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Context:

In health crisis, the availability of medical equipment is not guaranteed. Devices in hospitals require a huge investment and must meet strict standards. Providing reliable equipment in public health emergencies is a global challenge. In this frame, this research aims at the development of a generic multicriteria decision model for medical ventilators maintenance during a crisis to allow hospitals to provide a better health service while remaining in budget.

Methodology:

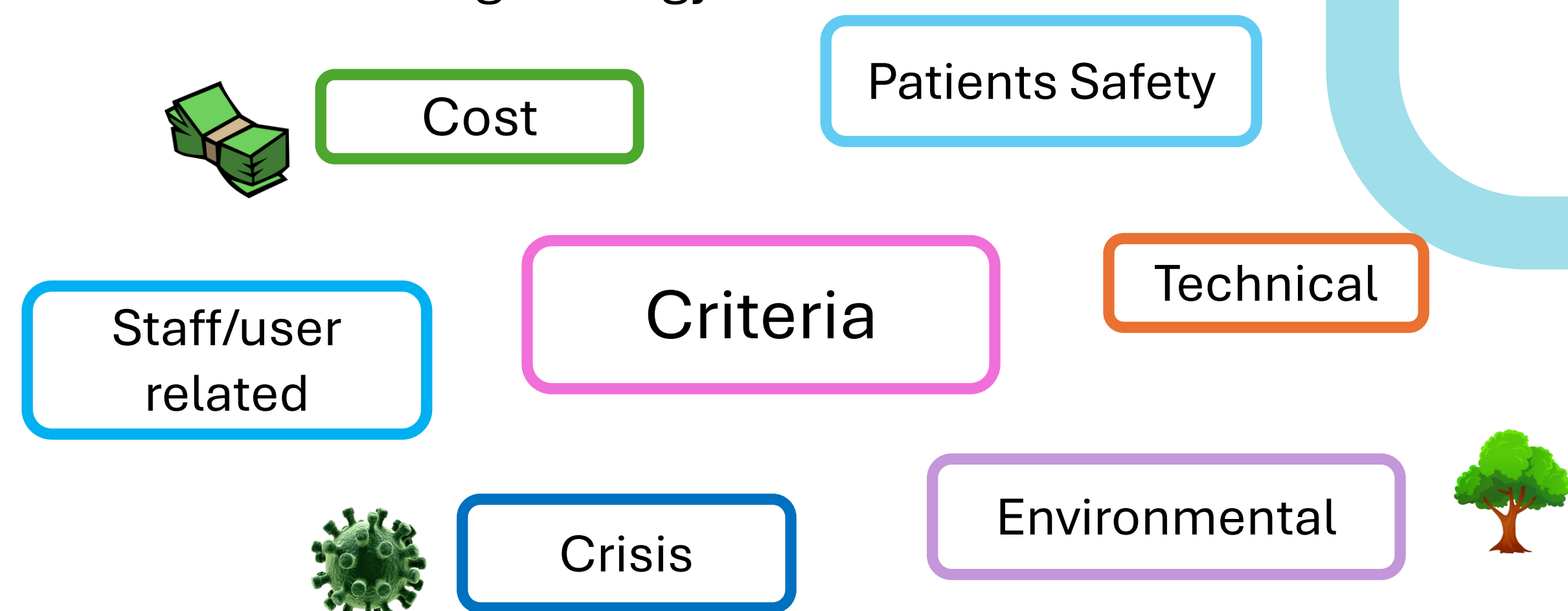
A multi-criteria decision aiding method in this frame, is a method based on choosing the right alternative according to different criteria that would help identify the optimal maintenance policy and management strategies for ventilators. The MCDA method that is used is the ELECTRE methodology.

The proposed model can be summarized in the following steps:

- Identify the asset management alternatives.
- Identify all the efficient criteria and sub-criteria.
- Determine weighting values for all criteria and sub-criteria.
- Set up grades and determine intensities for each criterion.
- Evaluate alternatives with respect to each criterion and assign grades and scores.
- Identify the appropriate alternative

Criteria :

The maintenance management plan needs to take into consideration different factors suggested by the assisting hospital and found in literature in order to design the corrective and preventive maintenance policy, the investment policy, and decommissioning strategy.



These big criteria families are split, on a second level, into more specific subcriteria that are assigned with scores.

Example:

Cost criteria

- New equipment acquisition cost
- Maintenance consumables cost
- Maintenance contracts cost
- Maintenance personnel cost
- Training cost

Maintenance scenarios :

- The first step in a multi-criteria decision aiding method is to define the different choices from which a decision will be chosen.
- Four different scenarios are suggested with different policies :

Investment policy: 5% of new equipment each year
Maintenance policy: Corrective maintenance and instant equipment stock maintenance at the time of crises.
Decommissioning policy: Disposal of the oldest 5% of the equipment.

Investment policy: 10% of new equipment each year
Maintenance policy: Corrective and continuous preventive maintenance for stock equipment.
Decommissioning policy: Disposal of the oldest 10% of the equipment.

Investment policy: 10% of new equipment each year + the required number of new equipment at the health crises.
Maintenance policy: Corrective and continuous preventive maintenance for stock equipment.
Decommissioning policy: Donate the oldest 10% of equipment to other health centers.

Investment policy: 10% of new equipment each year + **more** than the required number of new equipment at the crises.
Maintenance policy: Corrective and continuous preventive maintenance for stock equipment.
Decommissioning policy: Donate the oldest 10% of equipment to other health centers



Aknowledgements :

We thank the CHwapi (Centre Hospitalier de Wallonie picarde , Belgium) for funding this research project and for the useful discussions.



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