



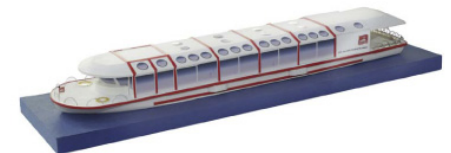
Market Potential of the ZEMSH₂IP-Technology – an indicative empirical study

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- Who we are – The Chair of Marketing and Innovation
- The ZEMSHI₂P: Vision and Mission of the Survey
- Approach of the Empirical Study and Indicative Results
- Lessons Learnt and Future Concept



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ZERO EMISSION SHIPS

Chair of Marketing & Innovation

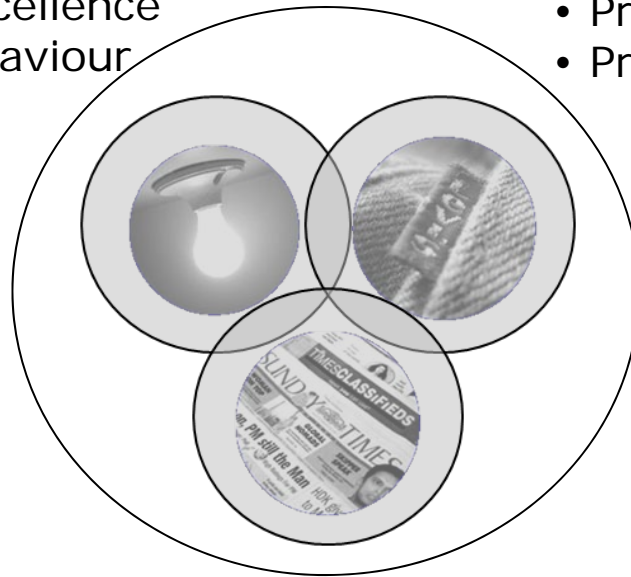
Prof. Thorsten Teichert

- Strategic Leadership
- Operational Excellence
- Innovation behaviour

Chair of Marketing & Brands

Prof. Henrik Sattler

- Brand Management
- Price Management
- Preference Measurement



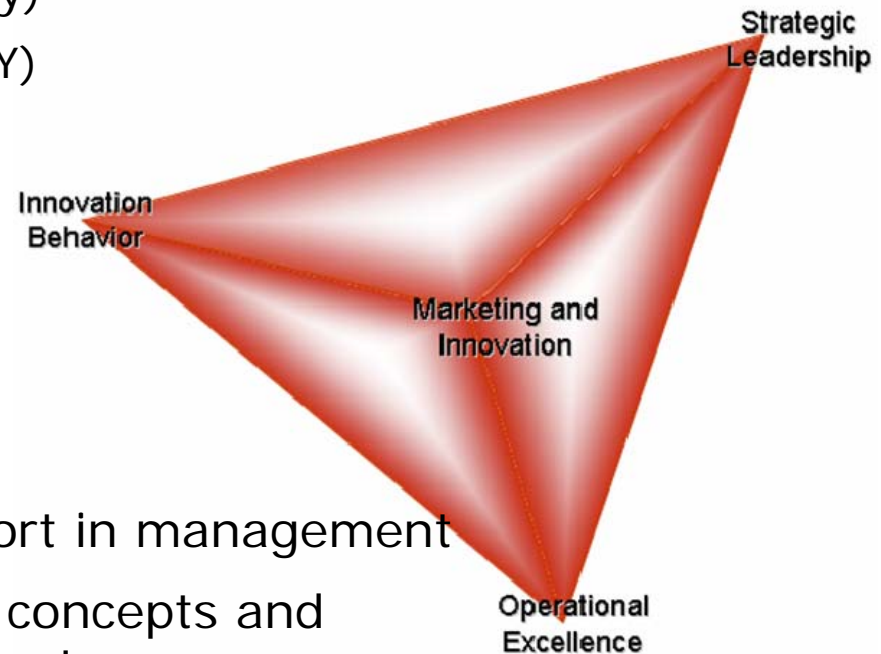
Chair of Marketing & Media Management

Prof. Michel Clement

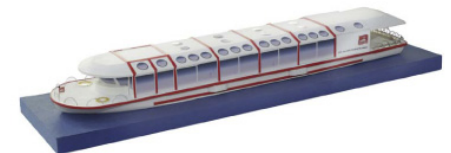
- Media Management
- Electronic Commerce
- Interactive and New Media



- International orientation
- Cooperation with prominent research institutes:
 - ▶ Center of Studies of Choice (Sydney)
 - ▶ Stevens Institute of Technology (NY)
 - ▶ Harvard Business School (Boston)
 - ▶ School of Management (University of London)
 - ▶ Institute for Technology (University of Cambridge)
 - ▶ HOSEI University (Tokyo)
- Precise solutions for decision support in management
- Our research combines theoretical concepts and methods with real-world strategy and processes



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- Acceptance analysis of the fuel-cell technology from different point of views:
 - ▶ perception of the new technology by general public, users and operators: tourist attraction, environment-friendly transport...
 - ▶ customer satisfaction: comfort, design, price...
 - ▶ customers´ and operators´ attitude towards hydrogen technology: fear, doubt, conviction...
 - Analysis of the economic requirements for operating fuel-cell powered ships in other European cities
 - Transferability check referring requirements for dissemination (political, operator and R&D implications).
- Summarize lessons learnt, derive conclusions for dissemination and identify relevant marketing implications.

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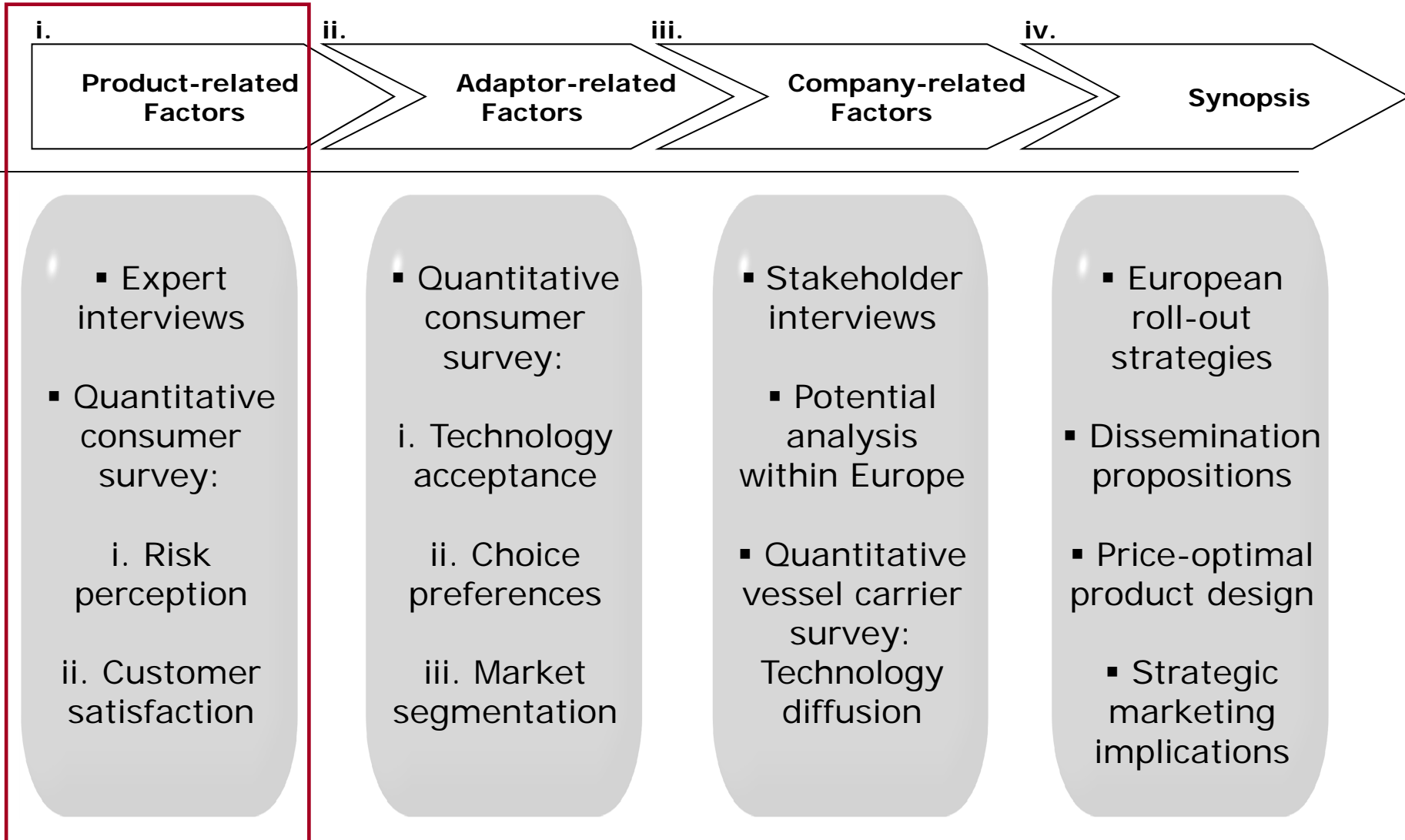
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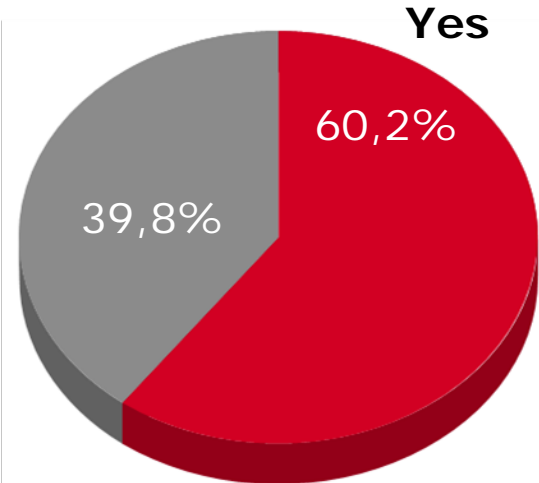


