Preparing for the new Supply Chain Law – An introductory paper discussing the Opportunities and Boundaries of a digitalized Supply Chain

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Abstract. Sustainability aims at a sound synergy of the economic, ecological and social dimension. To promote sustainable development and guarantee a high living-standard for future generations, all three elements must be balanced. The economy impacts the other two dimensions along the value chain. Particularly critical is the impact of the supply chain as human working conditions and environmental standards must be secured for procurement of materials along complex transportation routes. To tackle this issue, France has passed a Supply Chain Law (Loi de vigilance) in 2017, Britain has passed the Modern Slavery Act which prohibits child labor in 2015 and Germany has passed a Supply Chain Act (Lieferkettengesetz) in June 2021. Furthermore, a EU-wide supply chain law on due diligence and environmental standards for supply chains is expected for 2022. A transparent digitalized version of a company´s supply chain, including its human resources and environmental impact, would facilitate the identification of several sustainability intervention points. Such transparency could lead to not only better and supply chain law-compliant regulations for fairer working conditions and improved social sustainability, but also to optimized circular economy processes. However, there is also the risk that a high level of transparency in complex supply chains entails very high bureaucratic efforts. With this conceptual outline, we would like to contribute to the discussion of the new German legislation and present a variety of IT solutions to improve and monitor the sustainability of supply chains as well as to reduce the bureaucratic effort which comes with supply chain supervision.
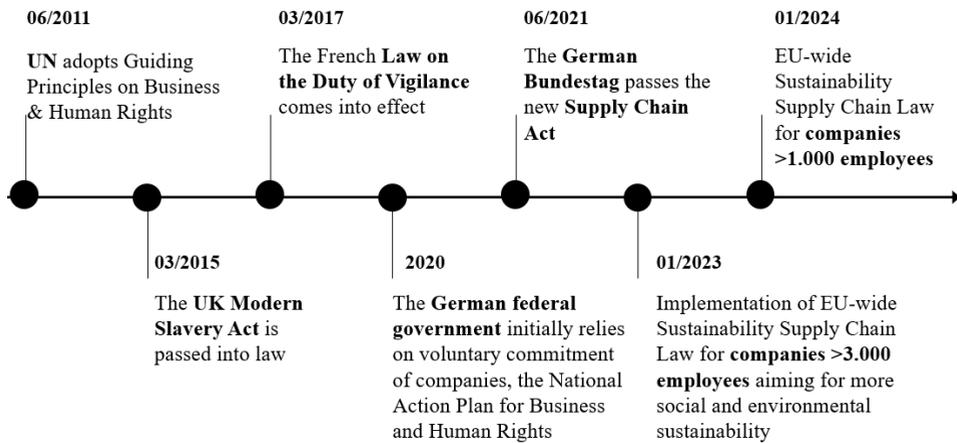
1 Introduction into the Supply Chain Law

Building sustainable supply chains confronts companies with the challenge of balancing economic, environmental and social aspects into their operations along the supply chain. At the same time this very challenge drives the development of a sustainable economy: up to 90% of a company's environmental impacts, depending on the industry, occur along the supply chain [1] and the globalization of procurement and production is still one of the major drivers for child labor and degrading working conditions violating the human rights [2].

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Promoting sustainable supply chains is therefore a declared aim of the newly introduced German Supply Chain Law. It addresses social and environmental issues through the implementation of a binding regulation of corporate due diligence along the whole value chain. [3] The law builds on the idea of holding companies accountable for respecting human rights in global supply chains and is driven by international and European efforts to enforce this responsibility. Starting in 2011 the UN adopted the Guiding Principles on Business and Human Rights, which intend to prevent the violation of human rights. In 2015 the UK Modern Slavery Act was passed into law for more transparency within the supply chain, counteracting human trafficking and inhuman working conditions. Also, France took actionand adopted its Law on the Duty of Vigilance in 2017, which extends the companies´ responsibilities to environmental aspects. [4] Meanwhile, Germany relied on voluntary engagement with the National Action Plan for Business and Human Rights.

