

E-Seals for Efficient Container Logistics

Kateryna Daschkovska

Prof.Dr.-Ing. Bernd Scholz-Reiter

Bremen Institute of Industrial Technology and Applied Work Science (BIBA)
University of Bremen

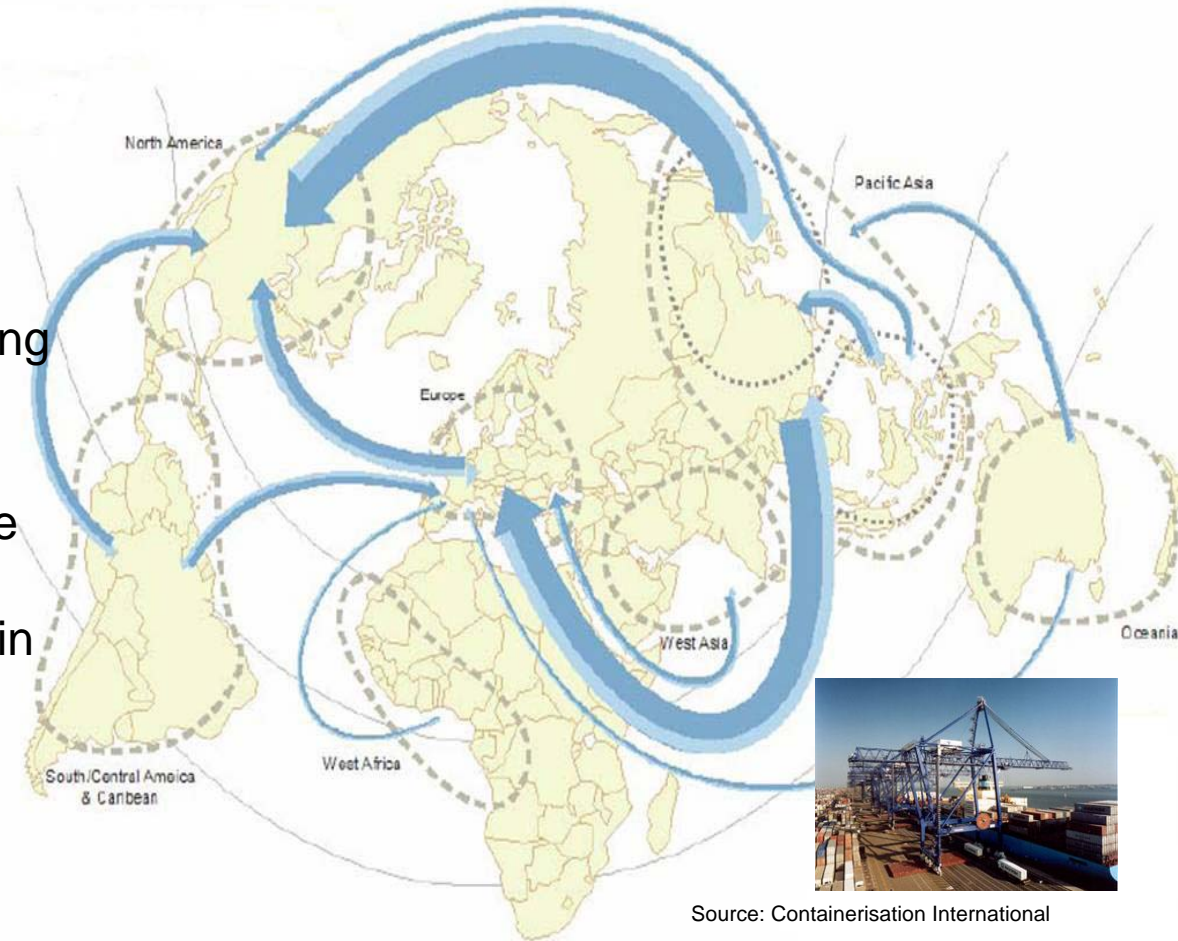
International Conference on Dynamics in Logistics
August 30, 2007, Bremen, Germany

Outline

- Introduction
- Security Programs
- Research Questions
- Container Electronic Seals
- Cost-Effective Investments
 - Container Inspections
 - Scenarios for port container processing
 - Analysis of Results
- Conclusion

