



The Multiple Benefits of Energy Efficiency

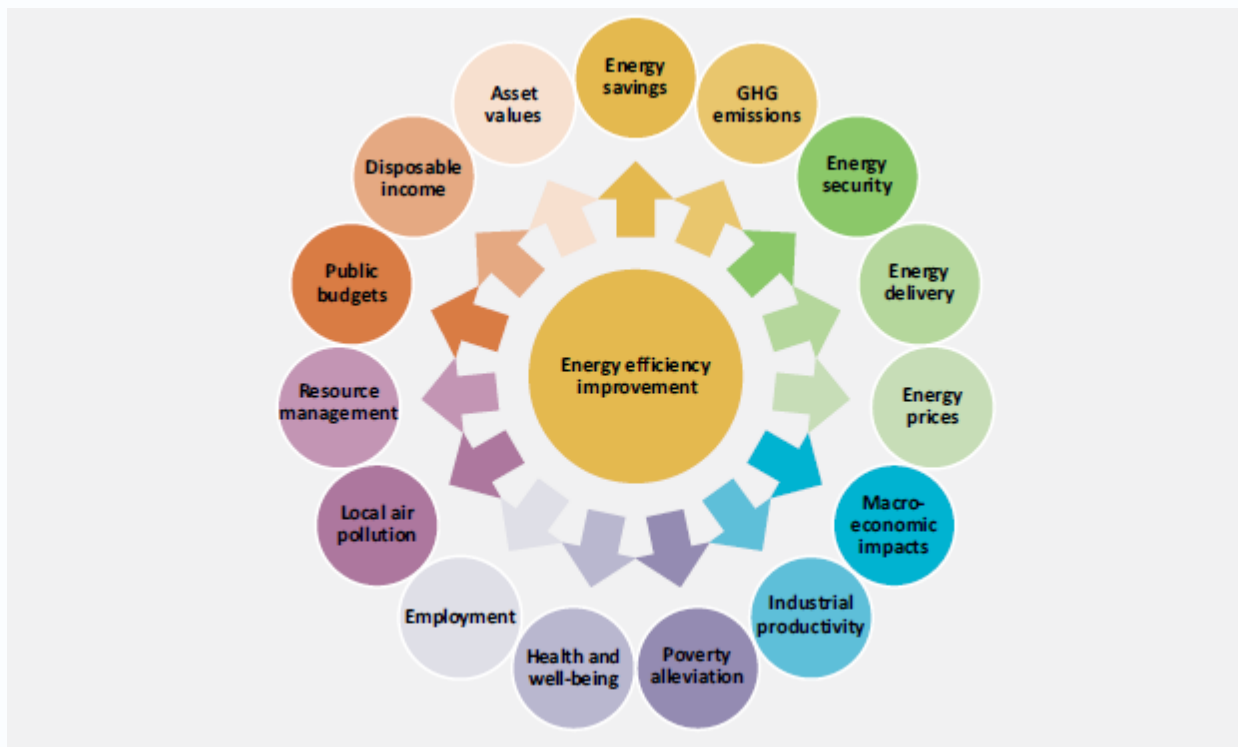
Dr. Catherine Cooremans

IEA DSM Workshop
Halifax

Outline

1. Context
2. Understanding investment behavior
3. Influencing investment behavior
4. Conclusion

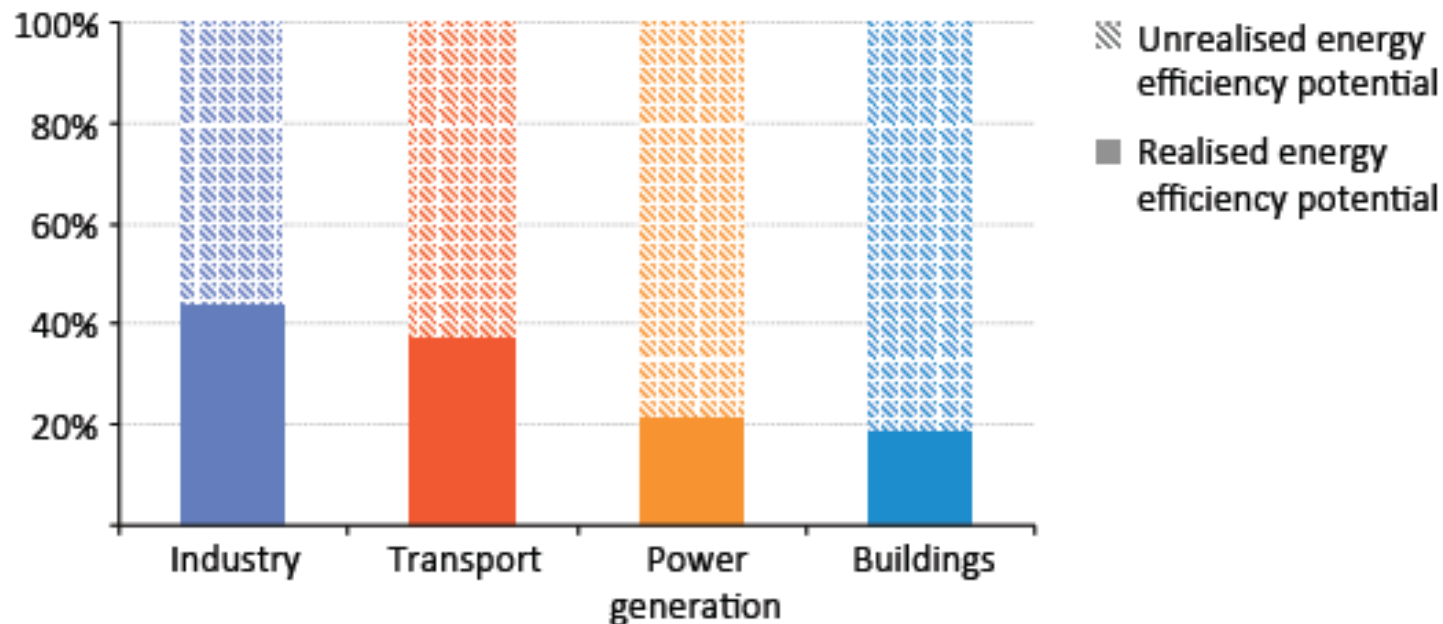
I. CONTEXT



IEA report, Capturing the multiple benefits of energy-efficiency, Paris, September 2014:

- *Macro-economic impacts*
- *public budget impacts*
- *Health & well-being impacts*
- ***Industrial sector impacts*** (in a broad sense)
- ***Energy delivery impacts***

A huge energy-efficiency potential remains untapped



Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035

Source: Philippe Benoît, *Several IEA strategic actions to increase energy-efficiency, EEMR 2015 and Multiple Benefits, ECEEE workshop, Brussels, October 21, 2014.*

The common engineers' “technico-economic” approach:



... does not work.

