RESEARCH IN PROGRESS

THE IMPACT OF DATA SHARING IN PRODUCT RECALLS: A COST-BASED APPROACH

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Product recalls often incur substantial operational, and reputational costs across supply chains due to precautionary "overkill" practices. While data sharing is increasingly promoted to enable more precise recalls, evidence on its actual impact remains limited. This work-in-progress paper investigates how data sharing can impact recall costs by conducting a multiple-case study of four recall incidents across the food and automotive sectors. For each case, we map tangible and intangible recall costs, as well as the risks associated with sharing data. We estimate the potential reduction in recalled products and preliminarily suggest conditions under which such potential could be reached. In the next step, we aim to support our findings with quantitative proof on the costs and risks of data sharing in product recalls and perform structured mapping of recall cases to uncover patterns in potential for data sharing.

Keywords:
data sharing,
data spaces,
product recalls,
cost modelling,
case study

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1 Introduction

In supply chains, product recalls are typically the result of faulty products considered dangerous to public safety and health (Ketchen et al., 2014). In a best case scenario, referred to as precise recalls, recalls would be efficient, meaning the faulty product is recalled and non-faulty ones can remain untouched (Ketchen et al., 2014). However, out of safety precautions, recalls occur frequently, and often at large scale as an "overkill" measure (Ketchen et al., 2014). This has a major impact on costs, interorganizational trust in supply chains, consumer trust, reputation, and company valuation to name a few (Fang et al., 2024).

Efforts to reduce the impact of recalls have focused on improving data sharing in supply chains. Solutions range from data platforms like the RASFF platform to track food contamination (Djekic et al., 2017), to more advanced data space solutions like Catena-X to track automotive supply chains (Ammann and Hess, 2025; Kernstock et al., 2025). Catena-X allegedly reduced 1.4 million vehicle recalls to just 14, which is considered a major success story (AIAG, 2025). However, little evidence is provided for this reduction in recalled vehicles.

Additionally, related work challenges if the benefits of sharing data in supply chains can be achieved. Agahari et al. (2022) show that data sharing generates value in supply chains but is hindered by concerns over data control, trust, and perceived risks, which makes firms cautious to share sensitive data. Confirming these views in supply chain context, Ströher et al. (2025) emphasize that traceability benefits for supply chain collaboration are clear but depend on high-quality inter-organizational data sharing. Brechtel (2025) further notes that many firms perceive inter-firm data sharing as a competitive threat if the value proposition is not clear.

Nonetheless, the traceability benefits that are put forward are relevant for product recalls. Similarly, Heeß et al. (2024) and Fani et al. (2025) argue that digital product passports and data-sharing architectures like blockchain can enhance transparency while protecting confidentiality. This could reduce fraud, strengthen information integrity, and improve trust in supply chains where product authenticity and safety are critical, which is essential for data sharing in recall cases. These studies show that inter-organizational data sharing is recognized to unlock potential benefits in identifying faulty products and managing recalls. However, they also emphasize that adoption remains constrained by trust, governance, cost, and control concerns. Therefore, we want to pose the following research question: What is the impact data sharing can have on product recall costs?

2 Methods & Data

To provide an answer to the question if data sharing has an impact on recall cases, we are employing a multiple-case study (Yin et al., 2018) of four recall cases in two domains: 1) a candy manufacturer cannabis contamination case (Clapson, 2025) (candy CS1), 2) a supermarket blueberry contamination case (FAVV, 2025) (blueberry CS2), 3) a car manufacturer fire hazard case (Vanoverbeke, 2025) (motor CS3), and 4) an airbag manufacturer corrosion hazard case (Bernard, 2015) (airbag CS4).

Gathering data on each recall case we are do by a collection of news articles, official company communication, official supply chain partner communication, official government communication channels, data platforms (like the RASFF), online price catalogues, and academic studies performed on related recall cases. When dealing with multiple price points of a product in online catalogues, or varying ranges of for example impact on missed sales by reputation damage, averages are assumed. Such uncertainties in the data, are dealt with also by assuming they can happen, and as such some are nuanced in the discussion section to describe different scenarios.
In the four case studies, we are distilling costs, under the assumption that each recall case incurs similar types of costs (but with different values and nuances). From this we are building a cost breakdown shown in Table 1.

3 Preliminary results

The preliminary cost breakdown from the case studies is shown in Table 1. It includes the tangible costs of recall cases, the intangible costs of recall cases, and finally the costs specific to data sharing. The perspective taken for these costs is that the company to which the faulty product is attributed at first, as they are typically held responsible for first-line handling recalls in the supply chain.

Table 1: Cost breakdown of studied recall cases, including costs of the recall itself and costs that come with sharing data in recall cases

Tangibles	Reimbursing customer	reimbursement of product
		shipment cost
		payment processing
	Logistics of return	handling customer returns
		moving products
		destroying products
	Testing	test cost (assuming independent lab)
	Reputational damage	missed sales
		court case settlements
		patching reputation
Intangibles	Reputational damage	stock price plummets
		trustworthiness drops
		market share loss
	Employee wellbeing	employee morale
		employee retention
Cost of data sharing	Revealing information	product design secrets lost
		process optimization secrets lost
		supplier relationships getting poached
		market insights revealed
		suppliers adjusting prices based on info

Next to mapping the costs of the studied cases, the potential that could be reached with sharing data must be determined. The preliminary results on potential, shown in Table 2 presents a best-case scenario (precise recall) of what the minimum number of products that need to be recalled are. For each scenario, the characteristics of this case, allowing for potential improvement are discussed.

