Testing the improved PAS methodology
Implementation of a search algorithm
Alignment in CREM

Large multinationals

Vast real estate portfolio’s

Corporate Real Estate Management (CREM)
Alignment in CREM

Real estate = Business activities
Alignment in CREM

Lease contracts 5 – 15 years

Business strategy max. 5 years
Alignment models in CREM

- Business strategy: Not transparent

Strategy alternatives:
- A
- B
- C

No structure selection best alternative
Relevance of research

- Improved decision-making
- Improved alignment
- More added value
- Increased prosperity

Preference-based Accommodation Strategy procedure as a solution to the model issues
PAS procedure
Imaginary case Bakery Brown

- Aim: Spread specialty, sugar bread, across the entire country
- Originally from Balk
- Multiple locations
- Additional location
Step 1: Specify variables

Variables:
- Distance to Balk
- Rent / m2
- City population
- Preference for sweet bread types (% sales)
Step 2: Specify preferences

Preference rating vs. Physical value (City population)

- Preference rating: 77 at 22,000
- Preference rating: 62 at 28,500
- Preference rating: 0 at 10,000
- Preference rating: 100 at 50,000
Step 3: Assign weights

- Popularity of sweet bread types: 37.5%
- Rent/m2: 25%
- Population city: 12.5%
- Distance to Balk: 25%
Step 4: Determine design constraints

**Constraints:**
- 3 regions covered
- 5 locations total
- Balk always included

One location in the north of the Netherlands
One location in the middle of the Netherlands
One location in the south of the Netherlands
### Step 5: Design alternatives

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### Step 6: Select the best alternative

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The best alternative is Alternative_02 with a preference rating of 62.
Iterative process

1) Specify criteria
2) Specify preferences
3) Assign weights
4) Determine design constraints
5) Design alternatives
6) Select the best alternative

Iteration: Adapt input
Iteration: Design alternatives
Added value of the PAS

- Structure & transparency
- Combine qualitative & quantitative
- Goal oriented
- Provides structure & transparency
Previous PAS research

Step 1 → Iteration → Step 2 → Step 3 → Step 4 → Step 5 → Step 6
Problem definition
Search algorithm

Model

Algorithm

Optimum portfolio alternative
Research question

“How could an improved PAS be developed in such a way that the outcome of the algorithm closely reflects the stakeholders’ preferences and what insights do a test and evaluation in practice provide?”
Research structure

1. Theoretical determinants for successful DSS implementation
2. Improved PAS procedure
3. Pilot study evaluation

PAS procedure
- Input
- Self Design
- Most preferred alternative

Improved PAS procedure
- Input
- Search algorithm
- Most preferred alternative

Building & testing a Matlab model
Successful implementation of DSS’s

1. Theoretical determinants for successful DSS implementation

2. Building & testing a Matlab model

3. Pilot study evaluation

PAS procedure

Input

Self Design

Most preferred alternative

Improved PAS procedure

Search algorithm

Input

Self Design

Most preferred alternative
Successful implementation of DSS’s

- PAS is a Decision Support System (DSS)
  - Helps making complex decisions
- Participation is key for acceptance
  - Preferences in model characteristics
  - Stakeholders understand model
- Trust: “expectations of tasks system will perform”
- Participation creates trust
  - Influence on characteristics
  - Development of expectations

Implement algorithm in addition to self-design in PAS

Step 6
Building & testing a Matlab model

1. Theoretical determinants for successful DSS implementation
2. Improved PAS procedure
   - Search algorithm
   - Most preferred alternative
3. Building & testing a Matlab model
   - Pilot study evaluation
Oracle’s current alignment process

1) Criteria + Weights
2) Locations
3) Rating locations
4) Location ranking

Line of Business (LOB)
Advanced Planning Team
Scorecard process
LOB picks location

Modelling & testing
Case original location study

- LOB 1; + 1 location
- 39 criteria; selection of 22 criteria
- 32 locations; 6 current, 26 alternatives

Aim pilot study:
- *Compare original : PAS ranking*
- *Design optimum portfolio LOB 1*
Model pilot study

Modelling & testing

Portfolio Name

Number of Selected Locations 7

Selected Locations

Criterion

Weight

Preference

Physical Value

Unit

Calc. Preference

Unselect All

Current Portfolio

Enable Number Of Locations Constraint

Location Dublin selected

Costs ( ) > Costs Current Portfolio ( ).

Region constraint met.

