



# Modeling and Optimizing the Motivation of Workers and Managers for Knowledge-Sharing: A Game-Theoretic Analysis

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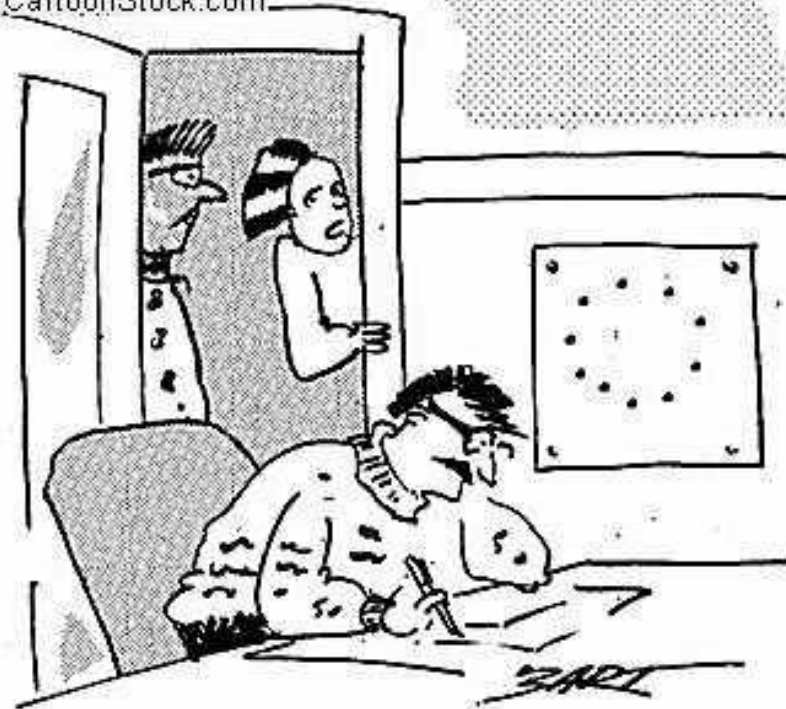
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# Motivation

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*"Ralph is doing a preliminary study  
of re-inventing the wheel."*