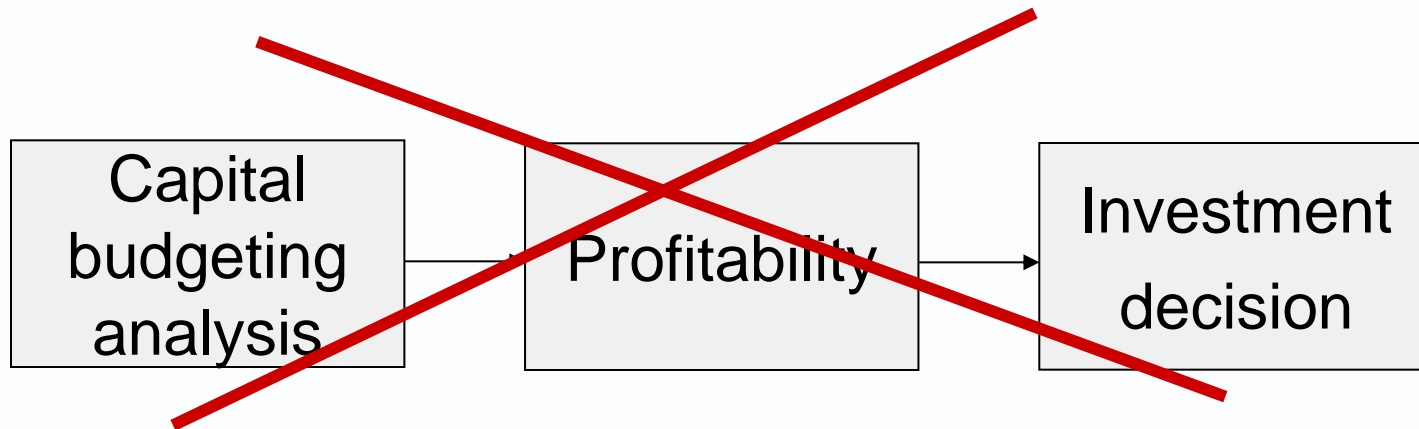
PART I

Understanding

investment behavior

Understanding investment behavior

Profitability is the key



Conclusion: not observed in the reality.

Profitability plays an important role but not a decisive one in investment decision-making:

- “*Profitability of an investment is not sufficient to entail a positive decision*” (37/44 – 15/17)
- “*A project can be realized even if it is not profitable*” (10/17)

Strategic investments win the competition:

- “*Above all, a project must contribute to the realization of the company’s strategic goals*” (16/17 – 40/44)

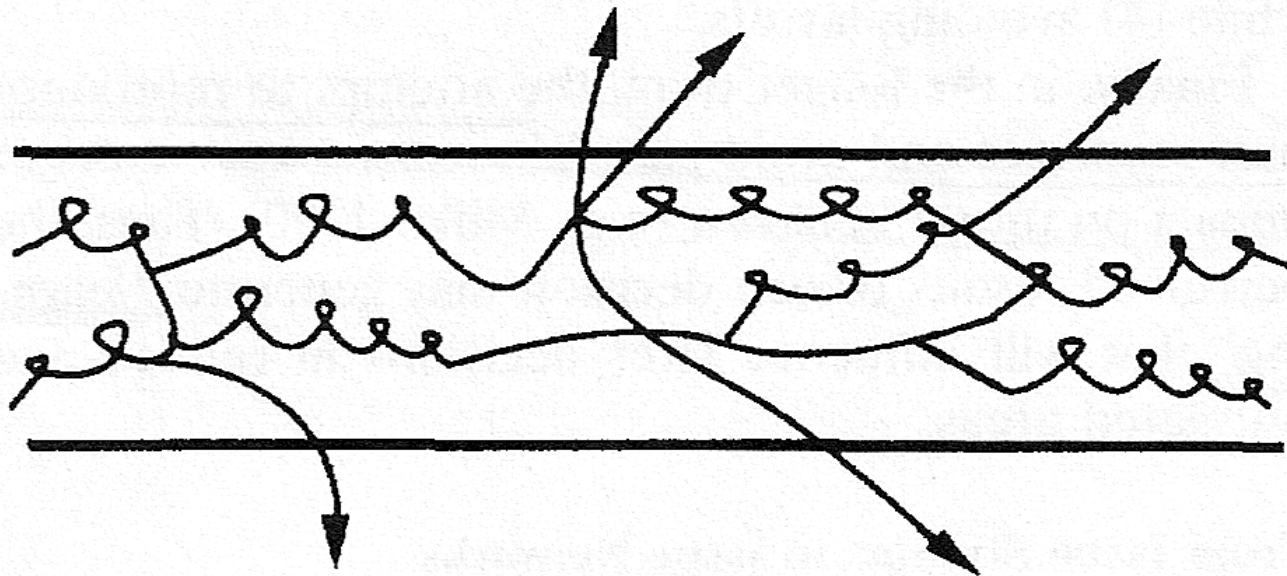
Understanding investment behavior

Investment amount and category influence:

- Procedure
- Type of analysis applied
- Capital budgeting tools used
- Profitability requirements
- Steps the investment process has to follow
- Resort to external financing
- Champion supporting the project

Conceptual framework

Competitive dimension of decision-making



Langley et al. (1995)

Interwoven **streams of issues competing for resources.**
Non strategic issues loose the competition.

Understanding investment behavior

Research finding 1:

- Financial logic not decisive
- Strategic logic more important
in businesses' investment choices

Understanding investment decision-making

Actors have mindsets and cognitive filters:

"...executives' experiences, values, and personalities affect their field of vision (the directions they look and listen), selective perception (what they actually see and hear), and interpretation (how they attach meaning to what they see and hear)."

