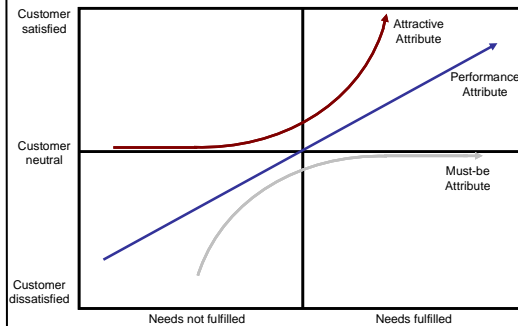




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Marketing Research & Consulting
Sensory Analysis



Application of the Kano model to Sensory Science - a new approach to develop the “ideal” fruit smoothie

Presentation at the 8th Pangborn Symposium
July, 29th 2009

Background / Research questions

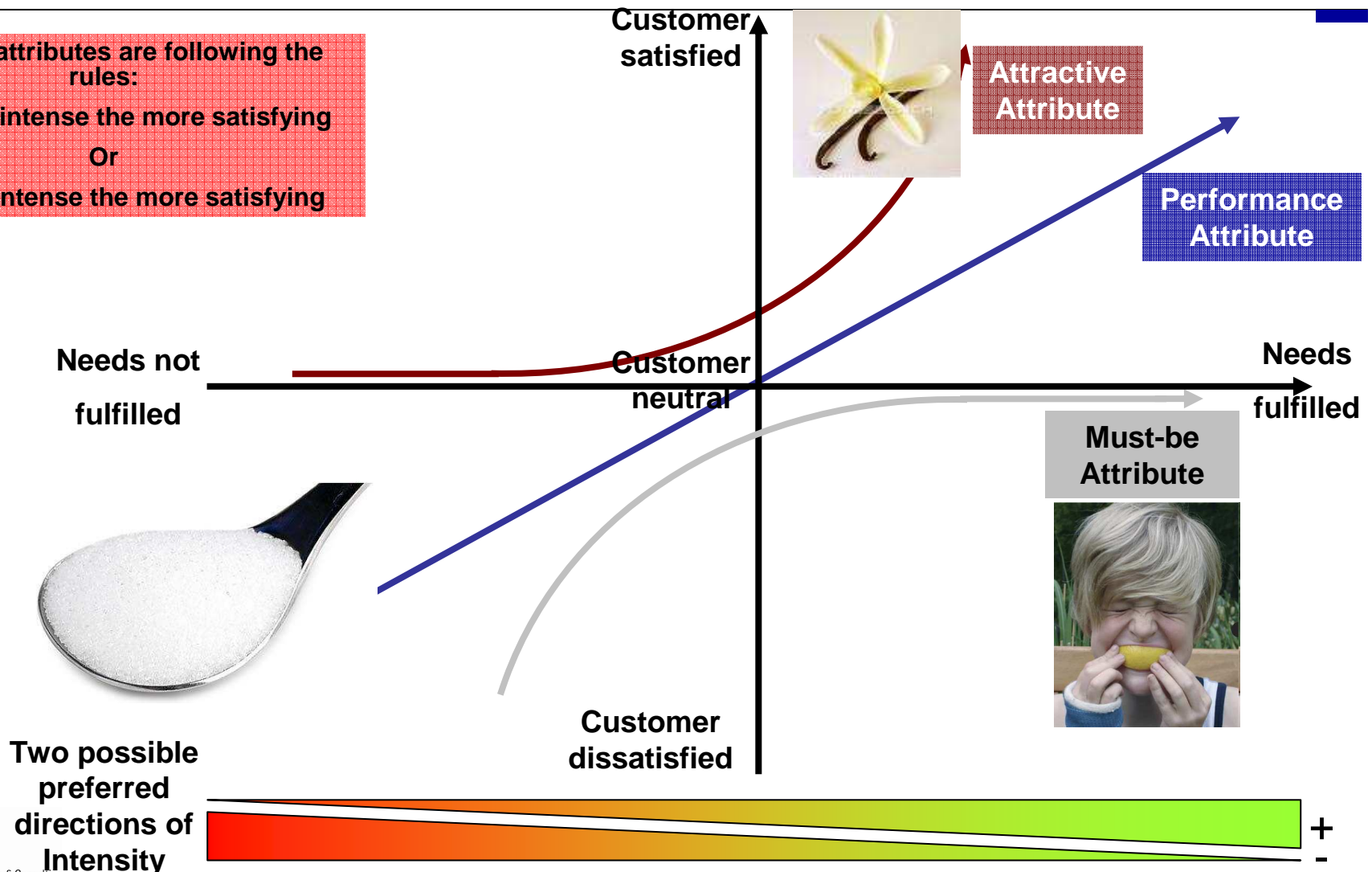
1. Illustration of the product evaluation by consumers
2. Illustration of the product perception by the descriptive panel
3. Data linkage, classification into Kano's typology

Management Summary

Background / Research questions

Kano's Model uses three categories of attributes: "Attractive Attributes", "Performance Attributes" and "Must-be Attributes".