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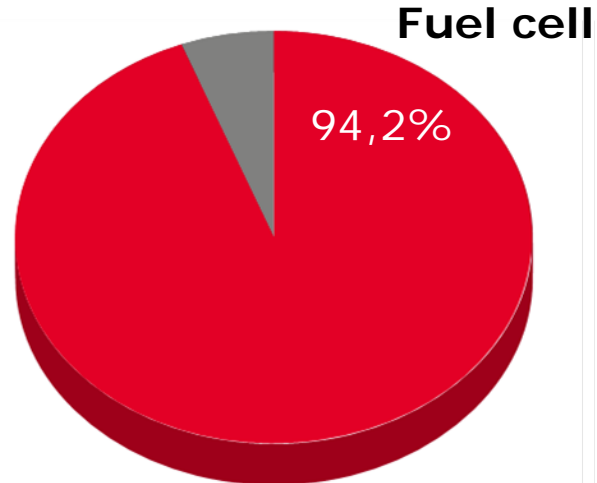


General knowledge about the ZEMSH₂IP

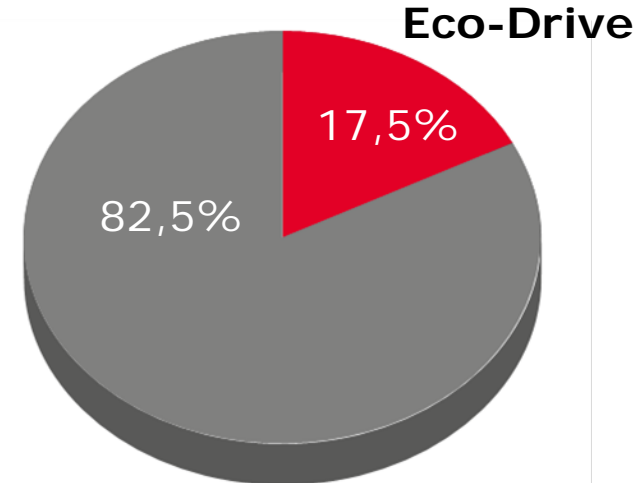
Have you heard about the ZEMSH₂IP before?



What kind of engine has the ZEMSH₂IP?



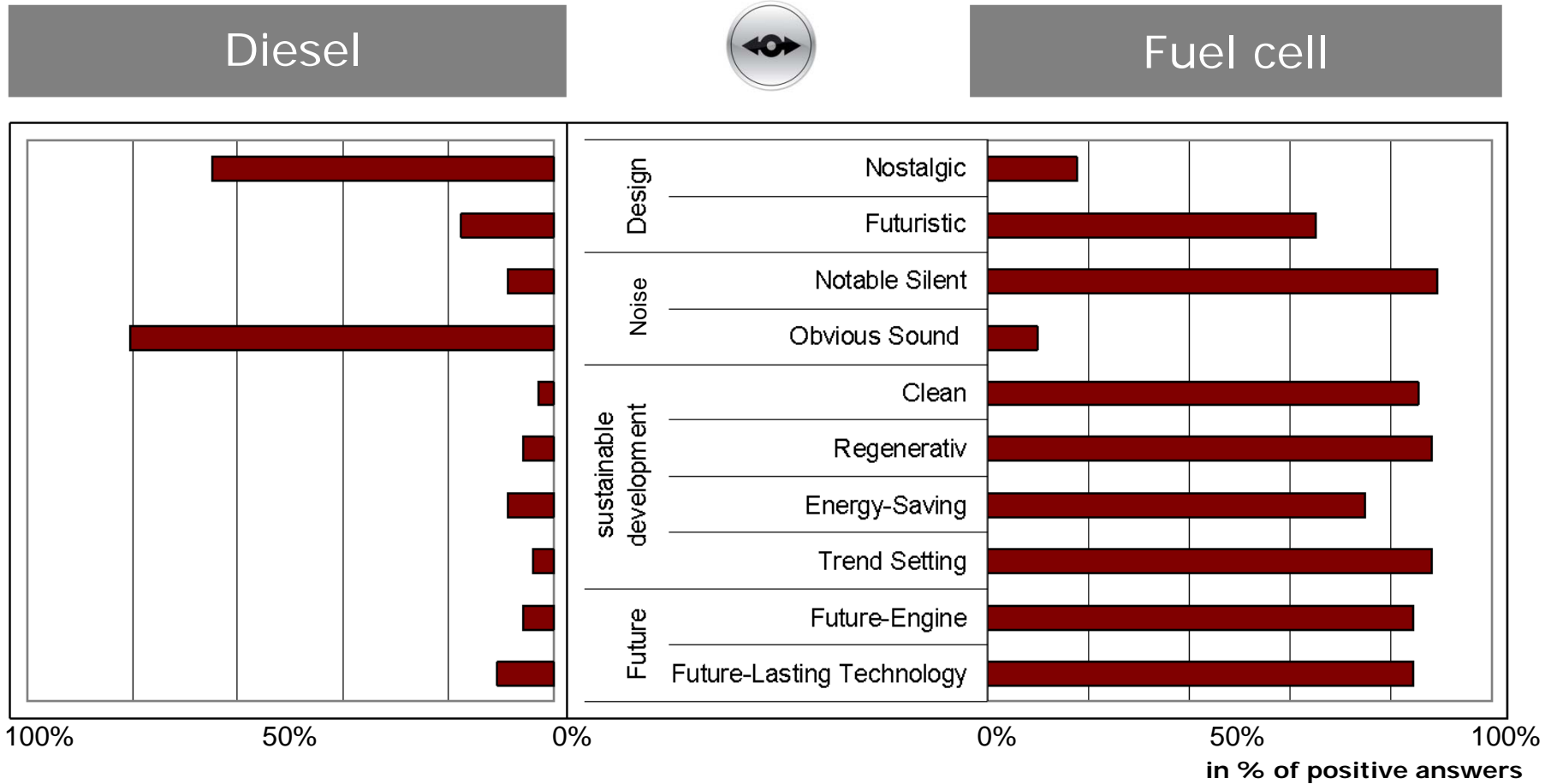
Why did you choose this ship for your trip?



■ Other

● The ZEMSH₂IP fuel cell technology is well-known in Hamburg: partly it is even an exclusive incentive for the Alster boat trip.

Comparison of consumers' inherent attribution between engine styles



● Subtyping of characteristics follows the motorization style. Fuel cell engines automatically lead to positive perceptions of other attributes.

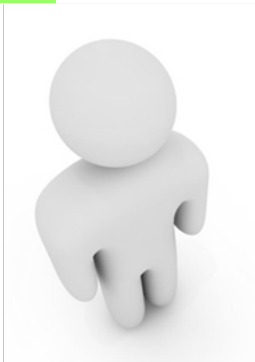


...Too many open questions.

...Risk of fire and explosion.

...Applicable for basic research but too expensive for a general service.

...Cells and batteries don't support long-distance trips (capacity).