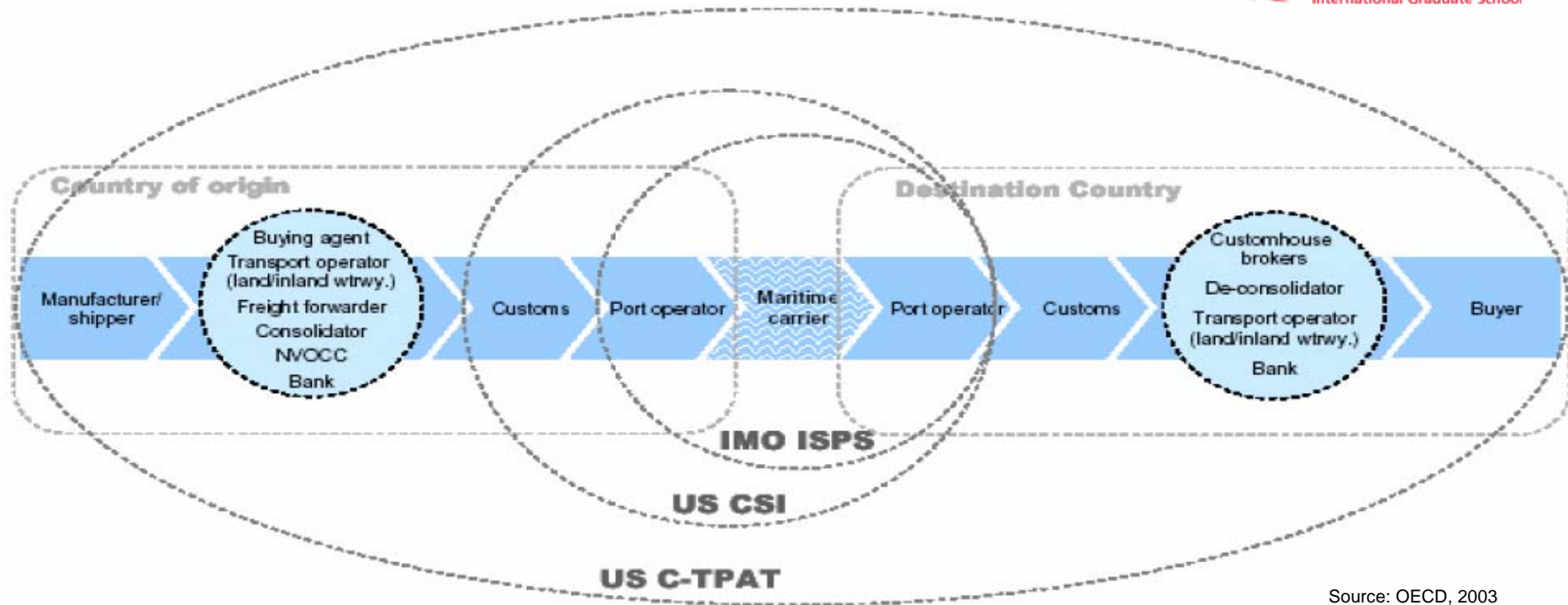
Introduction

- World economy is totally dependent on container transportation processes
- New high security requirements impact the efficiency of ever-increasing “just-in-time” container movements
- The key point affecting the efficiency is customs inspections of containers in the ports
- Technology can be an important bridge between efficiency and security of supply chain process



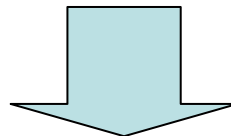
Source: Containerisation International

Security Programs



Source: OECD, 2003

E-seals can serve both commercial and security interests



"GreenLane"

Research Questions

- How can shippers benefit from investments in electronic seals?
- What monetary benefit results from avoiding customs inspections in the ports?
- What type of electronic seal is the most profitable over a 5-year investment period?

Container Electronic Seals

Electronic Seal Data:

- Seal ID number
- Security Status
- User
- Location
- Date
- Time
- Battery Status
- Container ID number
- Environmental Status (temperature, light, etc.)

