

Investigating the benefits of implementing logistics and supply chain resilience strategies:

Perspective from Japanese manufacturing companies

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Outline of presentation

1. Introduction
2. Literature review
3. Research methods
4. Findings
5. Summary and conclusion
6. Implications

List of abbreviations and definitions

List of abbreviations

LE	Large enterprises
SME	Small and medium enterprises
SC	Supply chain
SCREST	Logistics and supply chain resilience strategy
TE&M	Transport equipment and machinery manufacturing

Definitions

Large enterprises: 300 employees or more or capital 300 million yen or more. ¹

Small and medium enterprises: 10 or more employees, 299 or less, or capital of 0 yen or more, less than 300 million yen. ¹

Logistics and SC Resilience: The ability to be prepared for unexpected risks, respond to and recover quickly from potential disruptions to return to its original situation or grow by moving to a new, more desirable state to increase customer service, market share, and financial performance (Hohenstein et al. 2015).

SCRESTs: The strategies adopted to avoid, withstand, respond, and recover quickly from the impacts of the disruption on various activities.

[1] Statistics Bureau of Japan, <https://www.stat.go.jp/english/data/e-census/2016/industry.html#e>

INTRODUCTION

Supply chain disruptions

COVID-19 pandemic-led SC disruptions have affected every aspect of life.

Racing to meet global chip demand

Toyota Vehicle Output Shrinks Before Planned Production Hike

- Firm made 634,940 vehicles in May, down 5.3% from year earlier
- Automaker sold 761,466 units, also lower than May last year

USINESS / CORPORATE

Nissan keeps annual profit forecasts and cuts unit sales target

SC disruptions cost the average organization 45% of one year's profits over the course of a decade (McKinsey & Company, 2021).

Source:

2. NHK News, <https://www3.nhk.or.jp/nhkworld/en/news/backstories/2034/>, June 29, 2022

3. <https://www.bnnbloomberg.ca/toyota-vehicle-output-shrinks-before-planned-production-hike->, June 29, 2022

4. <https://www.japantimes.co.jp/news/2023/02/09/business/corporate-business/nissan-annual-profit-forecast-same/>, February 9, 2023



- **Resilient logistics and SCs** are and will be highly important to **combat disruptions** in the SC (Klibi et al., 2010; Dixit et al., 2016; Xu et al., 2020).
- Resilient logistics and SCs are essential for **national security, economic security, technological leadership, and fulfilling the needs and wants of people.**

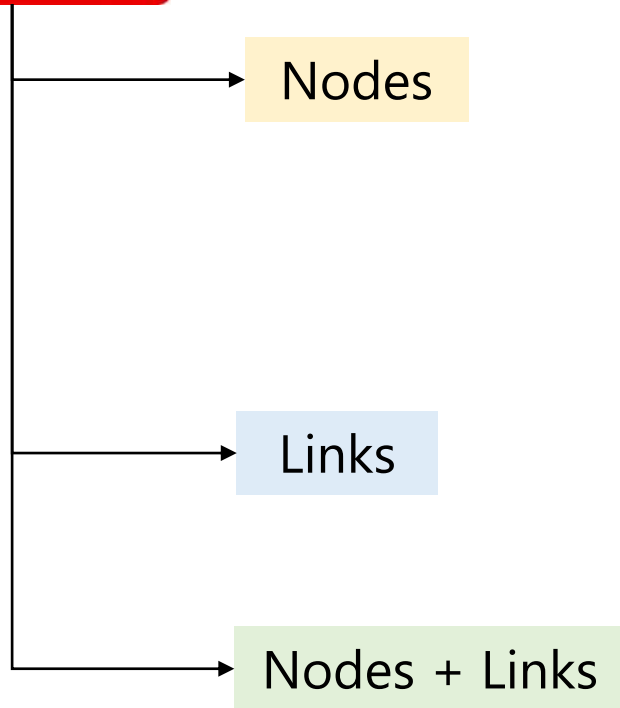
How to can Logistics and SCs be made resilient?

Implementation of SCRESTs

SCRESTs (Logistics and SC resilience strategies)

Strategies adopted to avoid, withstand, respond, and recover quickly from the impacts of the disruption on various logistics and SC activities.

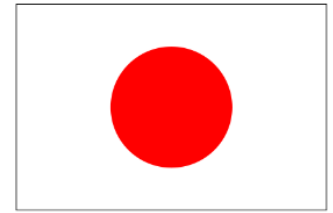
Disruption



SCRESTs

1. Multiple sourcing
2. Facility dispersion
3. Backup supplier
4. Lateral transshipment
5. Facility fortification
6. Facility redundancy
7. Inventory prepositioning
8. Adding extra production capacity
9. Rerouting
10. Collaboration
11. Business continuity plan

Enhancing national resilience is one of the Japanese government's top priorities.



JAPAN GOV
THE GOVERNMENT OF JAPAN

The transportation and logistics sector is considered one of the sectors contributing to national resilience (Cabinet Decision, 2018).

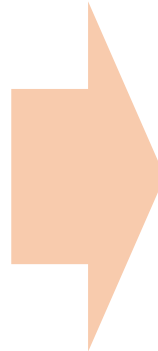
Government initiatives to improve SC resilience,

- Providing subsidies for implementing resilience strategies (The Japan Times, 2020)
- Promoting investment in Japan to strengthen SCs (METI, 2022)
- Investing in SC resilience in the Indo-Pacific (Suzuki, 2022)

Implementation of SCRESTs is critical to enhancing logistics and SC resilience.

