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SELECTION OF MEDICAL WASTE TREATMENT CENTERS USING ANP

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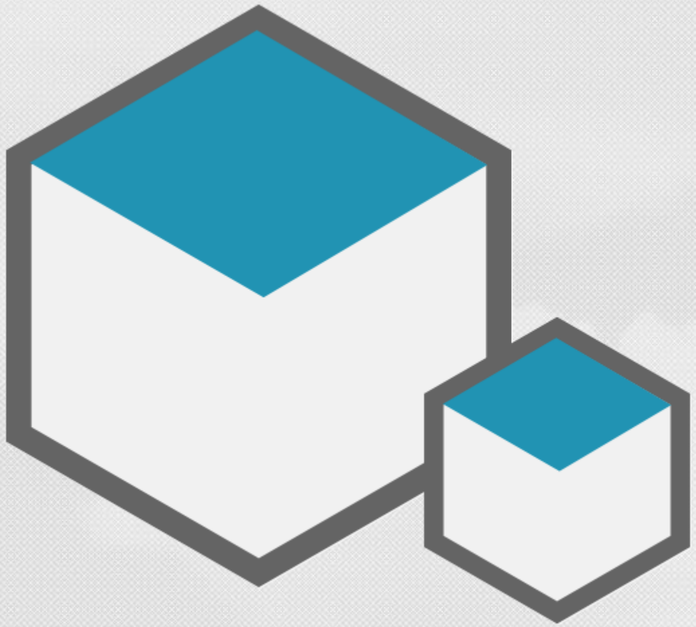
Presentation Outline



Introduction

Introduce the research background, point out the research motivation, establish the research problem, and analyze the significance of the research.

Methodology

Read literature, conduct field investigation, establish criteria system, analyze criteria correlation, and establish network hierarchy structure for medical waste treatment centers selection, analyze and solve.

Conclusion

Give the actual case, analysis and solution, verify the model, innovation points, limitations.

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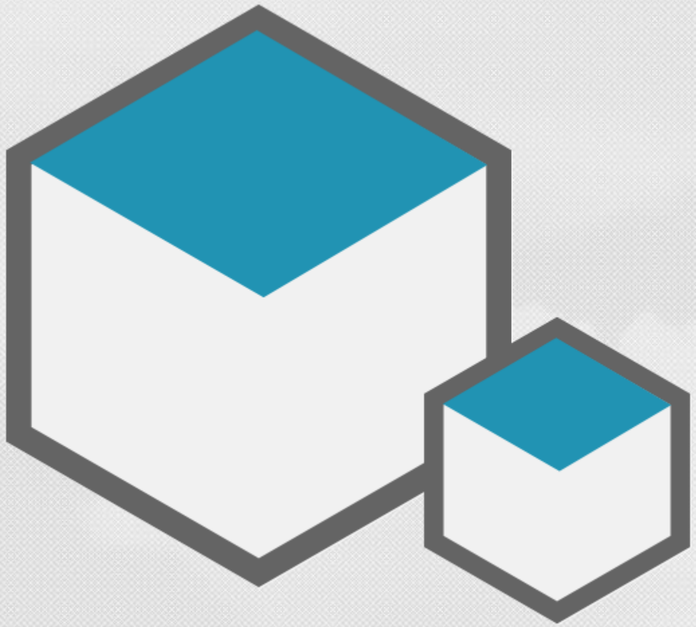

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Introduction

A global crisis

The WHO (World Health Organization) has declared the outbreak of COVID-19 to be the sixth global public health emergency to date and a global crisis if left unchecked.

A surge in confirmed cases

Outbreaks usually lead to a sharp increase in infections within a short period of time, putting medical resources under extreme pressure.

Transmission is fast

COVID-19 is highly infectious and has a wide range of the transmission route, so the daily protection must be taken.