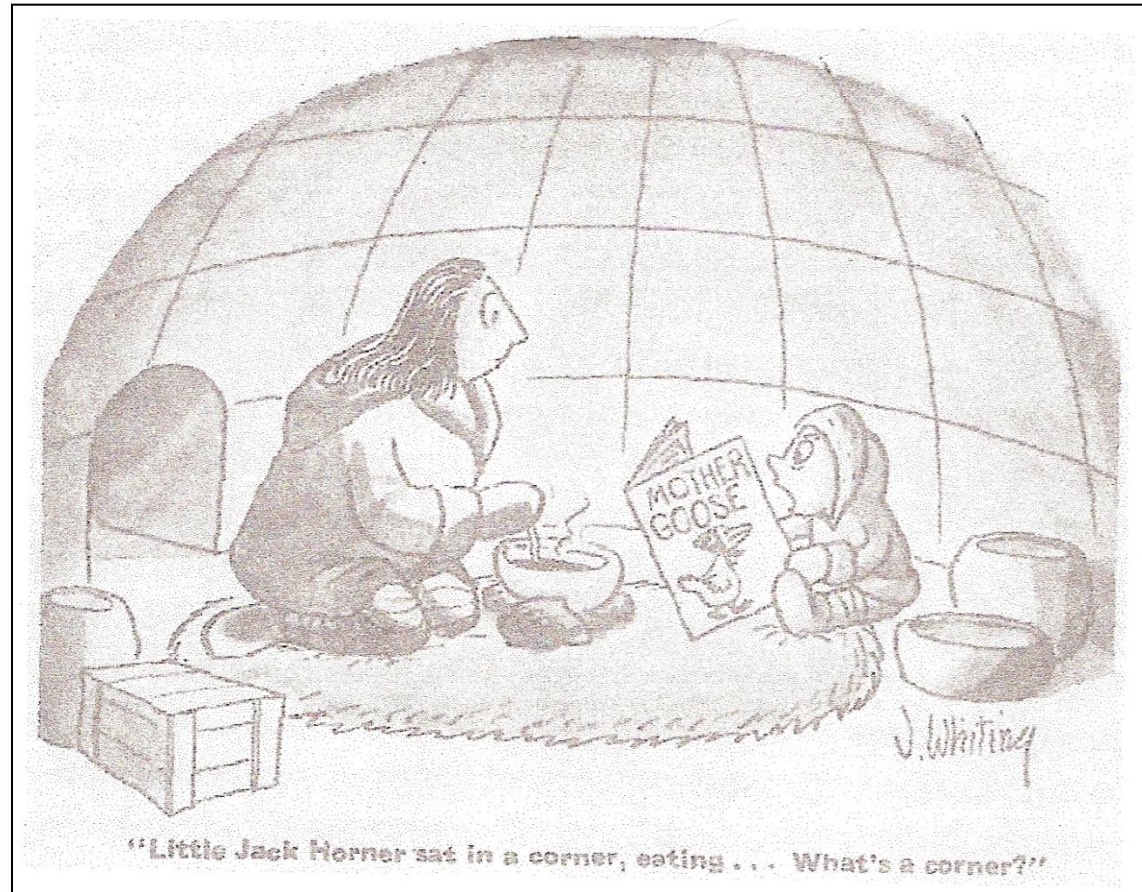
(Hambrick, 2007, p. 337).

"I see it when I believe it"

Understanding investment behavior

Filters...

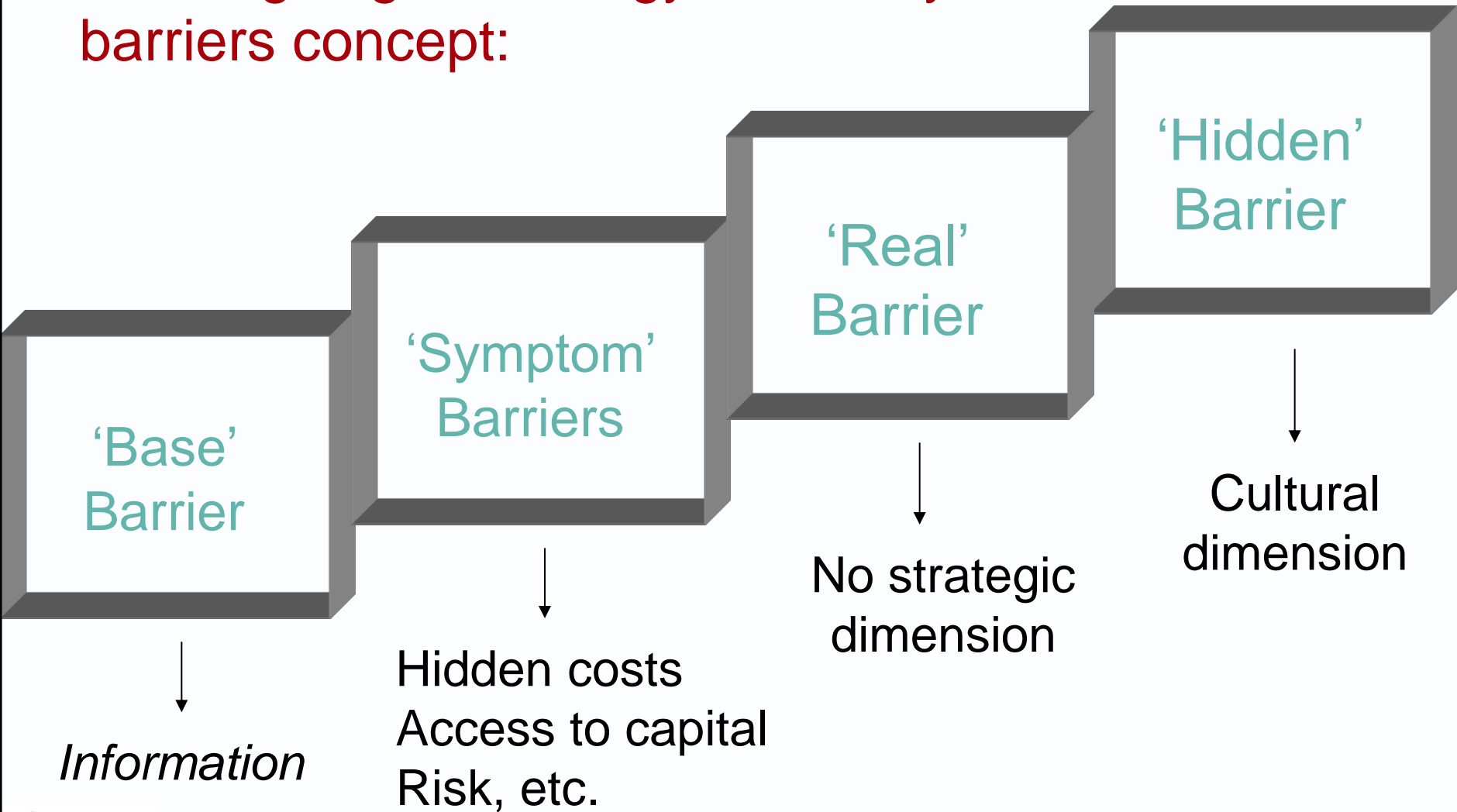
"What's
a corner?"