Issues

- Investment necessity
- Difficult to monetize payback
- No clarity on its benefits
- Unpredictability of disruptions



Ways forward

- Training and education
- Provide government subsidies.
- Law enforcement.
- **Illustrating the benefits of SCRESTs.**

Research objective

To investigate whether the implementation of SCRESTs is beneficial to deal with the negative impacts of the COVID-19 pandemic.

Research questions

RQ1: Have companies benefitted from implementing SCREST to deal with the negative impacts of the COVID-19 pandemic on their performance?

RQ2: Have companies benefitted from implementing SCREST to deal with the negative impacts of the COVID-19 pandemic on their logistics and SC activities?

Literature review

The resilience of logistics and SC can be improved by the implementation of resilience strategies.

(Baghersad and Zobel, 2021; Li et al., 2020; Ozdemir et al., 2022)

- During COVID-19 most companies failed to adopt strategies for improving their SC resilience (Remko, 2020).
- Types of resilience strategies implemented have been investigated (Prataviera *et al.*, 2022; Belhadi *et al.*, 2021; Chowdhury *et al.*, 2021; Trabucco and De Giovanni, 2021; Hoek, 2020; Zhu et al., 2020).

Studies investigating the status of implementation of SCRESTs are lacking in the literature.

Impacts of the COVID-19 pandemic

Several studies (Cai and Luo, 2020; Xu et al., 2020; Zhu et al., 2020; Magableh 2021) have summarized the impact of COVID-19 on SCs as

- Supply and demand shocks
- Bullwhip effect
- Increase in transportation and requirement costs
- Production interruption of raw materials and spare parts
- Logistics setbacks

The specific impacts on firm performance and logistics and SC metrics have not been investigated yet.

Benefits of SCRESTs

Maharjan and Kato
(2022)

Contradictory results:
Resilience measures reduce total costs as well as increase SC costs.

Kamalahmadi et al.
(2022)

Backup suppliers is beneficial to minimise expected SC costs and maximise expected service delivery.

Alfarsi et al. (2019)

SC resilience influences financial performance, service quality, reliability, and business attractiveness.

Still unclear if the investment in SCRESTs is beneficial in terms of firm performance and logistics and SC activities.

Research gap and contribution

Research gap

1. It is still unclear if the implementation of SCRESTs is beneficial.
 - Only a few studies have investigated the topic.
 - Existing studies lack logistics and SC focus.
2. Empirical research investigating the benefits of SCREST using real-life cases is generally lacking.

