



Applying Multi-Criteria Decision-Making (MCDM) to the Technology Investment Decision-Making Process

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Research Objective and Questions

Research Objective

The objective of this research is to propose and develop a consistent, repeatable, and subjective process using weighted criteria to make technology investment decisions.

Research Questions

- Can appropriate technology investment decision criteria be identified?
- How can technology investment decision criteria be quantified?
- Can statistical analysis through multi-criteria decision-making methods be used to accurately develop weighted decision criteria?
- Can the technology investment decision-making process be made more objective, consistent, and repeatable?



Research Issue

Research Issue

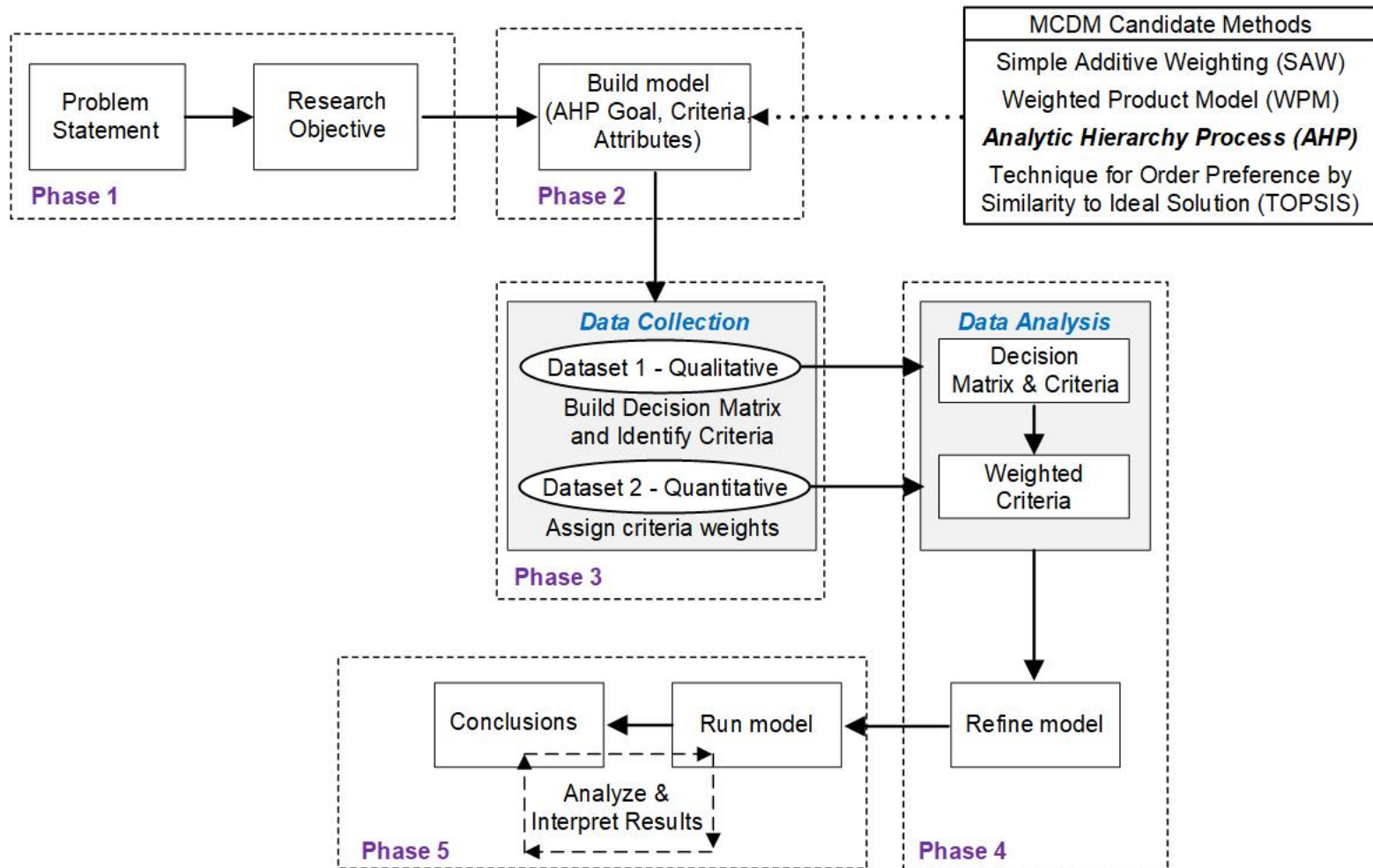
Current approaches to identifying, evaluating, and selecting emerging technologies for investment of limited resources can be inconsistent and based largely on subjective assessments and unstructured decision-making processes.

To ensure that technology investment decisions are properly aligned to organizational goals and objectives, decision-makers require a structured and objective approach to technology selection and investment decision-making.

Methodology

Multi Criteria Decision Making (MCDM)

(Choosing the best alternative from among a finite set of decision alternatives based on weighted criteria.)





Multi-Criteria Decision-Making (MCDM)

Level 1: Goal

The Goal represents the desired outcome or impact of the decision.

Level 2: Criteria

C1

C2

C3

.

Cn

Criteria are standards or decision parameters against which the candidate solutions will be evaluated.

Attributes

Attributes are qualities or characteristics associated with each criterion. Attributes help establish weights for each criterion relative to other criteria.

Level 3:
Alternatives

Alternative 1

Alternative N

Alternative 1

Alternative N

Alternative 1

Alternative N

Alternative 1

Alternative N

Each alternative evaluated against the weighted criteria.

Decision



MCDM Case Study

Level 1: Goal

Private Cell
Technology

Level 2: Criteria

Technology
Maturity

Signature

Network
Profiles

Range

Attributes

Technology Readiness Level (TRL)
Enabling Product Availability
Product technical data
Technical Support
Performance Data

Radio Frequency (RF)
Electromagnetic Spectrum
Physical Parameters
Communication Protocols

Reliability
Sustainability
Availability
Interfaces

Received Signal Strength Indicator
Tolerable Bit Error Rate (BER)
Channel Capacity and Range
Channel Interference Adjudication
Cell Hand-off

Level 3:
Alternatives

Product 1

Product 2

Product 1

Product 2

Product 1

Product 2

Product 1

Product 2

Product 1 and Product 2 evaluated against weighted criteria.

Product 1 and Product 2 rank ordered based on
aggregate score from individual criterion evaluations.

Decision



Findings and Conclusions

Findings

- Decision criteria identified and weighted using MCDM methods.
- Subject Matter Expert judgment critical to criteria weighting.
- Decision criteria should clearly differentiate decision alternatives.
- Acceptance Threshold for any alternative should be established.
- Risk tolerance impacts the decision-making process.

Conclusions

- MCDM model satisfied research objectives & answered research questions.
- MCDM produces a consistent, subjective, and repeatable process for technology investment decision-making.
- Future research should focus on methods to measure return on investment attributed to applying MCDM methods.