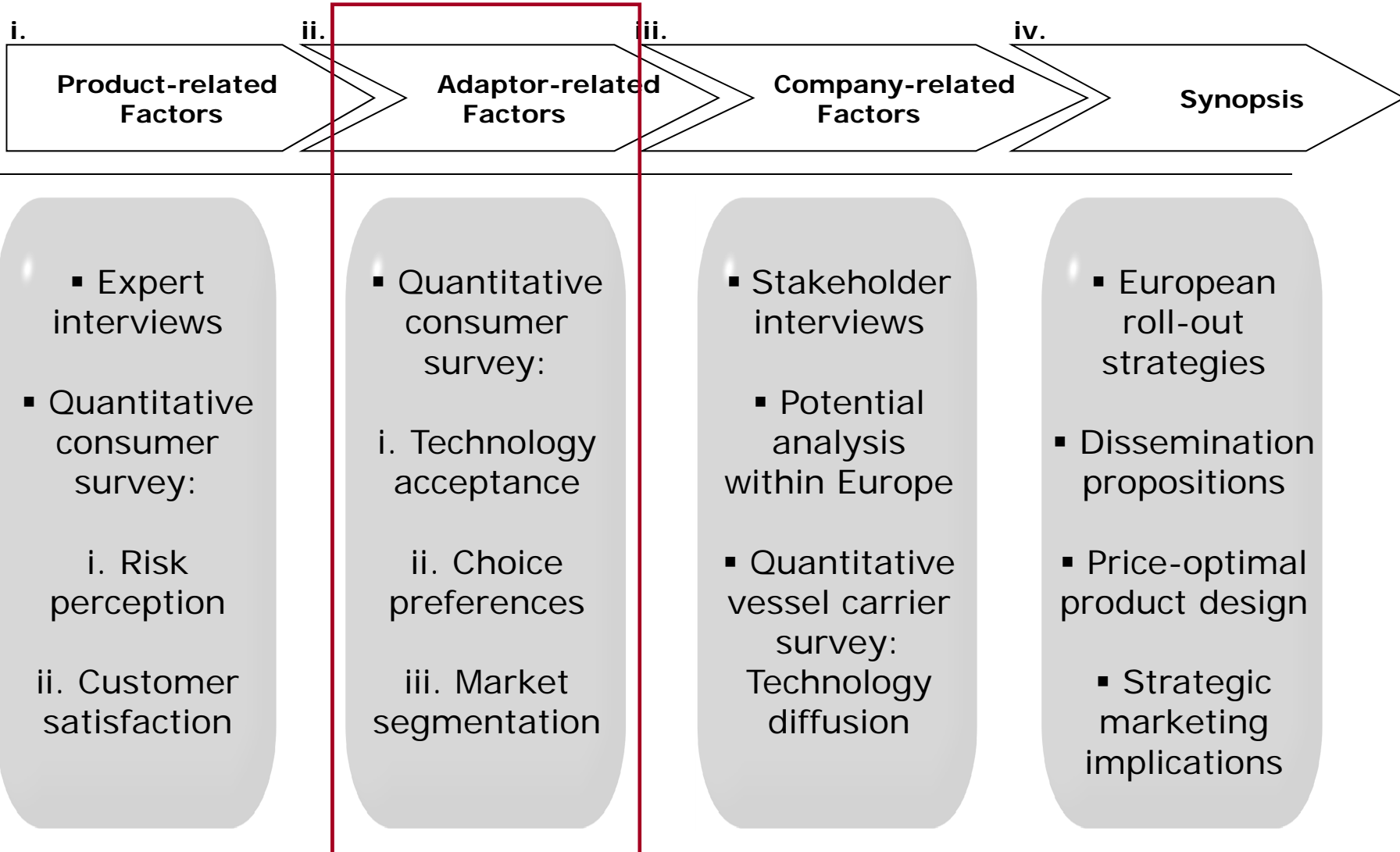


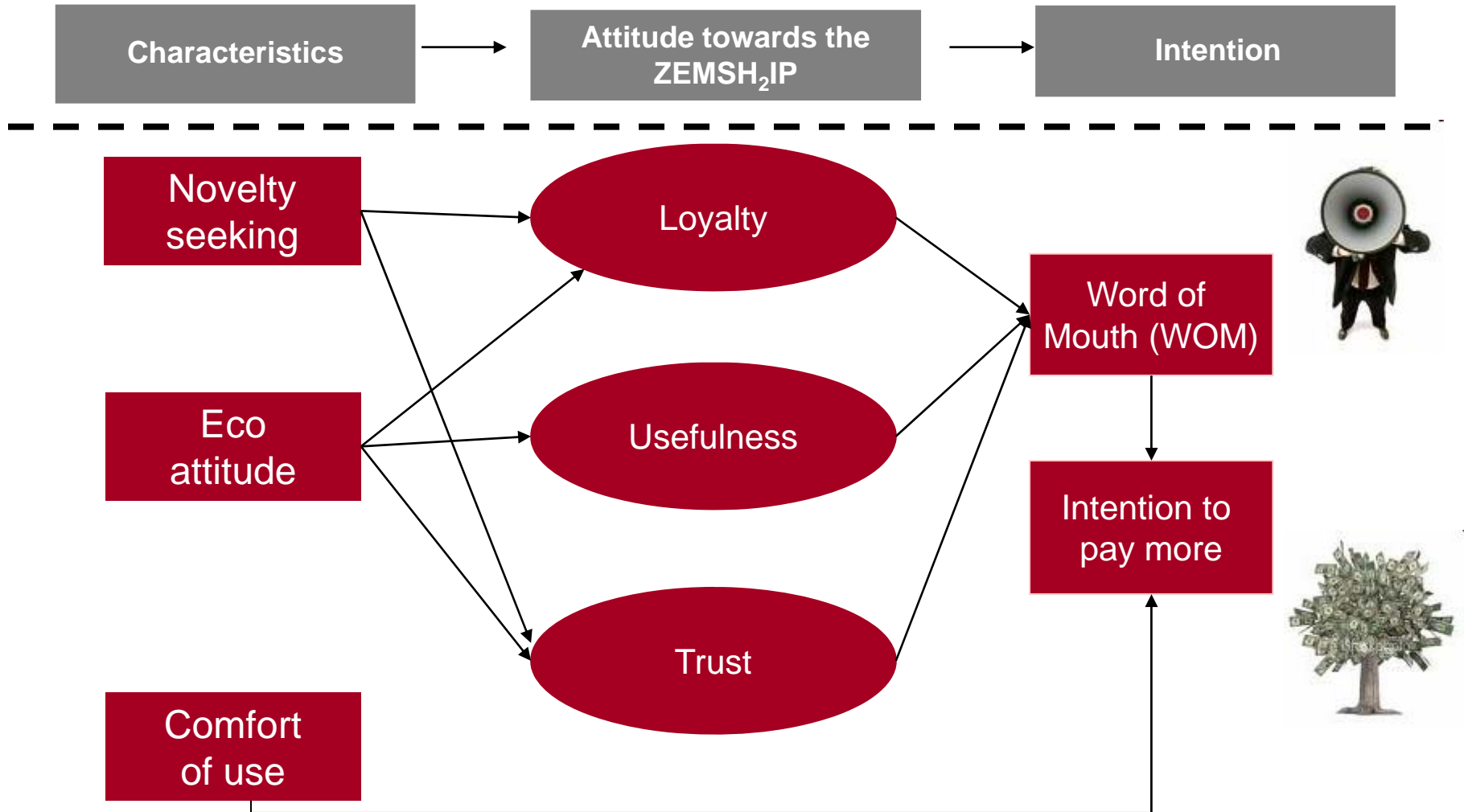
...Emission-free propulsion can play an important role in protecting the climate.

