

# An Early Warning Method for abnormal Operation Status in Electricity Market based on DAT-AHP Method

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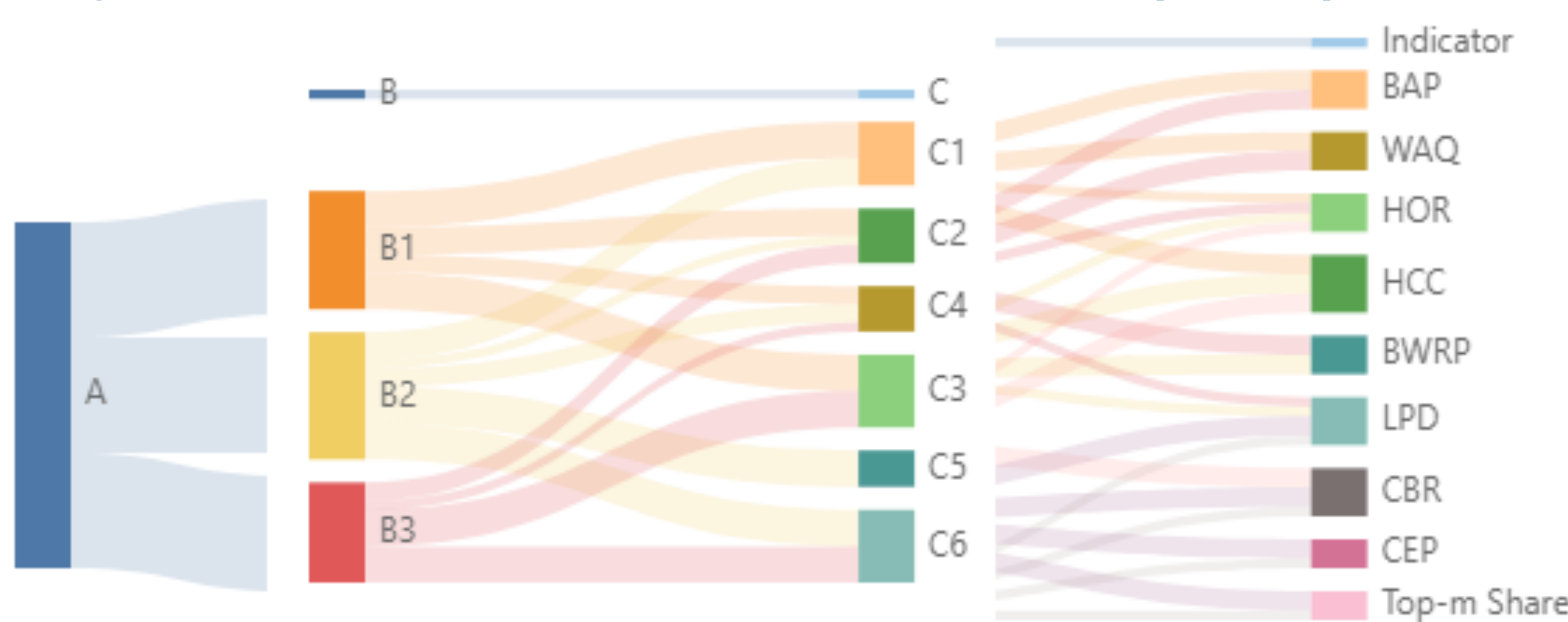
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## Introduction

The underdeveloped early-warning method for the current electricity market contradicts the steady progressing process of electricity market reformation. It is momentous to establish a qualified state assessment method for market operation status, discerning the marketization process and identifying potential problems. In this regard, this research builds an evaluation system of abnormal state of electricity market based on DAT-AHP, and carries out early warning test on actual electricity market operation state, and draws the following conclusions.

## Methods

A multi-level power trading operation status index system is established based on **Dynamic Association Tree (DAT)** and



The historical operation data is extracted as the mining object, the data set is processed by the classical **Analysis Hierarchical Method (AHP) method**, and the combination method of DAT-AHP is introduced to weight the indicators, thus achieving judgment on abnormal system operation status.

Table 1 Dynamic Warning Level for Operation Status

Monitoring Variable	Degree of Deviation	Warning Level
DED	$DED(k) \leq 25\%$	IV
	$25\% < DED(k) \leq 50\%$	III
	$50\% < DED(k) \leq 75\%$	II
	$DED(k) \geq 75\%$	I

The proposed **dynamic and static double-layer early warning method** is applied to a specific market to judge the abnormal operation status of the system, and the obtained results can effectively realize the abnormal early warning of the operation state and reflect the potential problems of the market, indicating that the evaluation method has strong practicability and advanced nature.

## Results

Table 2 Baseline and Threshold of Warning Level

Type of Indicator	Indicator	Baseline	Threshold
Static	HCC	80%	<60%
	BAP	70%	>80%
	BWRP	50%	>70%
	WAQ	vary with entities	vary with entities
	HOR	50%	>70%
	CEP	10%	<5%
	Top-m Share	30%	>90% & <10%
Dynamic	CBR	30%	/
	LPD	1.35	/

The evaluation index breaks the limitation of the traditional AHP method, creates a comprehensive early warning model considering the coupling and correlation of multiple factors. The proposed DAT-AHP method effectively **evaluate the marketization degree and operation efficiency**, and also fully take into account the sustainability and safety of the market.

## Conclusions

The proposed method can analyze the relationship between each specific indicator, equipped with a more flexible combination mode and stronger extensibility. Future research can further refine this evaluation method in terms of weight selection and application expansion.