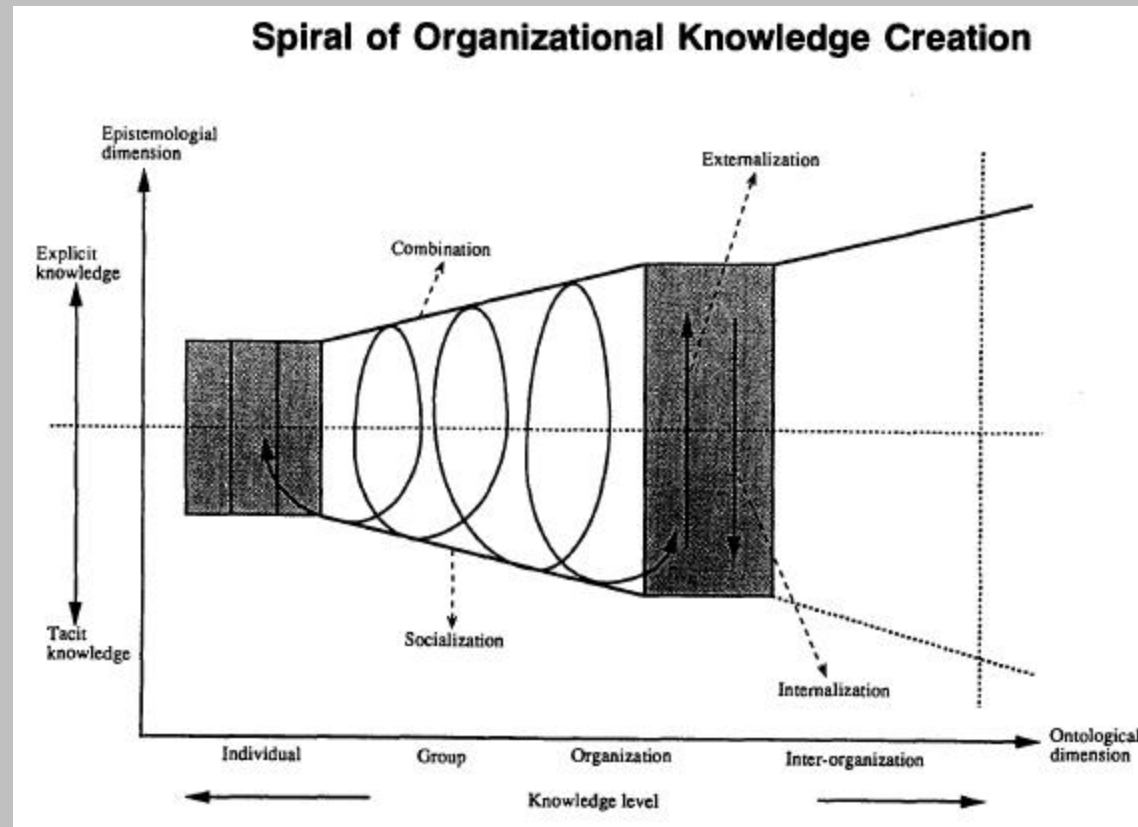


# Research Questions

- ***What are the drivers of knowledge sharing behaviors in organizations?***
- *What new knowledge taxonomy can be derived from the model of knowledge sharing dynamics and how can we identify and manage different kinds of knowledge?*
- *What are the model's implications for the design of knowledge management systems and organizations?*

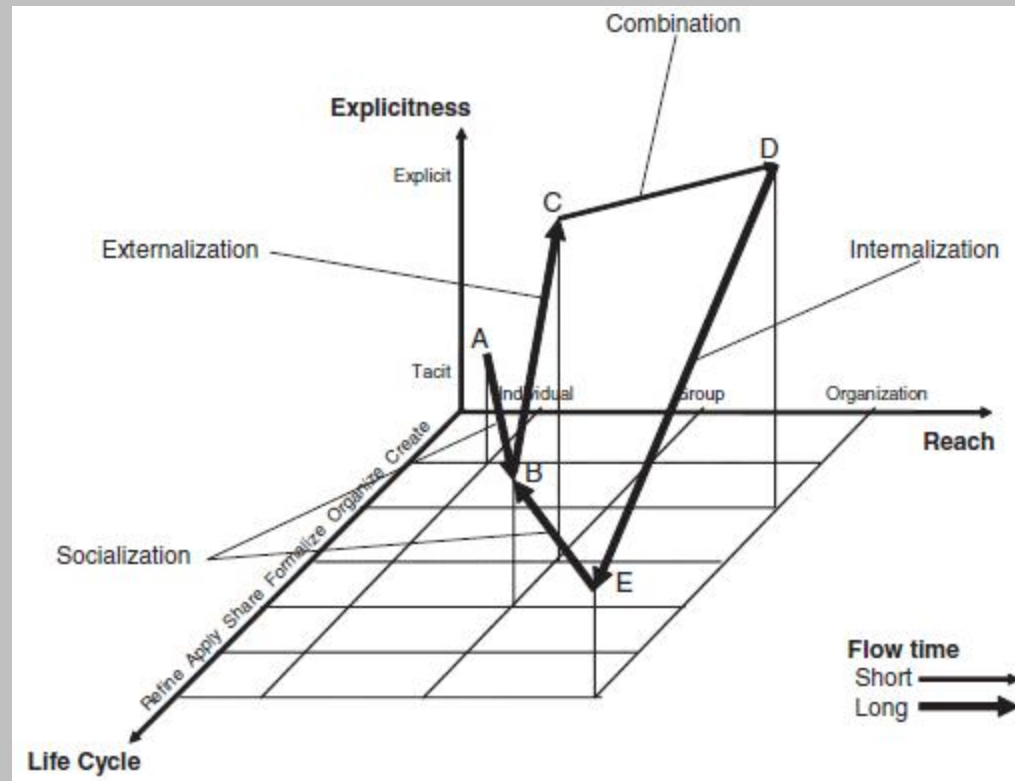
# Points of Departure

- Tacit & Explicit knowledge (Nonaka 1994)