A large amount of waste

During the prevention, control and treatment of COVID-19, a large amount of infectious medical waste (IMW) is generated, such as masks, disposable needles, nucleic acid testing waste, etc. A large amount of IMW is produced every day, which brings pressure to the medical waste treatment centers (MWTCs).

Introduction

Choosing a suitable medical waste treatment center can reduce the probability of infection risk.

This paper presents an evaluation model based on ANP, and establishes a universal risk evaluation method system for MWTCs. To minimize the risk, the ANP method was used to select and rank MWTCs.

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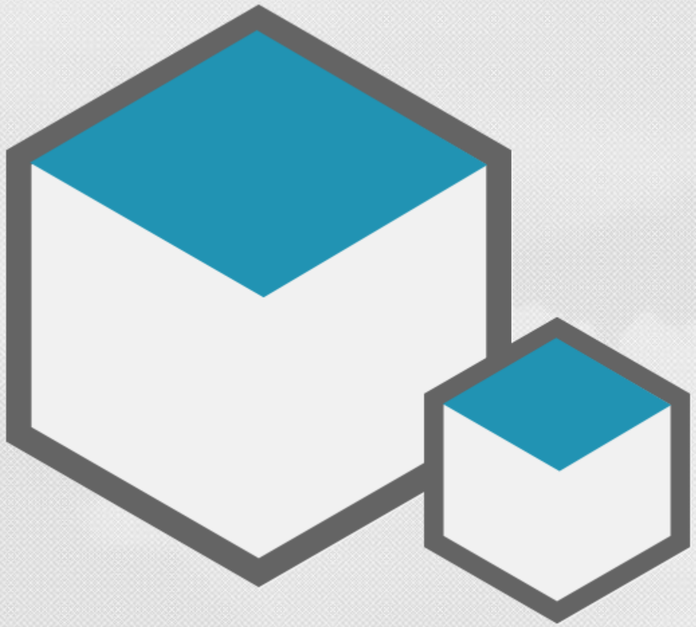

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Criteria	Sub-criteria	Explanation of criteria
Experience and qualification (C_1)	Technical level of operators (C_{11})	Operator's historical experience and technical capability
	Quality of treatment facilities (C_{12})	Treatment facilities correspond with standards
Equipment and technology (C_2)	Configuration completeness of treatment facilities (C_{21})	Treatment facilities are capable of handling all types of medical waste
	Automation control level (C_{22})	Level of automation of equipment
	Disposal facilities operability (C_{23})	Handling facilities are easy to operate
Waste disposal site exposure to public (C_3)	Area covered (C_{31})	The area specialized to a MWTC
	Instance from urban area (C_{32})	Distance of MWTCs from the urban
	Road conditions (C_{33})	Traffic flow, accident rate, etc

