TOWARDS A SELF-ORGANIZING LOGISTICS SYSTEM: IDENTIFYING THE VALUE OF SOLS FOR DIFFERENT STAKEHOLDERS AND TRANSITION-PHASES

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Outline

- Introduction: drivers towards SOL?
- SOL and stakeholder perspective
- Transition towards a SOL system
  1. optimize own logistics network
  2. exchange with other networks
  3. self-organizing logistics system
- Concluding remarks

INTRODUCTION: DRIVERS TOWARDS SOL?

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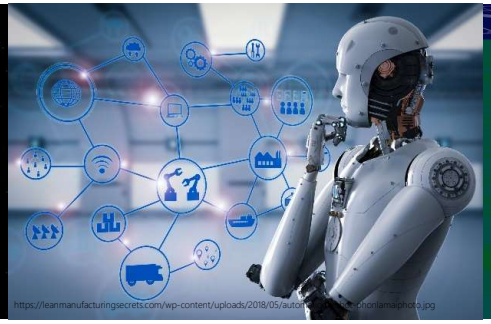
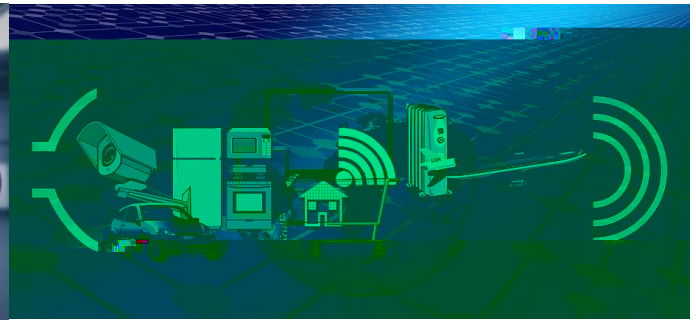
The logistics system is organized has to change in order to be sustainable; external factors that are driving the existing system towards changes:

- Decarbonization requirements
- Developments in automation and robotization
- Full connectivity in the physical world
- A more demanding end receiver





