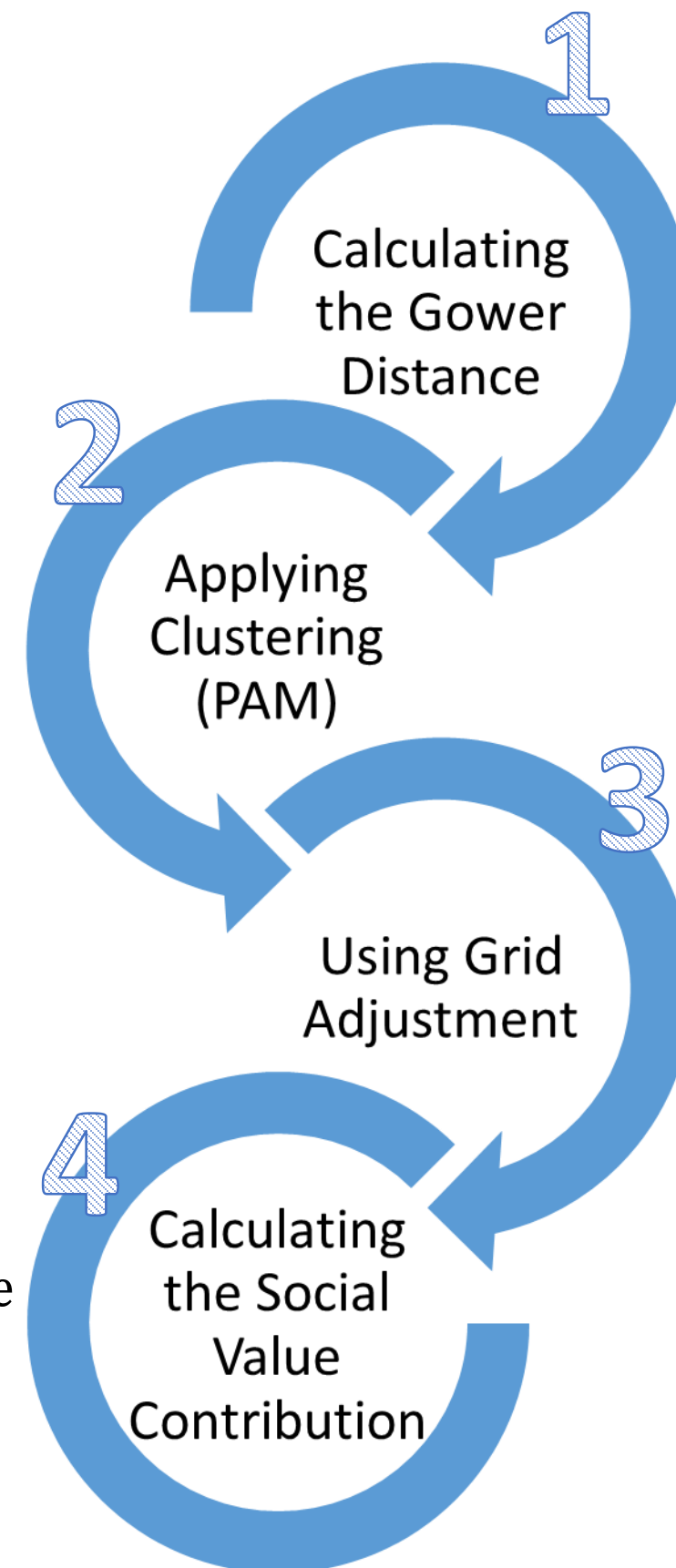


$$\hat{P}_{0j} = P_j + b_1(I_{00} - I_j) \forall j \text{ from Step 1}$$

(simple average of the above 5 values)

Proposed Methodology

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Building 17	4,5	4,0	4,0	4,0	5,0	4,0	3,0	4,15	225.000
Object of Study	3,0	3,0	3,0	3,0	3,0	3,0	5,0	3,20	



Attribute 6 is a **Green building concept**

The weight of the social value parameter is 10%



The green building concept as the social value attribute for the proposed building has a value of Rp 15,219/m²

$$\frac{(S_{SV_1} \times w_{SV_1}) + (S_{SV_2} \times w_{SV_2}) + \dots + (S_{SV_n} \times w_{SV_n})}{Total\ Index} \times \text{fair market price}$$

$$\frac{3 \times 0.1}{3.2} \times Rp\ 162,336 = Rp\ 15,219$$

Conclusion

By applying Gower Dis(similarity) index and clustering principles, it can produce an excellent fair market value estimate and measure the social value attribute of the proposed building.



THANK YOU

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