Methodology

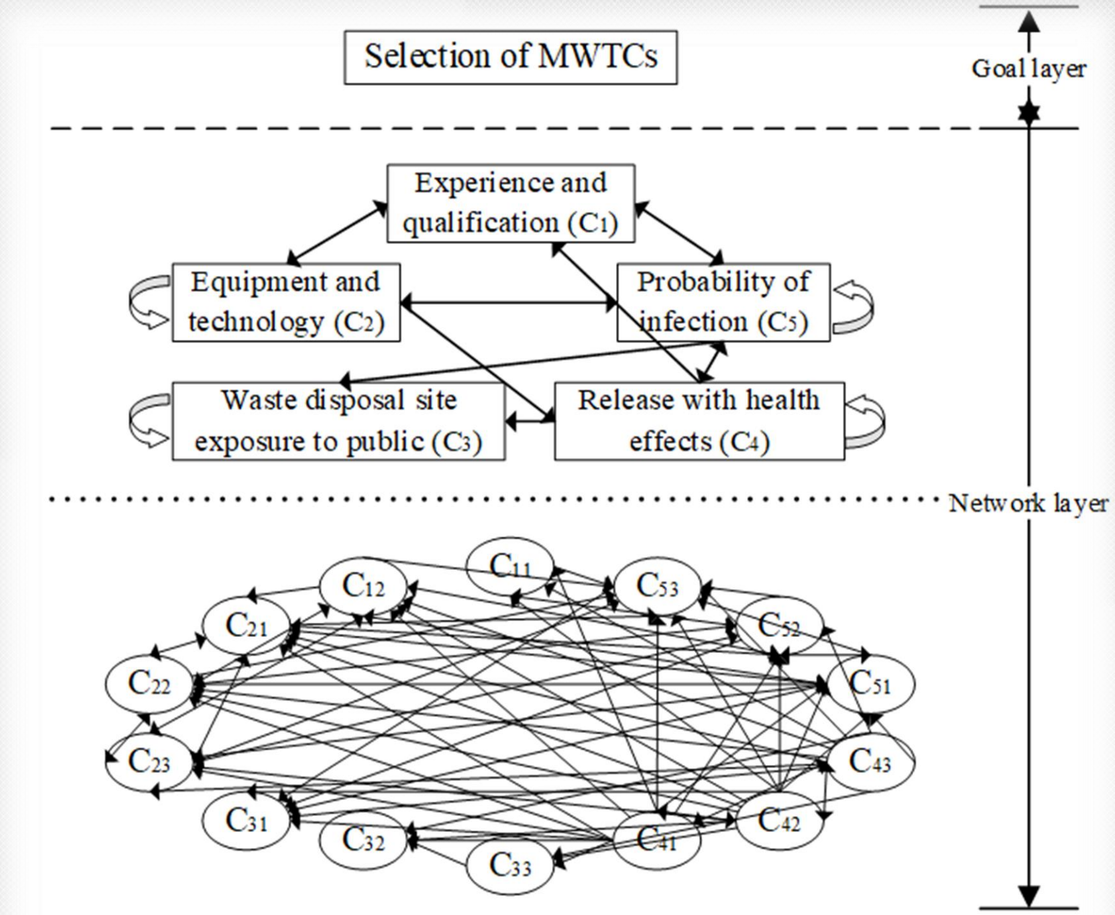
Criteria	Sub-criteria	Explanation of criteria
Release with health effects (C_4)	Risk of producing poisonous and harmful pollutants (C_{41})	Produce poisonous and harmful pollutants risk
	Environmental impact risk (C_{42})	Pollutants release impact to ecological environment
	Personnel impact risk (C_{43})	Pollutants release impact to contact people
Probability of infection (C_5)	Suitability of disposal facilities (C_{51})	Matching of treatment equipment to waste type
	Security protection measures deployment level (C_{52})	Whether the security measures are adequate
	Supervision means reliability (C_{53})	Whether the local supervision is strict

Methodology

Sub-criterion association table

	C_{11}	C_{12}	C_{21}	C_{22}	C_{23}	C_{31}	C_{32}	C_{33}	C_{41}	C_{42}	C_{43}	C_{51}	C_{52}	C_{53}
C_{11}									√	√	√		√	
C_{12}				√	√				√	√	√	√	√	
C_{21}		√		√	√				√	√	√	√	√	
C_{22}		√	√		√				√	√	√	√	√	
C_{23}		√	√	√					√	√	√	√	√	
C_{31}									√	√	√		√	√
C_{32}								√	√	√	√			
C_{33}									√	√	√			
C_{41}										√	√			
C_{42}									√		√			
C_{43}									√	√				
C_{51}		√	√	√	√				√	√	√		√	
C_{52}	√	√	√	√	√				√	√	√	√		
C_{53}	√	√	√	√	√				√	√	√	√	√	