Table 2: Number of products that need to be recalled in the worst (overkill) and best (precise) case scenario

	candy CS1	blueberry CS2	motor CS3	airbag CS4
Overkill recall	≈ 50.000	≈ 101.300	≈ 332.500	≈ 100.000.000
Precise recall	≈ 3	≈ 10–90	≈ 3	≈ 1000

In CS1, specific batches were recalled of a candy product which we assumed to be of typical food industry batch size for a product of this weight and size. After independent investigation, the company producing the product found no contamination in their manufacturing process. There is potential for more precise recalls in this case as the only bags that needed recalling were thus the ones were people reported feeling ill, which were only three. It remains unclear as to why the contamination occurred.

A similar logic was applied to CS2, as it was also a food industry recall, however actual contamination with Hepatitis A was found in several tens of cases in the Netherlands. Therefore, the number of products a precise recall would reduce is likely more limited. Nonetheless, assuming a positive scenario were only those tens of products turned out to be contaminated; there is still large potential. For example, as a safety precaution, the same product that was processed in the same timeframe of the contaminated ones in Belgium, were also recalled, while not finding any contamination. Therefore, we assume somewhere in the supply chain the contamination reached a split-off point or was physically constrained, which thus allows for potential improvement of the number of recalled products.

CS3 and 4 in turn being automotive cases, concerned faulty products from specific vendors. For both cases, we assume the best possible scenario is that mentioned in the Catena-X success story, being a reduction by factor of 100.000. For CS3, in Germany and the US combined, about 332.500 vehicles were recalled due to corrosion in the starter motor of the engine causing a fire hazard. No cases are reported of any engine failing, and as such this recall occurred out of precaution. The corrosion can occur due to faulty sealing or damaged protective coating during manufacturing, therefore, the best-case scenario will be a challenging one to achieve as likely each car with possibly fauly installtion needs to be checked by a mechanic.

In CS4 more than 100.000.000 vehicles are estimated to be recalled during several large recalls that are linked to the faulty airbags. Again, the potential can be challenging to achieve as each car that has an airbag of the bankrupted company, might get it replaced out of precaution anyways.

4 Discussion & preliminary conclusions

While a potential reduction of recalls seems possible, a discussion on preliminary conclusions if data sharing can offer a solution here, is appropriate.

To reach the potential in candy CS1 and blueberry CS2, for example, the source of the contamination, and its trace needs to be known. Data sharing can have potential impact here if it can show where contamination began and was halted. This would require all supply chain parties to test and share test results of handling of ingredients, packaging, and the final product. This would require substantial interorganizational trust among many parties as it requires sharing details on processes among competing suppliers. This again, potentially raises the costs of the risks of sharing data. Next to this, an additional issue could be the quality of testing, and consequently the quality of the data shared. Faulty testing could trigger false positives and negatives, with the first leading to inefficiency, and the later leading to possible health hazards, possibly diminishing the data sharing potential.

However, there are also conditions under which the risks of data sharing might be reduced. In CS2 for example, no data had to be shared with competing supermarket chains, and product design (being fruit, there is none) is not a crucial asset. As such the value of the data shared like test results among the supply chain and production processes is likely of less value to those involved in the recall, like farmers and distributors of fruit due to the non-competitive nature of the case. If the assumption is made that data can be shared in an obfuscated manner, the costs of data sharing risks are possibly reduced further. On the other hand, in motor CS3 and airbag CS4, product design is likely of high value, given they deal with car parts. Therefore, costs of sharing data might be significant if shared with competitors, and there might be reluctance to share product design info, even in obfuscated manner. The nature of CS3 and CS4, where it is unclear if a faulty installation occurred, would thus require extensive trace of every car part's assembly, raw materials and handling to reach its potential reduction of recalls.

We can preliminarily conclude that data sharing presents an interesting case for recall cases that have a non-competitive nature. Next to this, studying the impact of data sharing technology that preserves confidentially presents a research opportunity in recall cases with a competitive nature. However, further research is needed to determine whether the potential of data sharing, particularly within emerging initiatives such as data spaces, will materialize in practice, and thus lead to the associated public funding to indeed contribute to a more sustainable digital future.

5 Next steps

As our preliminary conclusions on the impact data sharing can have shows potential, but also challenges, we aim to further develop our cost model and structurally map recall cases on the model. This will allow both finetuning of the model and provide quantitative support for our arguments. We aim to quantify the costs of the different recall cases, as well as the risks of data sharing, so that both scenarios of overkill and precise recalls can be compared. The goal is to, by discovering patterns in recall cases, be able to distinguish recall cases with likely potential for data sharing, from those with high risks for data sharing. This must include mapping technology impact in a more structured manner to the recall cases than the short discussion currently provided on what data needs to be shared, and how this impacts the costs and risks of the recall cases.

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