Save Portfolio

Overall Preference

62.12

Overall Preference Current Portfolio

59.93

Difference

2.20

Exit
Case original location study

- LOB 1; + 1 location
- 39 criteria; selection of 22 criteria
- 32 locations; 6 current, 26 alternatives

Aim pilot study:
- Compare original : PAS ranking
- Design optimum portfolio LOB 1
Imaginary case Bakery Brown
## Location study ranking

<table>
<thead>
<tr>
<th>Rank</th>
<th>Original study</th>
<th>PAS ranking</th>
<th>Preference rating</th>
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<tbody>
<tr>
<td>1</td>
<td>Amsterdam</td>
<td>Amsterdam</td>
<td>70,43</td>
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<tr>
<td>2</td>
<td>Balk*</td>
<td>Balk*</td>
<td>69,19</td>
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<tr>
<td>3</td>
<td>Gouda</td>
<td>Sneek*</td>
<td>66,41</td>
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<tr>
<td>4</td>
<td>Enschede</td>
<td><strong>Den Bosch</strong></td>
<td>65,99</td>
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<tr>
<td>5</td>
<td>Sneek*</td>
<td>Gouda</td>
<td>61,00</td>
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<td>6</td>
<td>Meppel</td>
<td>Meppel</td>
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<tr>
<td>7</td>
<td>Groningen*</td>
<td>Enschede</td>
<td>59,84</td>
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<td>8</td>
<td>Vlissingen</td>
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<td>9</td>
<td>Hoorn</td>
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<td>58,26</td>
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<td>10</td>
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<td>11</td>
<td><strong>Den Bosch</strong></td>
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<td>12</td>
<td>Maastricht</td>
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Calculating portfolio rating

<table>
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<tr>
<th>Criterion</th>
<th>Average physical value portfolio</th>
<th>Preference rating</th>
<th>Weighted average portfolio preference rating</th>
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<tbody>
<tr>
<td>Distance to Balk (km)</td>
<td>184</td>
<td>53</td>
<td>59</td>
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<tr>
<td>Rent /m2 (EUR)</td>
<td>220,-</td>
<td>38</td>
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<tr>
<td>Population city (＃)</td>
<td>28.500</td>
<td>57</td>
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<td>Popularity of sweet bread types (% sales)</td>
<td>23%</td>
<td>79</td>
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# Portfolio alternatives self-design

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Application of algorithm and brute force

Global optimum solution
Application of algorithm and brute force

Local optimum solution
Added value of brute force function

Global optimum solution
### Optimum portfolio alternative

<table>
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| Preference rating | 59 | 62 | 64 |

- **Accepted**
Conclusions Oracle pilot study

Overlap ranking
original: PAS

Optimum alternative accepted
Pilot study evaluation

PAS procedure

Input

Self Design

Most preferred alternative

Improved PAS procedure

Search algorithm

Input

Self Design

Most preferred alternative

Theoretical determinants for successful DSS implementation

Pilot study evaluation

Building & testing a Matlab model

1

2

3
Pilot study evaluation

- Participation & Involvement
- Stakeholder Interaction
- Iterative System Development
- Perceived Control
- Familiarise with System Backside
- Clear System Goal
- Model Complexity
- Calibrated Variables
- Perceived Usefulness
- Perceived Ease of Use
- Performance Reliability
- Justification of Outcome
- Acceptance Trust
- Model Purpose

Pilot study evaluation
User experience and attractive tool

Participative process

Positive experience & Attractive tool
Minor improvements

- Add criteria to make optimum portfolio reflect preferences better
- Explanation model backside
  - Understanding for reproduction model
- Manual for business users
  - To explain PAS steps and perspectives required
Conclusions & recommendations

Theoretical determinants for successful DSS implementation

Improved PAS procedure

Search algorithm

Most preferred alternative

PAS procedure

Input

Self Design

Most preferred alternative

Input

Self Design

Building & testing a Matlab model

Pilot study evaluation

1

2

3
Comparison with previous PAS pilots

Increasing complexity

Oracle pilot lower complexity

Self-design: 51
Brute force: 64
Global optimum from brute force
Comparison with scorecard process

- Stakeholder preferences incorporated
- Represents preferences better
- Goal oriented system
Improved PAS procedure, with algorithm in addition to user participation in self-design of alternatives and adaptation of model input, results in acceptance and trust.

Model outcomes closely reflect stakeholder preferences and users accept the global optimum alternative from the brute force function, as the final outcome of the pilot study.

Users felt involved in the process and accepted and trusted the model and brute force outcomes, also they would like to use the tool in their daily decision-making process.
Use improved PAS with the algorithm in addition to the iterative self-design process

Conduct pilot studies with the PAS in more complex case, nevertheless still use a less complex model to explain its workings

Research up to what complexity level the brute force function is applicable and use it to test the reliability of the search algorithm
Thank you for your attention