J. Whiting in E. Schein, *Organizational Culture and Leadership*, 2004, p. 113

Understanding investment behavior

Redesigning the energy-efficiency barriers concept:



PART II

Influencing

investment behavior

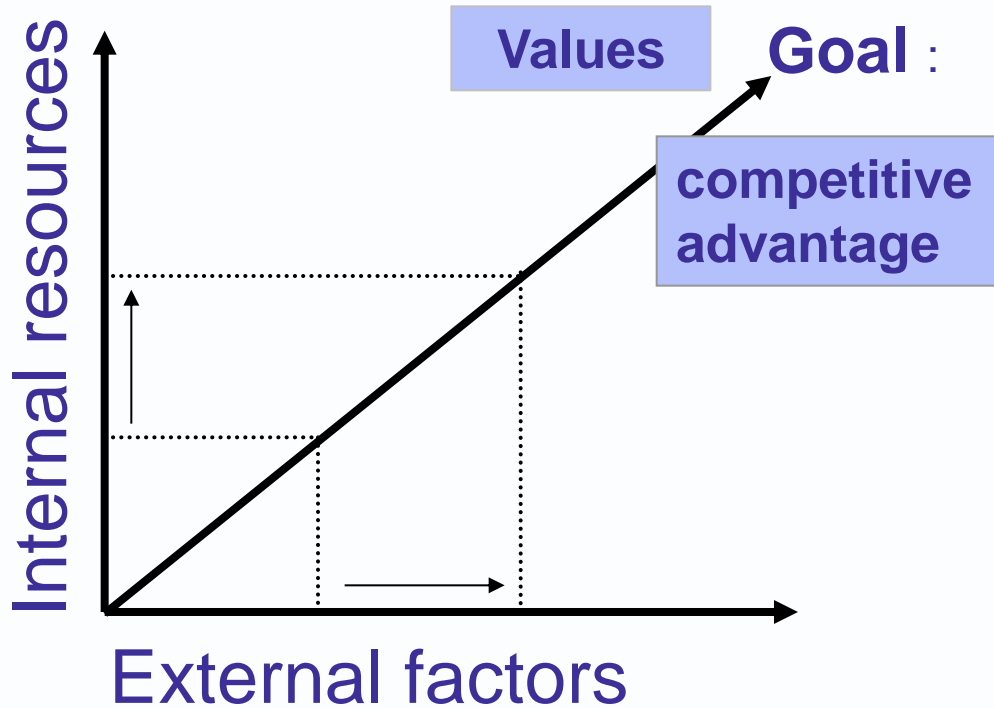
Make it strategic !

Competitiveness



Strategy:

a balance between internal resources and external factors in order to build a durable competitive advantage, through resources allocation.
(Johnson & Scholes, 1999)



The 3 dimensions of strategy

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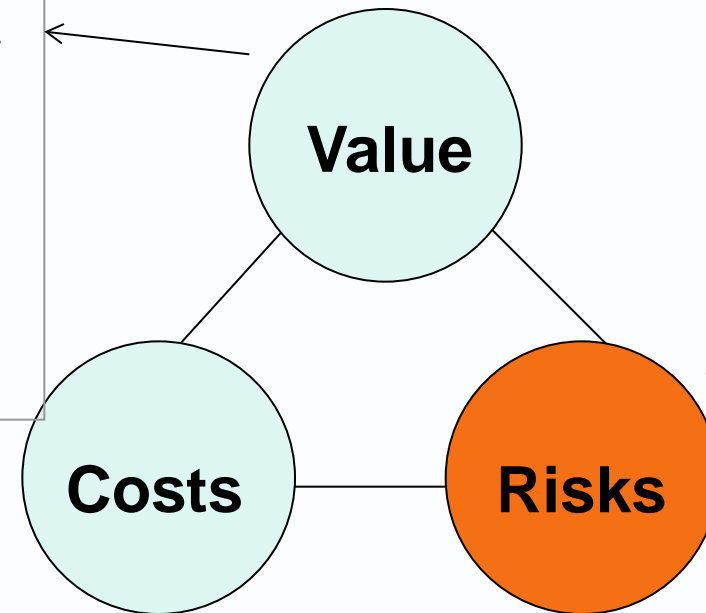
Definitions:

- An **investment is strategic** if it contributes to create, maintain or develop a sustainable competitive advantage (Cooremans, 2011)
- **Competitive advantage** is a three-dimensional concept, formed of three inter-related constituents: value, costs and risks (Porter, 1985; Cooremans, 2011)

Influencing investment behavior: strategic

Measuring strategicity

- = *value proposition*
= *the value a firm is able to create for its customers*
- *The higher the value the higher the sales*



borne to create and deliver the value proposition

borne to create and deliver the value proposal

3 dimensions of competitive advantage

The three dimensions of competitive advantage Cooremans, 2011

The “9-block business model” analysis:










The Business Model Canvas

Designed for:

Designed by:

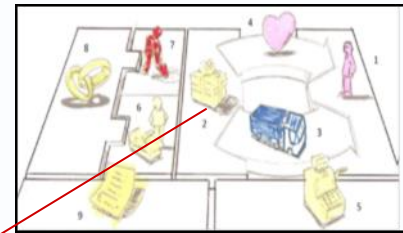
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Key Partners 	Key Activities 	Value Propositions 	Customer Relationships 	Customer Segments 
	Key Resources 		Channels 	
Cost Structure 		Revenue Streams 		

Competitive advantage:

Value proposition first !



“a set of benefits that a product (or a service) promises to deliver”

Kotler, 1999



Value proposition in questions...

- Which value do we bring to our customer?
- Which problem do we help him solve?
- Which needs do we answer to?
- Which combinations of products and services do we propose to each customer segment?

... and answers:

- Novelty – performance – customization – design – brand/status – cost reduction – risk reduction – convenience – price – accessibility, etc.

