The assessment of floorcovering materials by end-consumers and sales representatives:

A comparative study of substitute competition

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Research area: Consumer studies - the competition between different construction materials - focusing on the end-user

BACKGROUND & PURPOSE
Knowledge of factors affecting the end-consumers choice of material for specific building purposes, i.e., the mechanisms of substitute competition, necessary to understand the competitive situation of wood, is limited.

A methodology allowing estimation of determinants of material preferences is called for.
Further, of interest to investigate whether or not sales representatives and end-consumers differ as to assessing decisive criteria and appraisal of different building application materials.

A qualitative data gathering approach is combined with a multivariate method of analysis, Partial Least Square Discriminant Analysis (PLS-DA).
Objective: to evaluate the potential of the methodology in extracting decisive criteria, and in making between sample comparisons (end-consumers and sales representatives)

Why floorcovering?
Influence and involvement of the end-consumer greater for design purposes than construction ditto + distinct material alternatives ⇒ floorcovering a good example of substitute competition

Materials and methods

Sample
Observational units: households actively engaged in re-flooring & sales rep's of floorcovering outlets

Procedure: Interviewing customers at outlets for different types of floorcovering
Interviewing sales representatives

Interviews
• End-consumers (67 interviews in all):
Open-ended questions:
1. Type of room(s) considered
2. Type of material(s) chosen/preferred
3. Reasons for choosing the material(s) in question

• Sales rep's (11 interviews in all):
Open-ended questions:
1. Materials preferred by customers in different types of rooms?
2. Why?
⇒
Two types of variables (potentially) affecting floorcovering material preferences:
(i) Attributes / criteria
(ii) Type of room considered for reflooring.

In vivo categories: categories / variables expressed by the respondents. Related words and expressions form instances of the same category / variable.
Binary variables (1 for presence, 0 for absence of the variables in question).
Results & Discussion

Methodological implications

Context crucial:
1. Usage context, mainly type of room, but also ownership of dwelling
2. Life situation (e.g., asthma, small children, pets) ⇒ perspective ⇒ attitude toward the different types of floorcovering:
   "Because of kids, easy maintenance and no dust (laminate)" - "Because of large dog and parquet has thin grooves, laminate is better".

The use of classical statistical methods of analysis is difficult because of:
1. many variables
2. potentially highly collinear variables / predictors

Multivariate projection methods (projecting observations onto a low-dimensional subspace) cope with many variables and few observations as well as highly collinear variables

In addition, multivariate projection methods, like Partial Least Square Discriminant Analysis, PLS-DA, are able to handle binary variables, necessary with open-ended questions & PLS-DA takes explicitly into account the class membership of observations

Empirical: PLS-DA

End-consumers: 19 binary variables regarding attributes / criteria.
The type of room considered for reflooring is represented by 9 binary variables.

The final PLS-DA was conducted with 4 classes / materials:
1. Textile flooring (carpet)
2. Laminated flooring (laminate)
3. Ceramic tiles (tiles)
4. Wooden flooring (= parquet & solid floorboards)

Few observations and no discernible difference in consumer assessment between the different types of wooden flooring (henceforth wood) => one class.

• Goodness of fit: $R^2 = 0.81$
• Goodness of prediction: $Q^2 = 0.77$ (> 0.5 regarded as good)

Sales representatives: 12 binary variables regarding attributes / criteria.
The type of room is represented by 7 binary variables.

The final PLS-DA was conducted with 4 classes/ materials:
1. Carpet
2. Laminate
3. Vinyl
4. Wood

• $R^2 = 0.77$
• $Q^2 = 0.60$
Table 1. VIP values: end-consumers

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIP</th>
<th>Variable</th>
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<tbody>
<tr>
<td>aesthetic2</td>
<td>1,99</td>
<td>&quot;Wood feeling&quot;</td>
<td>0,62</td>
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<td>warmth</td>
<td>1,80</td>
<td>good price</td>
<td>0,61</td>
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<td>fashion</td>
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<td>hardwearing</td>
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<td>foothold</td>
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<tr>
<td>&quot;a change&quot;</td>
<td>0,74</td>
<td>tradition</td>
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<tr>
<td>health</td>
<td>0,74</td>
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Table 2. VIP values: sales rep's

<table>
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<td>0,39</td>
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<tr>
<td>hygienic</td>
<td>0,94</td>
<td>DIY</td>
<td>0,39</td>
</tr>
</tbody>
</table>

VIP (Variable Influence on Projection) values: The influence on Y (matrix of responses) of every predictor in the model. Terms with a VIP > 1 are the most relevant for explaining material preferences. For discriminating between important and unimportant predictors, a cut-off around 0.7 to 0.8 is recommended (0.75 is adopted in this study).

Table 1 and Table 2: important criteria / attributes (VIP ≥ 0.75) are almost identical => end-consumers and sales representatives agree in their assessment of determinant attributes. However, the total number of attributes listed by end-consumers is higher, they include more subjective, non-functional, attributes: "a change", "Wood feeling", fashion, and tradition.

Regression coefficients are useful for evaluating which variables are decisive for the choice of a particular material. Type of room apparently affects the choice of floorcovering => PLS-DA with the more important attributes (VIP ≥ 0.75) and variables for the type of room considered was conducted.
The coefficient profiles of Figure 1 and 2 are quite similar =>
End-consumers and sales representatives show agreement in their appraisal of the different materials.

Conclusions

Methodological
1. By using PLS-DA it is possible to extract the most important predictors of material preferences, and to make between samples comparisons, from the answers to open-ended questions => parsimony in the analysis, as there is no need for a follow-up study with pre-structured response alternatives to quantify variables (e.g., using Likert scales).

2. End-consumers and sales representatives show agreement in their assessment of determinant attributes and appraisal of the different materials => would suffice to interview sales representatives only? However; obtaining in-depth understanding of underlying motives / perspectives necessitates interviews of end-consumers.

Empirical
1. Unlike the other materials, the decisive reasons for choosing wood are exclusively subjective and / or non-functional.

2. One of the apparently decisive reasons for choosing wood is its natural material property, natural. This quality of wood, being part of its intrinsic character, could provide an edge on laminate and should be stressed in promotion activities.