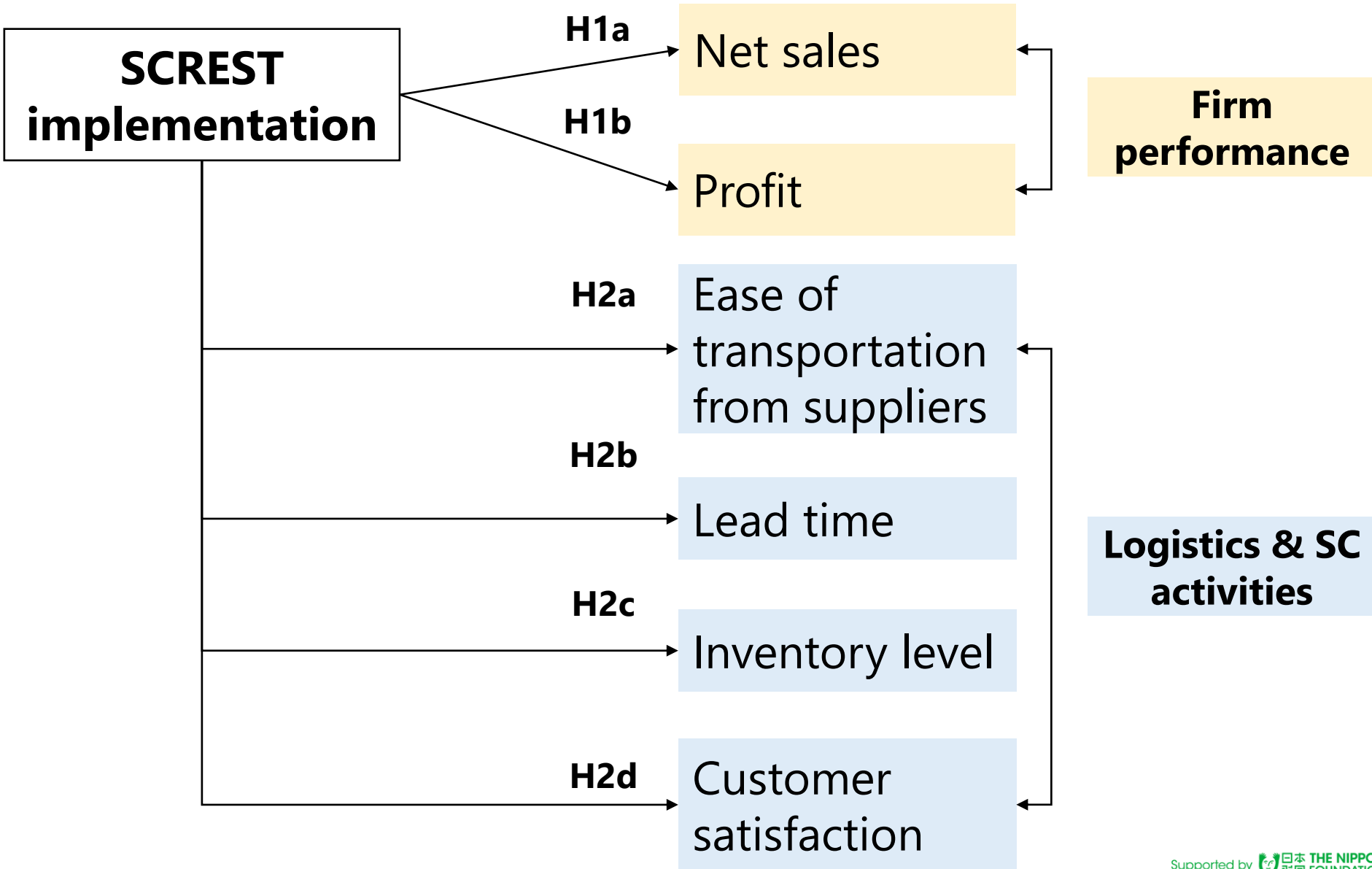
Research Contribution and Novelty

The **first empirical study** to investigate the benefits of implementing SCRESTs using company performance and logistics & SC activities as evaluation metrics using a real-life scenario.

Research methods

- Hypothesis development
- Questionnaire design
- Sample selection
- Data collection
- Benefit analysis

Hypothesis development



Literature review

Interviews



Structured questionnaire

Survey Questionnaire outline

1. Profile of the companies
2. Profile of the respondents
3. Impacts of the COVID-19 pandemic
4. SCRESTs implementation status
5. Benefits of implementing SCRESTs

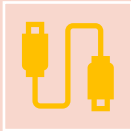
Sample selection



Transport equipment and machinery manufacturing



Pharmaceutical manufacturing



Semiconductor and device manufacturing



Textile manufacturing

Data collection

Survey method

Questionnaire survey (WEB + PAPER)

Survey partner

Tokyo Shoko Research

Target respondents

Logistics and/or SC professionals

Number of questions

24 questions

Number of samples

628 samples (549 valid samples)

Response rate

7.85 percent

Implementation time

March 28, 2022 - April 15, 2022

SCRESTs benefit analysis

1. Indirect method

2. Direct method

SCRESTs implementation

COVID-19 impacts

Findings

Status of SCRESTs implementation

Impacts of COVID-19

Benefits of SCRESTs implementation

Types of SCRESTs implemented

Qualitative
analysis

Descriptive statistics

Table 1. Descriptive statistics of respondent's profile

Variable		Frequency	Percentage
Company size	SME	520	94.7
	LE	29	5.3
Industrial sector	Transport equipment and machinery manufacturing	343	62
	Pharmaceutical manufacturing	62	11
	Semiconductor and device manufacturing	39	7
	Textile manufacturing	105	19
Company age	21–50 years	200	36
	51–100 years	240	44
Logistics strategy	Partially used own logistics assets	169	31
	Fully outsourced to logistics companies	241	44
Manger experience	Greater than or equal to 20 years	255	49

Status of implementation of SCRESTs

Status of SCRESTs implementation

Before COVID-19, 9% of companies implemented SCRESTs.

During COVID-19, 6% of companies implemented SCRESTs.