Methodology



The ANP network structure for selecting MWTCs

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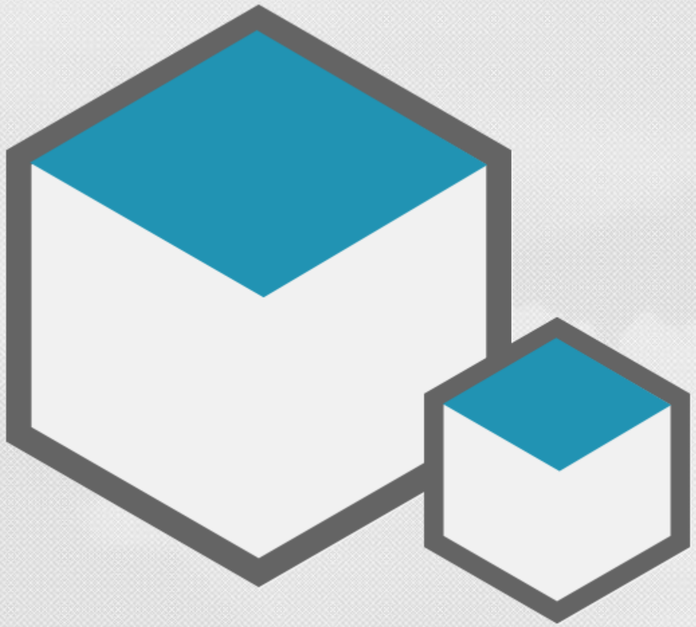

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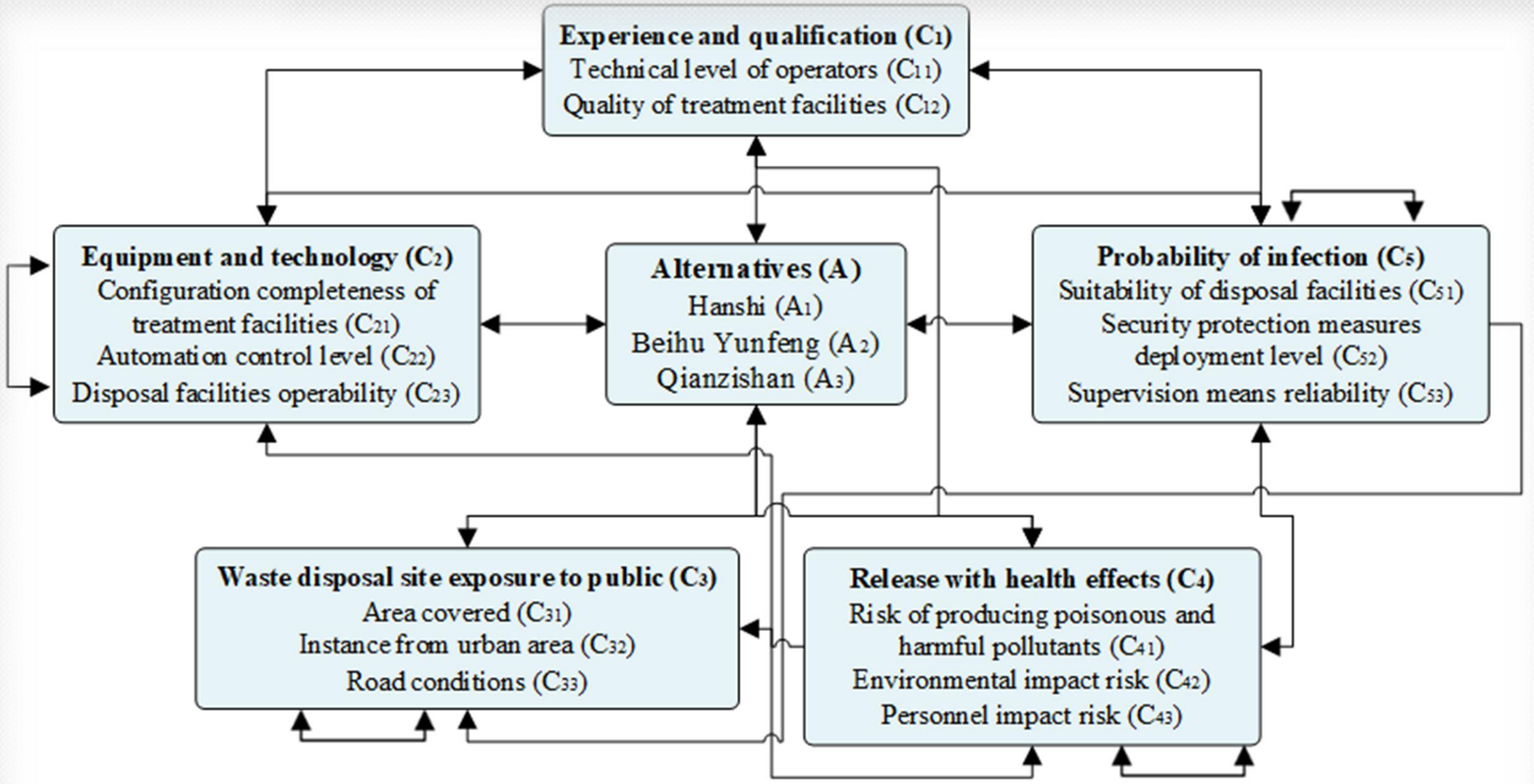
We selected three typical MWTCs in Wuhan, namely, Hanshi, Beihu Yunfeng and Qianzishan.

