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IDENTIFICATION OF KEY FACILITATORS BY USING A MULTI-CRITERIADECISION-MAKING APPROACH

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ABSTRACT
Nowadays, cities throughout the world are under economic strain, and a recurrent source of contention is the disagreement between governments and their citizens over the taxes and costs the latter must pay for public services. Government attempts to raise them frequently attract widespread opposition. Financial constraints have influenced governments' objectives in nontax or non-fee revenue assets, such as the collection of land value increases generated by public infrastructure projects to offset the costs of providing public offers. Value capture or land value capture Financing is a global strategy through which such undeserved gains may be collected, at least in part, in a dependable and properly-described way for the welfare and benefit of the people in that society. Traditionally, municipal infrastructure is paid by taxes. In India, urban infrastructure is usually supported by increased government grants/transfers, augmentation of neighbouring self-revenue above running expenses, and long-term borrowing. Furthermore, these behaviours are not practised equally throughout India. Non-urban areas are rarely considered for these mechanisms due to a lack of systematic measures in place. As a result, there was a desire to codify this value capture technique using parameter priority. This research finds an excellent facilitator who enables improved land value collection by utilising the best worst approach of the MCDM technique.

Keywords: *Value Capture Mechanisms (VCM), Multi Criteria Decision Making Method (MCDM), Best Worst Method (BWM), Carriers*

INTRODUCTION
The concept of "land value capture" has developed as a popular justification for imposing or modifying entirely land-based taxes in the disciplines of urban public finance and global development. (Walters, 2012) Land Value Capture is a type of revolutionary public financing in which increases in land values generated by using new public infrastructure funding are all or partially "captured" via a land-related tax or other active or passive mechanisms, such as betterment charges, tax increment financing, air rights sale, and asset development, to pay back such funding. In a broader view, Value Capture process is to earn unearned increment/gain from onsite planning features or natural entities. Such gains, may be whole or part, to pay public financing and, or to compensate for social expenditures that are frequently linked to funding deficiencies.

Many cities throughout the world are facing budgetary challenges, and one recurring issue is the conflict between governments and their inhabitants over the taxes and fees that the latter must pay to fund public services. Attempts by governments to raise them frequently face public opposition, and financially difficult times have fuelled governments' interest in nontax or fee revenue sources, such as the capture of land value increases created by public infrastructure investments to defray the costs of providing public services.(Suzuki, Murakami and Hong, 2015)To fulfil the transportation needs and rapid urbanisation for the developing country like India, many cites adopted alternative approach as a metro rail construction as a fastest mode of transportation. Such mass transit system required strong political support and funding. Hence government took initiative to provide capital infrastructure expenditure for developing country.

As mentioned in the 12th 5-year Plan draught operational group record, Indian cities require investments of around US 58 billion. As a result, government subsidies and offers todevelop such a projects.They include land improvement and a land value capture strategy focused on non-fare box earnings. Value Capture Financing (VCF)

is a sort of public financing that functions as a tax collection mechanism and seeks to recapture a portion of the entire value generated by public infrastructure for private landowners. It is obligated to serve as a source of finance for urban investment. International organisations have long campaigned for land value capture as a source of money to assist local improvements in urban infrastructure and services.

LITERATURE REVIEW ON VCM CARRIERS:

The literature gives a methodological framework that provides incredible flexibility in terms of adding values to quantitative criteria and repeating the examination in the event of a VCM conviction. Public institutions entrusted with building and maintaining this infrastructure are always looking for solutions that will allow for monetary guiding of those investments. Value capture is one such funding strategy. A value capture Mechanism is a method of achieving broader public and private objectives that may be executed through certain types of financial contraptions. Price capture schemes are pleasant and improve as a result of the advantages offered by way of public investments, which will cover the costs of the investment itself.Value capture approaches are based on the premise that public investment typically results in increased valuations of private land and real estate. "Capturing" future price increases allows governments to receive a good budget, which may then be utilised to provide more value for communities in the future. The primary focus of the study is on knowledge and financial impacts on nearby properties. Applying more cutting-edge value capture tactics on the side of quantitative components that may be included in the various duties would be a future possibility for Indian cities.The performance of land prices surrounding public infrastructure provides significant potential for towns to sell projects and for local governments to gather some of the wealth produced by employing different "VCM techniques."