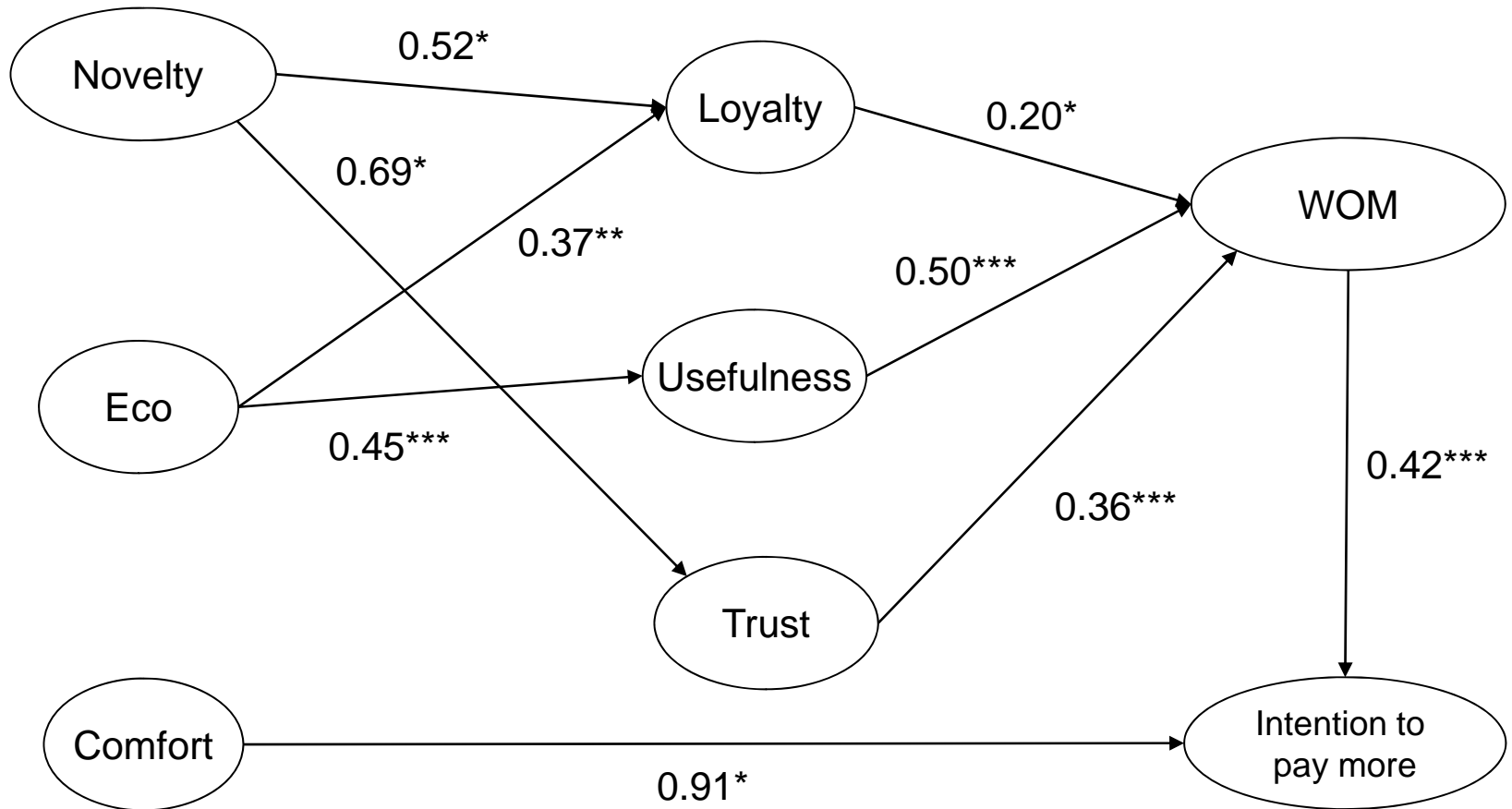
...Safeguarding the future.

...For a market-ready technology start-up financing for follow-on projects is very important.

...This innovation might cause a paradigmatic change in maritime propulsion technology.





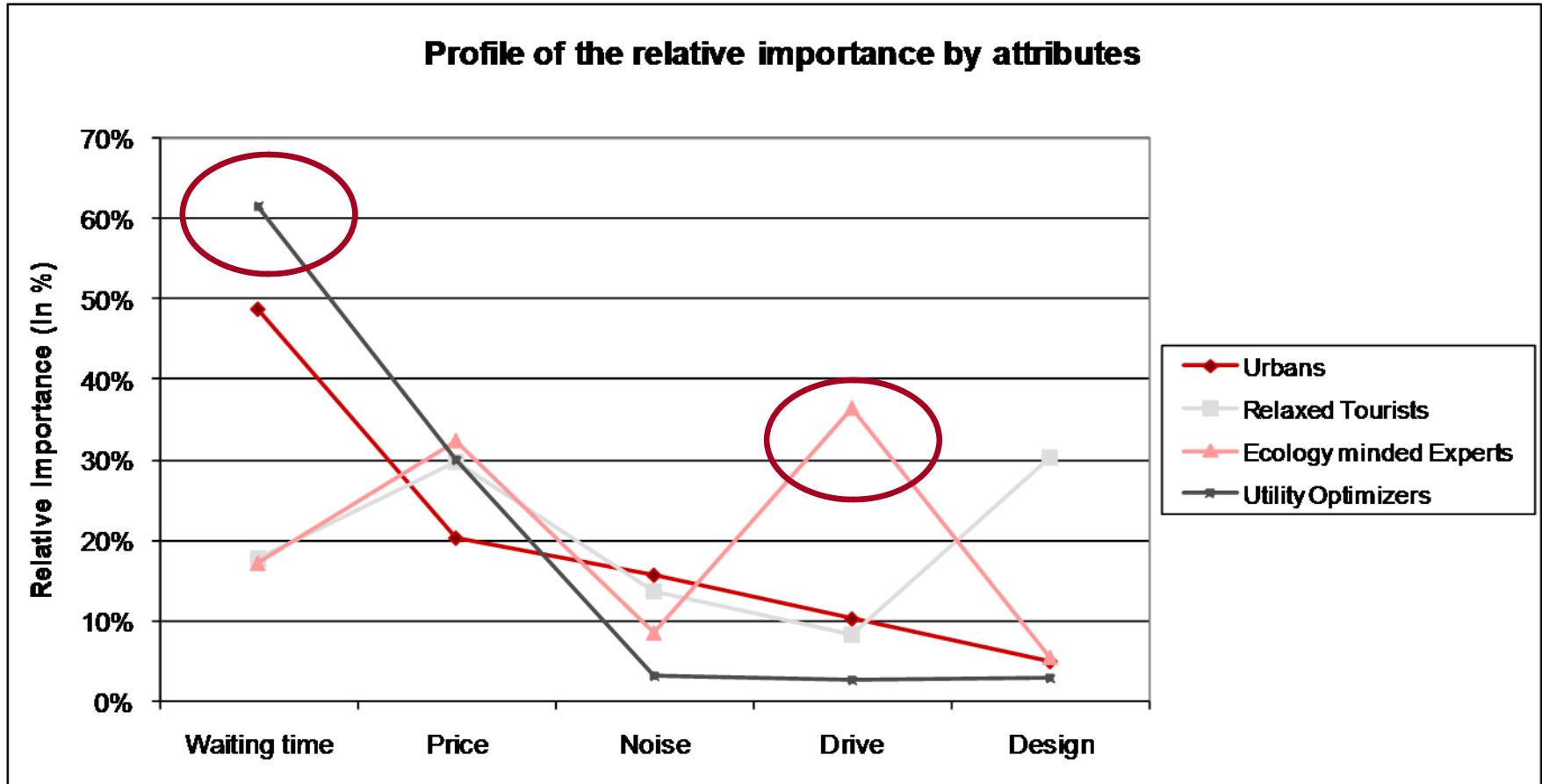


Significance of values:
 p<0.001 = ***; p<0.01 = **; p<0.1 = *

Structural Equation Model Fit Measures: Chi²=688; Df = CFI = .952; RMSEA = .048

■ Variables to optimize product features:

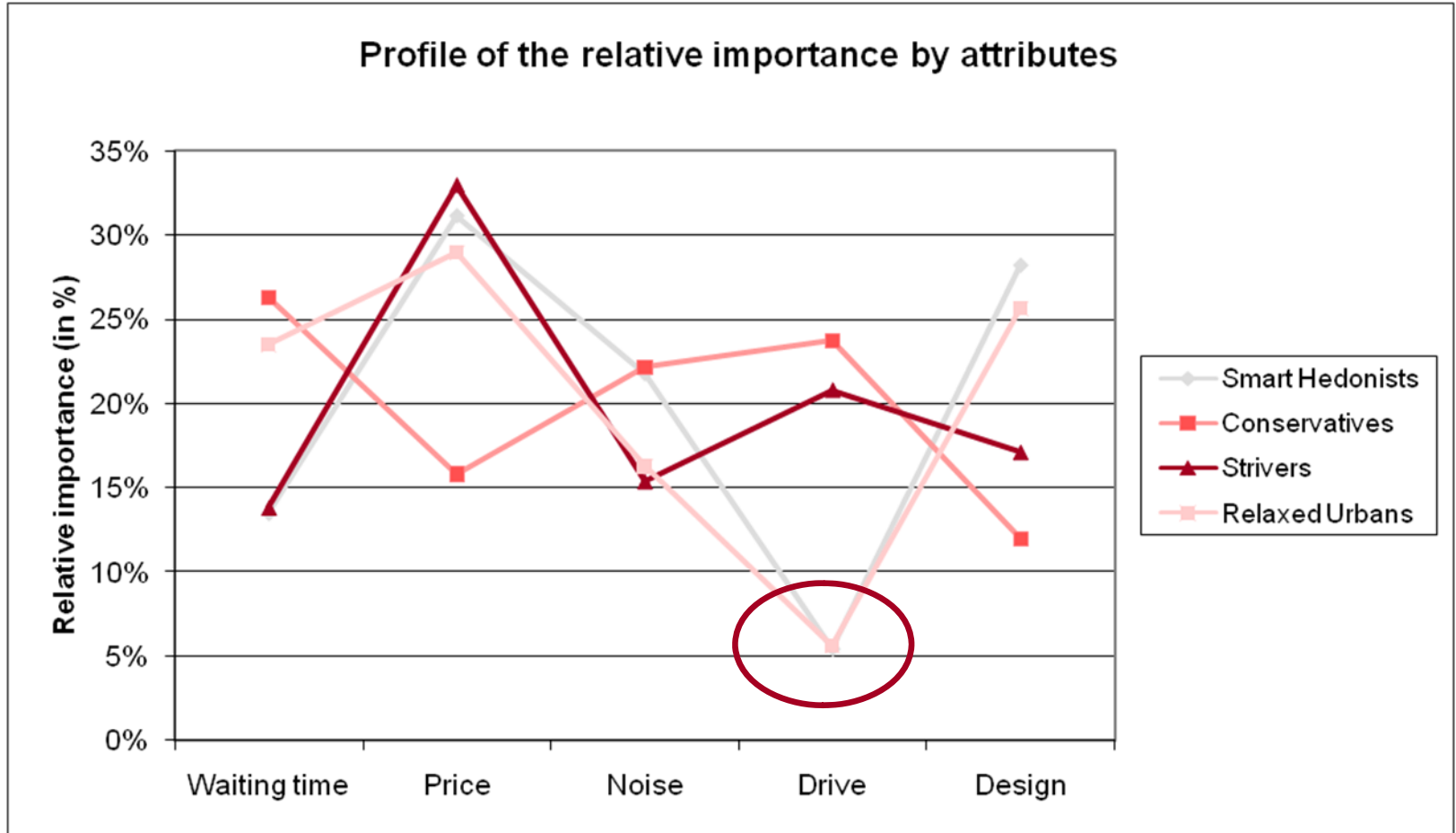
Attributes:	Waiting time	Price	Noise	Drive	Design
Characteristics of attributes:					
Characteristic A:	0 min.	€ 10.00	Noiseless	Diesel	Nostalgic
Characteristic B:	20 min.	€ 13.50	Buzzing	Hybrid	Established
Characteristic C:	40 min.	€ 17.00	Banging	Fuel cell	Innovative
Characteristic D:	60 min.	€ 20.50	n.a.	n.a.	n.a.