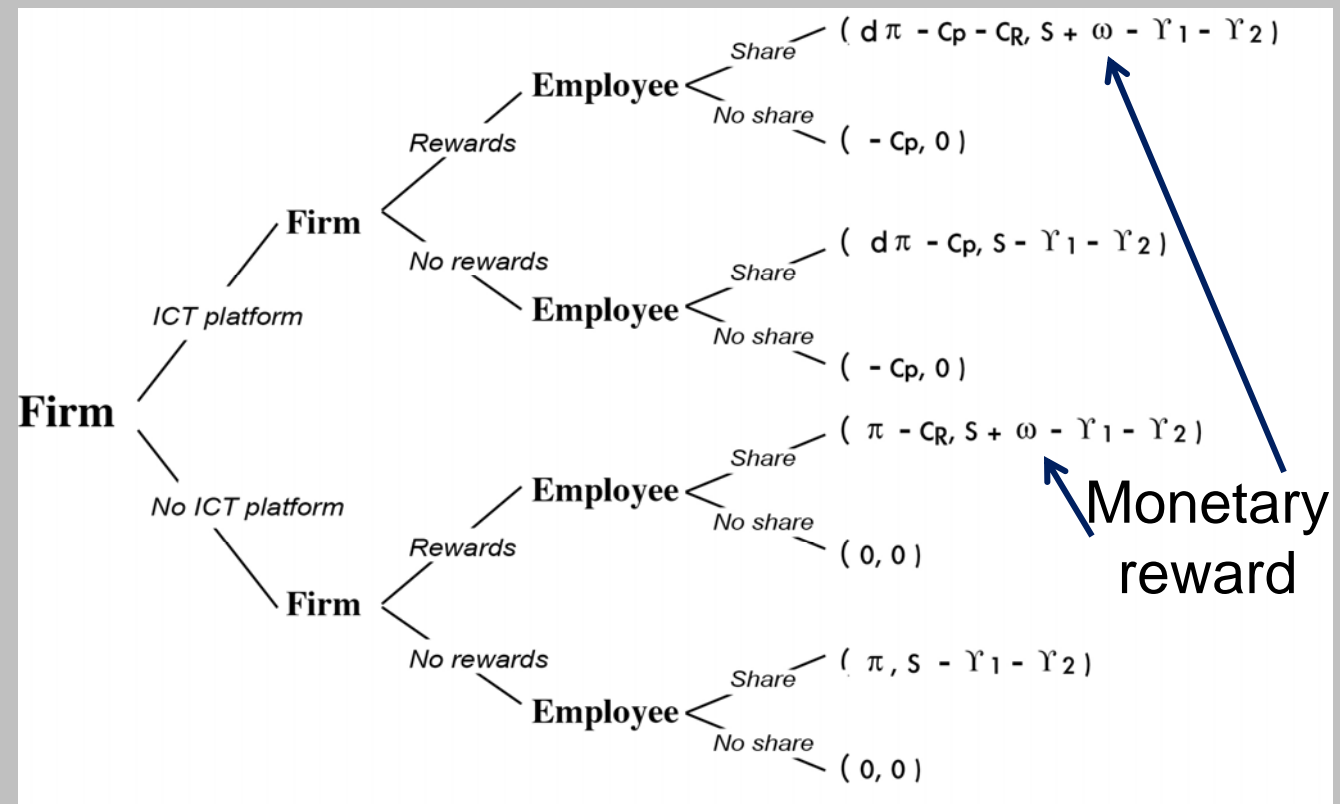
# Points of Departure

- Knowledge inertia (Nissen 2006)



# Points of Departure

- Game tree (Ho et al. 2006)
  - Interaction b/w firm and employee is modeled



# Points of Departure

- Knowledge taxonomy (Ho et al 2009)  
—Core vs. Non-core knowledge

		Value to firm, $\pi$			
		Low $\pi$		High $\pi$	
		Employees' implicit sharing cost, $\gamma_2$			
		Low $\gamma_2$	High $\gamma_2$	Low $\gamma_2$	High $\gamma_2$
Employee's explicit sharing cost, $\gamma_1$	Low $\gamma_1$	Simple Knowledge	Special Knowledge	Core Simple Knowledge	Core Unique Knowledge
	High $\gamma_1$	Spurious Knowledge		Core Complex Knowledge	

# Research Design

Ethnographic  
interviews/  
Grounded  
theory  
(Eisenhardt  
1989)



Game-  
theoretic  
model  
development  
/Analysis



Implications





# Ethnographic Interviews

- Comparison of Company A and B

	Company A	Company B
Industry	Construction	Construction
Size	36,000+	1,000+
Communities are aligned with	Individual's expertise	Job placement
Cross-department KS	More	Less
Company-wide KM system?	Yes	No
KS Reward mechanism?	Yes (mostly reputation-related)	No

