

APPLYING CBA TO DECIDE THE BEST EXCAVATION METHOD: SCENARIO DURING THE COVID-19 PANDEMIC

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AGENDA

- Context
- Research method
- Case study
- Results and discussions
- Conclusions

CONTEXT

In March 2020, the **coronavirus pandemic** reached all the nations worldwide; it was declared a global pandemic by the World Health Organization (2020)



Given this fact, **building projects were paralyzed** in the middle of the execution process, **affecting the time, costs, and resources.**

CONTEXT

- Choosing By Advantages (CBA) is a tool that **helps decision-making based on relevant facts** (Arroyo et al. 2013). CBA is **used to make multiple decisions** in the building project life cycle (Brioso et al. 2019).
- However, there are still no publications that explain its **use during the COVID-19** pandemic in the excavation phase.
- The **purpose** of this work is to introduce the method CBA for decision-making of the **best alternative material removal systems** in basement construction and applying it to a real case study during the pandemic

CONTEXT

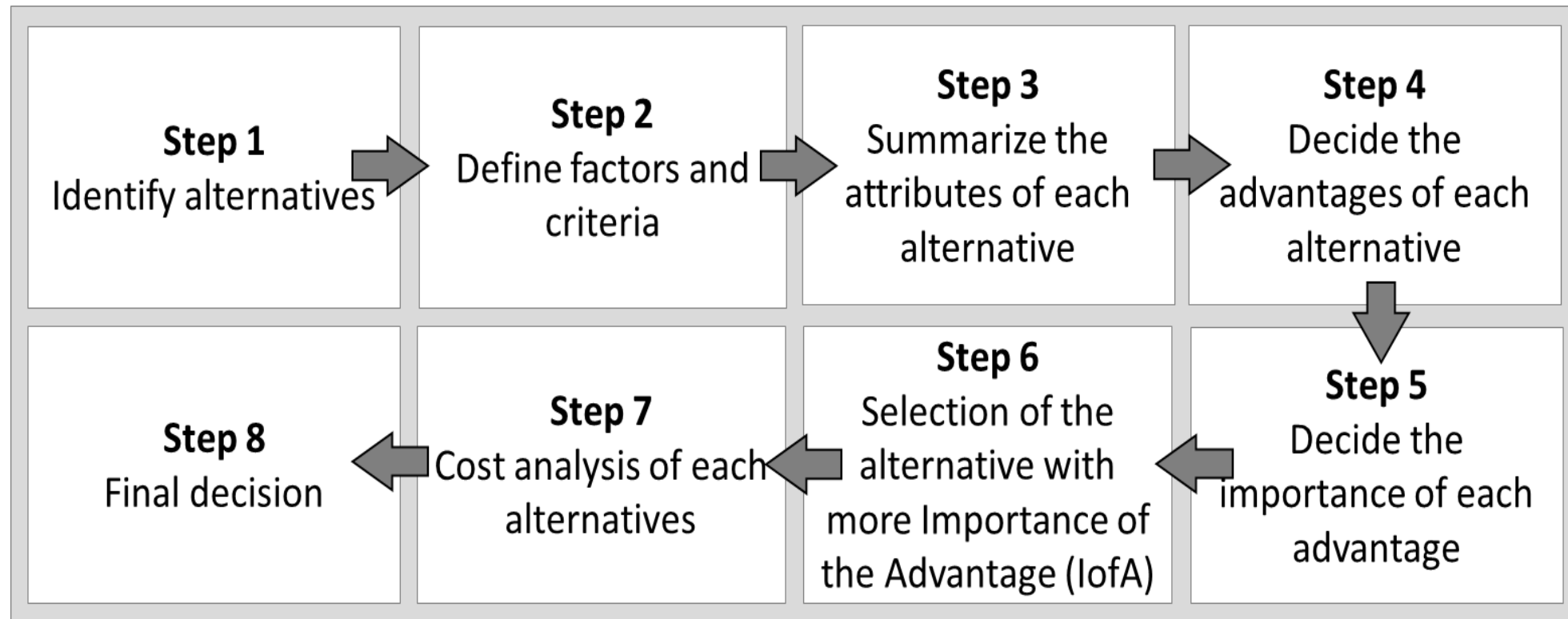


Figure 1. Steps to CBA method (Arroyo et al. 2013; Brioso et al. 2019).