SOL AND STAKEHOLDER PERSPECTIVES

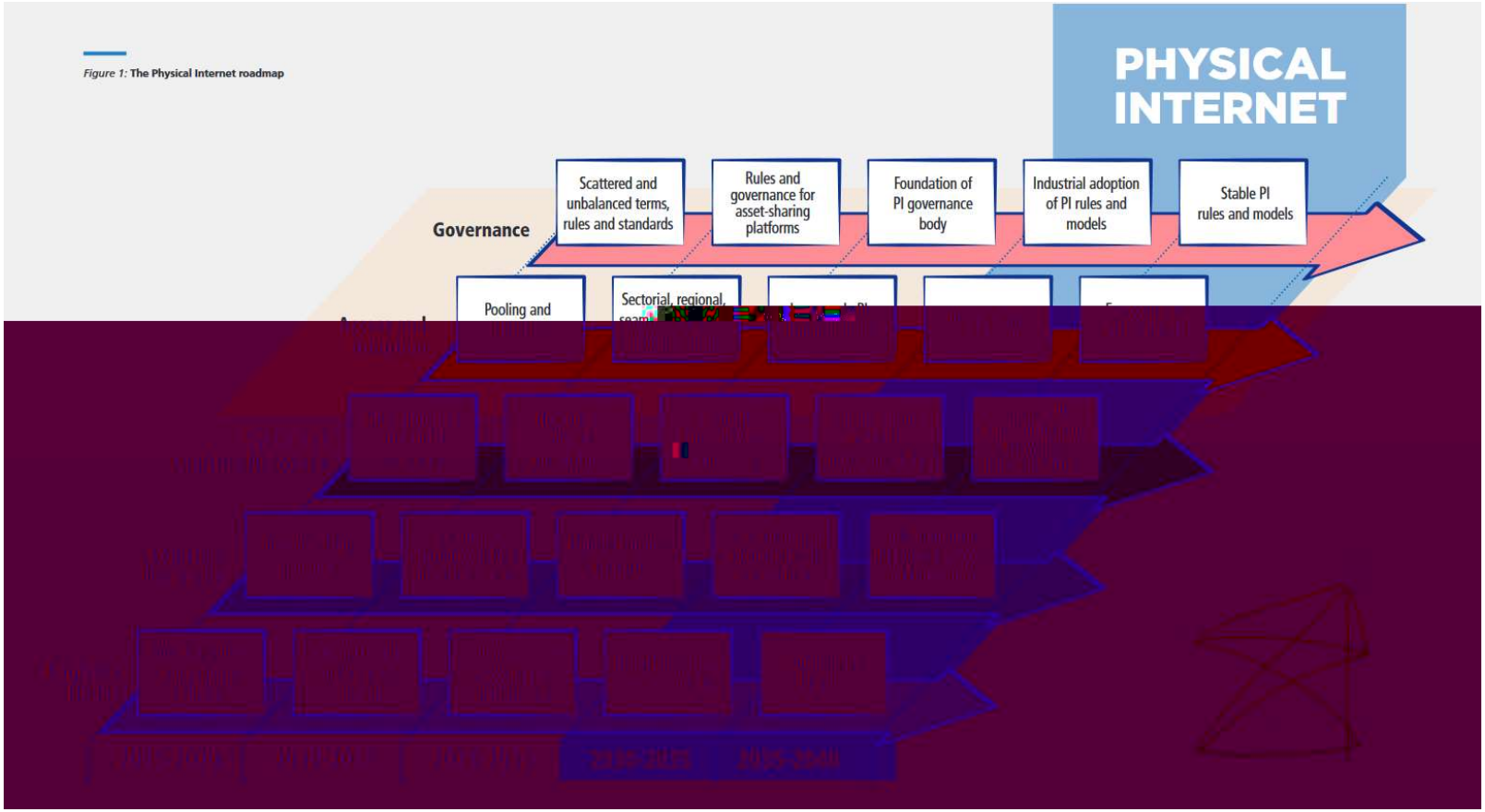


Figure 1: **The Physical Internet roadmap**

Source: ALICE (2020) Roadmap to the Physical internet

Pan et al. (2017):
1. Openness
2. Intelligence
3. Decentralised control

are the three main functionalities of Self-organizing logistics system,

PI can be seen as an application of SOL

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SOL AND STAKEHOLDER PERSPECTIVES

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- Most of the PI literature that is earmarked as the business model theme by Treblmaier et al. (2020) is concerned with the conceptualization of the main PI components such as interconnected logistics networks, PI hubs, containers and vehicles.

- In the emergence of the PI literature it was already recognized that the PI could have a potential impact on current business models:

  "The Physical Internet provides numerous opportunities for enhancing existing business models and designing novel business models. It can transform unprofitable or unreachable markets and ideas into attractive business opportunities" (Montreuil et al., 2012; pp.35).

