



TPR

Department of Transport and Regional Economics
University of Antwerp

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The challenges of digitalization and the use of data**

Digital Innovation in the Port Sector: Barriers and Facilitators

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RATIONALE

- Digital innovation gradually moves to the maritime supply chain
 - cost savings
 - increased quality of product (or service), and
 - further growth
- The trend towards collaborative innovation in the maritime supply chain
- The **speed** at which digital innovation is **reshaping** the port sector is lower than in other industries



Contents

- Digital Innovations in the Port Sector – Definitions
- Case Sample Description
- Combined Methodological Approach
- Findings per Analysis
- Overall Conclusions

DIGITAL INNOVATION IN THE PORT SECTOR

Definitions

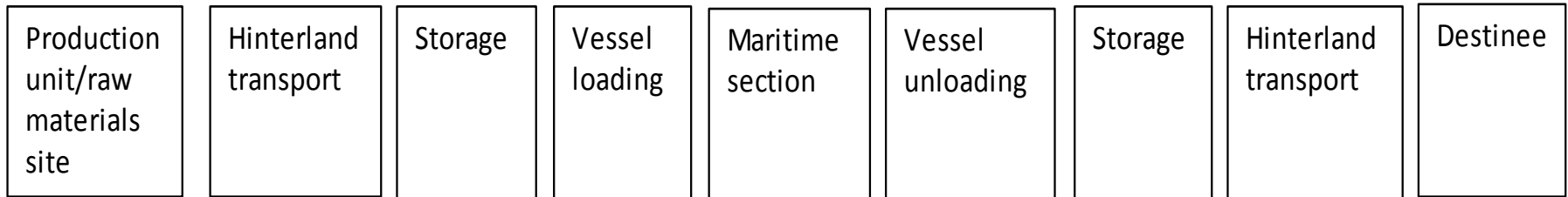
- Innovation is the market introduction of a **technical** or **organisational** novelty, not just its invention.
(Schumpeter, 1939)
- “A **technological** or **organizational** (including cultural as a separate sub-set) change to the **product** (or **service**) or production process that either lowers the cost of product (or service) or production process or increases the **quality** of the product (or service) to the consumer.” *(Arduino et al., 2013)*

DIGITAL TECHNOLOGY: Key innovation types

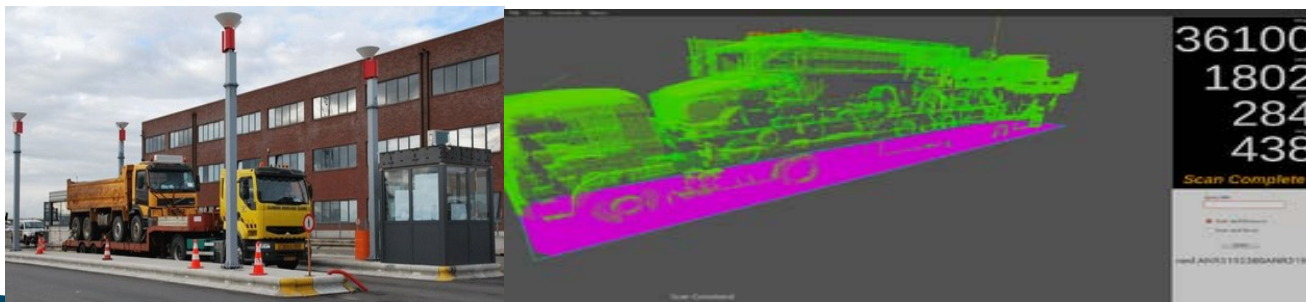
Electronic data interchange innovation (information flow)