All three attributes are following the rules:
 The more intense the more satisfying
 Or
 The less intense the more satisfying

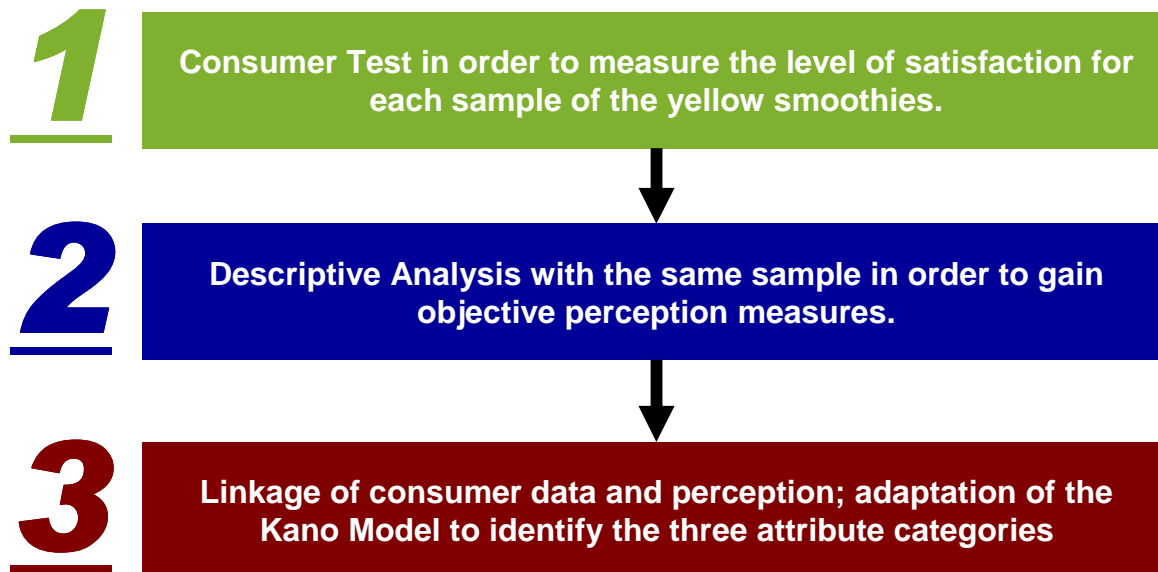


Background / Research questions

Two Reasons for modifying the application of Kano's Model

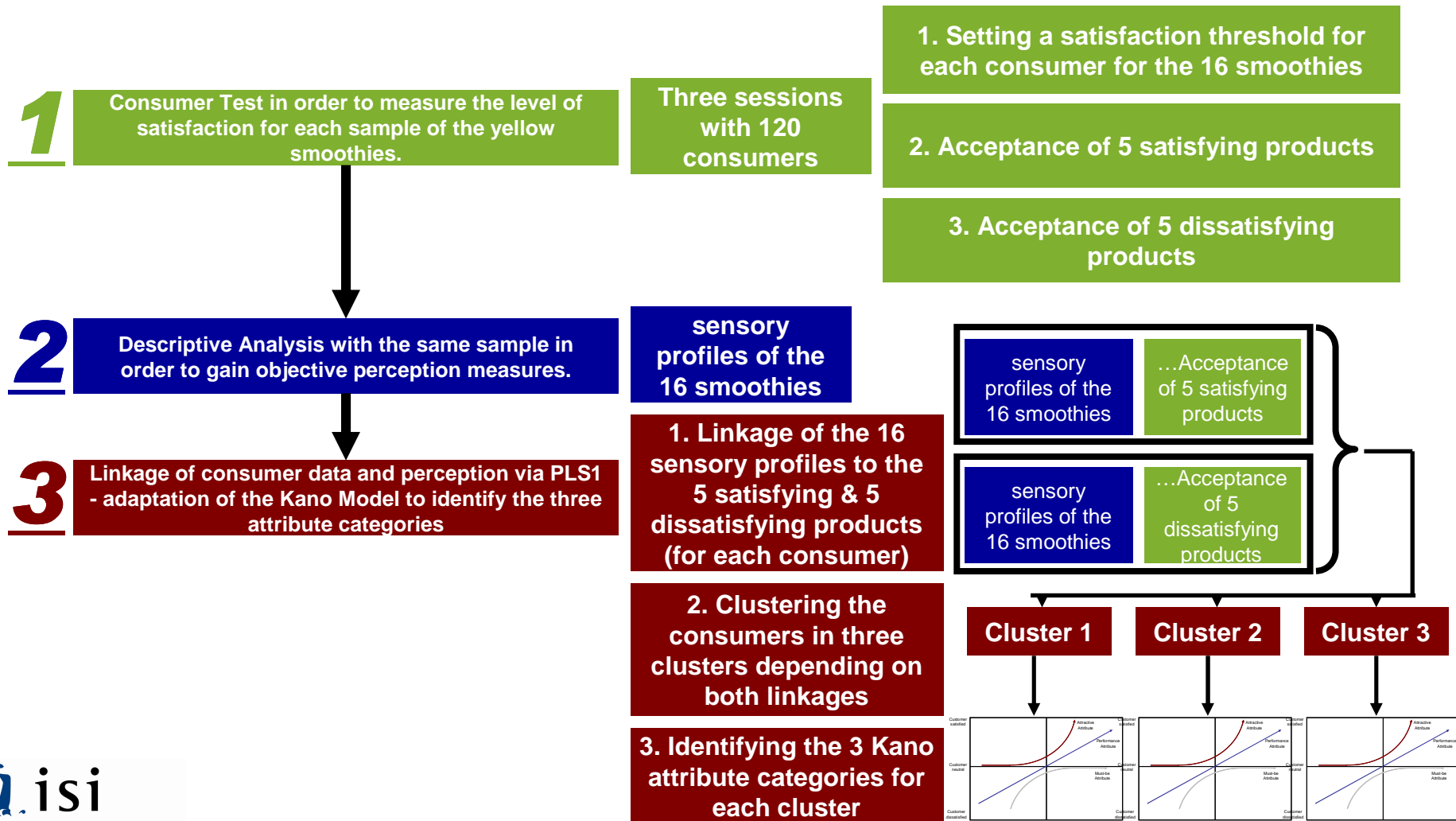
1. Consumers are not able to split the complex sensory perception food and beverage products into single product attributes in terms of answering the functional and dysfunctional question for every attribute
2. Untrained consumers cannot measure intensities for single attributes