06/2011

UN adopts Guiding Principles on Business & Human Rights

03/2017

The French **Law on the Duty of Vigilance** comes into effect

06/2021

The **German Bundestag** passes the new **Supply Chain Act**

01/2024

EU-wide Sustainability Supply Chain Law for **companies >1.000 employees**

03/2015

The **UK Modern Slavery Act** is passed into law

2020

The **German federal government** initially relies on voluntary commitment of companies, the National Action Plan for Business and Human Rights

01/2023

Implementation of EU-wide Sustainability Supply Chain Law for **companies >3.000 employees** aiming for more social and environmental sustainability

Figure 1: Timeline of the Supply Chain Law

The poor implementation of the National Action Plan (NAP) in German companies, the increasing societal pressure, and the agreement on the EU Green Deal with new and stricter sustainability targets lead to a legally binding regulation in 2021; the German Supply Chain Act. [5] The law becomes applicable from 2023 onwards for companies with more than 3000 employees and from 2024 onwards for companies with more than 1000 employees. A fine of up to 50.000€ for non-compliance shall ensure its implementation. [3] It binds companies to reporton their progress and successful implementation of the regulations on an annual basis. The regulations include the:

- Implementation of a risk management with the definition of responsibilities
- A comprehensive regular risk analysis
- Formulation of a policy statement
- Measures for prevention in the own business area and at suppliers
- Measures for remedial action (internal complaint procedures)
- Implementation of due diligence obligations with regard to risks at indirect suppliers
- Documenting and Reporting (annual report) [3]

The declared aim of the German Supply Chain Law is to strengthen social and environmental sustainability, to identify points where human rights are at risk within the supply chain, implement concrete measures for improvement, enable grievance mechanisms and report on the progress. However, it has been heavily criticized by NGOs for not addressing environmental aspects more thoroughly, for only addressing the Tier-1 suppliers,

for not introducing civil liability in case of violations and for being valid only for companies with more than 1000 employees from 2024 onwards. [6]

But even the limited measures will present companies with the challenge to increase transparency along the supply chain and to reduce bureaucratic effort to effectively track suppliers and identify risks. Therefore, a use case of how to improve corporate due diligence and several digital solutions to encourage companies to prepare for the Supply Chain Law will be discussed in the following.

2 Use case from textile industry - KiK

KiK is a German textile & non-food items Discounter with main procurement markets in Bangladesh, China, Pakistan and Turkey. The company works with around 400 direct suppliers, 55% of which are long term business relationships (≥ 5 years).

The company has been heavily criticized for neglecting supervising duties, when in 2012 a fire at one of its supplier's plants led to the biggest ever recorded industrial accident in Pakistan in which more than 250 people died. The accident resulted in the first trial on supply chain related human rights violations outside Germany brought to a German court.[7]

Since 2012, KiK has reduced its direct suppliers significantly from 600 to 300 and made substantial efforts to improve labor standards along its supply chain by introducing an improved supplier acquisition processes, a supplier code of conduct and external audits. [8]
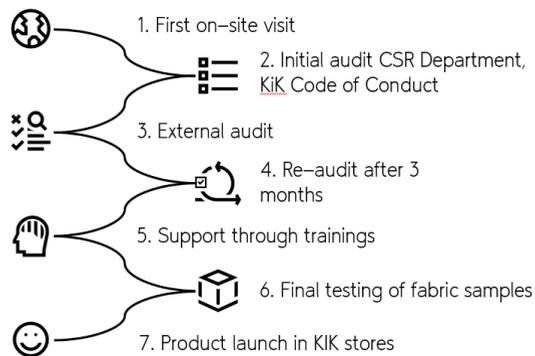
Figure 2: KiK supplier acquisition process

As shown in Fig. 2, the supplier acquisition process integrates on site visits and initial audits to list a potential supplier. Before an order is placed, the supplier must sign the KiK Code of conduct which requires a set of social and environmental standards and pass an external audit. In case of findings the supplier must provide solutions and pass a re-audit after 3 months before the samples are tested and the product is eventually launched.

By 2018 the company voluntarily implemented the National Action Plan for Business and Human Rights (NAP) and strongly supported the introduction of a supply chain law. It has aligned its supplier acquisition and management process along five core elements of the NAP to strengthen corporate due diligence.

- A human rights policy statement
- Procedures for the identification of actual or potential adverse impacts on human rights
- Measures to ward off potentially adverse impacts incl. a review of their effectiveness
- Grievance mechanisms
- (Annual) reporting

The company also did a pilot study in 2018 in which Blockchain technology was used to enable an anonymous but transparent monitoring of suppliers. With the help of an electronic signature audit and other sensitive information can be transmitted safely. [9]

3 Digital Helpers to improve supply chain sustainability

We will now present three digital helpers to improve, monitor and manage supply chain sustainability.

Table 1: Opportunities and boundaries of digital helpers for Supply chain law implementation.