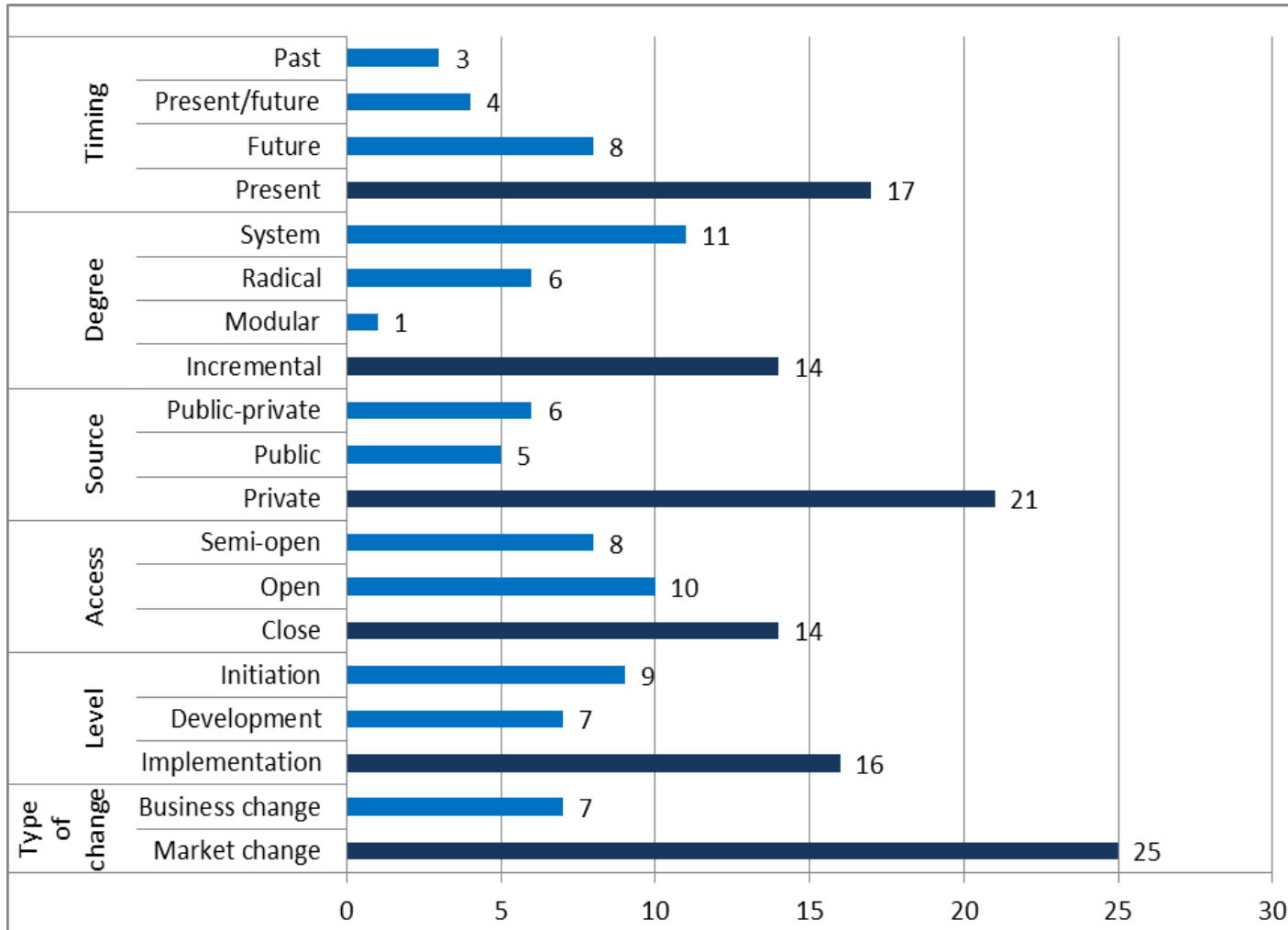
IT innovation supporting the cargo flow