● Results show heterogeneous consumer preferences, therefore we need to evaluate the target groups.

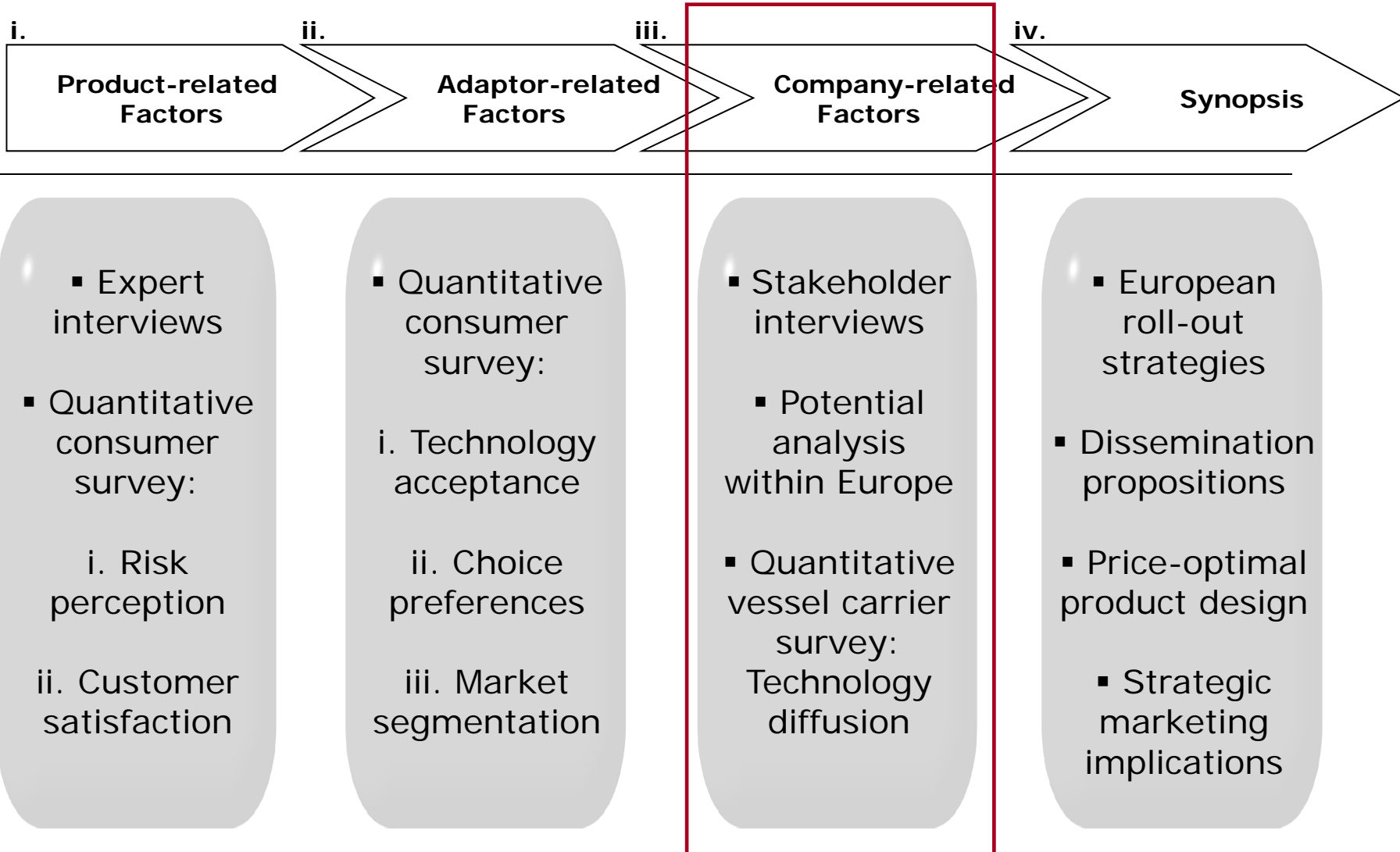


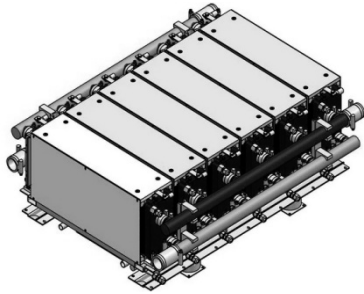
Segment	Description	Regional provenance	Target segment
The Urban Ecological Locals 38 (36.2%)	Price and waiting time are highly important, value of fuel cell is outstanding	Locals	YES
The Relaxed Tourists 34 (32.4%)	Are accepting higher prices, loving a nostalgic vessel with diesel engine, want to wait	Tourist	NO
The Ecologists 17 (16.2%)	High affinity towards ecological driving, same values for hybrid and fuel cell	Locals and tourists	YES
The Utility Optimizers 16 (15.2%)	High focus on waiting time and price	Tourists	NO



- Results show a different preference profile for the market in Bratislava: the relevance of "drive" is considerably lower...

Segment	Description	Regional provenance	Target segment
The Smart Hedonists 43 (43%)	Price sensitive, high design affinity, preference for low noise	Locals	YES
The Conservatives 20 (20%)	Do not like noiseless and fuel cell-driven vessels	Locals and tourists	NO
The Strivers 20 (20%)	Medium acceptance of fuel cell, no affinity for low noise	Locals	NO
The Relaxed Urbans 17 (17%)	High design affinity, relaxed, high preference for low noise	Locals	YES





Function

Touristical
customer
service

ZEMSH₂IP
operator

Engine-based
R&D

Provider of
day-to-day
motor operations

Hydrogen
delivery

Service station
optimization

Scientific
advisory /
Efficiency
measurement

Future scenario
deduction

Motives

Customer image
improvement

Corporate social
responsibility
initiative

1st Movers´
competitive
advantage

Reference project
for R&D

Usability tests,
image position as
1st Mover

Competence
extension within
hydrogen domain

Scientific
community
building

Knowledge
transfer &
extension

	ZEMSH₂IP Operator	Fuel Cell Operator	Filling Station Operator	Scientific Consulting
Future challenges	<ul style="list-style-type: none"> ▪ Innovation enabling legal structures (permission appliance) ▪ Fuel cell capacity optimization 	<ul style="list-style-type: none"> ▪ Long-lasting experience of fuel cell operations needed for serial-production (scale effects) 	<ul style="list-style-type: none"> ▪ Reduce legal efforts ▪ Keep hydrogen tax exemption ▪ Incremental optimization: scale-effect development 	<ul style="list-style-type: none"> ▪ Technological standard solutions are required ▪ Cost effectiveness via technology optimization
Success factors	<ul style="list-style-type: none"> ▪ Sustainable flexibility of SME participation 	<ul style="list-style-type: none"> ▪ Realizing economies of scale: market development through knowledge base extension 	<ul style="list-style-type: none"> ▪ Efficient strategic logistics ▪ Reduce maintenance intensity ▪ Political cluster management 	<ul style="list-style-type: none"> ▪ Hydrogen production supported by intelligent power supplies (usage of industrial surplus production)