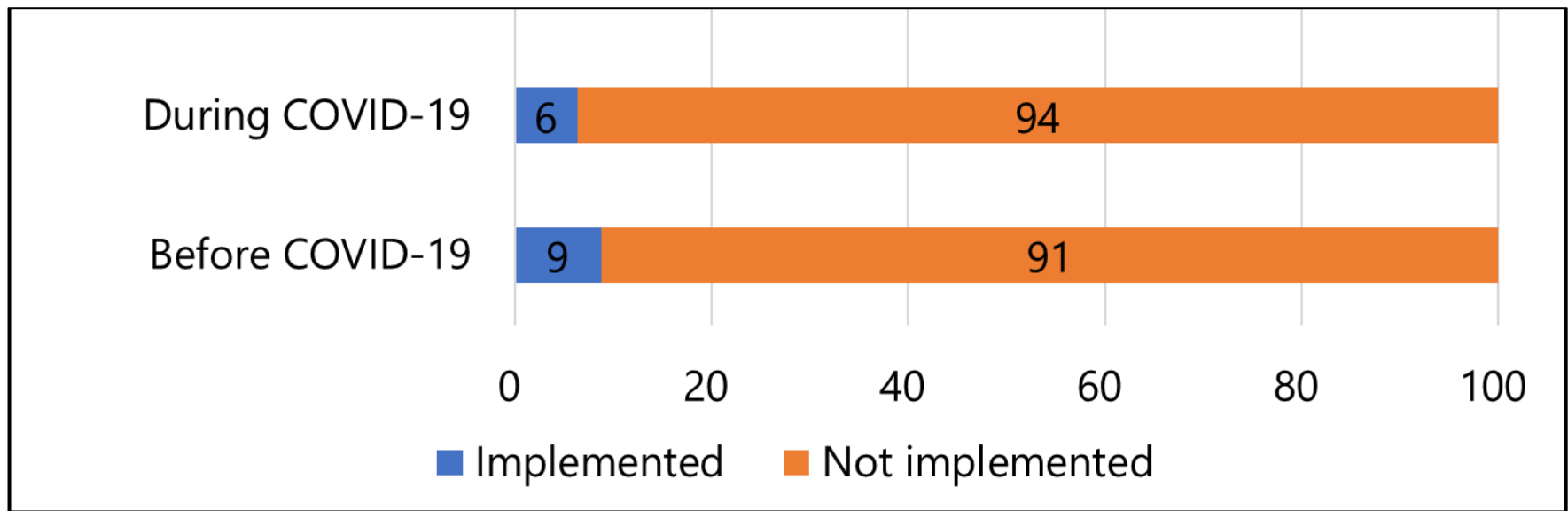


Figure 1. Status of implementation of resilience strategies (in %)

Impacts of COVID-19

Firm performance

Logistic and SC activities

Impacts on firm performance

- 67% of companies observed over 10% decrease in net sales.
- 64% of companies observed over 10% decrease in profit.