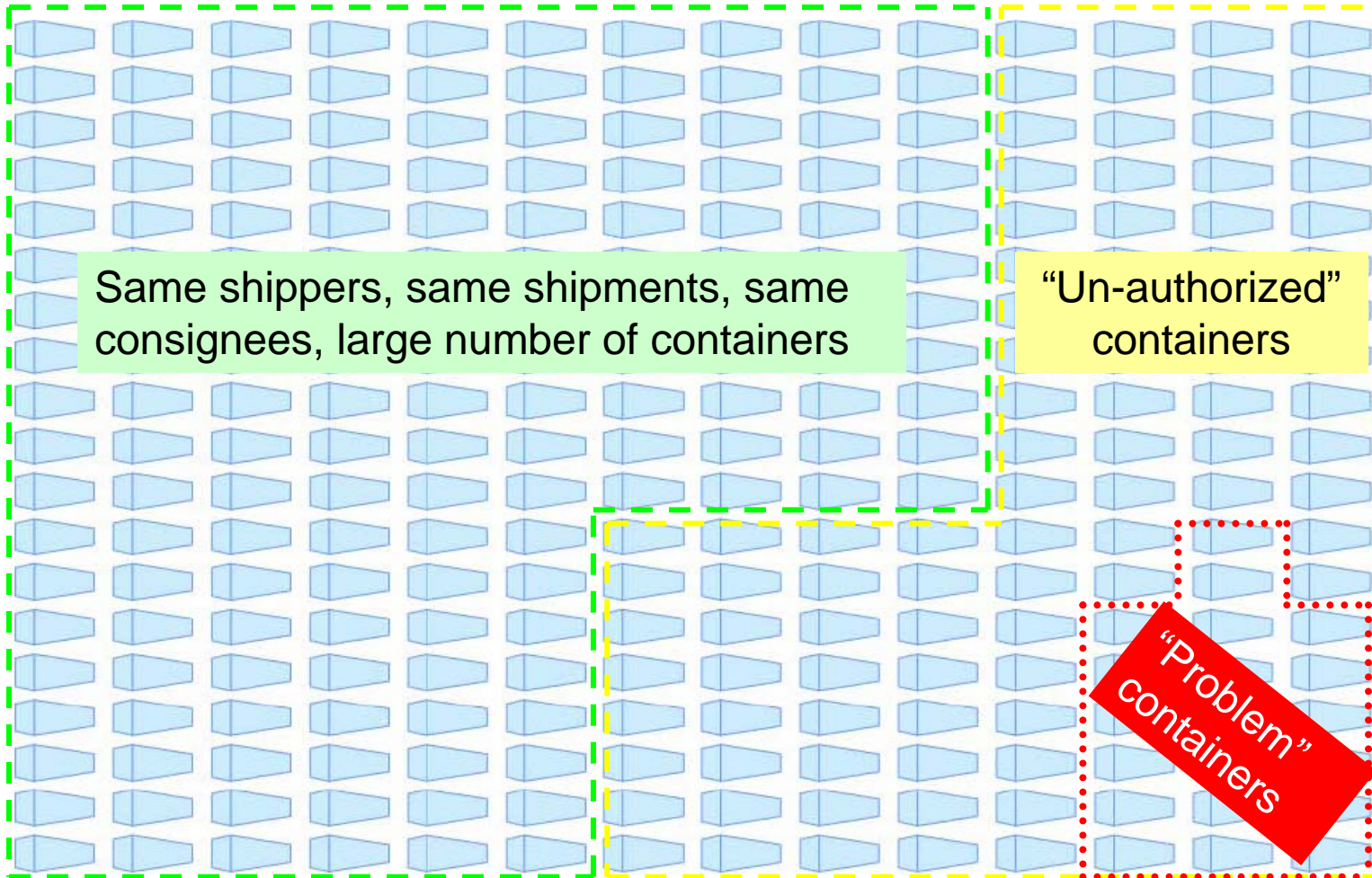
1. Disposable E-seal

2. Reusable E-seal

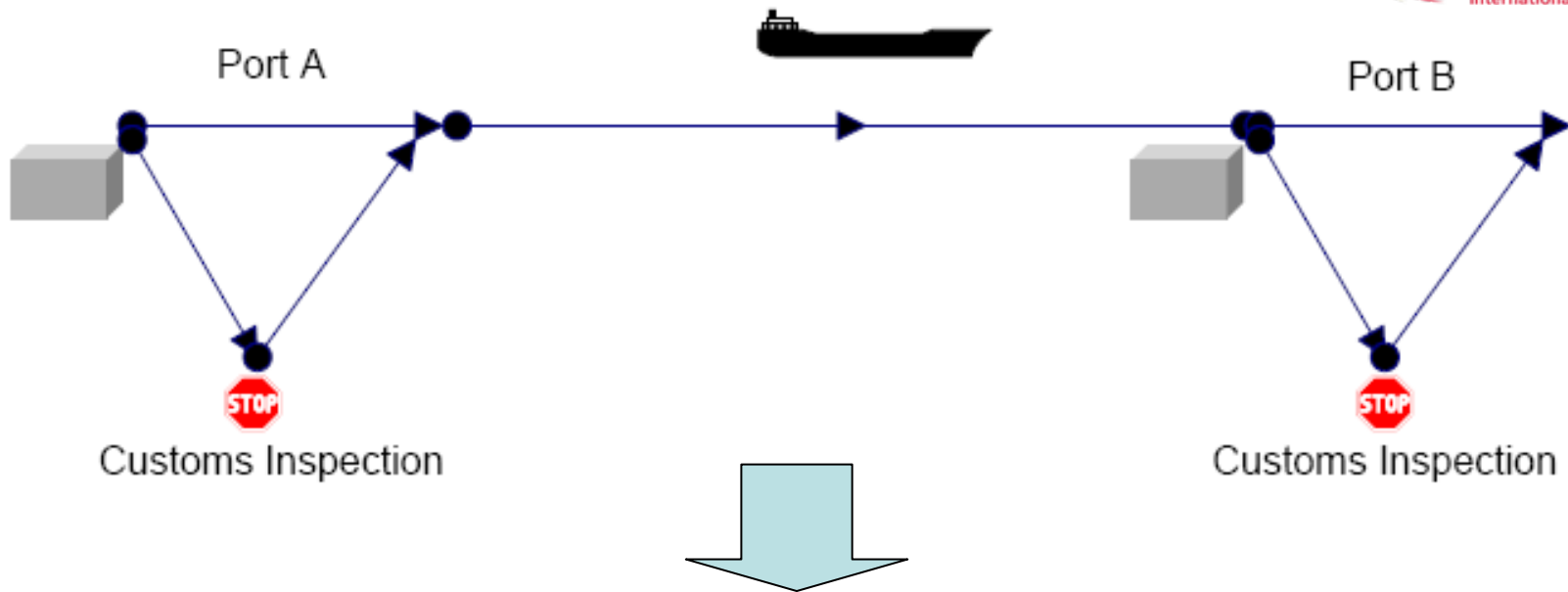
3. Container Security Device



Container Inspections



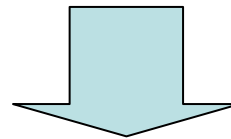
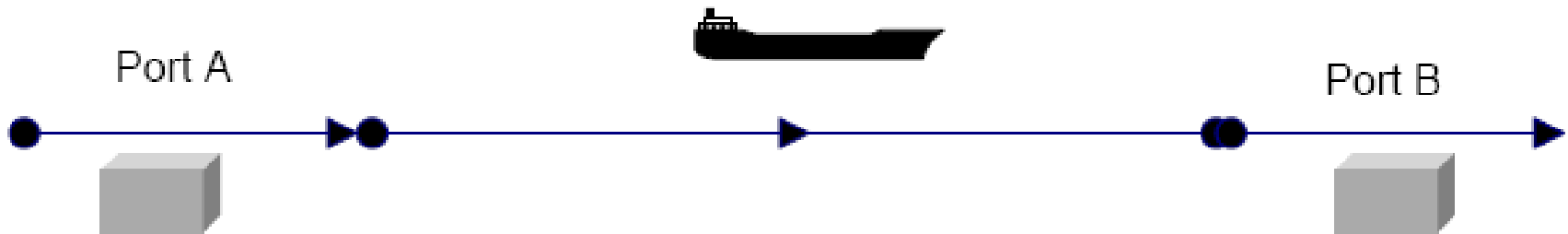
Scenarios for port container processing



Customs Costs (CS)

	CS_A	CS_B	CS_{A+B}
Port A	X	-	X
Port B	-	X	X

Scenarios for port container processing

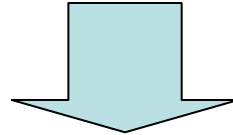


Investments Projects

	Dispoisable Seal	Reusable Seal	Container Security Device
Rent	-	X	X
Buy	X	X	X

Cost-Benefit Analysis

Parameters of the investment values



1. Time value formulas:

- Present Value (PV)
- Net Present Value (NPV)
- Profitability Index (PI)

2. Formulas based on record appraisals:

- Payback Period (PP)
- Return on Investments (ROI)