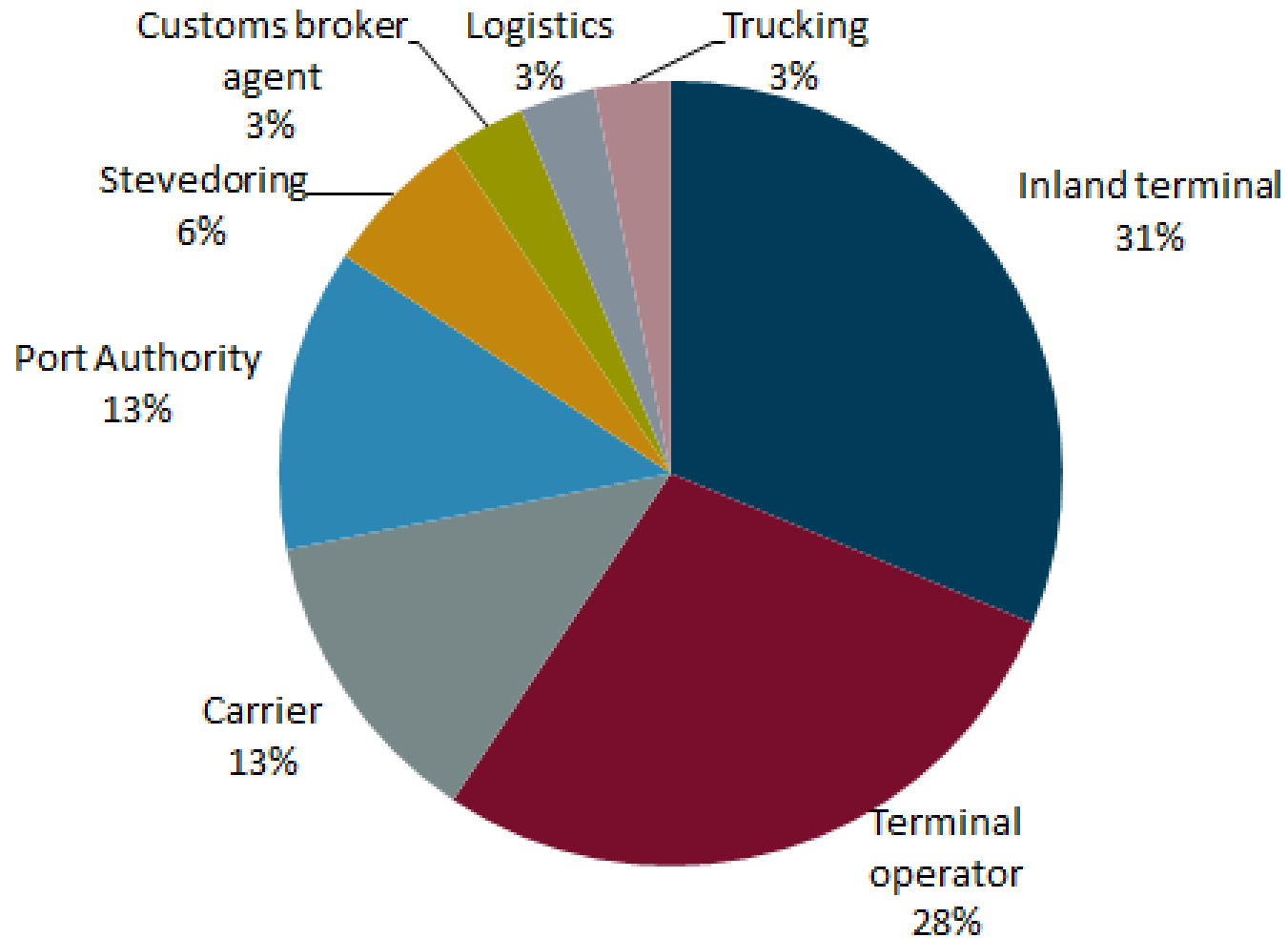
Monitoring innovation - vehicles & cargo