RESEARCH METHOD

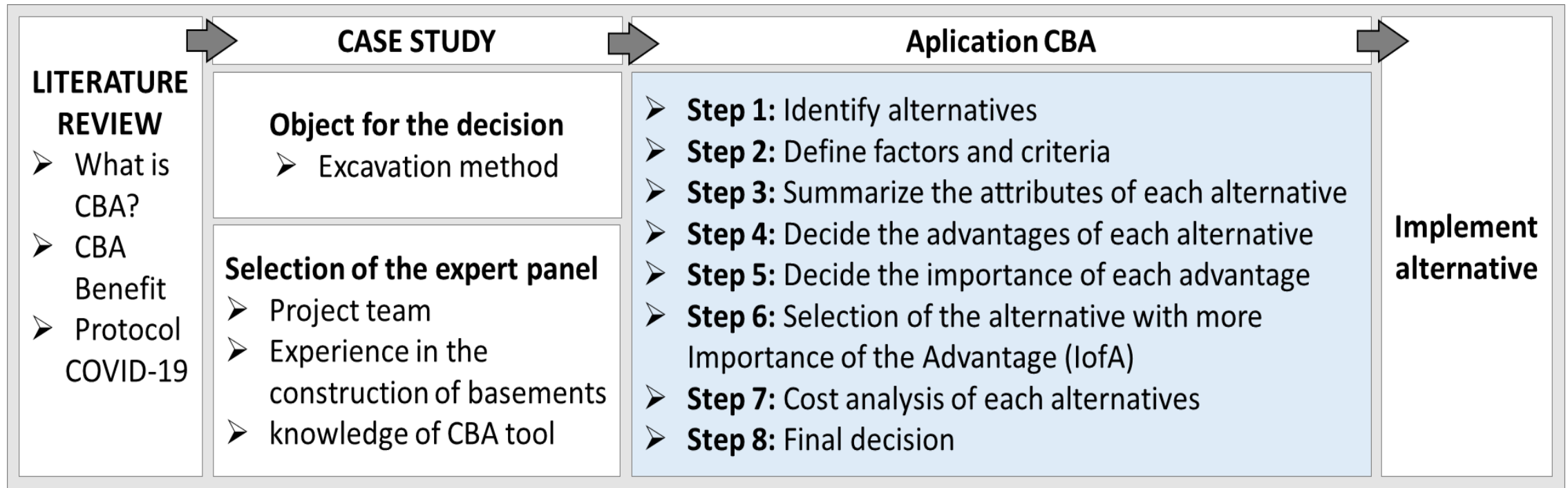


Figure 2. The case study protocol

CASE STUDY



Figure. Set of material to remove that hinders the execution of anchored walls

RESULTS AND DISCUSSION

Step 1: Identify alternatives



1) Removal by conveyor belt anchored in walls

2) Conveyor belt without anchoring in walls

3) The vertical lifting system

Figure 4: Alternatives to remove material for the seven, eight and nine basements.

RESULTS AND DISCUSSION

Step 2: Define factors and criteria

(1) Productivity: Capable of removing material in a number equal to or to achieve the established term.	
(2) Interferences with other areas: That when removing material, it execution of other planned activities, such as drilling or construction	x
(3) Installation time: Short installation time, so as not to have to not to interfere with the execution of other activities.	x
(4) Facility of installation: Without needing excess machinery and	x
(5) Occupation area: A system is sought that occupies a small area, to execution of other activities	x

Table 1. Matrix factor and Criteria vs Plan of the prevention and control of COVID-19

RESULTS AND DISCUSSION

Step 3: Summarize the attributes of each alternatives

Step 4: Decide advantages of each alternative

Step 5: Decide the importance of each advantages

Step 6: Selection of the alternative with more Importance of the Advantage (IofA)

Table 2: CBA Analysis.

Solution alternatives for the removal of material from basement seven to basement nine				
Factor	Criterion	ALTERNATIVE 1: Conveyor belt anchored in walls	ALTERNATIVE 2: Conveyor belt without anchoring in walls + bucket crane	ALTERNATIVE 3: vertical lifting system
Productivity	Higher productivity is better	Attribute: 500 m ³ /day	Attribute : 500 m ³ /day	Attribute : 600m ³ /day
		Advantage: 0	Advantage: 0	Advantage: 100 m ³
		Importance : 0	Importance : 0	Importance : 50
interferences with others areas	Less interference is better	Attribute: It hampers many tasks	Attribute: It hampers a little some task	Attribute: It almost does not hamper tasks
		Advantage: 0	Advantage: It interferes a bit more than alternative C	Advantage: It is the one that least interferes
		Importance: 0	Importance: 70	Importance:75
Installation time	Less time is better	Attribute: 14 days	Attribute: 5 days	Attribute: 5 days
		Advantage: 0	Advantage: 9 days	Advantage: 9 days
		Importance: 0	Importance: 75	Importance: 75
Facility of installation	Higher facility is better	Attribute: this alternative uses overlaps that make installation difficult	Attribute: average difficulty	Attribute: average difficulty
		Advantage a: 0	Advantage: the least difficult	Advantage: the least difficult
		Importance: 0	Importance: 50	Importance:50
Occupation area	Less area is better	Attribute: It occupies a considerable area	Attribute: occupies little area	Attribute: occupies little area
		Advantage: 0	Advantage: it allows more area available for work	Advantage: it allows more area available for work
		Importance: 0	Importance: 100	Importance: 100
Score IofA		0	295	305