# Ethnographic Interviews

- Cost & benefit of knowledge sharing

## Individual-related

Benefit from self,  $B_{es}$

Benefit from others,  $B_{eo}$

Time spent & the possibility of losing jobs,  $C$

Self-satisfaction,  $A$

## Community-related

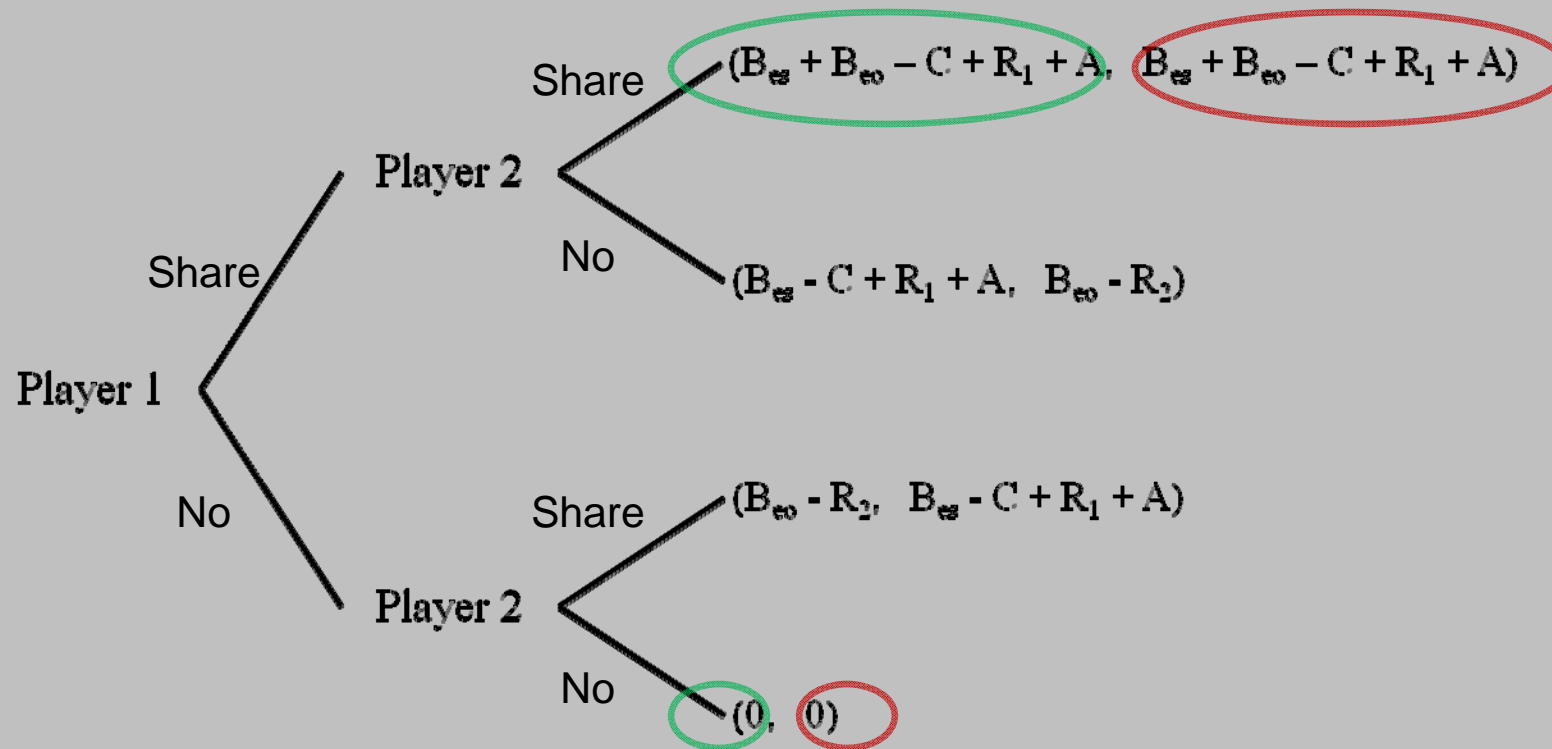
Social reward,  $R_1$

Social punishment,  $R_2$



# Model Development and Analysis

- Study subject: Interaction b/w employees
- Analysis tool: Game Theory
  - Nash Equilibrium
  - Type of game
  - Backward Induction