Influencing investment behavior: customized

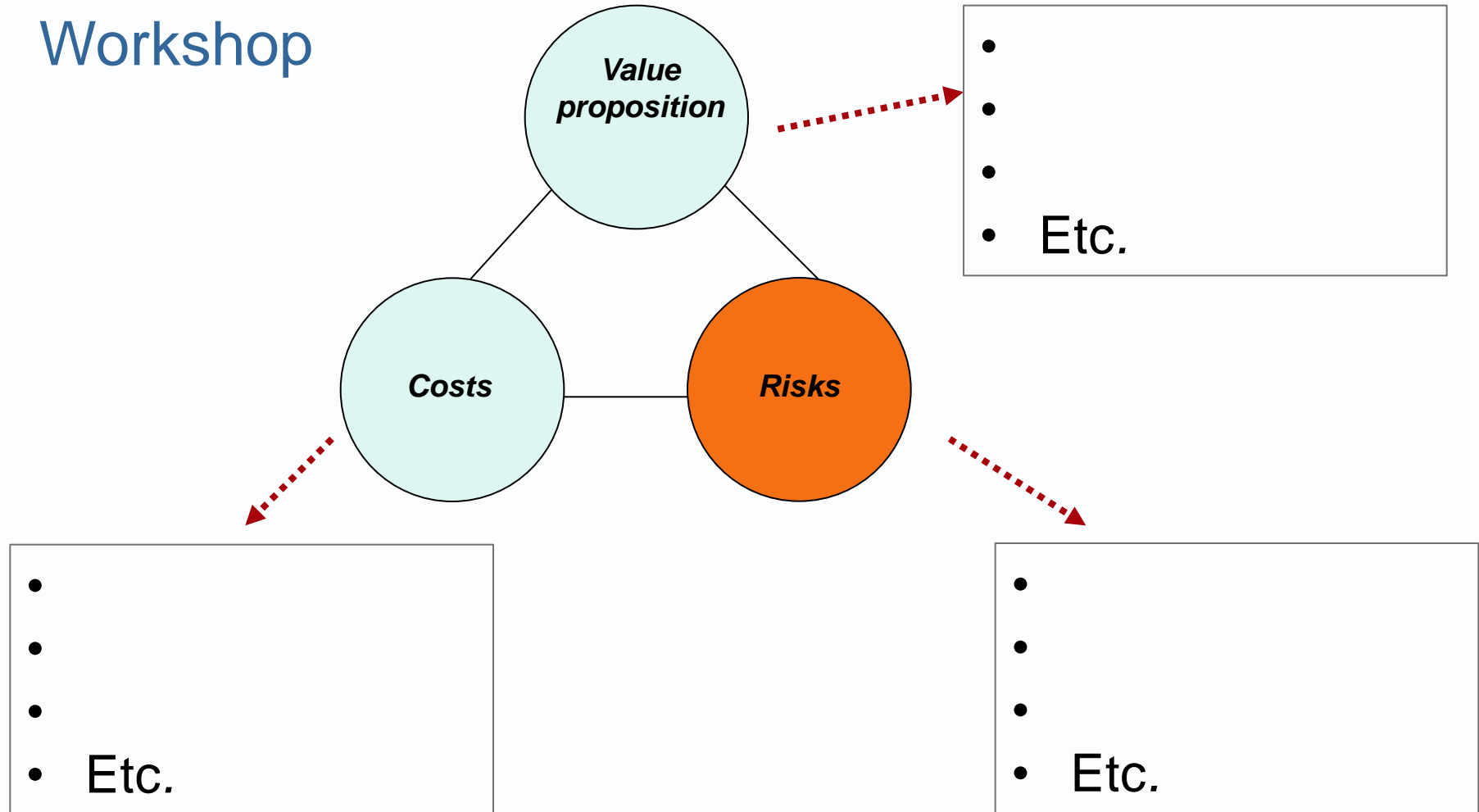
For many companies, strategic advantage is based on a “superior value” stemming from providing unique benefits and not for offering lower prices.

As emphasized by Michael Porter:

“Value, instead of cost, must be used to assess competitive position since firms often deliberately raise their cost in order to command a premium price via differentiation” (Porter, 1985:38).

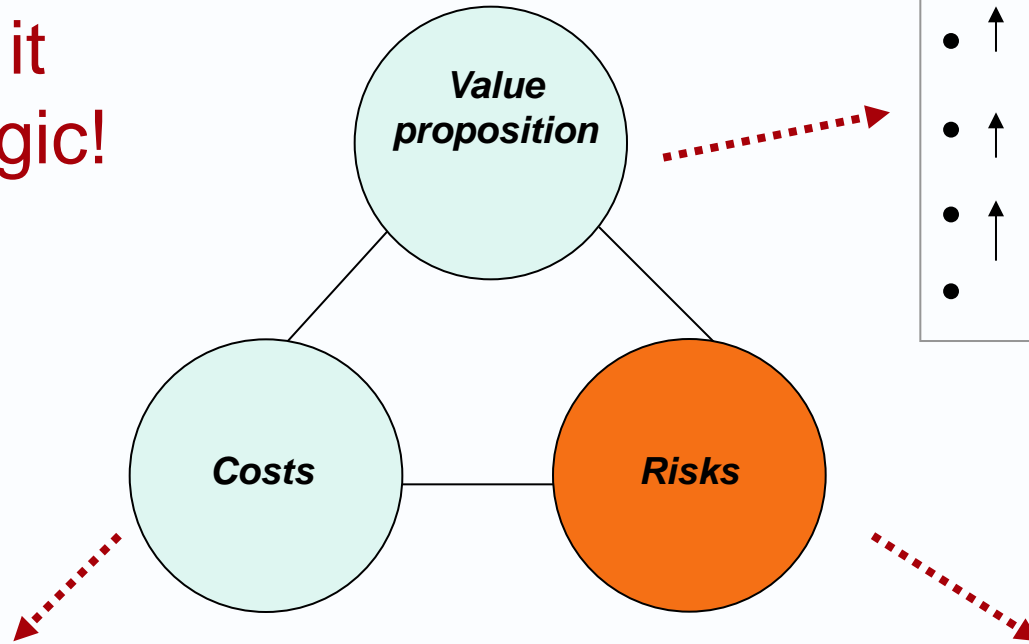
Multiple (strategic) benefits of energy efficiency

Workshop



Multiple (strategic) benefits of energy efficiency

Make it strategic!