Top-ten list for touristical fuel cell dissemination in European cities

Success factors for market diffusion
<i>Number of tourists</i>
<i>Attractiveness for tourists</i>
<i>Availability of hydrogen</i>
<i>Experience: projects with hydrogen</i>
<i>Commitment of politics</i>
<i>Economic development scheme</i>



No.	City	Score
1	London	89.2%
2	Amsterdam	82.0%
3	Hamburg	81.5%
4	Bodensee	78.4%
5	Berlin	75.3%
6	Paris	73.0%
7	Geneva	65.7%
8	Oslo	65.0%
9	Copenhagen	64.4%
10	Budapest	61.0%

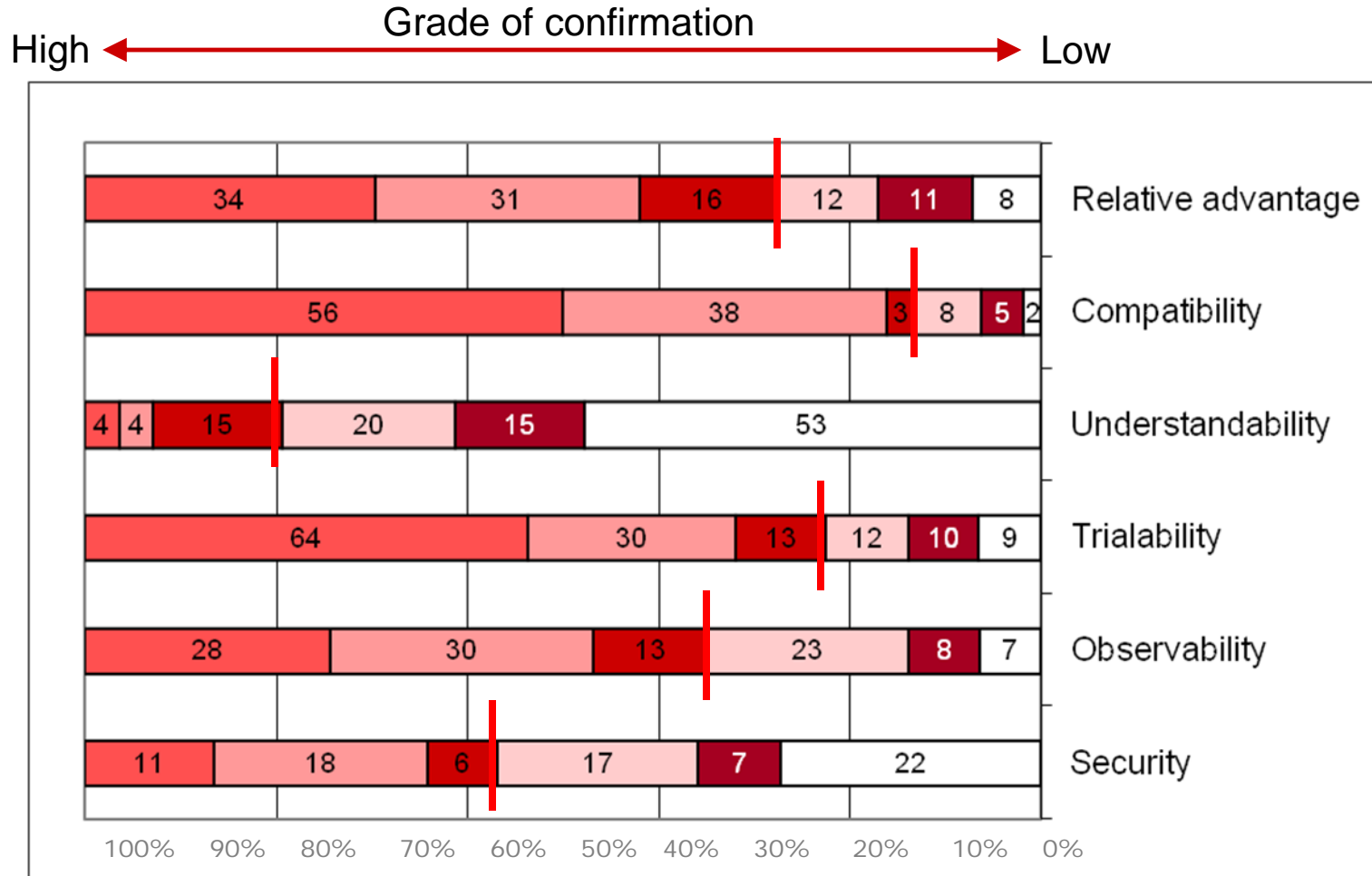
Ideas for roll-out strategies:

- Building cluster initiatives of vessel operator and industry
- Activities from local tourism federation
- Direct and indirect governmental funding
- Building scientific excellence centres

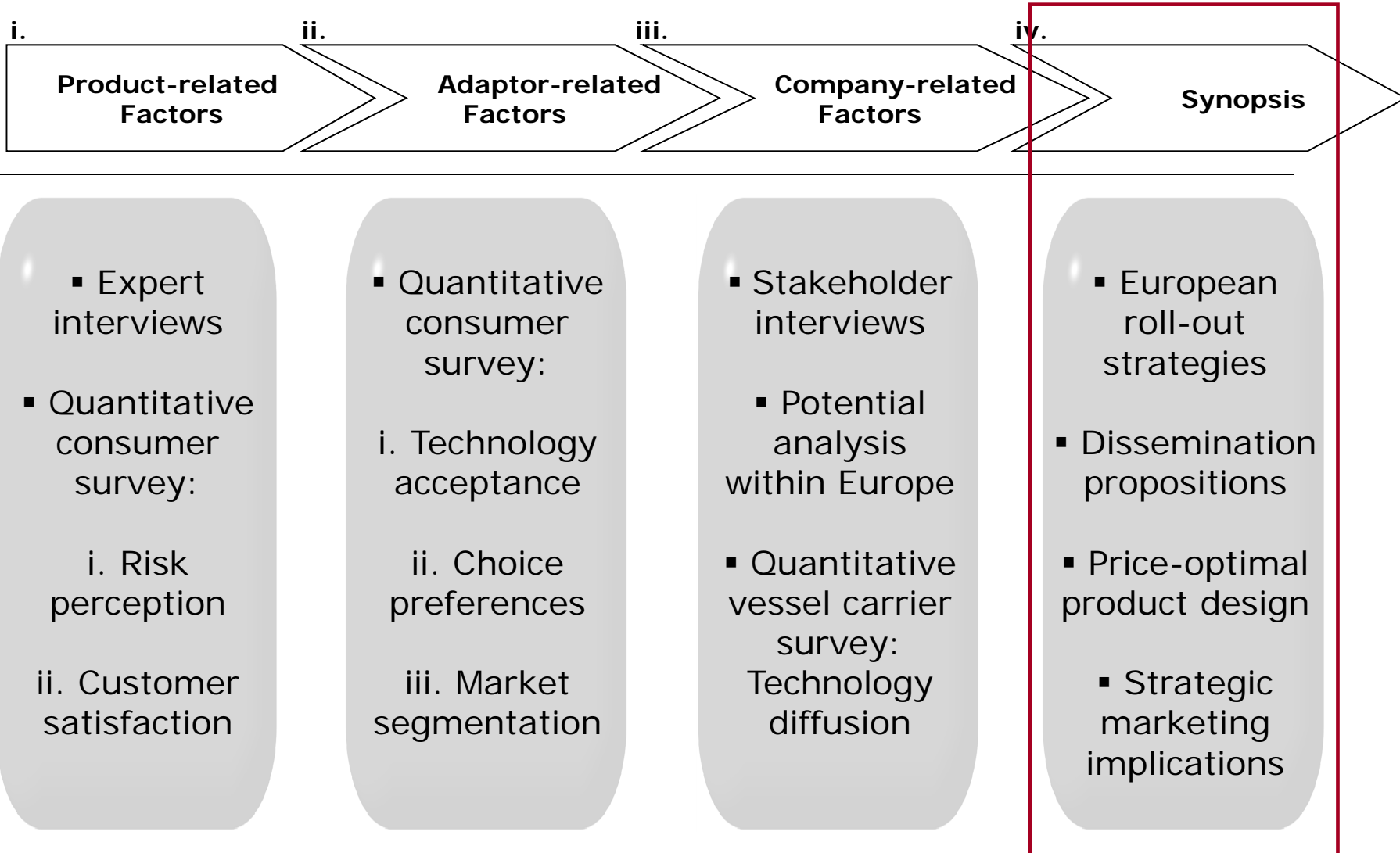
(Indicative results from a five-factor evaluation by 50 regions in Europe.)