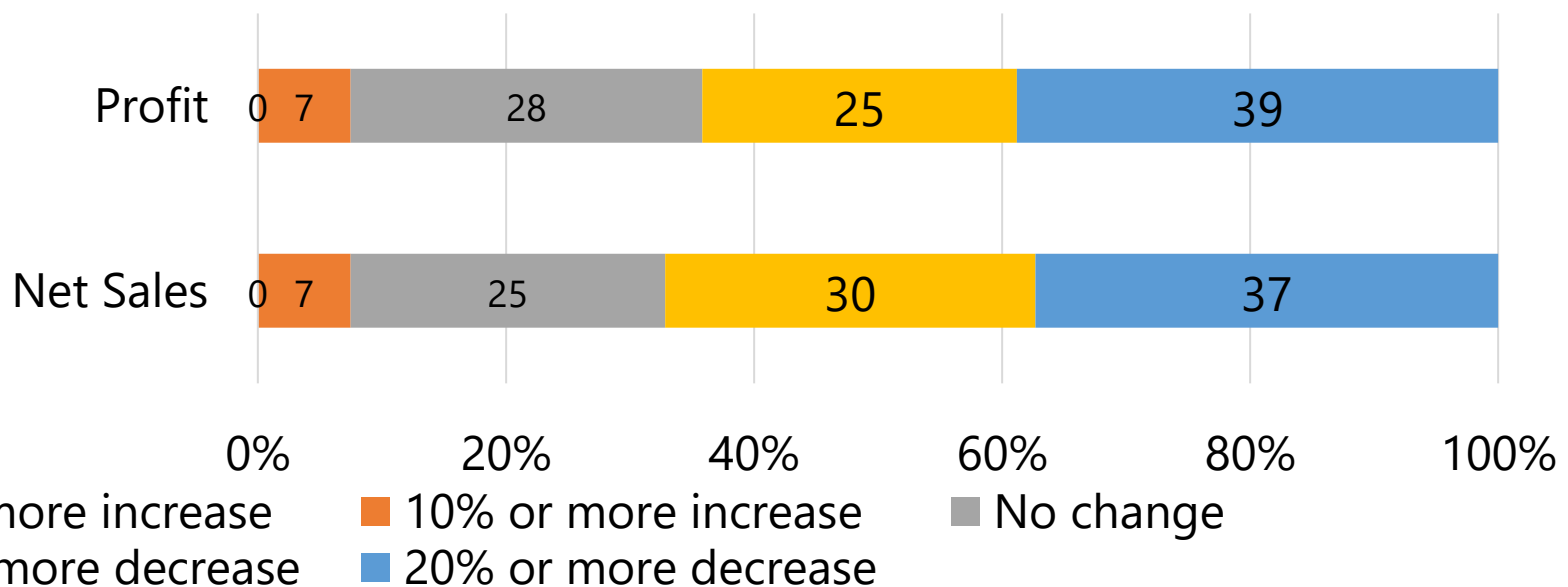


Figure 2. Impacts of COVID-19 on firm performance

Impacts on logistics and SC activities

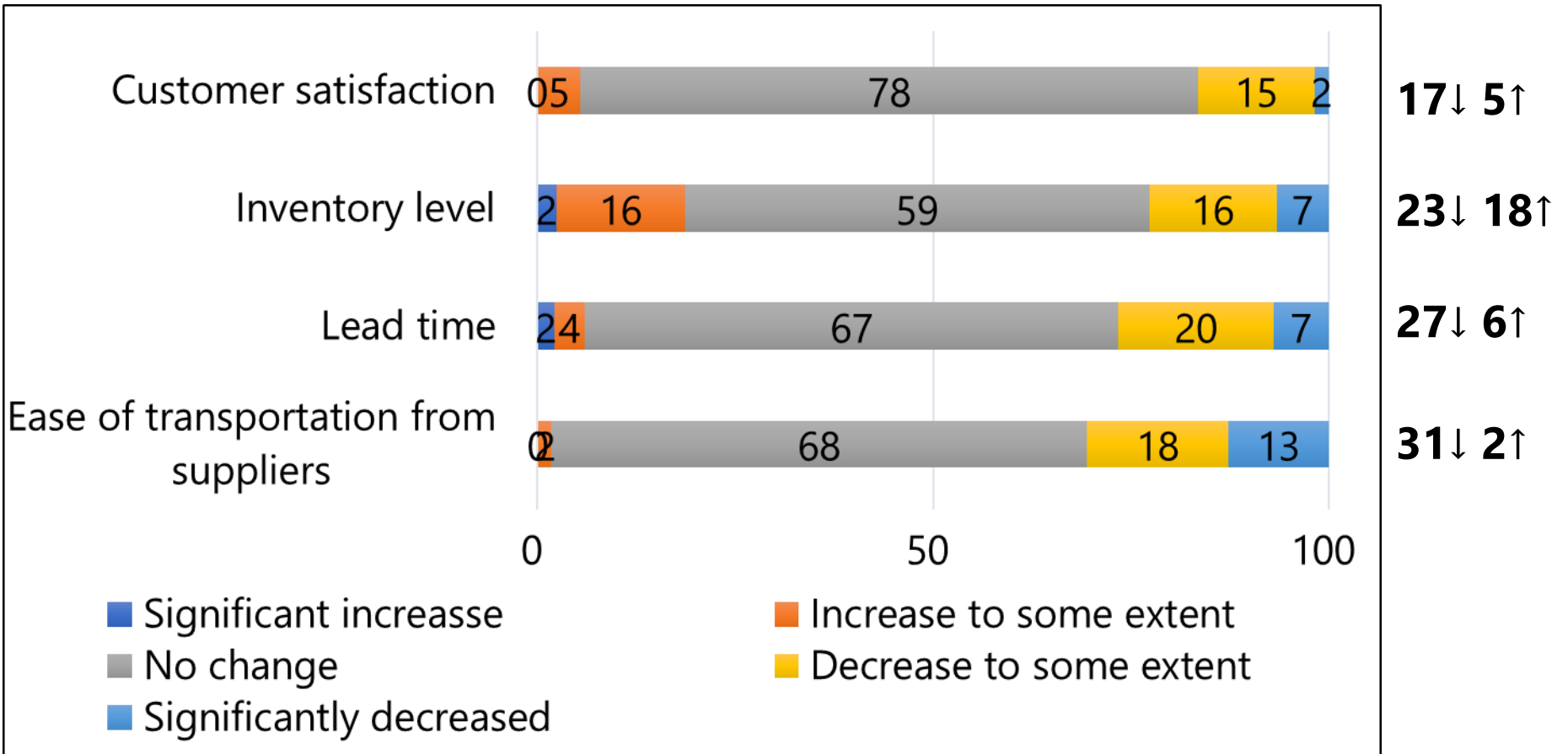


Figure 3. Impacts of COVID-19 on logistics and SC activities (in %)

Benefits of implementing SCRESTs

Indirect findings

Benefits on firm performance

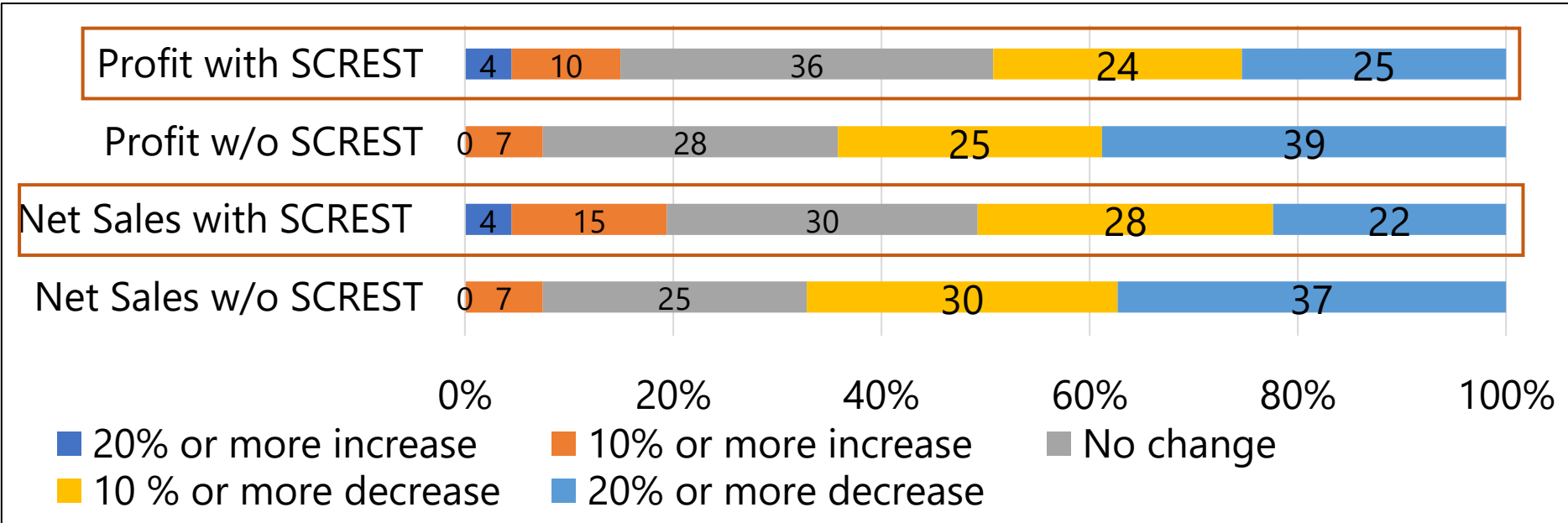


Figure 4. Impacts of COVID-19 on firm performance of companies with and w/o SCRESTs