TRANSITION TOWARDS A SOL SYSTEM: EXPLORING STAKEHOLDER VALUE

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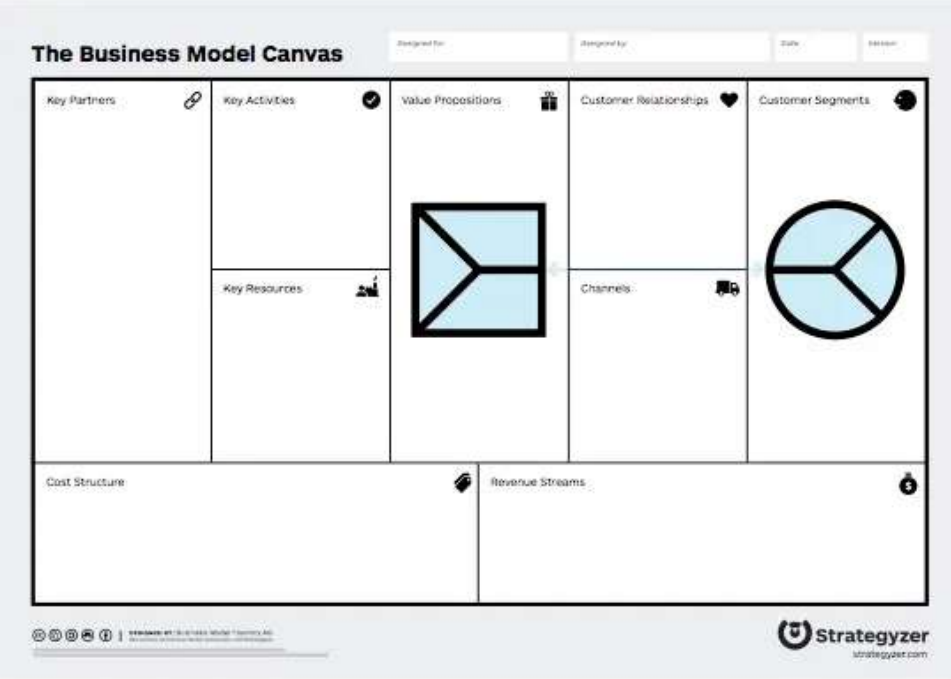

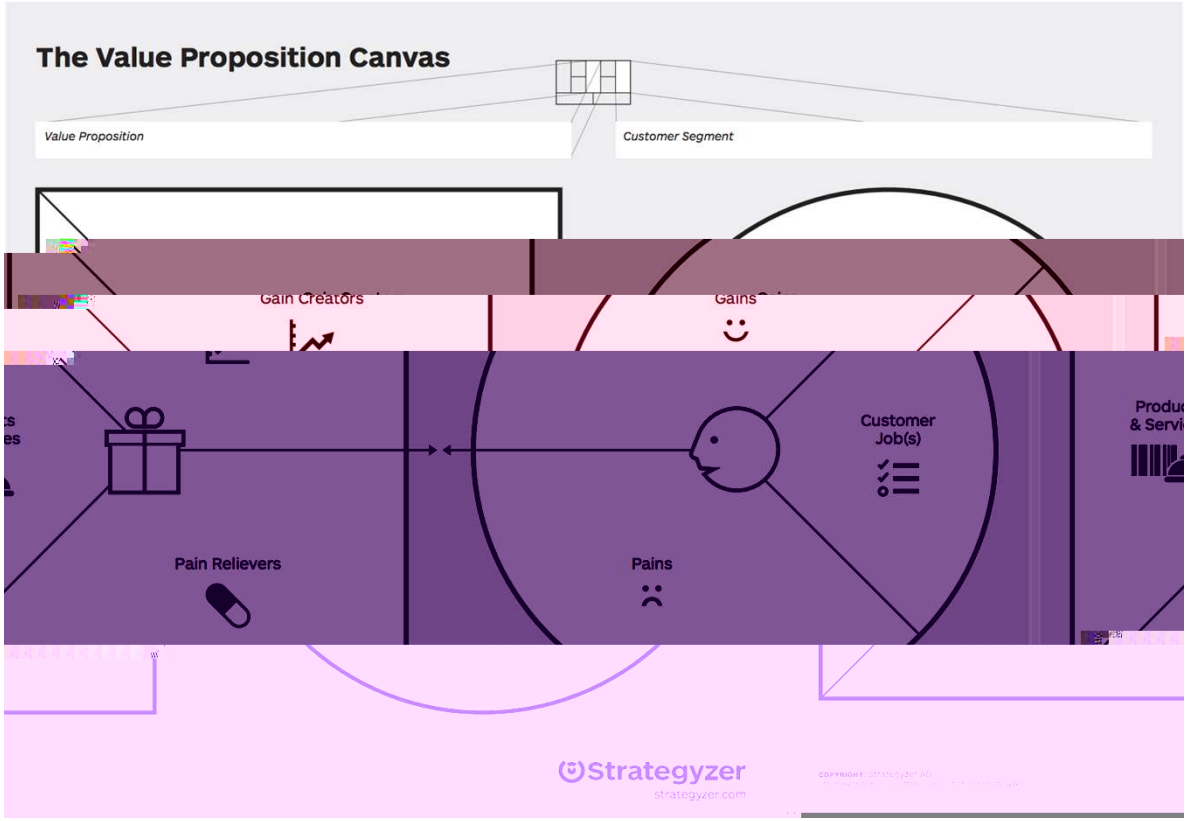

Source: The Business Model Canvas and the Value Proposition Canvas. Osterwalder and Pigneur (2010) and Osterwalder et al., (2014); reproduced from Strategyzer.com