Analysis of Results

Parameters of the investment values for different types of eSeals

Projects	IC [Mio €]	NPV [Mio €]	PP [years]	PI [%]	ROI [%]
I. "Rent CSD"	20.00	-18.11 ¹ -18.10 ²	40.40 ¹ 40.00 ²	0.09 ¹ 0.09 ²	0.02 ¹ 0.03 ²
II. "Rent reusable eSeal"	2.50	-0.61 ¹ -0.60 ²	5.00 ¹ 5.00 ²	0.75 ¹ 0.76 ²	0.20 ¹ 0.20 ²
III. "Buy CSD"	4.00	-4.41 ¹ -4.39 ²	-38.1 ¹ -38.1 ¹	-0.10 ¹ -0.10 ²	-0.03 ¹ -0.03 ²
IV. "Buy disposable eSeal"	0.25	0.75 ¹ 0.75 ²	0.90 ¹ 0.90 ²	3.98 ¹ 4.02 ²	1.05 ¹ 1.06 ²
V. "Buy reusable eSeal"	0.50	0.50 ¹ 0.48 ²	1.90 ¹ 1.91 ²	1.99 ¹ 1.97 ²	0.53 ¹ 0.52 ²

¹ Customs check randomly 0.5% of containers 2 years after implementation of eSeals;

² "Green lane" advantages are from the first year.

where IC – Investments Costs, NPV – Net Present Value, PP – Payback Period, PI – Profitability Index,
ROI – Return on Investments

Analysis of Results

Parameters of the investment values for different types of eSeals

Projects	IC [Mio €]	NPV [Mio €]	PP [years]	PI [%]	ROI [%]
I. "Rent CSD"	20.00	-18.11 ¹ -18.10 ²	40.40 ¹ 40.00 ²	0.09 ¹ 0.09 ²	0.02 ¹ 0.03 ²
II. "Rent reusable eSeal"	2.50	-0.61 ¹ -0.60 ²	5.00 ¹ 5.00 ²	0.75 ¹ 0.76 ²	0.20 ¹ 0.20 ²
III. "Buy CSD"	4.00	-4.41 ¹ -4.39 ²	-38.1 ¹ -38.1 ¹	-0.10 ¹ -0.10 ²	-0.03 ¹ -0.03 ²
IV. "Buy disposable eSeal"	0.25	0.75¹ 0.75²	0.90¹ 0.90²	3.98¹ 4.02²	1.05¹ 1.06²
V. "Buy reusable eSeal"	0.50	0.50 ¹ 0.48 ²	1.90 ¹ 1.91 ²	1.99 ¹ 1.97 ²	0.53 ¹ 0.52 ²

¹ Customs check randomly 0.5% of containers 2 years after implementation of eSeals;

² "Green lane" advantages are from the first year.

where IC – Investments Costs, NPV – Net Present Value, PP – Payback Period, PI – Profitability Index,
ROI – Return on Investments

Analysis of Results

Parameters of the investment values for different types of eSeals

Projects	IC [Mio €]	NPV [Mio €]	PP [years]	PI [%]	ROI [%]
I. "Rent CSD"	20.00	-18.11 ¹ -18.10 ²	40.40 ¹ 40.00 ²	0.09 ¹ 0.09 ²	0.02 ¹ 0.03 ²
II. "Rent reusable eSeal"	2.50	-0.61 ¹ -0.60 ²	5.00 ¹ 5.00 ²	0.75 ¹ 0.76 ²	0.20 ¹ 0.20 ²
III. "Buy CSD"	4.00	-4.41 ¹ -4.39 ²	-38.1 ¹ -38.1 ¹	-0.10 ¹ -0.10 ²	-0.03 ¹ -0.03 ²
IV. "Buy disposable eSeal"	0.25	0.75¹ 0.75²	0.90¹ 0.90²	3.98¹ 4.02²	1.05¹ 1.06²
V. "Buy reusable eSeal"	0.50	0.50¹ 0.48²	1.90¹ 1.91²	1.99¹ 1.97²	0.53¹ 0.52²