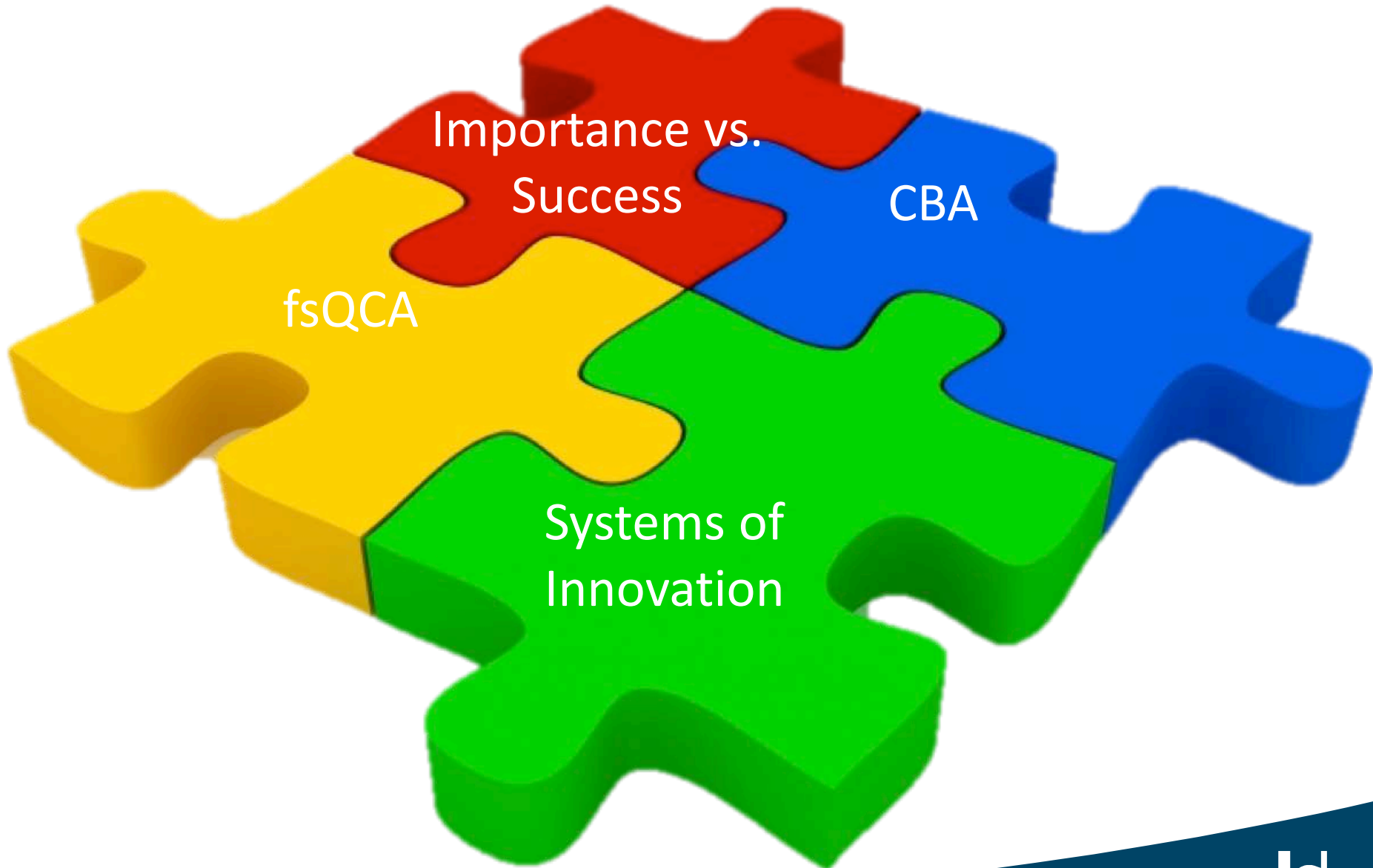
CASE DESCRIPTIVE STATISTICS



INDUSTRY INVOLVED

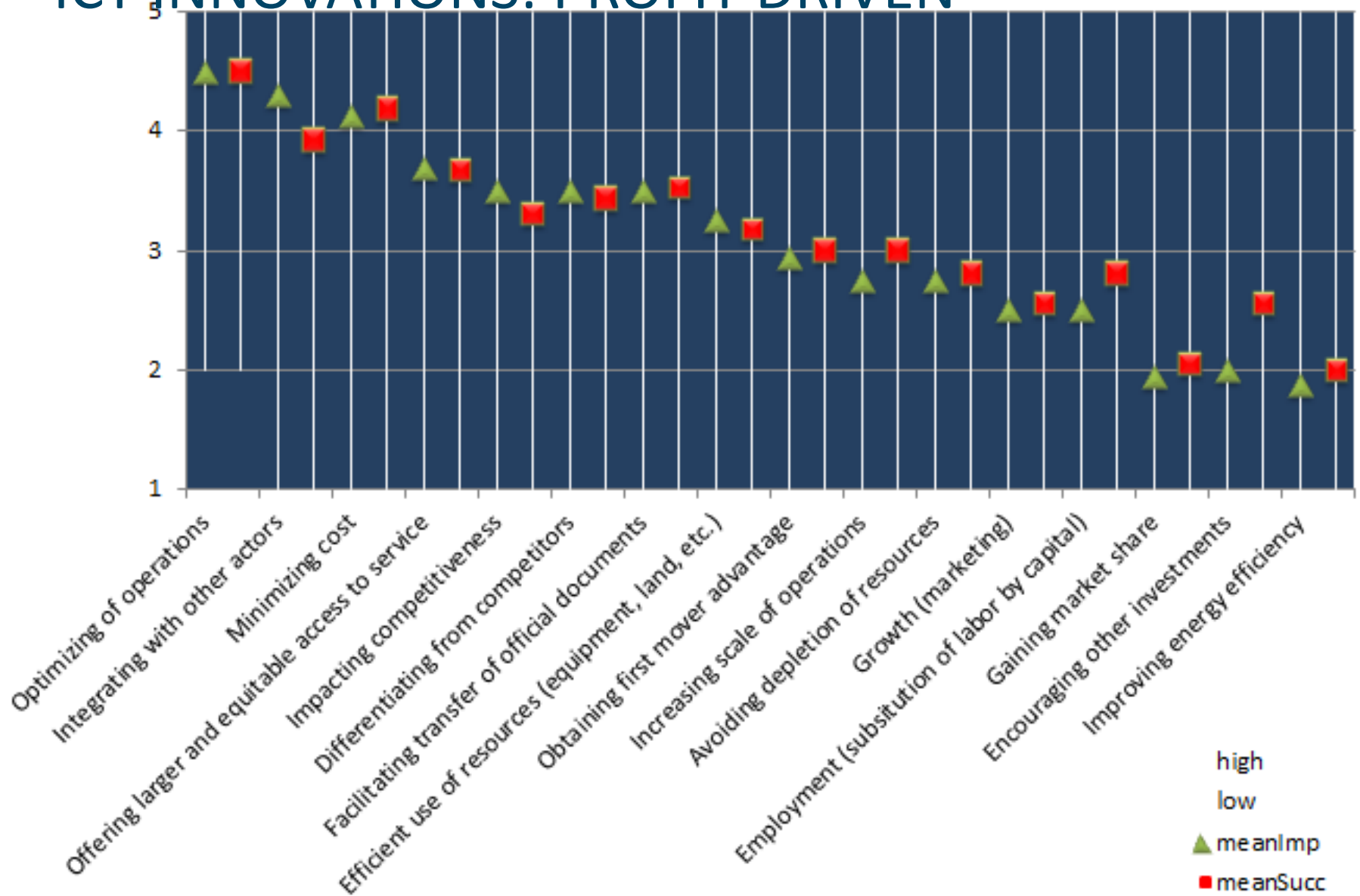


MULTIPLE ANALYSIS APPROACH



Importance vs Success

ICT INNOVATIONS: PROFIT DRIVEN





FRAMEWORK FOR DECISION-MAKING

No systematic feasibility or CBA

- Relatively **few** innovation initiatives are initiated as a response to **regulation** or subsidies (5 over 32 cases)
- Equally **few** (8 over 32) are initiated to improve efficiency **independent** from external influences (encouraged by port authorities / associations offering free web applications)
- The **majority** of innovation cases have been initiated as a response to **external pressure** and **competition**.

FsQCA

CONDITIONS TO SUCCESS

- No unique recipe
- Four conditions consistently lead to success:

fsQCA1	Terminal alignment with infrastructure, development and implementation phases
fsQCA2	Shipping line alignment with infrastructure, development and implementation phases
fsQCA3	Soft-institutional involvement of innovation champion in all three stages
fsQCA4	Innovation champion alignment with infrastructure and involvement with hard institutional arrangements in the inititation phase

FsQCA

CONDITIONS TO SUCCESS: CASES

fsQCA success condition ICT Innovation cluster	fsQCA 1	fsQCA 2	fsQCA 3	fsQCA 4	
Electronic data interchange innovation (information flow)	APCS				
	Administration (EDI)		Administration (EDI)		
	IT data management				
	SEAGHA - port community system				
			eTransit (prior to the Extended GATE)		
IT innovation supporting the cargo flow	3PL - Primary Gate of Leixões Port				
Monitoring innovation - vehicles & cargo	Autotrakker			Truck Appointment System	

SYSTEMS OF INNOVATION



1. The importance of capabilities (external knowledge and financing)
 - No financial support
 - Important: knowledge capabilities
2. The importance of market push
3. The cooperation of all actors involved