	Opportunities	Boundaries
Digital Twin	Decrease risks, increase resilience & optimize processes	Cross-company confidential data not easy to retrieve / must be protected
Blockchain	Transparency, traceability, and security / Greenwashing is avoided	Possibly restricted data due to privacy policies
Robotic Process Automation	Substantial reduction of repetitive office tasks	Setup / Training costs / Acceptance by office workers

3.1 Supply chain digital twins & Circular economy digital twins

A digital twin typically simulates a specific environment – for example a design environment, a production system or a supply chain by integrating customer experience, production or supply chain data. The goal of a digital twin is to enable a constant learning and reasoning by comparing the planned behavior of the digital twin to the actual behavior of the real-life system.

A supply chain digital twin is a detailed supply chain simulation model in which data from a company's enterprise resource planning and from external sources is used to analyze supply chain interactions. [10] Such a model should: (1) Be detailed enough to understand macro demand changes, (2) Assess the current state of the supply chain based on shipment schedules, vehiclelocations and inventory levels and (3) Enable prediction of financial and inventory impact of actual or expected demand variability.

If fed with relevant information a supply chain digital twin can also assess the environmentalimpact of the supply chain, such as (1) carbon footprint of the raw materials, (2) the processing andtransportation, (3) product life cycle information as well as (4) its social impact with the help of audit information, for example on working conditions. By enhancing transparency, companies are able to de-risk their supply chain, improve critical suppliers or trigger re-design projects to reduce the social and environmental impact of their productsand services. [11] There are estimates that virtual twins can help save up to 7.5 Gt of CO_2 emissions by 2030. [12]

3.2 Blockchain

A blockchain is a distributed database of records of all digital events that have been executed and shared among participating agents. It creates a distributed consensus and allows participating entities to know for certain that a digital event happened by creating an irrefutable record.

As already mentioned, KiK did a pilot study in 2018 in which Blockchain technology was used to analyze the supply chain of a T-shirt. [9] The goal was to track the certification status of all suppliers on the different levels of a supply chain with the help of an electronic signature.

Central prerequisites for a successful implementation of Blockchain technology in supply chains are: (1) Certificates of suppliers are digitally created and stored by independent agencies and (2) Certificates of all supply chain levels are available for the client to judge the social andenvironmental impact of a particular product or material

Certified companies can thus store all relevant information in a forgery-proof way. Currently there are initiatives to provide contract, which can even be retrieved by final customers with the help of a QR-Code. An example of a platform in which suppliers can use the blockchain technology to provide real time information is the Accenture True Supplier Marketplace. [13]

3.3 Robotic Process Automation (RPA)

Robotic process automation (RPA) uses automation technologies to mimic back-office tasks of human workers, such as extracting data, filling in forms, moving / saving files, writing e-mails, et cetera. It combines application programming interfaces (APIs) and user interface (UI) interactions to perform repetitive tasks.

It is not entirely clear how the implementation of the German Supply Chain Law will be controlled by government entities, but it is probable that a series of declarations or certificates of the Tier-1 suppliers must be presented to the government bodies each year. This would resemble the way of working of Preferential Trade in which long-term supplier's declarations can be issued by the suppliers on a yearly basis. [14]

Robotic Process Automation can be used to reduce the bureaucratic effort of collecting relevant information from suppliers, given that even the number of Tier-1 suppliers can be substantial (KiK has more than 300 direct suppliers worldwide). To be more specific, the requesting and processing of declarations and / or auditing results can be automated. This includes the monitoring of missing or late responses by suppliers, which can be monitored real-time and reminders or escalations can be automated to reduce bureaucratic effort. Furthermore, the status of inputs / corrective actions can be automatically tracked and processed in charts which then can be used in sustainability reports. An easy way to implement RPA is available for Windows 10 users with the application Power Automate Desktop.

4 Conclusion

The new German Supply Chain Law will come into force in January 2023 for companies with more than 3000 employees and one year later for companies with more than 1000 employees. It has been criticized for (1) not addressing entire supply chains, (2) for being limited tohealth implications of environmental damages, (3) for not implementing a clear civil liability and (4) for only being valid for companies with more than 1000 employees, and thereby not obligating a substantial part of the economic sector to due diligence in their supply chains. Nonetheless the law represents the step from voluntary (as recommended in the National Action Plan) to mandatory supply chain monitoring & reporting and it is very likely that later law amendments will tighten the current regulation.

In this contribution we have discussed the good example set by KiK with regards to supply chain monitoring and how crucial elements like external and on-siteaudits, corrective action management and grievance / whistleblowing mechanisms are in this context.

We have also presented several digital tools to improve, monitor and manage supply chains. These tools include larger conceptual frameworks such as (1) digitaltwins of the supply chain, for the product design and the production and recycling process as well as specific technologies such as (2) Blockchain technology for secure data transmission and (3) Robotic Process Automation which can be used the reduce bureaucratic effort of data collection and handling.

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