The terminology refers to a various policies and legislative tools aimed to generate unearned hike, uplift value, or assets value enhancement. The application ofvalue capture tools is that a proprietor or project promotors benefits from value risefrom their property as a result of market variation or the movements and involvement of public bodies such as urban local bodies, zoning boards, and other planning firms.

Table 1: Literature Review

Sr. No.	Paper Title	Author	Description
1	The best-worst multi-criteria decision-making method	Rezaei, 2015	BWM is proposed to cure issues related to multi-criteria decision-making (MCDM)
2	Assessing the social sustainability of supply chains using Best Worst Method	H., S. and J., 2017	Suggested framework contains, a sample of 38 experts review used to evaluate and prioritize social sustainability criteria, using a BW-MCDM
4	The state-of-the-art survey on integrations and application is one of the best and worst methods in decision making: why, what, what for, and what's next?	Mi *et al.*, 2019	This paper concentrates on the state-of-the-art survey of the BWM based on the in- root analysis
5	A systemic model for implementing land value capture to support urban rail transit infrastructure projects	Li *et al.*, 2022	Value Capture mechanism and its obstacles and to capture revenue from LVC

The McKinsey Global Institute estimates that Indian cities would require $1.2 trillion in cash over the next 20 years to finance urban development by 2031. It is a difficulty because of the current paucity of public funding.

METHODOLOGY

In 2015, Rezaei developed the Best Worst Method (BWM) to address different Multi-criteria Decision Making (MCDM) difficulties (Yadav, Seth and Desai, 2018). Researchers use approaches such as the simple Multi-attribute rating method (smart), the Analytic Hierarchy Process (AHP), and the method for prioritisation utilise to find best solution (TOPSIS), among others (Yadav *et al.*, 2019). Two criteria are compared in the procedures described above. Furthermore, a large range in weights is identified in AHP by a lot of specialists due to a tremendous number of pairwise assessments of criterion.BWM may process this scenario more accurately by limiting the selection to the most easily recognisable best fit and poor criteria. Within the Best-worst technique, the largest rank-marked as 9 isthe best and smallest rank- marked as 1 is worst criteria are compared by experts (Rezaei, 2015b). Furthermore, the BWM methodology is more consistent over another methods of decision making and often used by researchers. Following that, weights for Carriers are diagnosed using the BWM technique in this article.

Here, BWM approach(Rezaei, 2015b) used to evaluates the weightage of every criterion (w_j). Score of each alternative with recognitionof every criterion (p_{ij}) the overall rating can effortlessly be obtained.

primarily based on BWM need to tune the subsequent steps to calculate the vector W = {W_1, W_2, W_3…, Wn} (Rezaei, 2015a)**.**

Part 1. Outline Hard and Fast Standard

In this step, the choice-maker has to define a hard and fast of criteria ({C_1, C_2, $C_{3,\ ....}$, C_n}) this is used to choose alternatives.

Part 2. Define B-W Criterion

At this factor, field experts and the decision-makers review carried out to determine the B-W criterion that appeared to their significant.

Part 3. Define the Choices of the First-rate Criterion over the other Standards

In this step the selection-maker determines a vector marked as Best-to-other (BO) which is as under:

$$A_B = (a_{B1,}\, a_{B2}\, , a_{B3}\, , \ldots .\, , a_{Bn}) \qquad (3)$$

in which $a_{bj}$the satisfactory criterion B on the criterion j and its weightage is an integer quantity within the range of 1 to 9. Assumea_{BB}= 1.