RESULTS AND DISCUSSION

Step 7: Cost analysis of each alternatives

Step 8: Final Decision

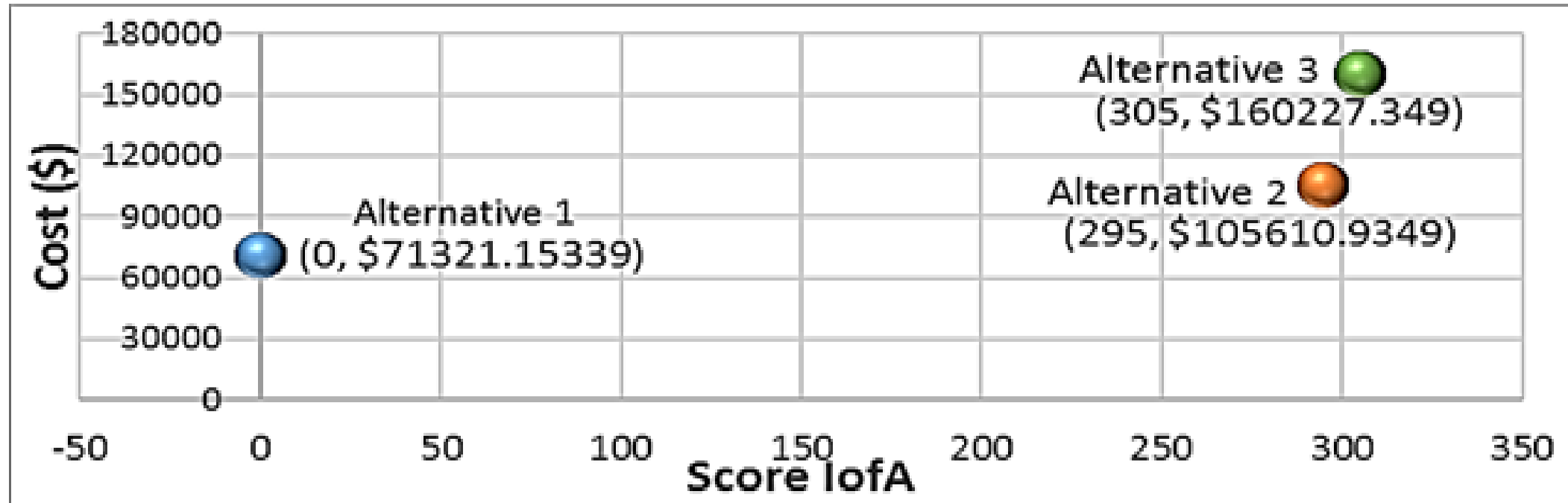


Figure 5. Alternative Costs.

RESULTS AND DISCUSSION

Implement alternative



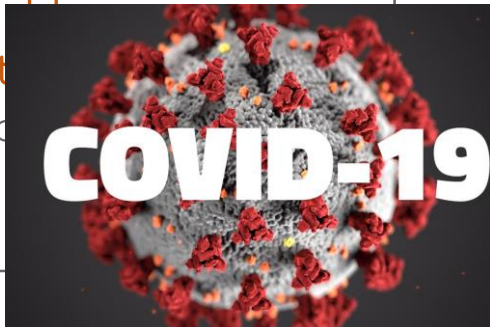
A and B. the conveyor belt operation, which is not anchored in walls

C. bucket crane removal work in simultaneously

Figure 6. Operation of the conveyor belt and bucket crane.

CONCLUSIONS

To evidence applying the Choosing by Advantages (CBA) successfully. Second, the evidence that the **COVID-19 protocol compliance did not impact the productivity of the project**.



A practical contribution is **the information and important data of the alternatives** to choose the best removal system according to the conditions of the project.



Allows **document and formalize** relevant data, making decisions based on important criteria, **speed up the decision-making process**, allow decide for an alternative that **expedite** the project.



THANK YOU!



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