=> **Solution to solve these problems:**



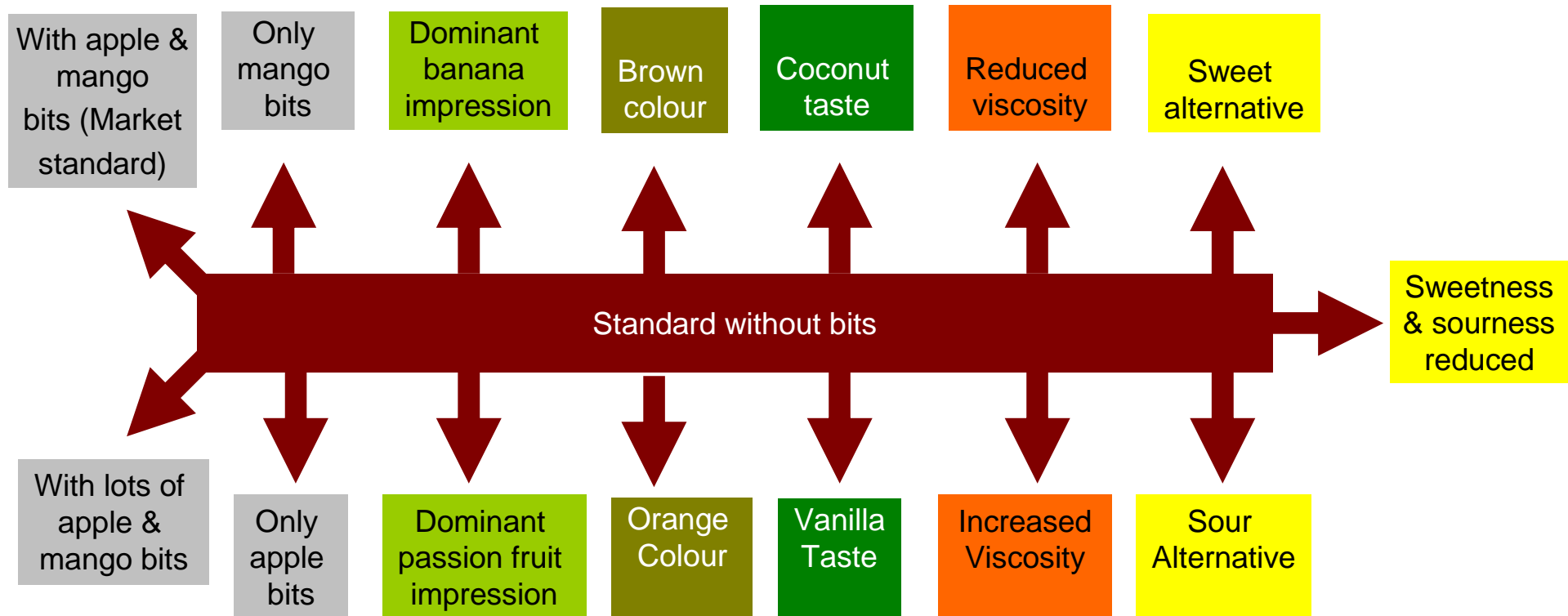
Background / Research questions

Structure of the research project



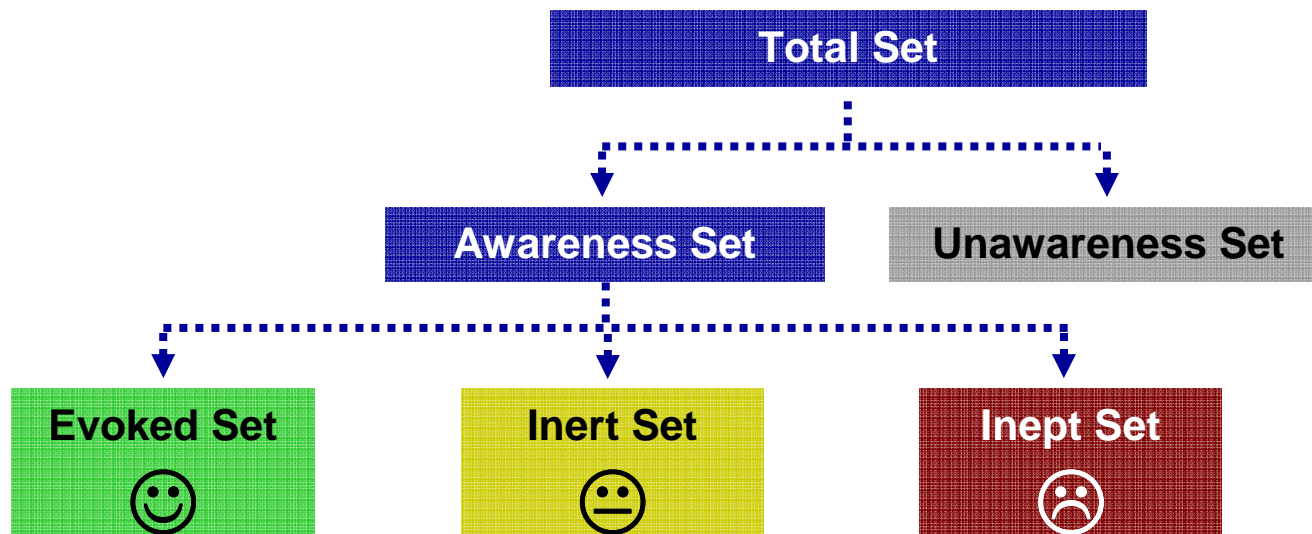