Part 4. Prioritise Best Criteria (j) over the Worst Criterion (w)

In this portion, the field expert suggest a vector referred to as differ-to-Worst (OW) as below:

$$A_w = (a_{1w}, a_{2w}, a_{3w}, \ldots., a_{nw})^{T} \qquad (4)$$

Wherein a_{jw}– most fit criterion j on the worst criterion W (cost is an integer)

Range of 1 to 9. Assume that a_{ww} = 1.

Part 5. Search for the Ultimate Answer

In this step, we should discover the ideal weights of the standards (vector W). We've got the subsequent version as the very last linear version of BWM.

$$\min \xi^{L}$$

s.t.

$$|w_b - a_{bj} w_j| < \xi^{L}, \text{ for all j} \qquad (5)$$

$$|w_j - a_{jw} w_w| < \xi^{L}, \text{ for all j}$$

$$\sum_{j=1}^{n} wj = 1$$

$W_j > 0$, for all j

To prioritise in this test, the facilitator BWM approach with 5 different phases is used. The Carriers for VCM were identified in the first phase using recorded literature; in the 2nd part, Carriers were established ordered manner by splitting them into major and sub parameters. Figure 1 depicts the Carriers' order wise organisation. The 3rd phase is determining the B-W Carriers among all obtained parameters by individual field expert prior to the relative comparison. The 4th phase consists of an expert opinion-based pairwise comparison in which each of the Carriers is scored on a scale of 1 to 9 on the subject of exceptional and worst carriers defined in part 3.

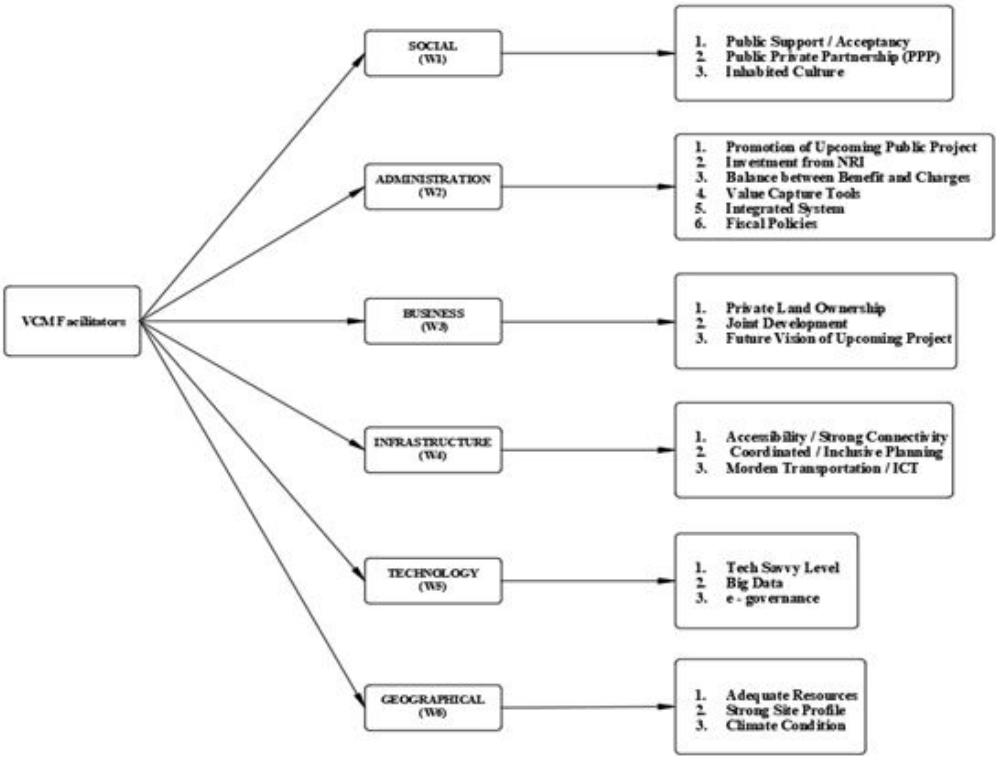

Figure 1: Hierarchical Structure of VCM Carriers

Table 2 shows the expert-filled pairwise comparison. Finally, using the BWM technique, the weight of the major Carriers is calculated in Table 3. Sub – criterion weight is obtained using the same technique as the weight of main criteria.The ultimate weight of all criteria is obtained by subtracting the main and sub-criteria. The final output/weight, as stated in Table 4, is used to rank the candidates.