The **negative impact** on net sales and profit is **lower** on companies with SCRESTs. **Supports H1a and H1b**

Benefits on ease of transportation

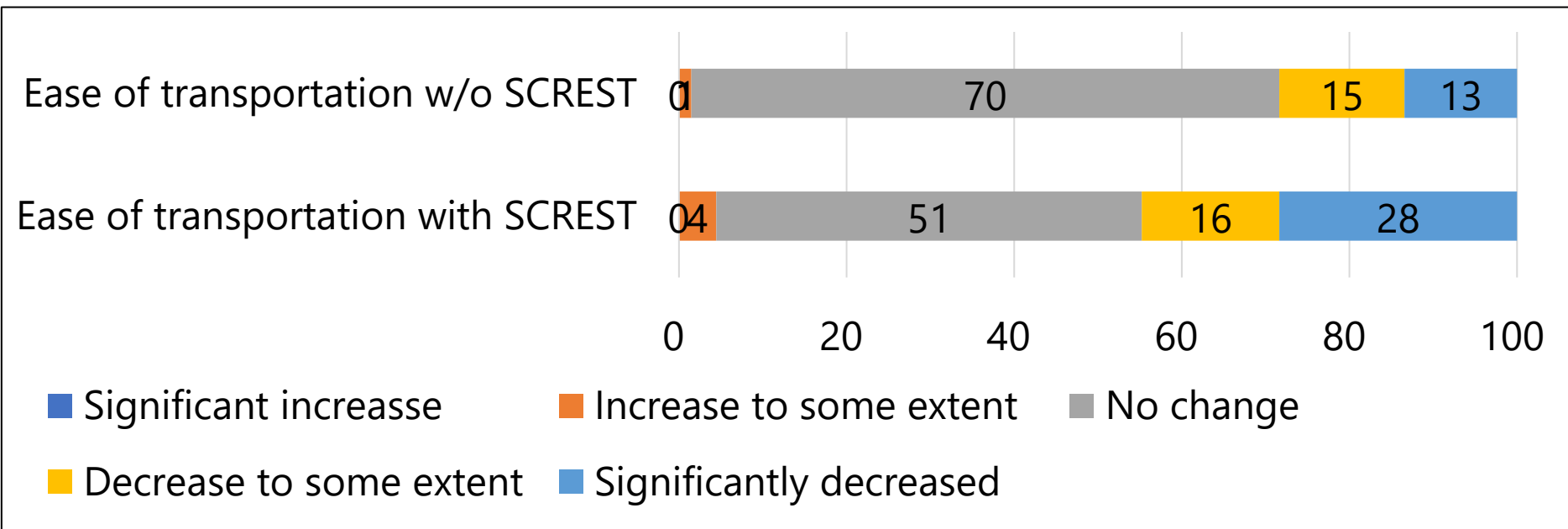


Figure 5. Impacts of COVID-19 on ease of transportation of companies with and w/o SCRESTs

Negative impacts on the **ease of transportation** from suppliers are higher for companies with SCREST. **Doesn't support H2a**

Benefits on lead time

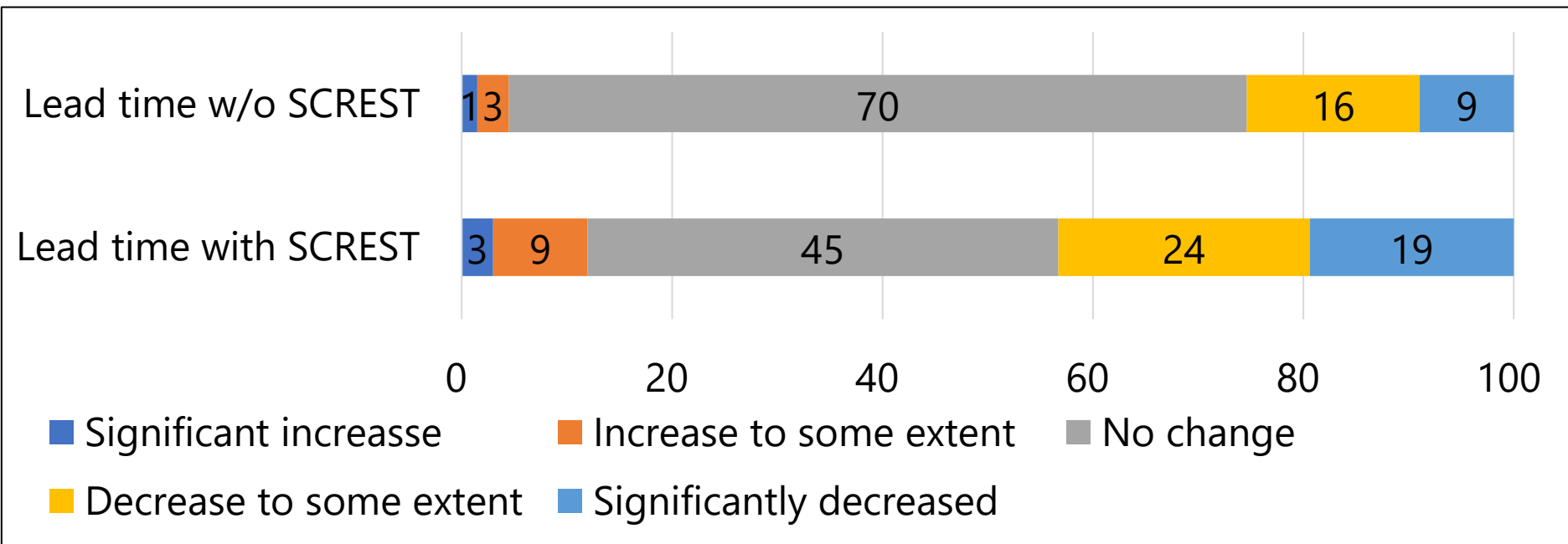


Figure 6. Impacts of COVID-19 on lead time of companies with and w/o SCRESTs

Positive impacts on the **lead time** are higher for companies with SCRESTs. **Supports H2b**