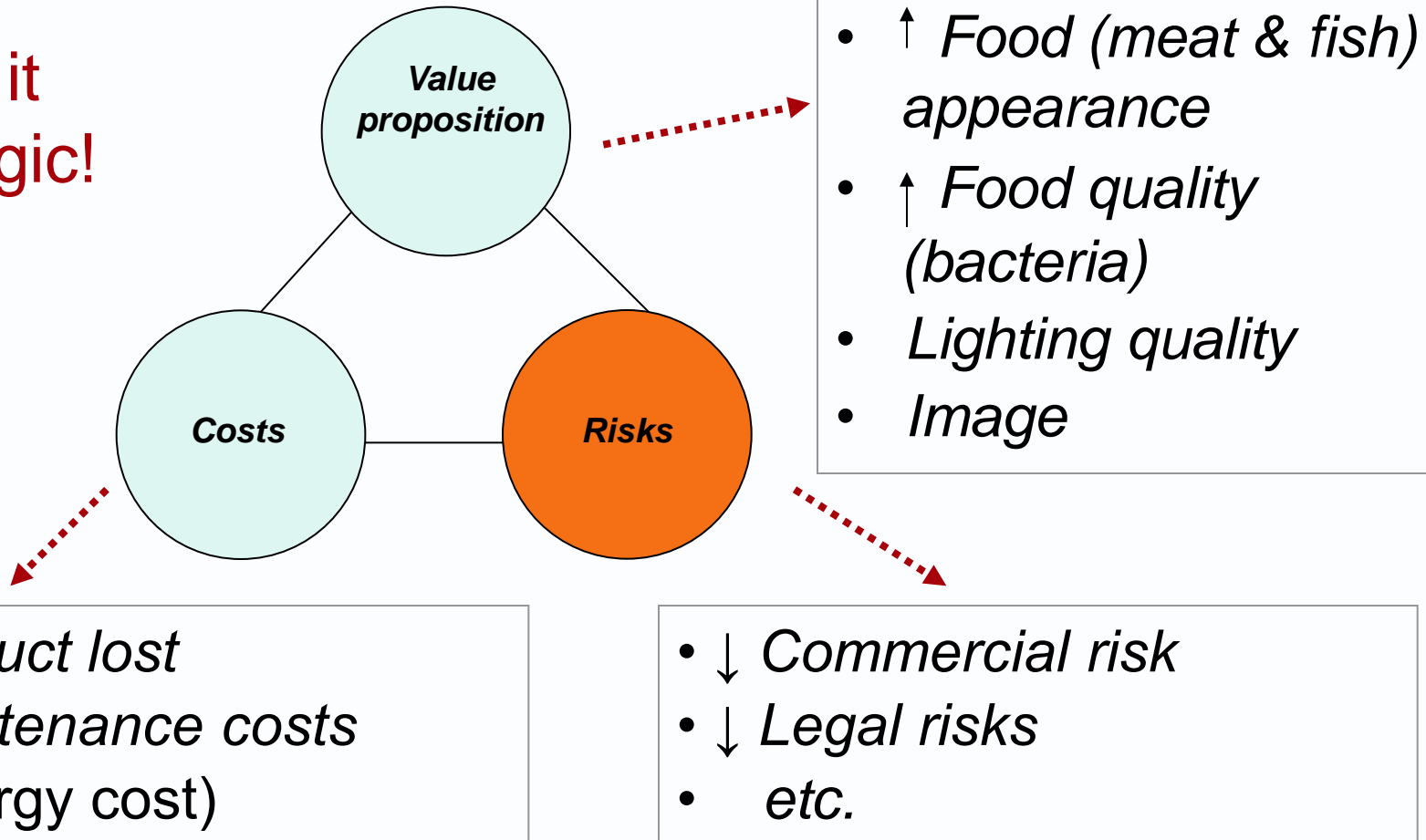
- ↑ *Product quality*
- ↑ *Product reliability*
- ↑ *Facilities security*
- *Etc.*

- ↓ *Raw materials*
- ↓ *Maintenance costs*
- ↓ *Equipment oversizing*
- ↓ *Employee turnover*
- *etc.*

- ↓ *Commercial risk*
- ↓ *Equipment breakdown*
- ↓ *Legal risks*
- ↓ *CO2 risks*
- *Etc.*

Ex Large chain grocer – Led lighting investment

Make it strategic!



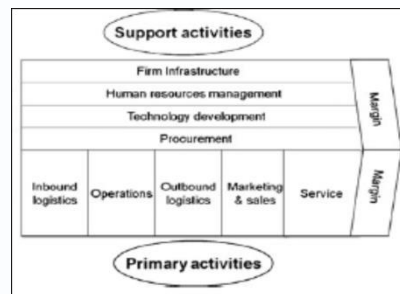
Rules:

- Do not take into account energy cost reductions only, but all cost reductions
- Take into account not only cost reductions but also a possible **increase in sales** (thanks to higher quantity sold and/or to a price premium)
- Risk reduction can often be translated into cost reduction (quantitative terms). If not possible then qualitative risk analysis

Influencing investment behavior: strategic

“Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering and supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation.”

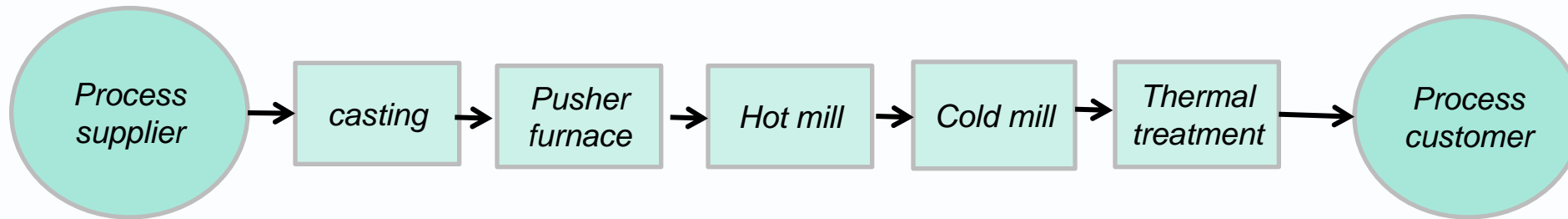
(Porter, 1985:33)



