Concept Selection

Methods in Early Product Development

MEC-E3002

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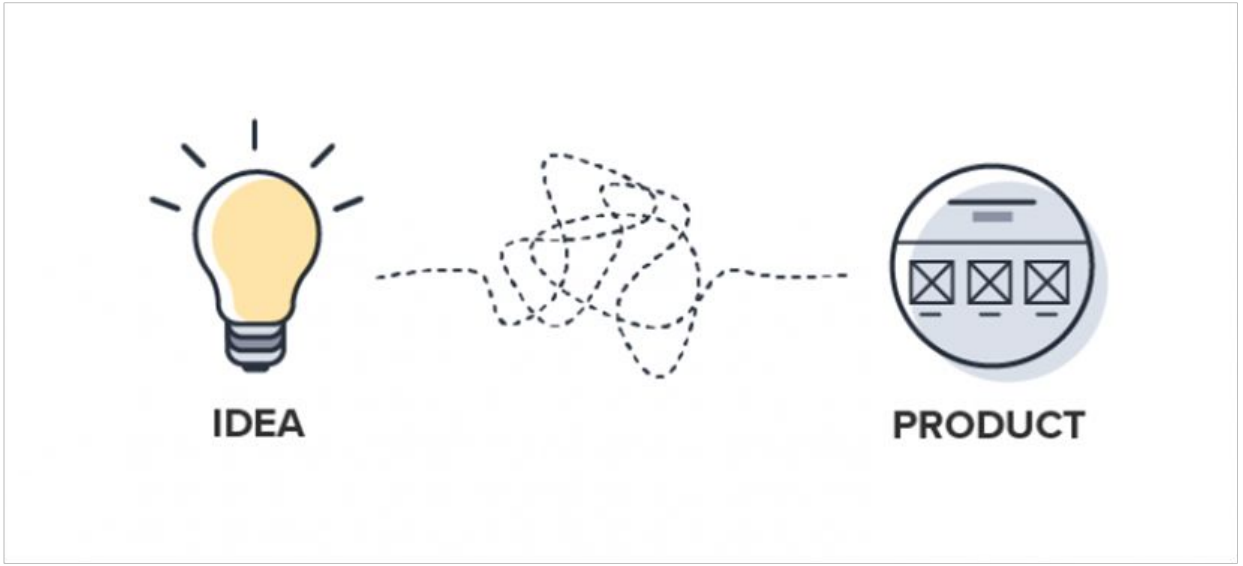
Identifying customer needs → Product specifications → Concept generation → Concept selection



1. introduction
2. methods for choosing a concept
3. characterstics of structured method
4. concept screening
5. concept scoring
6. summary

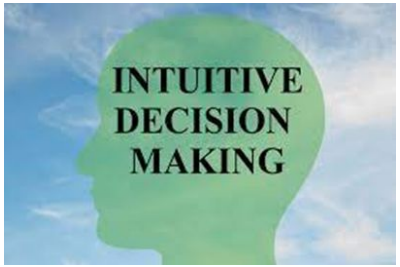
Introduction

- **What is concept selection?**
  - Evaluating concepts
    - Different methods
- **Why do we need concept selection?**
  - Budget
  - Time