● Today there are only a few but best-in-class cities for dissemination.

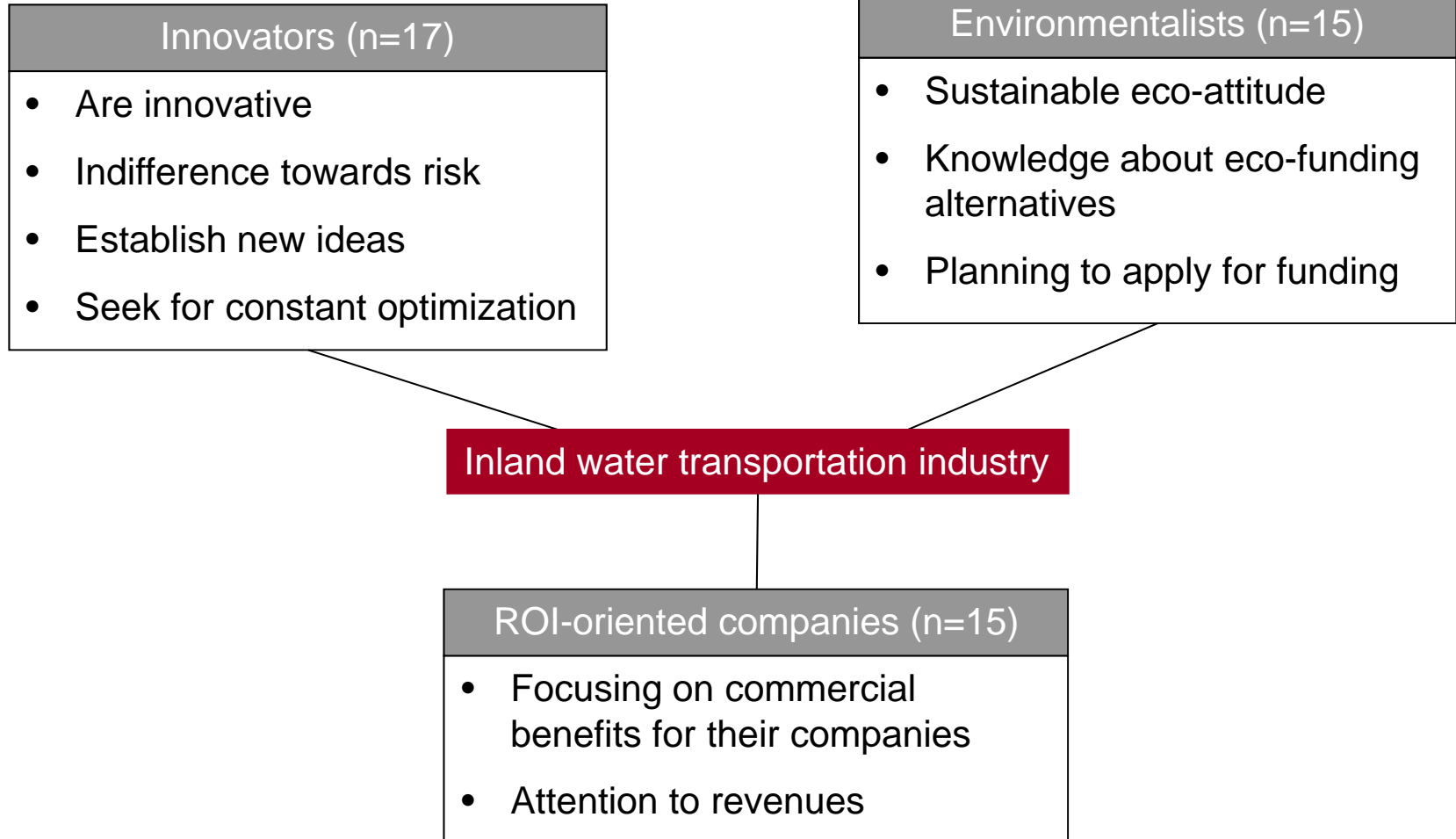
Answering behaviour in aggregated dataset



- Inland water transportation organizations show a high adoption propensity. Furthermore a high risk perception as well as a low understanding is observable.



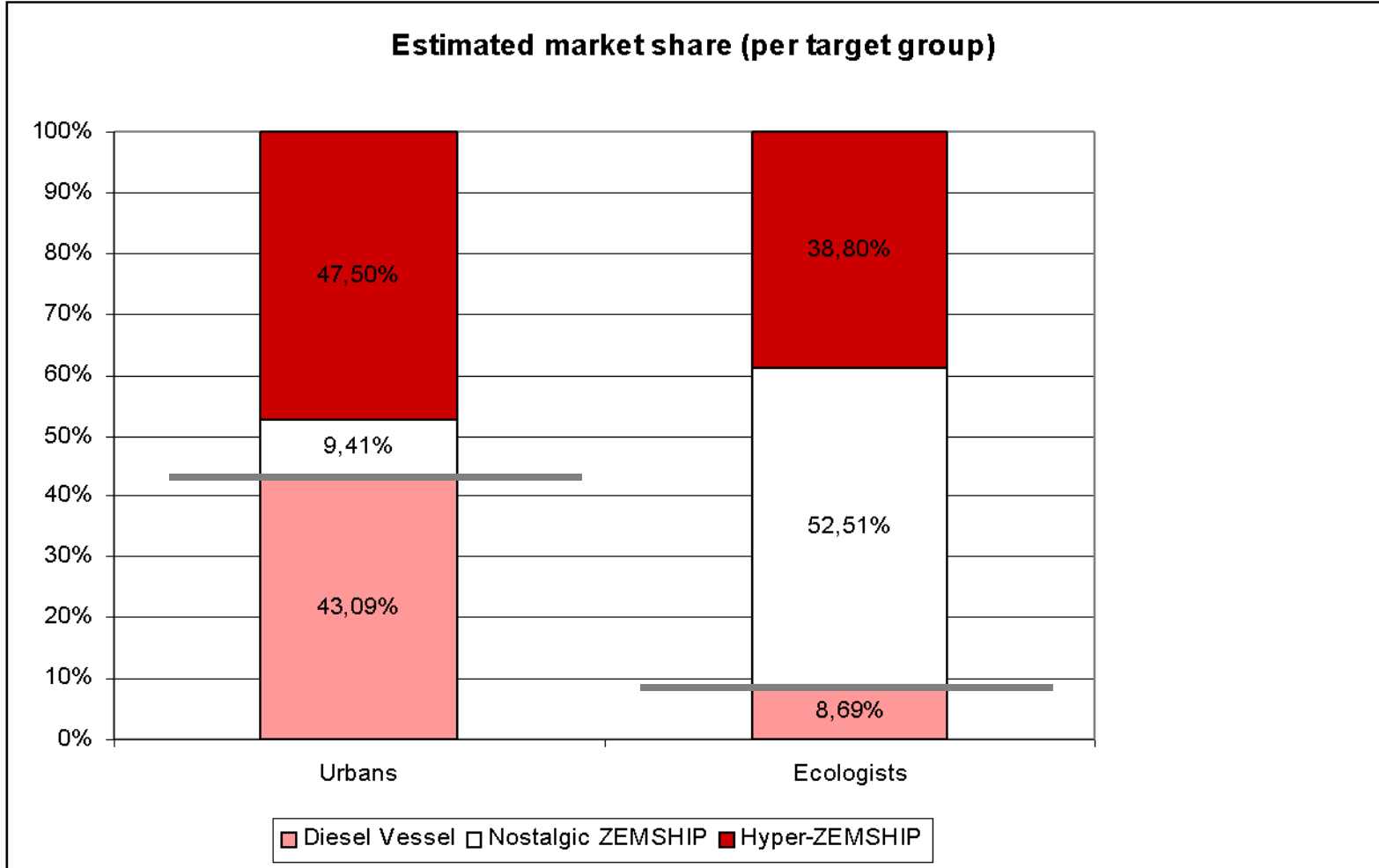
We identified three touristical vessel operators target groups