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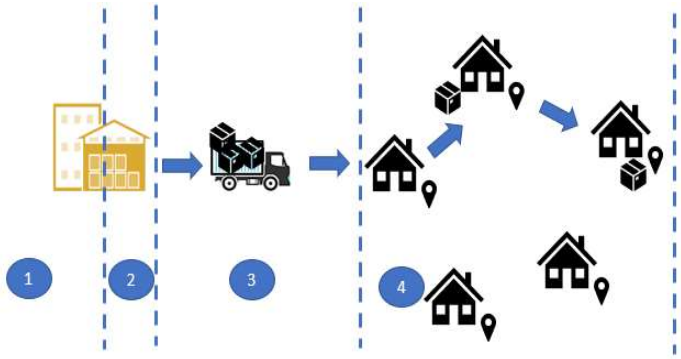
SOLID (Self-organizing Logistics in Distribution)

Experimenting with promises / ideas of SOL in real life

1. More dynamically planning delivery areas based local information
2. Adding local intelligence in order to reduce handling activities
3. Continuous replanning of delivery routes based on receiver feedback
4. Making local intelligence of good-performing drivers available

- Simulation environment (complementing case 1+ 3)
- Learning environment for developing future steps



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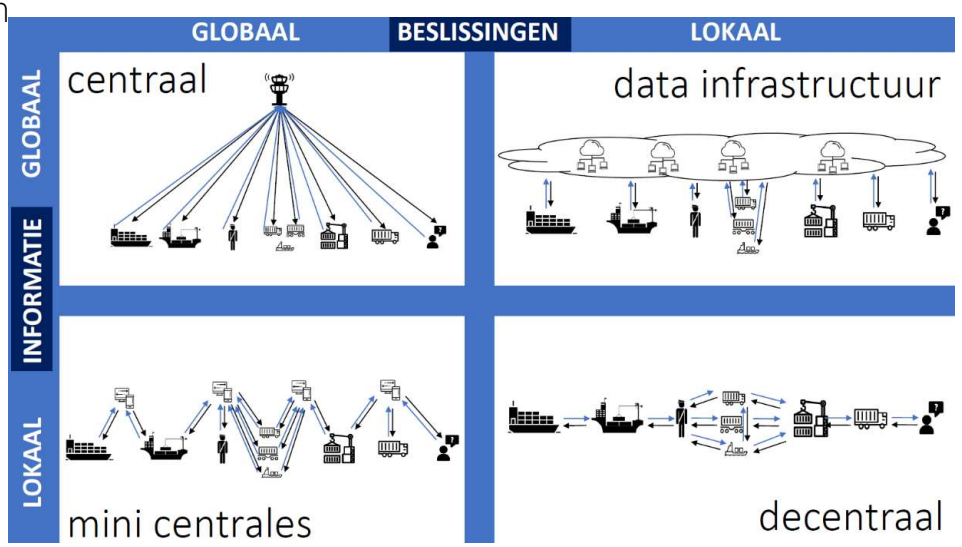
SOL-port (Self Organizing Logistics in the Port)

This research focuses on the potential of decentralized management (self-organisation) or hybrid forms and the added value compared to centralized management in the port and hinterland transport.

- Under what circumstances and for what type of chains what form of control (central/decentralized/intermediate form) is the most suitable
- what does it mean for the parties involved in logistics
- what its advantages and disadvantages are.