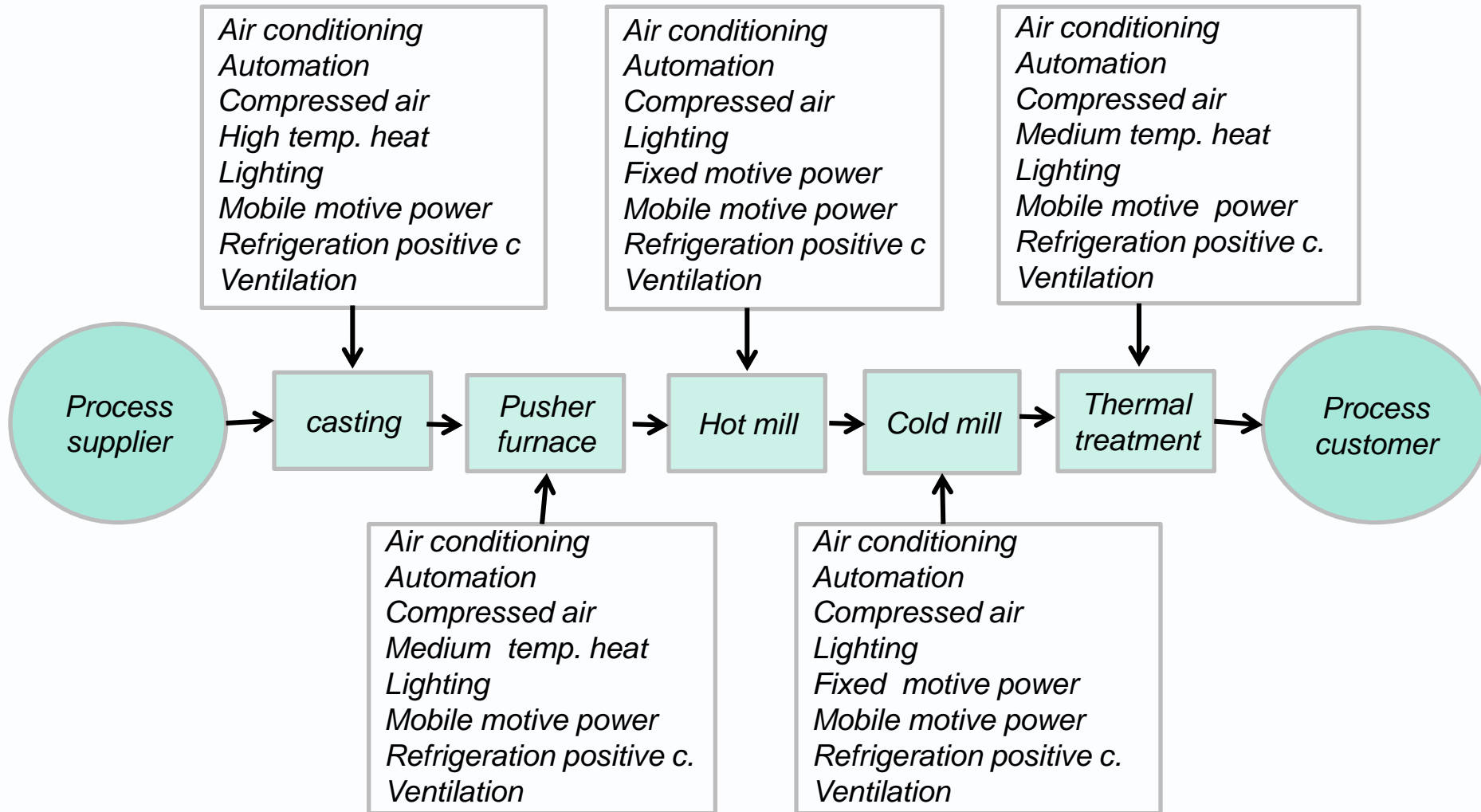
The value chain, Porter, 1985

Process mapping :

ex. aluminum foil production process map



Aluminium foil production process mapping + energy services



Aluminium foil production process mapping + energy services

Air conditioning
Automation
Compressed air
High temp. heat

Air conditioning
Automation
Compressed air
Lighting

Air conditioning
Automation
Compressed air
Medium temp. heat

**Energy services key contributions to process:
security (critical values) - quality, quantity**

Air conditioning
Automation
Compressed air
Medium temp. heat
Lighting
Mobile motive power
Refrigeration positive c.
Ventilation

Air conditioning
Automation
Compressed air
Lighting
Fixed motive power
Mobile motive power
Refrigeration positive c.
Ventilation

**Integrating energy & operations approaches
*erases the line between process energy
services and ancillary energy services and
opens the door to strategic analysis***

Influencing investment behavior

Once identified, **multiple benefits** of energy-efficiency projects have to be translated into **financial calculations**

SANTA CLARA UNIVERSITY Lighting project		Year 0	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
			(% or thousand of USDOL)				
Revenues							
Energy benefits - Financial savings from energy consumption reduction			11'169	11'169	11'169	11'169	11'169
Non-energy benefits 1 - Impact on maintenance			2'366	2'366	2'366	2'366	2'366
Non-energy benefits 2 -			0	0	0	0	0
Non-energy benefits 3 -			0	0	0	0	0
Total gross revenues			13'535	13'535	13'535	13'535	13'535
Lamps furniture			2'700	2'700	2'700	2'700	2'700
Depreciation			850	850	850	0	0
Net income before taxes			9'985	9'985	9'985	10'835	10'835
Taxes			2'396	2'396	2'396	2'600	2'600
Net income after taxes			7'589	7'589	7'589	8'235	8'235
Depreciation			850	850	850	0	0
Net income			8'439	8'439	8'439	8'235	8'235

Bridging strategicity with financial analysis

SANTA CLARA UNIVERSITY Lighting project		Year 0	Proj. Year 1	Proj. Year 2	Proj. Year 3	Proj. Year 4	Proj. Year 5
			(% or thousand of USDOL)				
Net income			8'439	8'439	8'439	8'235	8'235
Capital expenditure		2'550	0	0	0	0	0
Terminal value before taxes			0	0	0	0	0
Terminal value after taxes			0	0	0	0	0
Free Cash-Flows		-2'550	8'439	8'439	8'439	8'235	8'235
NPV (NET PRESENT VALUE)							
	15%	11'169					
	9%	29'996					
	5%	33'657					
IRR (INTERNAL RATE OF RETURN)							
		311%					
PAY-BACK TIME							
		0.30					

CONCLUSION

Conclusion & take home messages

- Financial logic is not decisive
- Strategic logic is more important
in businesses' investment choices

Conclusion & take home messages

The common engineers'
“technico-economic” approach:



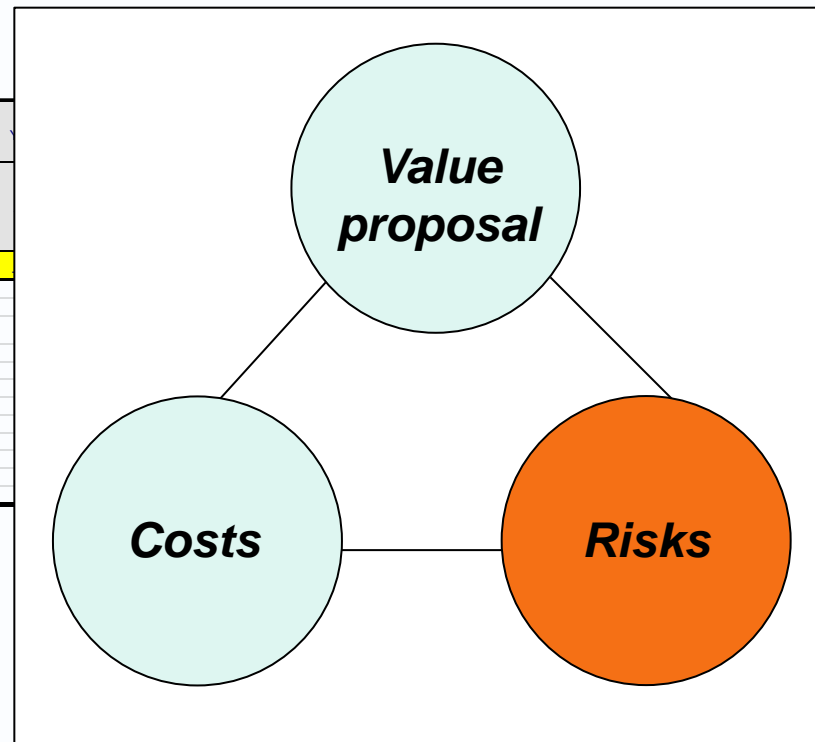
... does not work.

Conclusion & take home messages

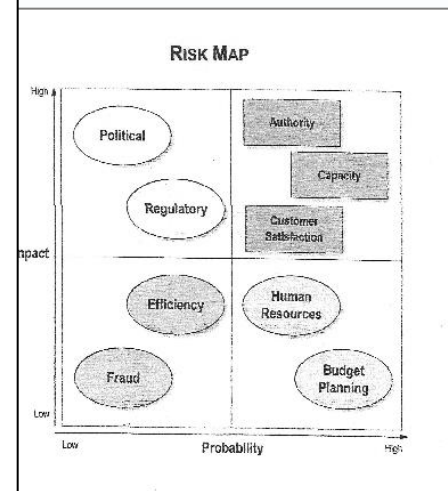
A comprehensive analysis to build up the business case of energy-efficiency investment projects

SANTA CLARA UNIVERSITY Lighting project		
Net income		
Capital expenditure		
Terminal value before taxes		
Terminal value after taxes		
Free Cash-Flows		
NPV (NET PRESENT VALUE)		
	15%	11'169
	9%	29'996
	5%	33'657
IRR (INTERNAL RATE OF RETURN)		311%
PAY-BACK TIME		0.30

*Quantitative
analysis*



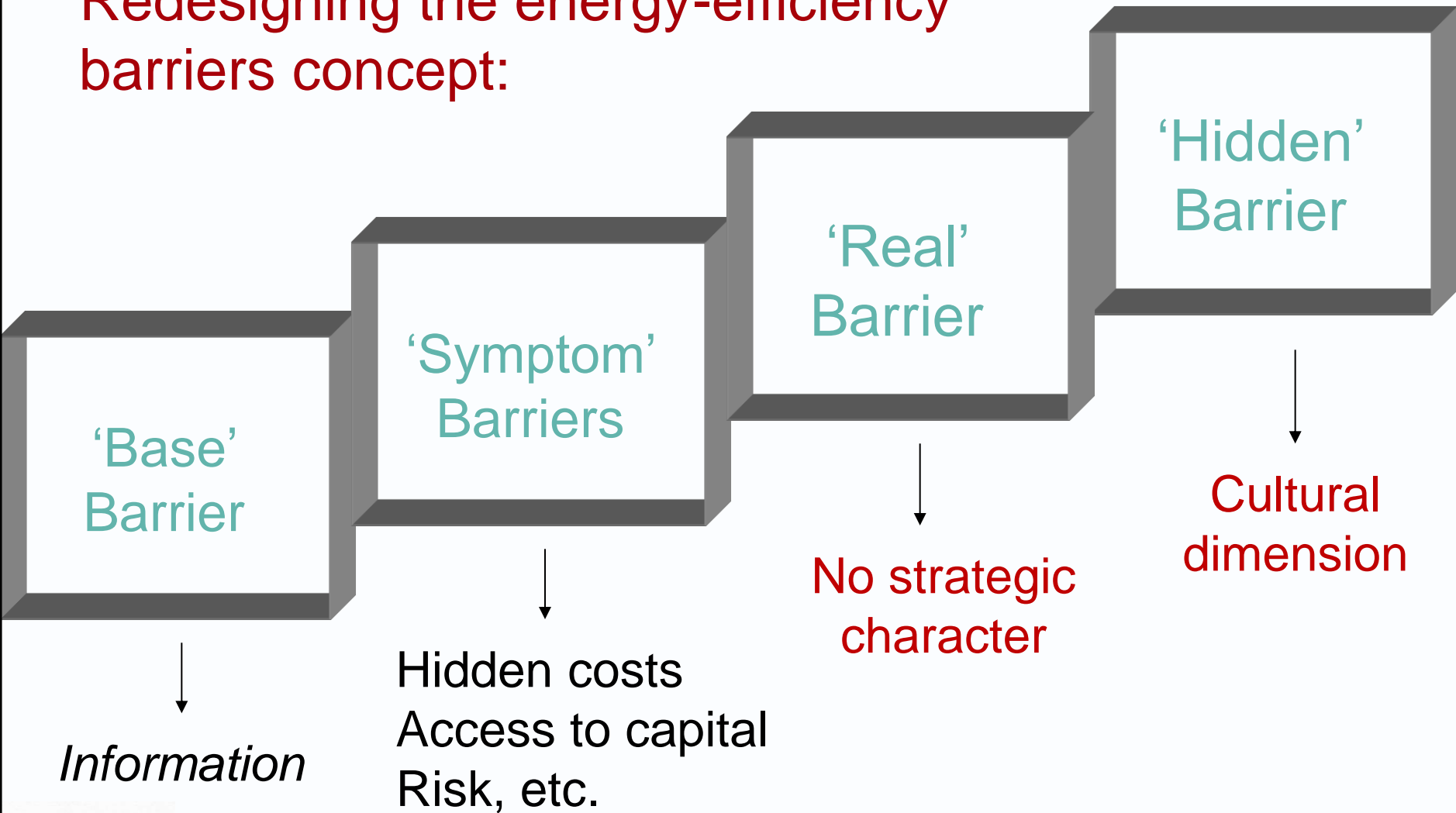
Strategicity



*Qualitative
risk analysis*

Conclusion & take home messages

Redesigning the energy-efficiency barriers concept:



Conclusion & take home messages

Non-energy / multiple benefits :

- Can make energy issues strategic

but

- they have to be analyzed ex ante (i.e. before projects start)
- They have to be communicated in a convincing way to stakeholders

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