Table 2: Prioritize the B-W criteria (on a 1 to 9 scale)

Distance of particular criteria from the Best criteria								**Distance of particular criteria from the Worst criteria**						
Field Experts	Best	W1	W2	W3	W4	W5	W6	Worst	W1	W2	W3	W4	W5	W6
F.Expert1	W3	2	5	3	7	3	1	W3	2	7	1	5	9	6
F.Expert2	W2	3	1	7	5	4	9	W5	3	8	5	7	1	2
F.Expert3	W3	5	1	7	9	5	7	W6	2	9	5	7	5	1

F.Expert4	W1	6	1	5	7	6	8	W6	4	7	5	6	6	1
F.Expert5	W1	5	3	7	1	3	1	W1	1	3	5	7	5	5

Table 3: Main Criteria Weight

Field ExpertNo.	W1	W 2	W 3	W 4	W5	W6	W^L
1	0.266723	0.106689	0.042337	0.076207	0.177815	0.330229	0.203218
2	0.194805	0.383117	0.194805	0.116883	0.045455	0.064935	0.201299
3	0.141256	0.49701	0.100897	0.078475	0.141256	0.041106	0.209268
4	0.112559	0.49763	0.135071	0.096479	0.112559	0.045701	0.177725
5	0.036885	0.143443	0.061475	0.307377	0.143443	0.307377	0.122951
Final Weights	0.150446	0.325578	0.106917	0.135084	0.124105	0.15787	0.182892

Table 4: Final weights of Main Criteria and Sub-Criteria

Main criteria	Main criteria Weight.	Sub criteria	Sub criteria Numbers	Sub criteria weight	Final weight	Rank
Social Carriers	0.1504	Public Support/ Acceptancy	1	0.487035	0.0732	4
		PPP	2	0.247835	0.0372	16
		Inhabited Culture	3	0.26513	0.0398	13
Administrative Carriers	0.3255	Promotion of upcoming public project	4	0.1207	0.0393	14
		Investment from NRI	5	0.1238	0.0403	12
		Balance between benefit and charges	6	0.0701	0.0228	18
		VC Tools	7	0.2166	0.0705	6
		Integrated System	8	0.2181	0.0710	5
		Fiscal Policies	9	0.2504	0.0816	2
Business Carriers	0.1069	Private land ownership	10	0.1423	0.0152	21
		Joint development	11	0.3505	0.0374	15
		Future vision of upcoming project	12	0.5071	0.0542	9
Infrastructure Carriers	0.1350	Accessibility/strong connectivity	13	0.5082	0.0686	8
		Coordinated/Inclusive Planning	14	0.3349	0.0452	11
		Modern Transportation/ICT	15	0.1567	0.0211	20

Technological Carriers	0.1578	Tech. Savy Level	16	0.5409	0.0853	1
		Big Data	17	0.1344	0.0212	19
		E-Governance	18	0.3246	0.0512	10
Geographical Carriers	0.1828	Adequate resources	19	0.4386	0.0802	3
		Strong site profile	20	0.3800	0.0694	7
		Climate Condition	21	0.1814	0.0331	17

OUTCOME

The final result, as shown in table 4, demonstrates that Administrative carriers continue to hold the top spot among all primary criteria, with a weight of 0.3255. At the same time, geographical, technical, and social facilitators are ranked 2nd, 3rd and 4th, with loads of 0.1828, 0.1578, 0.1504, respectively. That means that by attaining the Administrative and geographical elements, the peer group may achieve about half of the possible value capture inside the acceptance. Improvement of Tech-savvy Level has the greatest weight of 0.0853 in sub-criteria.