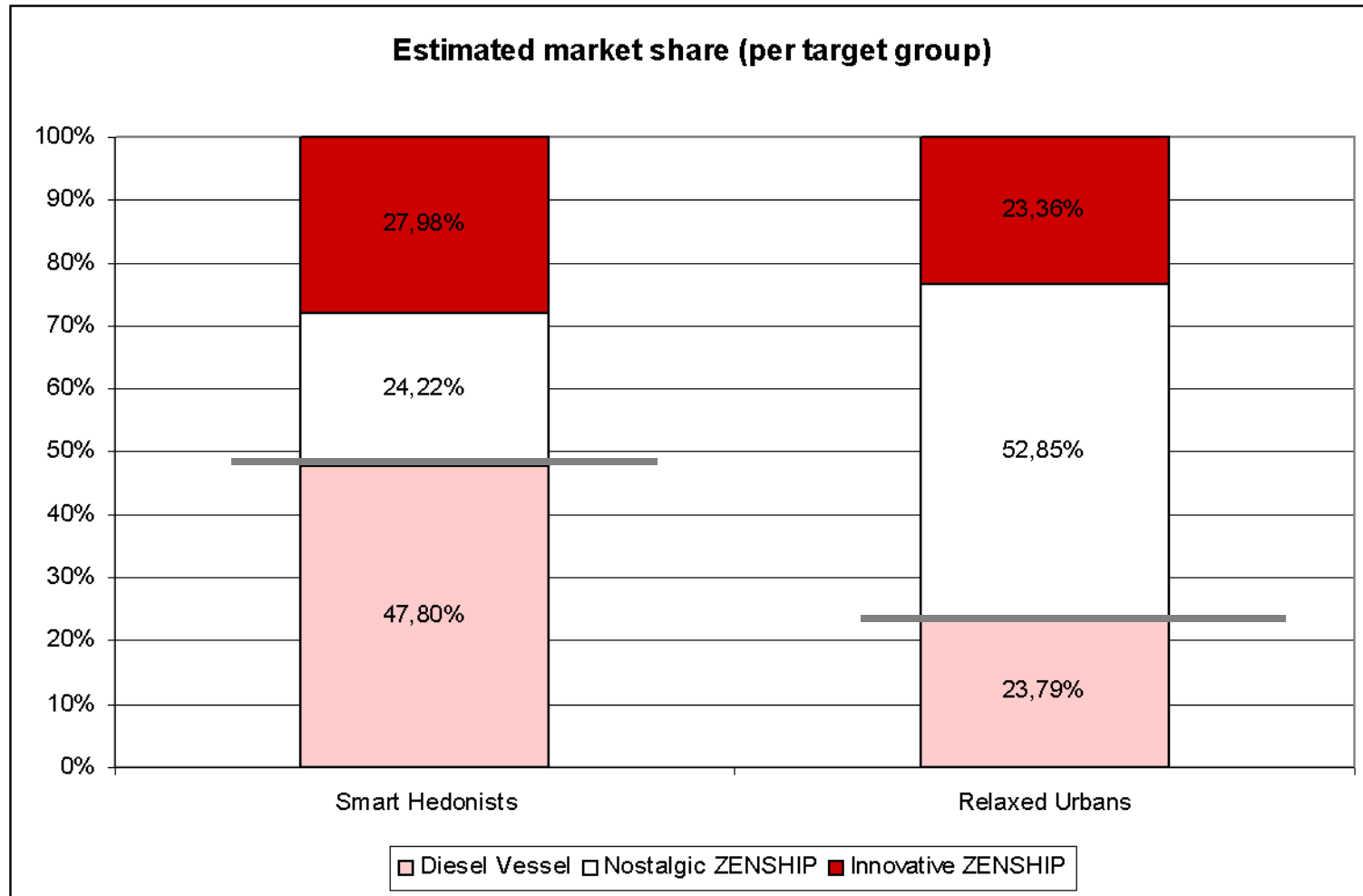
- Three stereotyped products on the vessel market as basis for market potential estimation:

Attributes	"Hyper"-ZEMSH ₂ IP	"Nostalgic"-ZEMSH ₂ IP	Diesel vessel
Waiting time	20 min.	20 min.	0 min.
Noise	Noiseless	Buzzing	Banging
Drive	Fuel cell	Hybrid	Diesel
Design	Innovative	Nostalgic	Established
Price	€ 17.00	€ 13.50	€ 10.00

- We anticipated a market potential for three vessel types. The original diesel vessel, a "Nostalgic"-ZEMSH₂IP and a "Hyper"-ZEMSH₂IP.

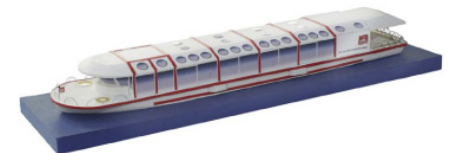


● Indicative market shares show high potentials for the ZEMSH₂IP: a solid basis for further quantification.



● We found an optimal design for an ZERo Noise SHIP – Short “ZENSHIP” in Bratislava: Noiseless driving substitutes zero emission shipping!

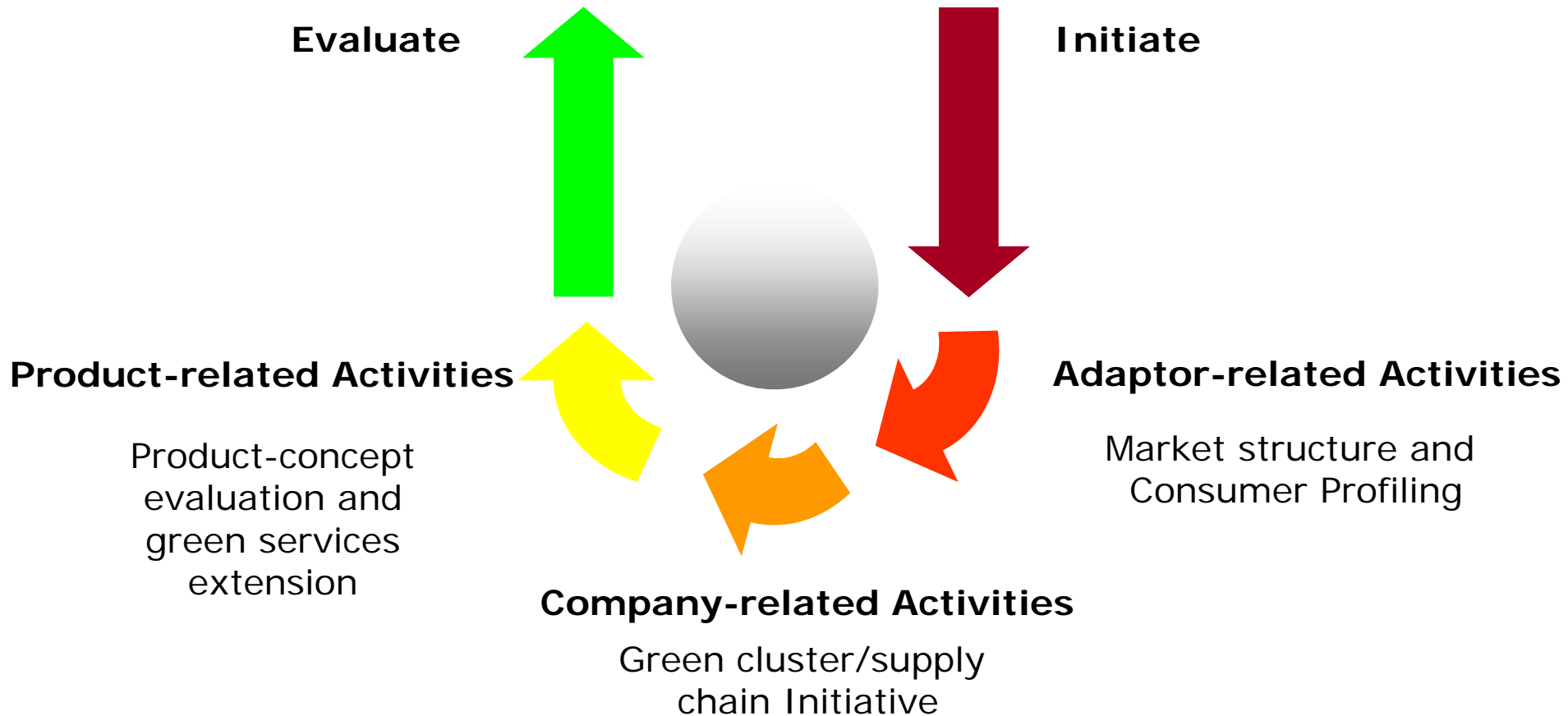
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Politics	Operators	Technology and R&D
Offering attractive funding projects	Establishing cooperation in supply chains to develop and prototype the technology	Knowledge diffusion programmes by scientific institutes
Financial incentives for dissemination of technology (e.g. taxes)	Designing regional target group-specific marketing strategies	R&D projects enforcing economies of scale for H ₂ and fuel cell batteries
Establishing excellence and cluster initiatives	Conceptualize a choice-preference optimal product	Prototyping for efficient technology diffusion in market
Investments into local infrastructure (e.g. H ₂ -Pipelines)	Be aware of price premiums for ZEMSH ₂ IP users	

Proposed lifecycle of ZEMSH₂IP-Dissemination for all stakeholders



Thank you for your kind attention!

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