According to the established evaluation criteria system, the final ANP structure diagram of MWTCs selection can be obtained.



The structure diagram of ANP method in MWTCs selection

Conclusion

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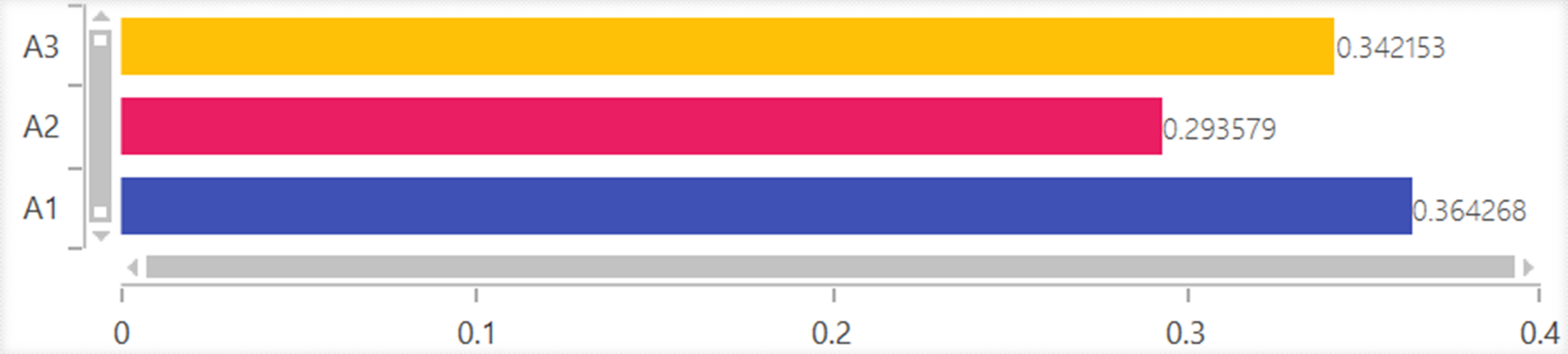
Experts use 1 ~ 9 score method to get pairwise comparison matrix, and then solve to get the result.

A1(0.364268)>A3(0.342153)>A2(0.293579)

Hanshi>Qianzishan>Beihu Yunfeng



Conclusion

- The selected criteria are limited to risks and not perfect enough. The follow-up can refer to the BOCR (benefit-opportunity-cost-risk) model proposed by Saaty for further development.

- In this paper, only one expert is considered, the information is not completely reliable, so group decision making can be considered in the future.

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Thank You!

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