- Contingencies:
  - Company size & Core knowledge type

Company  
size



Cost of KS  
per  
employee

Core  
knowledge  
type

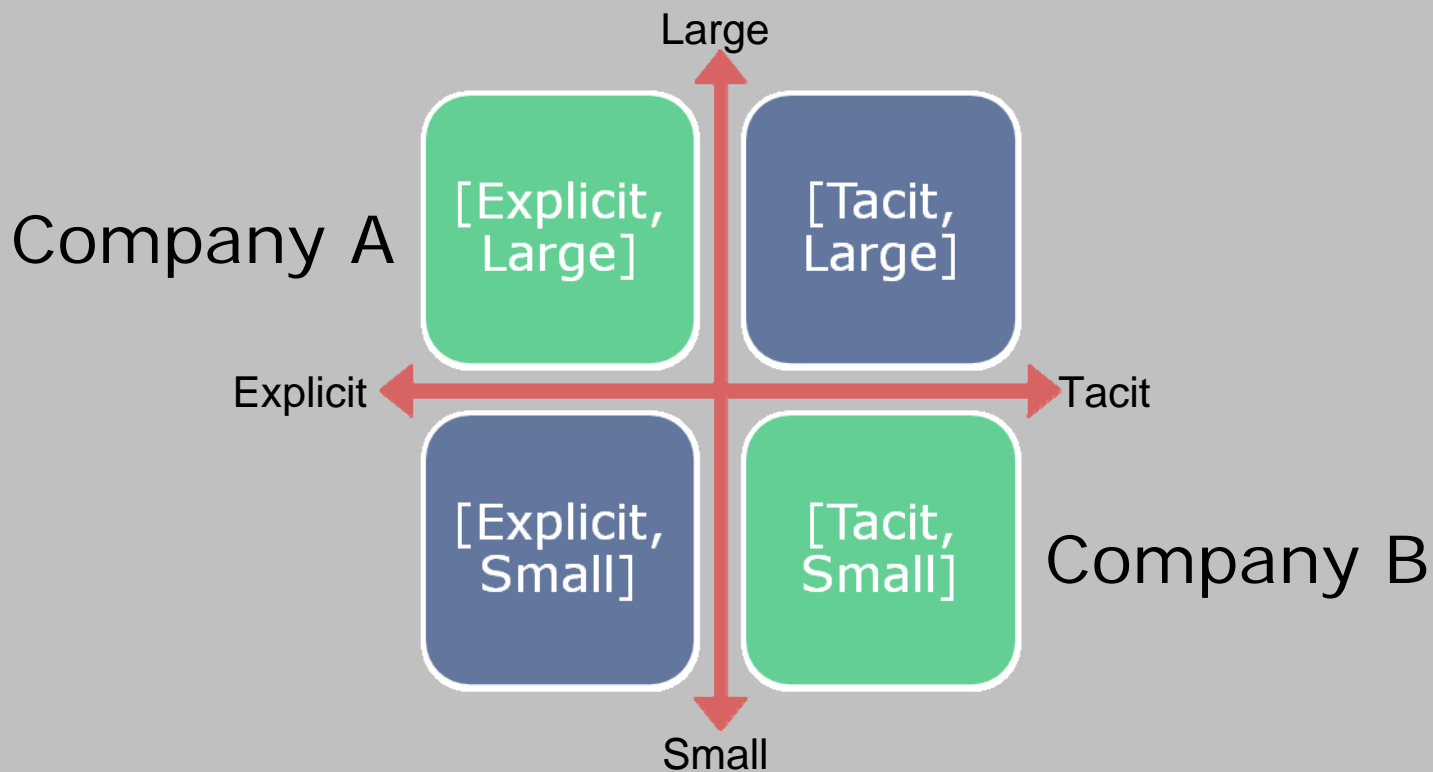


Benefit to  
knowledge  
contributors

# Model Development and Analysis

Contingencies:

—Company size & Core knowledge type



# Preliminary Results

Explicit, Large] Company A

**[Share, Share] if**  
 $B_{es} - C + R_1 + A > -R_2$

strong social  
punishment (large  $R_2$ )

**[No, No] if**  
 $0 > -R_2 > B_{es} - C + R_1 + A$

small perceived benefit  
from KS (small  $B_{es}$ )

weak social reward  
(small  $R_1$ )

low level of self-  
actualization  
(small  $A$ )

# Preliminary Results

[Tacit, Small] Company B

[Share, Share] if

$$B_{es} - C + R_1 + A > -B_{eo}$$

strong social  
punishment (large  $R_2$ )

difficulties to  
understand KS without  
interaction (small  $B_{eo}$ )

[No, No] if

$$-B_{eo} > B_{es} - C + R_1 + A > -R_2$$

high KS cost (large C)

weak social reward  
(small  $R_1$ )

low level of self-  
actualization  
(small A)



# Applications in Practice

Compare associated conditions of NEs  
Determine the desired direction



# Applications in Practice

Explicit, Large] Company A

[Share, Share] if

$$B_{es} - C + R_1 + A > -R_2$$

strong social  
punishment (large  $R_2$ )