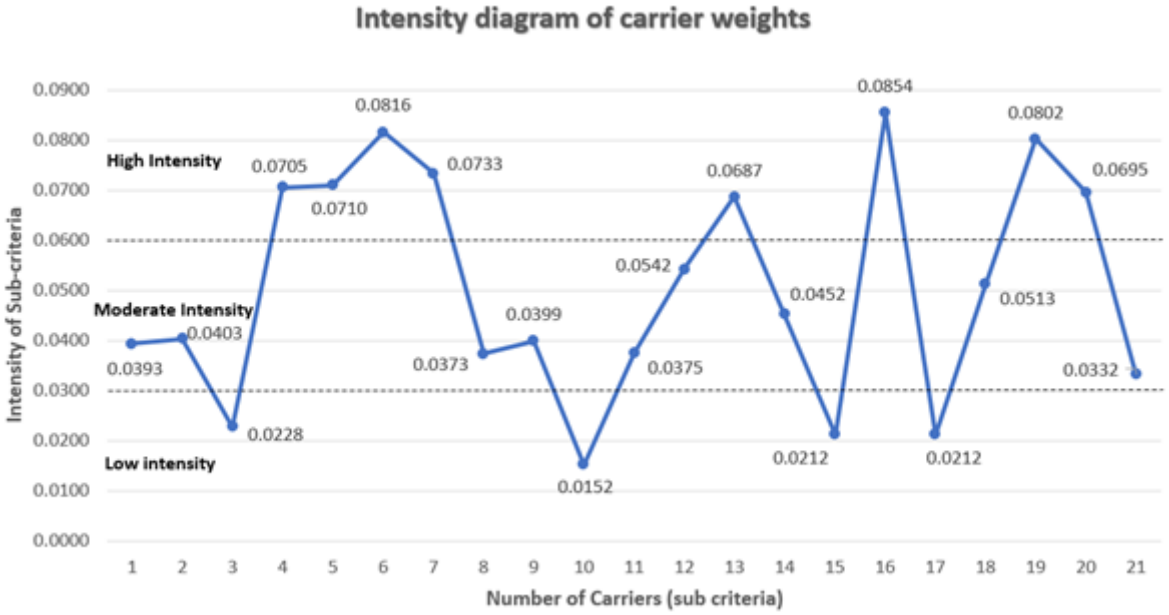

Figure 2: Intensity diagram of carrier weight

Adequate resources, Public support, and Integrated circuit rank second, third, fourth, and fifth for value capture method, with weights of 0.0816,0.0802,0.0732, and 0.071, respectively.

Further investigation was performed to determine the intensity of the specific carriers, which were classified as high intensity, moderate intensity, and low intensity, as in Figure 2. Graphic aids in determining which carrier has the most influence on the value capture mechanism. Carriers 4,5,6,7,13,16,19, and 20 provide a high intensity in the value capturing mechanism. Carrier numbers 3, 10, 15, and 17 are less influential in terms of VCM. According to the author, this is one of the best approaches to create a foundation for a value capture system.

FINDINGS

The outcome of this studyis to findparticular carriers which act as facilitatorin capturing value from urban projects in the Indian context. Thedifferent papers are referred to(Salon, Sclar and Barone, 2019) , (Thomas, 2018) , (Eni

et al., 2017) , (Milan, 2015) , (Nguyen, van der Krabben and Samsura, 2014) etc. referred to identify the carriers for the LVC all around the world. Best Worst Method analysis is done for value capturing from urban projects in the Indian context. The result concluded with prioritisation of criteria as administration facilitator secured 1st rank among the all criteria with the weight of 0.3255. While geographical, technological, and social facilitators hold 2nd,3rd, 4th positions respectively with the weight of 0.1828, 0.1578, and 0.1504. In sub –criteria, Improvement of Tech-savvy level capturesthe highest weight of 0.0853 and private land ownership capture lowest weight of 0.0152. The study findings will help to make strategic framework for value capture from urban projects in the Indian context, whether it will succeed or not. The use of value capturing mechanism from urban projects will help in understanding the chain reaction economics.

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