Methods for choosing a concept

External decision

Product champion



Intuition

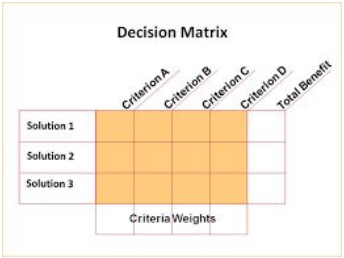
Multivoting

Methods for choosing a concept

Online survey/
Crowdsourcing

Pros and cons

Prototype
and test



Decision
matrices
/Pugh matrix

A structured method goes a long way

Competitive design

Customer oriented product

Product-process coordination

A structured method goes a long way

Time saving for product introduction

Effective group based decision

Documentation of decision process

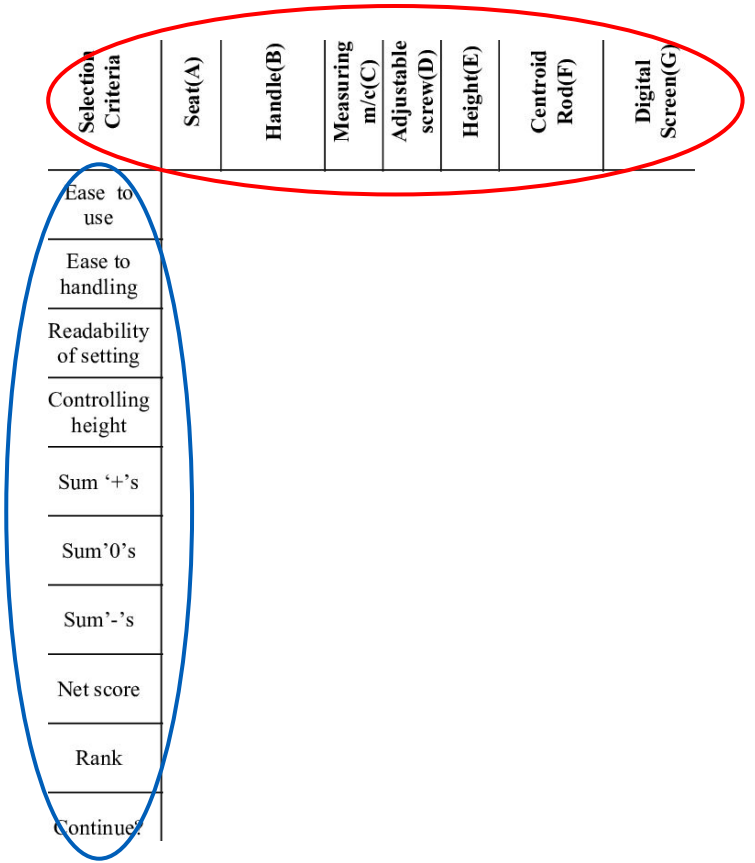
Concept Screening

- Narrow the number of concepts and to improve them
- A matrix is used as a helping tool with 6 steps

Selection Criteria	Seat(A)	Handle(B)	Measuring m/c(C)	Adjustable screw(D)	Height(E)	Centroid Rod(F)	Digital Screen(G)
Ease to use	0	+	+	+	0	-	+
Ease to handling	-	0	0	0	+	+	0
Readability of setting	0	-	0	0	0	0	0
Controlling height	-	0	0	0	0	0	-
Sum '+'s	0	1	1	1	1	1	1
Sum'0's	2	2	3	3	2	2	2
Sum'-'s	2	1	0	0	0	1	1
Net score	-2	0	1	1	1	0	0
Rank	3	2	1	1	1	2	2
Continue?	No	Combine	Yes	Yes	Yes	Combine	Combine

Concept Screening

- **Step 1: Prepare the matrix**
  - Paper, Whiteboard, Excel..
  - Preferably less than 12 concepts
  - Criteria chosen based on customer needs or for example manufacturing details
  - Choosing a reference concept



Concept Screening

- **Step 2: Rating the concepts**
- **A relative score is placed in each cell comparing to the reference concept**
  - “Better than” : (+)
  - “Same as” : (0)
  - “Worse than” : (-)

Selection Criteria	Seat(A)	Handle(B)	Measuring m/c(C)	Adjustable screw(D)	Height(E)	Centroid Rod(F)	Digital Screen(G)
Ease to use	0	+	+	+	0	-	+
Ease to handling							
Readability of setting							
Controlling height							
Sum ‘+’s							
Sum’0’s							
Sum’-’s							
Net score							
Rank							
Continue?							