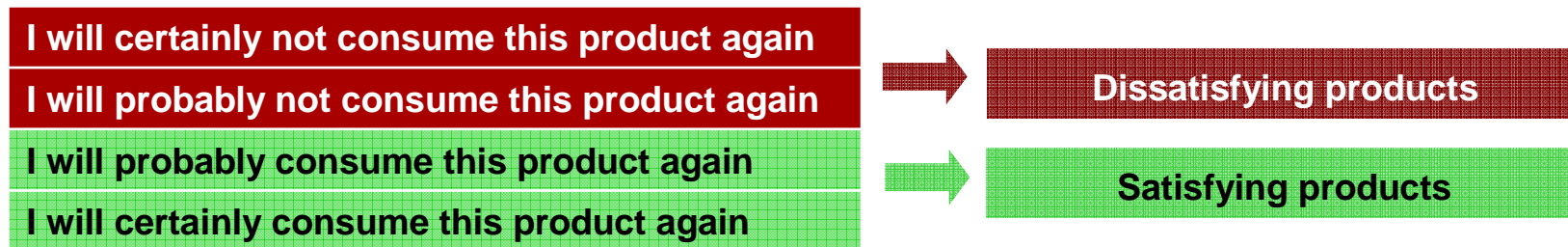
Background / Research questions

16 samples were provided for this research, all modifications of an existing market product.