Benefits on inventory level

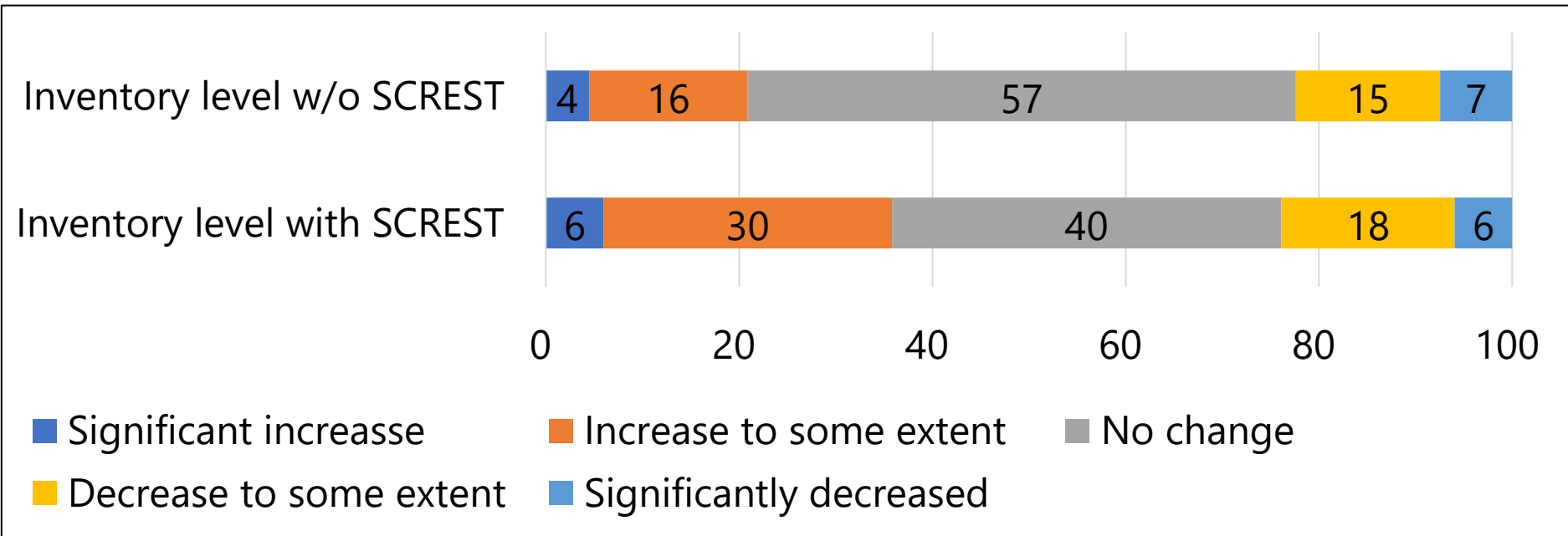


Figure 7. Impacts of COVID-19 on inventory level of companies with and w/o SCRESTs

The increase in **inventory level** was higher for companies with SCREST. **Doesn't support H2c**