Concept Screening

- **Step 3: Rank the concepts**
  - Sum the ‘+’s, ‘0’s, ‘-’s
  - Rank the concepts
  - Identify the best ones

Selection Criteria	Seat(A)	Handle(B)	Measuring m/c(C)	Adjustable screw(D)	Height(E)	Centroid Rod(F)	Digital Screen(G)
Ease to use	0	+	+	+	0	-	+
Ease to handling	-	0	0	0	+	+	0
Readability of setting	0	-	0	0	0	0	0
Controlling height	-	0	0	0	0	0	-
Sum ‘+’s	0	1	1	1	1	1	1
Sum’0’s	2	2	3	3	2	2	2
Sum’-’s	2	1	0	0	0	1	1
Net score	-2	0	1	1	1	0	0
Rank	3	2	1	1	1	2	2
Continue?	No	Combine	Yes	Yes	Yes	Combine	Combine

Concept Screening

Step 4: Combine and improve the concepts

- Otherwise good concepts that are degraded by one bad feature?
- Combining two concepts?

Step 5: Selecting one or more concepts

- Selecting the promising concepts
- Concept number limited by resources

Step 6: Reflect on the results and the process

- Are everyone happy?
- Criterias and ratings are fine?

Concept Scoring

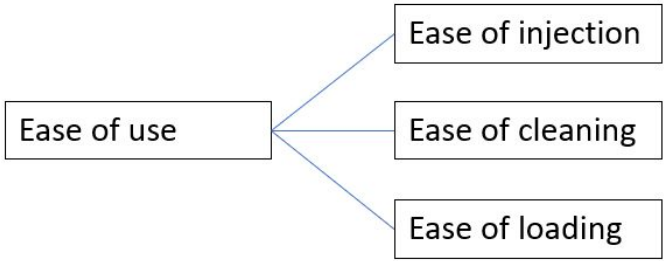
- Used to better differentiate competing concepts
- The relative importance of each selection criteria is determined
- A matrix can be used also in this stage as an aid

Concept Scoring

Step 1: Matrix for concept scoring

-Usually more detailed criteria and concepts than in the screening phase

-For example:



-Each criteria is given some weighted value

Concept Scoring

Step 2:

- Each concept is rated

Step 3:

- Based on the weights and rates, the weighted scores are calculated

Concept Scoring

Step 4:

- Concept improvement

Step 5:

- Concept selection

Step 6:

- Reflection of the results
- *“point of no return”*

Example pros/cons

+low cost

-stability (safety)

+stable

-higher wheel cost than 3 wheeler

+stable

+more friction = stops faster

-more friction = more fuel

+/- looks cool or not?

-Very high cost when changing wheels

Possible problems with these approaches?

Concept quality might suffer?

- Concept selection is based on criteria and customer needs.
- It assumes that criteria and customer needs can be evaluated independently.
- The sum of these criterion does not always capture the relationships between these criterions.

Is the selection criteria objective enough?

- Especially criterions related to the appearance.
- If the criterias are bad the results are bad.

Refining or combining concepts before discarding them?

- It is important to notes of the features and think of ways how the could be improved to make the concept better overall.

How to take cost in to account?

- Cost, easiness of manufacturing is important for the company producing the product as well as the customer.

Selecting simplified elements of a more complex concept?

- If all of the concepts share a simplified element.
- The selection of this element could be done separately and before.

Continuous concept selection throughout the development

- The concept selection methods are not only applicable to the early stages of product development.

Summary

Concept selection is crucial for product success and an important tool to think about how good the concept could be in reality and its business potential.

Concept selection can be done by structured methods or it can more intuitive

Even when using structured methods, the people in the team are in a important position. As they determine the weights and grades. They are also the ones that have to interpret the results as the highest score is not alway the best at least in the first iteration.

Questions?

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Sources

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- International Journal of Engineering and Technology (https://www.academia.edu/37074654/Identification_of_The_Concept_Selection_Method_for_Product_Design_and_Development_in_The_Manufacturing_Industry) Accessed on 18.09.2022