1 Illustration of the product evaluation by consumers

Setting a satisfaction threshold based on the model of limited purchase decisions (Foscht/ Swoboda, 2004, S. 154)



1 Illustration of the product evaluation by consumers

1. Session: Each consumer tried all 16 smoothies and decided individually if he/she would consume them again or not.

Step 1: Unforced decision

This Smoothie / I...

- ...comes in consideration for me
- ...would consume this smoothie again
- ...persuades me
- ...would buy this smoothie again

I do not know, if this smoothie / I...

- ...comes in consideration for me
- ...consume this smoothie again
- ...persuades me
- ...would buy this smoothie in the future

This Smoothie/ I...

- ...does not come into consideration for me
- ...would not consume this smoothie again
- ...does not satisfy me
- ...would not buy this smoothie again

Step 2: Forced decision

This Smoothie / I...

- ...comes in consideration for me
- ...would consume this smoothie again
- ...persuades me
- ...would buy this smoothie again

This Smoothie/ I...

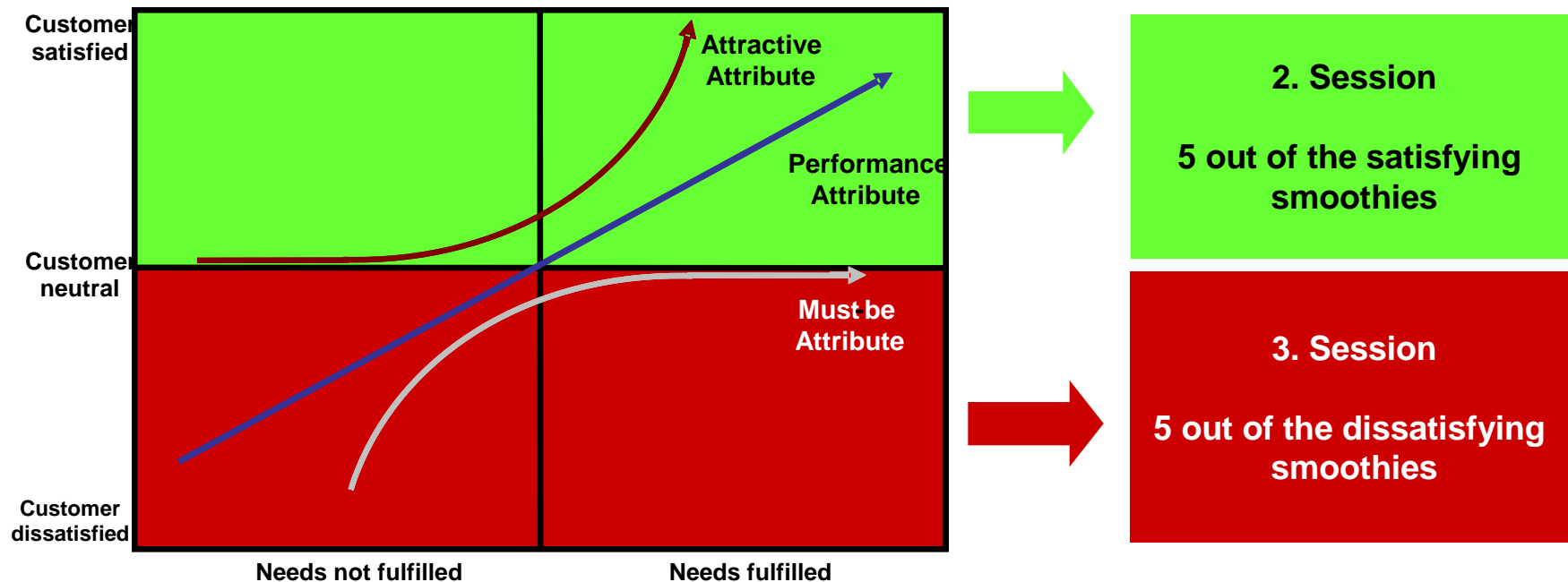
- ...does not come into consideration for me
- ...would not consume this smoothie again
- ...does not satisfy me
- ...would not buy this smoothie again