[No, No] if

$$0 > -R_2 > B_{es} - C + R_1 + A$$

small perceived benefit  
from KS (small  $B_{es}$ )

weak social reward  
(small  $R_1$ )

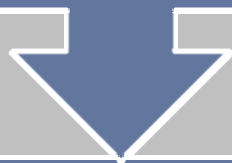
low level of self-  
actualization  
(small  $A$ )

# Applications in Practice

Compare associated conditions of NEs  
Determine the desired direction



Identify manipulable variables  
(note: not all variables can be manipulated)



# Applications in Practice

Explicit, Large] Company A

[Share, Share] if

$$0 > B_{es} - C + R_1 + A > -R_2$$

strong social  
punishment (large  $R_2$ )

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(small  $R_1$ )

low level of self-  
actualization  
(small  $A$ )

# Applications in Practice

Compare associated conditions of NEs  
Determine the desired direction



Identify manipulable variables



Develop KM strategies

# Applications in Practice

What can managers do?

Benefit from self,  
 $B_{es}$

- Education/training

Self-actualization,  
 $A$

- Seek high achievers

Social reward &  
punishment,  
 $R_1$  &  $R_2$

- Strengthen KS culture:  
CoPs, SME, competition

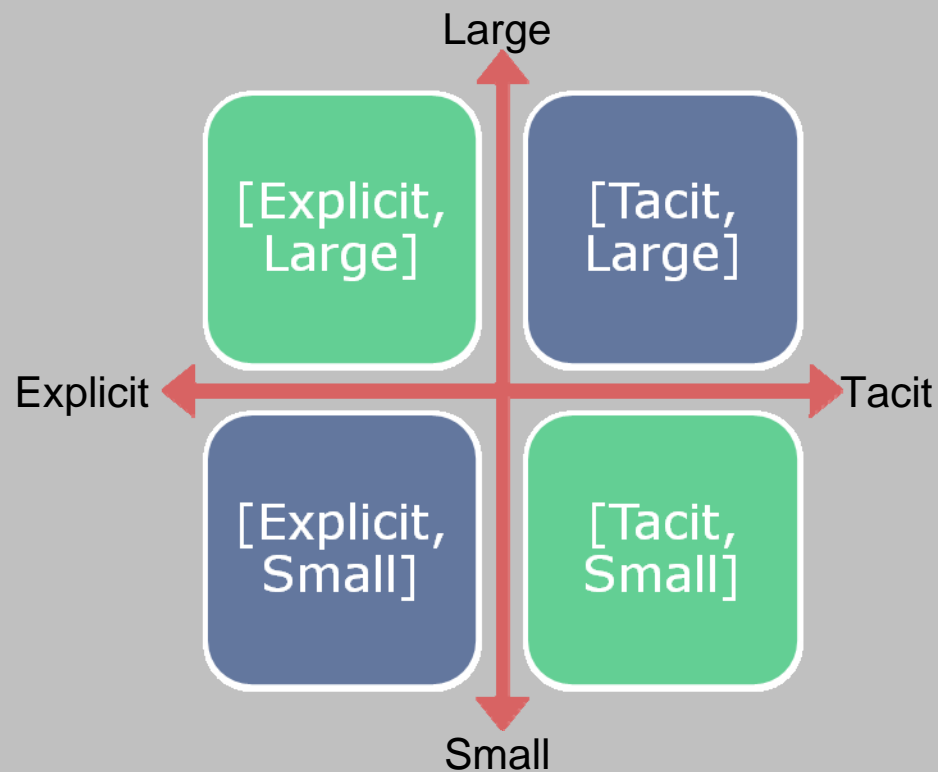
# Preliminary Results

## Expected causes and findings

Company type	Behavior	Expected causes	Found?
[Explicit, Large] Company A	[Share, Share]	strong social punishment (large $R_2$ )	V (A)
	[No, No]	small perceived benefit from KS (small $B_{es}$ )	X (A)
		weak social reward (small $R_1$ )	V (A)
		low level of self-actualization (small A)	X (A)
[Tacit, Small] Company B	[Share, Share]	difficulties to understand KS without interaction (small $B_{e0}$ )	V (B)
		strong social punishment (large $R_2$ )	X (B)
	[No, No]	high KS cost (large C)	V (B)
		weak social reward (small $R_1$ )	V (B)
		low level of self-actualization (small A)	X (B)

# Progress on the way

[Tacit, Large] & [Explicit, Small] companies





Thank you!

# Questions & Comments



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