Benefits on customer satisfaction

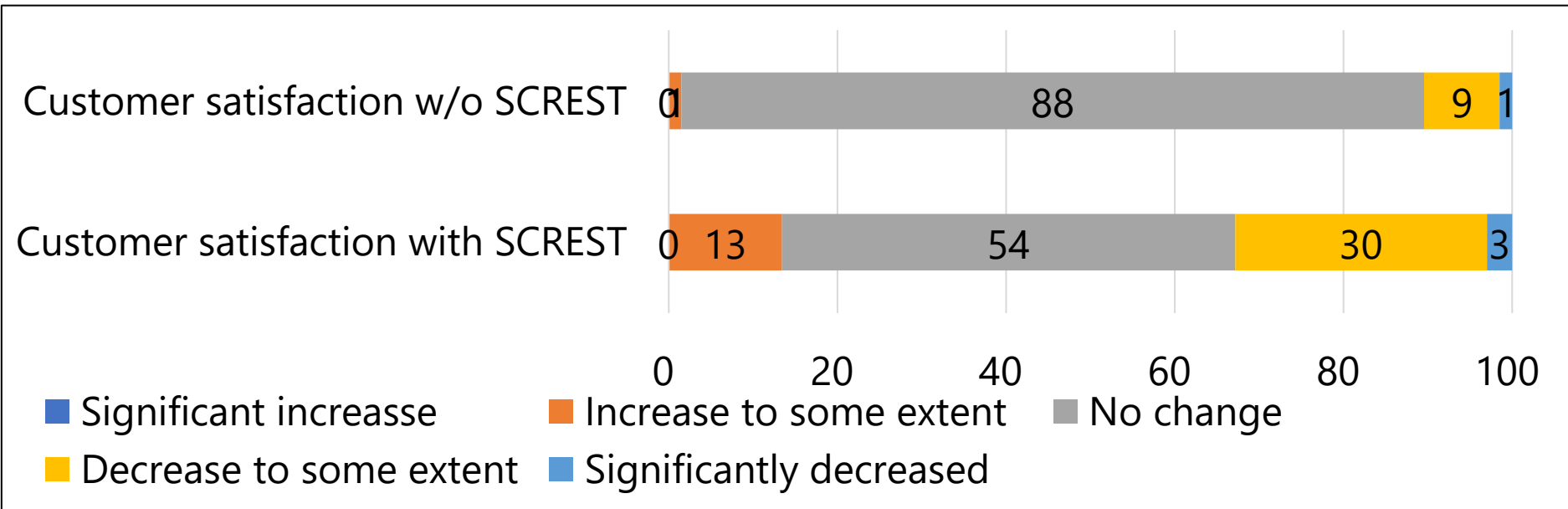


Figure 8. Impacts of COVID-19 on customer satisfaction of companies with and w/o SCRESTs

The decrease in **customer satisfaction** is higher for companies with SCREST than for those without. **Doesn't support H2d**

Benefits of implementing SCRESTs

Direct findings

Benefits on firm performance

- 35/45 companies observed benefits from SCREST implementation.
- The benefits of implementing SCREST were reported by
 - 24 companies on net sales
 - 24 companies on profit
 - 8 companies did not observe benefits.

The implementation of SCREST is beneficial to deal with the negative impacts of COVID-19 on firm performance.

Supports H1a and H1b

Benefits on logistics and SC activities

- 40/46 companies observed benefits from SCREST implementation.
- The benefits of implementing SCREST were reported by
 - 13 companies on ease of transportation from suppliers
 - **22 companies on lead time**
 - **17 companies on the inventory level**
 - 13 companies on customer satisfaction
 - 6 companies did not report any benefits.

The implementation of SCREST is beneficial to deal with the negative impacts of COVID-19 on logistics and SC activities.

Supports H2a, H2b, H2c, and H2d

Benefits analysis summary

Companies from all industry sectors benefitted from the implementation of SCRESTs.

Table 2: Benefits of implementing SCRESTs

Industry sector	Firm performance		Logistics and SC activities	
	LE	SME	LE	SME
Transport machinery and equipment manufacturing	4	15	4	20
Pharmaceutical manufacturing	1	6	6	1
Semiconductor and device manufacturing	2	2	1	2
Textile manufacturing	0	5	0	6
Proportion/Total	58%	51%	92%	53%

Types of SCRESTs implemented [1/2]

Inventory prepositioning, Rerouting, and Backup supplier are the top 3 SCRESTs implemented by companies that observed benefits.

Table 3: SCRESTs implemented by companies that observed benefits on performance

SCRESTs	Total		TE&M	Pharma ceutical	Semico nductor	Textile
Inventory prepositioning	20		15	4	0	1
Rerouting	19		10	4	2	3
Backup supplier	18		8	3	3	4

Types of SCRESTs implemented [2/2]

Inventory prepositioning, Backup supplier, and Rerouting are the top 3 SCRESTs implemented by companies that observed benefits on logistics and SC activities.

Table 4: SCRESTs implemented by companies that observed benefits on logistics and SC activities

SCRESTS	Total	TE&M	Pharmaceutical	Semiconductor	Textile
Inventory prepositioning	22	18	3	0	1
Backup supplier	20	10	3	3	4
Rerouting	18	12	3	1	2

Summary and Conclusion

- The **implementation of SCREST** stood at 9% before and 6% during the pandemic.
- The **impacts of COVID-19 on firm performance** were negative.
- The **impacts of COVID-19 on logistics and SC activities** were
 - mainly negative,
 - a small proportion of companies observed positive impacts,
 - most respondents stated no change in the metrics.

Benefits of implementing SCRESTs,

Measured on	Metrics used	Benefits		Hypothesis
		Indirect	Direct	
Firm performance	Net sales	Yes	Yes	H1a
	Profit	Yes	Yes	H1b
Logistics and SC activities	Ease of transportation from suppliers	No	Yes	H2a
	Lead time	Yes	Yes	H2b
	Inventory level	No	Yes	H2c
	Customer satisfaction	No	Yes	H2d

Types of SCRESTs

- Type of SCRESTs implemented had a significant impact on whether companies benefitted from SCRESTs.
- A distinction in the priority of SCRESTs was observed among different industry sectors
- Inventory prepositioning, rerouting and backup suppliers were the top three SCRESTs implemented by companies that observed benefits.

Implications

Policymakers

Practitioners

Implications

	Policy	Practitioners
SCRESTs implementation Benefits of SCRESTs	Encourage companies, <ul style="list-style-type: none"> • Financial incentives • Training and education 	Prioritize SCRESTs. implementing
COVID-19 impacts	Development and standardization of logistics and SC performance measurement metrics.	Performance measurement using logistics and SC metrics.
Types of SCRESTs	A framework for identifying SCRESTs is necessary.	

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Thank you very much for your time and attention.

ご清聴ありがとうございました。