1 Illustration of the product evaluation by consumers



1 Illustration of the product evaluation by consumers

2. and 3. Session of the Consumer Test: Each consumer rated 5 out of his satisfying and 5 out of his dissatisfying smoothies on a 9-point hedonic scale



2. Illustration of the product perception by the descriptive panel

Approach

The smoothie samples have been evaluated by the Descriptive Panel

Assessment of objective perception data:

- The Descriptive Panel (10 panelists // two measurements; n=20) assessed all 16 smoothies that have been evaluated by the consumers.
- All samples have been served with a temperature of 7 to 8°C.
- For the assessment of the samples the panel uses 44 “descriptors” to describe all sensory dimensions (appearance, odor, taste, texture, mouth feeling).
- For 31 out of the 44 descriptors significant differences can be detected (p-value is ≤ 0.05)

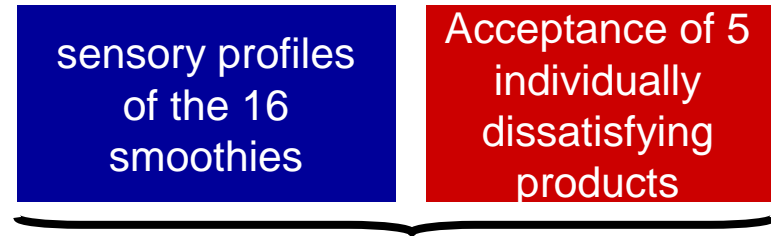
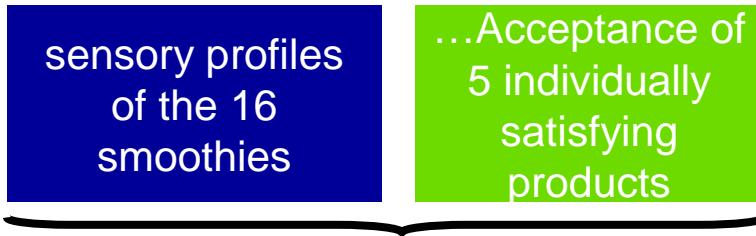
3. Data linkage, classification into Kano's typology

Segment-specific classification

3 Data linkage, classification into Kano's typology

For each consumer the influence coefficient on acceptance is estimated by using satisfying & dissatisfying acceptance scores and perception data for PLS 1

101
Consumers
x



	31 statistically significant Descriptors		
Consumer	yellow orange colour	grey brown tone	...
1			
2			
3			
...			

	31 statistically significant Descriptors		
Consumer	yellow orange colour	grey brown tone	...
1			
2			
3			
...			

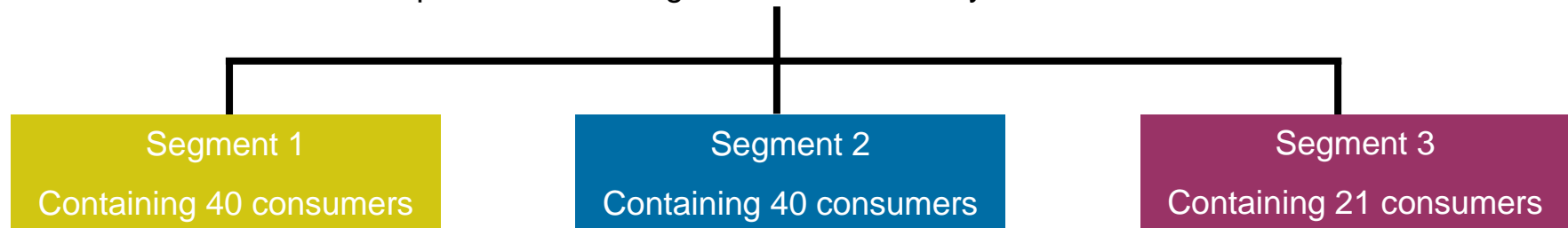
3 Data linkage, classification into Kano's typology

In terms of consumers heterogeneity 3 segments have been detected by an innovative segmentation approach using Wards-Hierarchical-Clustering

	31 statistically significant descriptors of satisfying products		
Consumer	yellow orange colour	grey brown tone	...
1			
2			
3			
...			

	31 statistically significant Descriptors of dissatisfying products		
Consumer	yellow orange colour	grey brown tone	...
1			
2			
3			
...			