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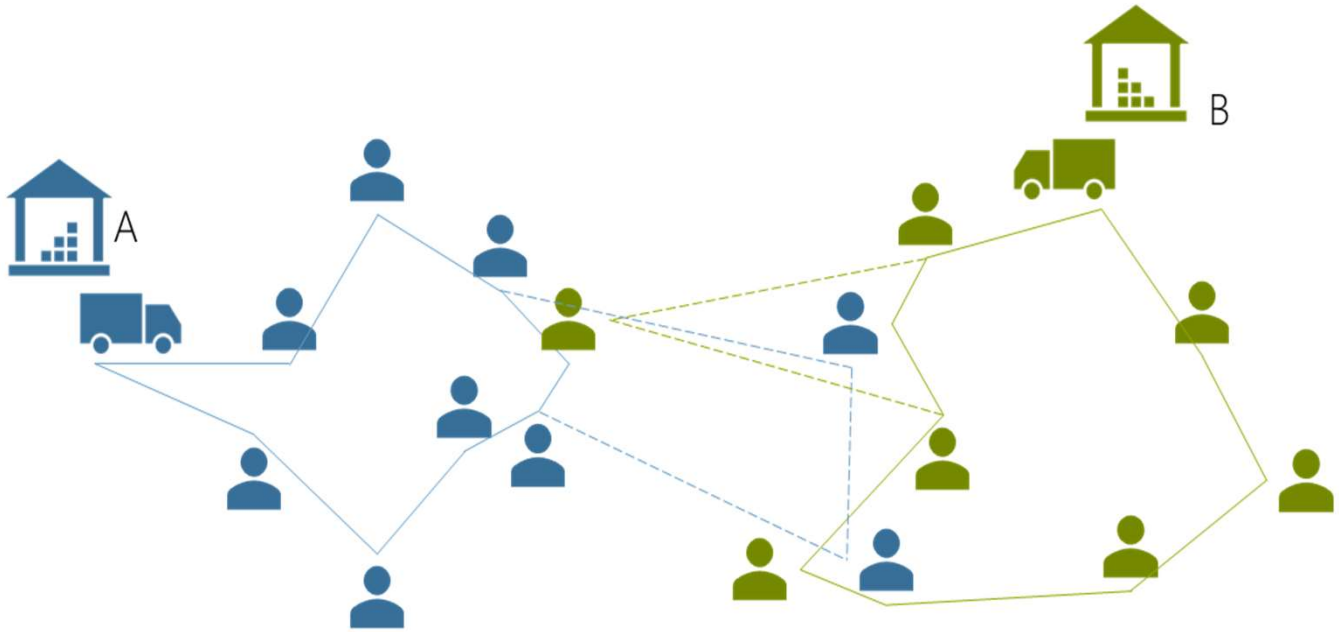
TRANSITION TOWARDS A SOL SYSTEM: EXPLORING STAKEHOLDER VALUE

- Scenario 1. optimize the own logistics network

Stakeholder group	Role/ Cares about	✓ Potential gains	Potential pains
Shipper 	Selling products. Agreeing service contracts with transporters. Good service to final receiver.	✓ Goods delivered ✓ Being able to create customer intimacy by offering customized delivery services via LSP	- Offering specific delivery options for reasonable costs
Receiver 	Receives ordered goods at preferred location. Wants to feel serviced and treated well (customer intimacy)	✓ Goods delivered at time, location of choice and receiver does not necessary have to go to the store	- Only one daily timeslot is available for the consumer to receive the goods. - No/ limited influence on timeslot.
Municipality, Community, Society 	Cares about livable environment; clean air, congested-free roads.		- Number of delivery vans/bike messengers remains the same, Increased customized services might increase freight traffic - Optimization single logistics network does not affect congestion, air pollution and vehicle emissions
	Value proposition	Gain creator	Pain reliever
Logistics Service Provider/ Transporter 	Fulfilling shippers request by servicing final receivers at low costs. Timely delivery of goods while optimizing vehicle movements.	✓ Optimizing load factor of delivery vans/bike messengers ✓ Automation of planning eliminates central planner; time is saved as decisions on routes are made based on local information ✓ Flexibility in offering extra services	- Feeling of lack of control in case there is no direct receiver-contact; - Lack of trust with collaborating partner.