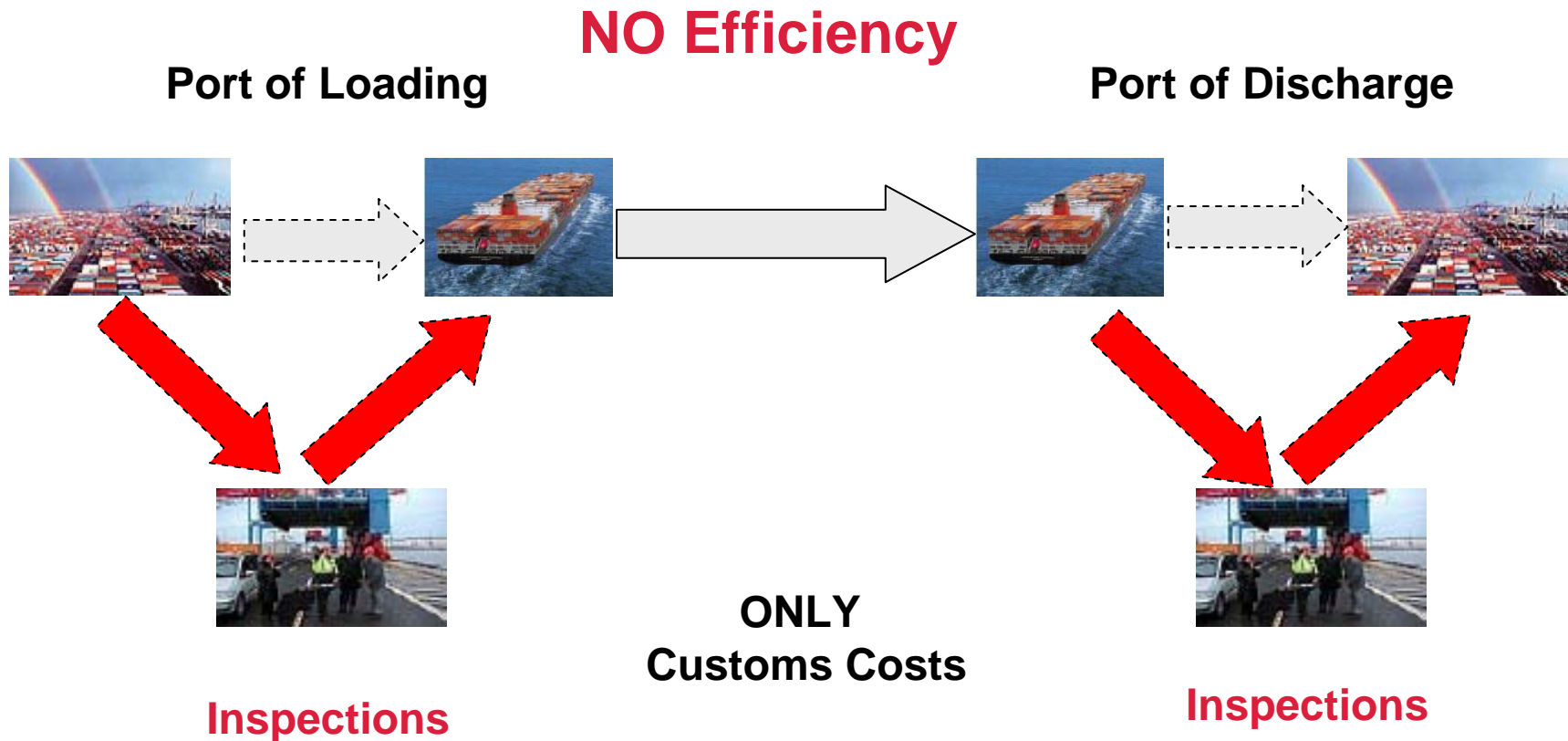
¹ Customs check randomly 0.5% of containers 2 years after implementation of eSeals;

² "Green lane" advantages are from the first year.

where IC – Investments Costs, NPV – Net Present Value, PP – Payback Period, PI – Profitability Index,
ROI – Return on Investments

Conclusion

Inefficiency caused by Security Inspections

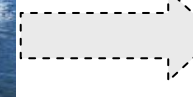
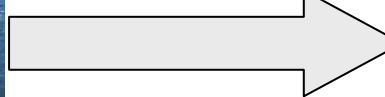


Conclusion

More Efficiency via Less Customs Scrutiny

Container Chain Efficiency

Port of Loading



Port of Discharging

NO more STOPS for CUSTOMS scrutiny

Monetary BENEFIT from using E-Seals in LESS than 1 YEAR

POSITIVE influence of investing in E-Seals on EFFICIENCY of container business

E-seals for Efficient Container Logistics

Thank you for your attention!

Kateryna Daschkovska
dka@biba.uni-bremen.de