Analysing Segments of Consumers by comparing the 62 acceptance influencing coefficients of every consumer



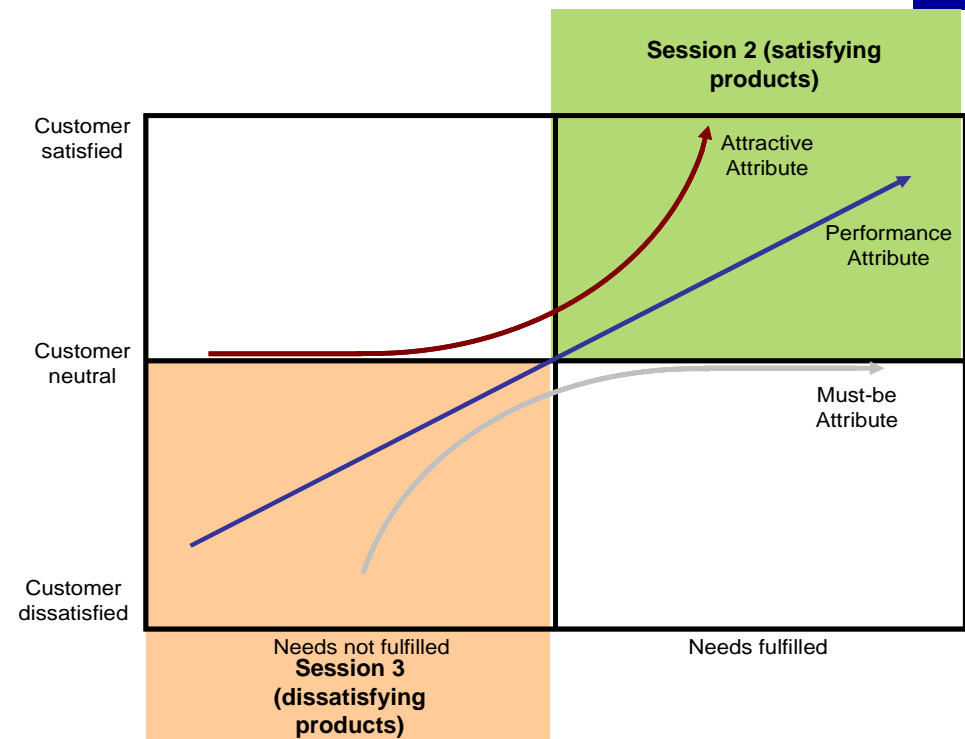
3 Data linkage, classification into Kano's typology

In the following, all “influential” descriptors were classified to the three Kano categories according to the following classification rules (Rivière et al., 2006, S. 576)

- Descriptors found “influential” **only in the 3rd session modelling** (dissatisfying products) are **must-be attributes**

- Descriptors found influential **only in the 2nd session modelling** (satisfying products) are **attractive attributes**

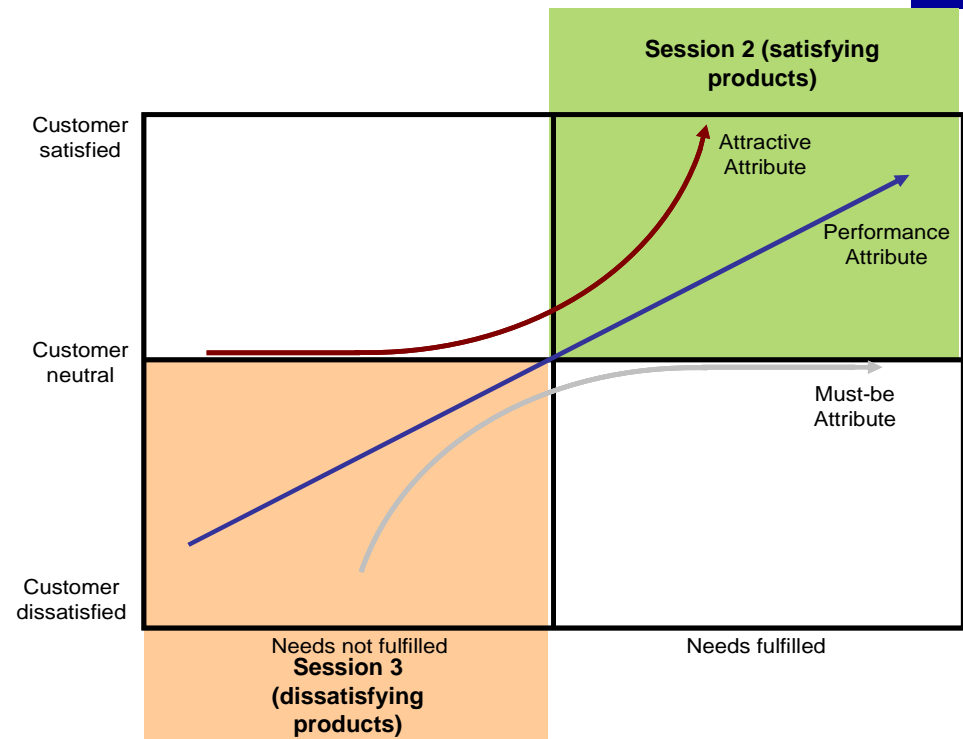
- Key drivers for **both sessions modelling** are **performance attributes**.