4. The ability of the innovation champion to influence actors and outcome

JOINT LESSONS



- Preliminary research: barriers:
 - Lack of collaboration between actors
 - Need for further integration along the maritime supply chain
 - Uncertainty about legislation
 - Drifting apart of the local needs and the strategic decisions made by headquarters as a result of globalization
- Cost-Benefit Analysis:
 - Cost and benefits for every stakeholder
 - Benefits usually less visible than costs → low willingness to pay
- Game-theoretical perspective:
 - No willingness to co-operate
 - **regulation against barriers to entry?**

JOINT LESSONS



- Imitation, triggered by entry costs: if all stakeholders are in from the beginning, greater success
- Role of innovation champion limited by:
 - Capabilities of all involved partners
 - Market demand
 - Lock-in effects on behalf of the innovation champion
- Stimulating co-opetition: key to successful adoption of innovation + important objective
- Standardisation >> regulation

CONCLUSIONS (1)

- Digital innovation will change the business model of the actors along the maritime supply chain.
- The combination of analyses provides the opportunity for a holistic approach and improved understanding of the digital communication innovation process within the port sector.
- In contrast to the non-ICT innovation cases, alignment exists between company strategies and success in the port sector
- The port sector should be more open to disclose cost and benefit info

CONCLUSIONS (2)

- No unique recipe for port ICT innovation success
- Regulation was not identified as a barrier nor as a facilitator

However, Digital Innovation is facilitated by:

- Actor capabilities,
- Market demand,
- The innovation champion profile
- Cooperation (coopetition, co-innovation) BUT
 - Divergent interests among the stakeholders challenge digital innovation

Thank you for your attention

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