TRANSITION TOWARDS A SOL SYSTEM: EXPLORING STAKEHOLDER VALUE

- Scenario 2. exchange with other networks



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- Scenario 2. exchange with other networks

Stakeholder group	Role/ Cares about	✓ Potential gains	Potential pains
Shipper 	Selling products. Agreeing service contracts with transporters. Good service to final receiver.		- Lack of influence on which transporter will service final receiver
Receiver 	Receives ordered goods at preferred location. Wants to feel serviced and treated well (customer intimacy)	✓ Bundled deliveries	- No influence on delivery time
Municipality, Community, Society 	Cares about liveable environment; clean air, congested-free roads.	✓ Bundled deliveries might reduce vehicle movements in neighborhood	- Double parking by transport companies in neighborhood
Logistics Service Providers/ Transporter 	Fulfilling shippers request by servicing final receivers. Timely delivery of goods while optimizing vehicle movements.	✓ Optimizing load factor (of delivery vans);	- Feeling of lack of control in case there is no direct consumer-contact; - Lack of trust with collaborating partner. - Less visible at receiver
	Value proposition	Gain creator	Pain reliever
Logistics Service Providers/ Transporter 	Together with partner provide higher service at lower costs, reduce number of vans in neighborhoods	✓ Higher drop density provides possibilities for service customization ✓ Higher service to receiver	- Less vans in neighborhood and / or streets (not necessary fewer kilometers though)

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TRANSITION TOWARDS A SOL SYSTEM: EXPLORING STAKEHOLDER VALUE

- Scenario 3. self-organizing logistics system

Stakeholder group	Role/ Cares about	✓ Potential gains	Potential pains
Shipper 	Selling products. Agreeing rules with receiver on conditions of transported goods.	✓ No contracts with specific LSPs needed ✓ Customized service based on receivers' demands	- Hard to differentiate in offering (delivery) services as receiver can set conditions
Receiver 	Receives sets conditions for delivery: ordered goods at preferred time and location. Wants to feel serviced and treated well (customer intimacy).	✓ Bundled deliveries ✓ Possibilities to steer on deliveries and set conditions	
Municipality, Community, Society 	Cares about liveable environment; clean air, congested-free roads; sets conditions on space utilization, emissions and …	✓ Bundled deliveries might reduce vehicle movements in neighborhood	- Reduction externalities - System does not automatically develop in desirable direction (risk for race to the bottom in delivery-employment)
Logistics Service Providers/ Transporter 	Sets conditions on availability of assets		- Lack of control in case there is no direct consumer-contact; - Lack of trust with collaborating partner. - Less visible at receiver and shipper
	Value proposition	Gain creator	Pain reliever
SOL system	Provide open, intelligent and decentralized controlled network to fulfil requirements within conditions	✓ Possibilities for highly customized services	- Reduction externalities

CONCLUDING REMARKS

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- Identified the incentives and barriers for the different stakeholders in the transition towards a more self-organizing logistics system.
- These results help us to understand how to steer the developments, that follow from the external factors, in the changing logistics system in a more sustainable way, as well as to identify the main actors in the different transition-phases that have an interest and are able to cause a change the system.
- SOL (applications) might improve the operations within logistics networks or even in (closed) collaboration between networks.
- The last scenario, the SOL systems shows that this requires – especially for LSPs – a new way of thinking, On a system level, this SOL system might lead to the highest benefits. However, it remains uncertain whether this is enough for making a transition towards SOL happen by itself, since there are quite some barriers for LSPs.
- The question is what stakeholder from what role needs to take initiative towards the transition to a more SOL system.
- This contribution suggests that, without such a stakeholder, it might be very likely that we do not arrive at a SOL system, but might end up in (a number of competitive closed cooperative) networks that are dominated by stakeholders that have a strong position in the existing logistics system; as in scenario 2.

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