3 Data linkage, classification into Kano's typology

Consequences for optimizing the ideal smoothie

1. Optimize all must-be attributes to avoid dissatisfaction
2. Optimize all performance attributes to ensure satisfaction
3. Optimize all attractive attributes to arouse high satisfaction level and to distinguish from competitive products



3 Data linkage, classification into Kano's typology

Having classified the “influential” descriptors, the direction of influence is of critical importance.










	positive influence	negative influence
Must-be attribute	high perception of this sensory attribute leads to absence of consumer dissatisfaction and low perception of this sensory attribute leads to high consumer dissatisfaction	high perception of this sensory attribute leads to high consumer dissatisfaction and low perception of this sensory attribute leads to absence of consumer dissatisfaction
attractive attribute	high perception of this sensory attribute leads to high consumer satisfaction and low perception of this sensory attribute leads to absence of consumer satisfaction	high perception of this sensory attribute leads to absence of consumer satisfaction and low perception of this sensory attribute leads to high consumer satisfaction
performance attribute	the higher the perception of this sensory attribute the higher the consumers satisfaction and vice versa	the lower the perception of this sensory attribute the higher the consumer satisfaction and vice versa

Recommendations for product development	Increase the perception of this attribute	Decrease the perception of this attribute
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3 Data linkage, classification into Kano's typology

Segment 1










Containing 40 consumers

"influential" descriptor	Kano's attribute classification	
A_yellow/ orange	must-be attribute -	↓ 
sour	must-be attribute -	↓ 
O_sourly	must-be attribute -	
O_overall intensity	must-be attribute +	↓ 
O_apricot/ peach	must-be attribute -	
sweet	performance attribute +	↑ 
banana	performance attribute +	↑ 
lemon	performance attribute -	↓ 
M_slimy	attractive attribute +	
O_banana	attractive attribute +	↑ 
T_viscous	attractive attribute +	
A_viscous	attractive attribute +	↑ 
overall intensity	attractive attribute +	
apricot/ peach	attractive attribute +	↑ 

3 Data linkage, classification into Kano's typology

Segment 2

Containing 40 consumers

"influential" descriptor	Kano's attribute classification	
coconut	must-be attribute -	
T_viscous	must-be attribute -	
A_viscous	must-be attribute -	
M_slimy	must-be attribute -	
overall intensity	must-be attribute -	
sweet	performance attribute +	
A_grey-brown-tone	performance attribute -	
A_yellow/ orange	performance attribute -	
sour	attractive attribute -	
T_homogenous	attractive attribute +	
vanilla	attractive attribute +	
A_visible fruit bits	attractive attribute -	
O_vanilla	attractive attribute +	
T_puree level	attractive attribute +	

Management Summary

Innovativeness and advantages of this approach:

- **Classifying the products into satisfying and dissatisfying products for every consumer individually based on well accepted approach of limited purchase decisions (Foscht/Swoboda, 2004, S. 154)**
 - ⇒ **Identifying the influence of each descriptor for satisfying and dissatisfying products via PLS separately**
- **Hierarchical Clustering using the 62 regression coefficients of the satisfying and dissatisfying products for depending variables**
 - ⇒ **homogenous segments of consumers having comparable preferences in purpose of making conclusions for a group of consumers instead of identifying the Kano attributes for every consumer individually**
- **Using Classification Rules (Rivieré et al., 2006) to adapt Kano's Theory of Satisfaction**
 - ⇒ **Identifying the three Kano attributes must-be, performance and attractive attributes which provide more detailed information about the influence on satisfaction than only identifying the preference driving attributes without differentiation between satisfying and dissatisfying products**
 - ⇒ **interesting for food industries working on innovative food products not knowing which product attributes have to be fulfilled (must-be) and which product attributes are able to arouse high satisfaction levels (attractive attributes)**

Thank you for your attention!
Any questions?



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