

Traceability thinking and technology

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Simply put, traceability is all about provenance, or the ability to follow a product back through the supply chain and be very focused on what happened to that product, what materials were used, who worked on it, and if there were any problems, what those problems were and how they can be prevented in future. The standard definitions of different types of traceability are given in the text box below.

Internal traceability: the traceability activities that take place inside a business unit that allow the monitoring, documentation, and transparency of objects, services, or processes.

Chain traceability: the traceability activities that take place inside a supply chain that allow the monitoring, documentation, and transparency of objects, services, or processes.

In 2017, *theSauerReport* generated a comprehensive guide to traceability that forms a review, the situation in other industries, and a plan of action going forward for the leather industry (Sauer Report, 2017). There have been many developments in the industry that follow some of the suggested paths forward. The difficulty is that there is very little consensus in the leather industry on how to do this. It is absolutely clear that this is a downstream pressure in the supply chain who are not willing to bankroll or even subsidise any systems. In other industries, requirements from downstream users were major incentives for traceability systems, but they were accompanied by legislative and first adopter suppliers who saw the cost reduction benefits.

Drivers for traceability and those of major interest for the tannery

There are seven main drivers that permeate all industries that practice traceability. These drivers are shown in Figure 1.

1. Legislation/regulation

Many countries have legal instruments in place to protect certain supply chains. The statutory obligations are accompanied by detailed digital or paper-based guidance that support business and consumers in their understanding of the aims and objectives of product regulation and traceability. Policing, monitoring, advisory services, and

whistleblowing functions are generally defined by regulations or laws. The leather industry has very few laws that enforce or encourage traceability.

2. Labour/cost reduction

A business that is currently dealing with high levels of compliance and product risk knows the costs associated with non-conformance. Brofman et al. (2009) and Nga (2009) highlighted that the following costs can be reduced with traceability technologies or systems after implementation:

- Process inefficiencies
- High inventory levels
- Spoilage
- Additional labour costs dealing with non-conformance
- Material procurement inefficiencies
- Fines and penalties by regulatory bodies
- Brand damage
- Recall costs (time and scope)

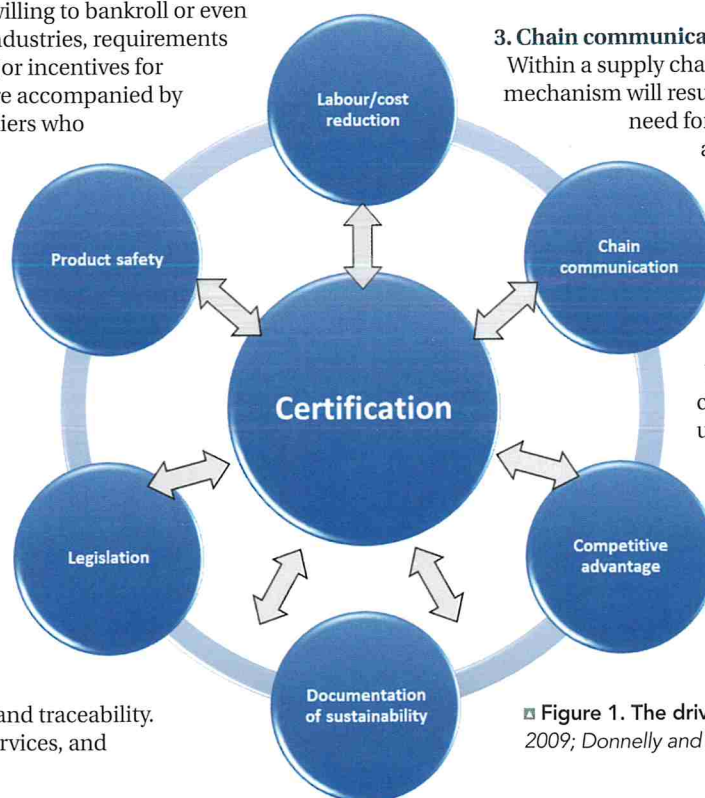
Many downstream users of products have reported that the cost of implementing a traceability system is often returned if the calculation of a major product recall is done. Some companies have had one major product recall and have implemented a traceability system before the second one could happen because of the sheer cost experienced of the first recall.

3. Chain communication

Within a supply chain, the presence of a traceability mechanism will result in increased transparency and a need for improved communication, both as a link between supply chain business units and between suppliers and consumers. It is all about information flow.

4. Competitive advantage

Traceability is a significant advantage that more organised brands can have over their competitors. The brands that insist upon traceability of their supply chain will, in addition, offer to their suppliers the opportunity for them to differentiate their supply by showcasing their own chain traceability, conferring sustainability certification and consumer peace of mind. ■



■ Figure 1. The drivers for traceability. (Source: Olsen, 2009; Donnelly and Thakur, 2010)

5. Documentation of sustainability

To provide the downstream users (of products and services) the information relating to their purchase and to provide them with the correct documentation that will attest to the origin of not only the starting materials, but any other ingredients that are included in the manufacture. Those ingredients can be evaluated for environmental credentials.

6. Product safety

With ever increasing reliance on guarantees that a product does not contain restricted substances, end users are insisting on more rigorous visibility (ingredient lists, verifications of responsible suppliers, and cast-iron reassurances of safety). To be able to prove these claims, manufacturers are resorting to very careful control and documentation of all components and their suppliers.

7. Certification

The labelling that accompanies products entering mature economies can be quite sophisticated and there could be links to iconic environmental, safety, and fair-trade organisations that verify the credentials of a brand. These organisations are increasingly asking for closer tracking of ingredients and manufacturing procedures to ensure that they can offer certification to the level that the consumers are requesting.

Data protection?

The flow of information down through the supply chain is not without difficulties. The business entity does fall within the protections afforded by the Data Protection Acts that are implemented in many countries. Companies that are not willing to share data will be side-lined or ostracised for a lack of willingness to participate in a provenance accountability exercise. Basic questions like: "What are they trying to hide?" are obvious ones. Suppliers can be anonymised and given a unique identifier number that shows that leather moved through that facility without giving the name of that supplier. Malicious activists could be screening actors in a supply chain to find targets and locations where they can direct protests. A robust traceability system has all the provenance, without hurting the business activities of tanneries (through data leaks).

Leather supply

theSauerReport in-depth report identified a course of action, which is given in Figure 2 (Sauer Report, 2017). The full report is available

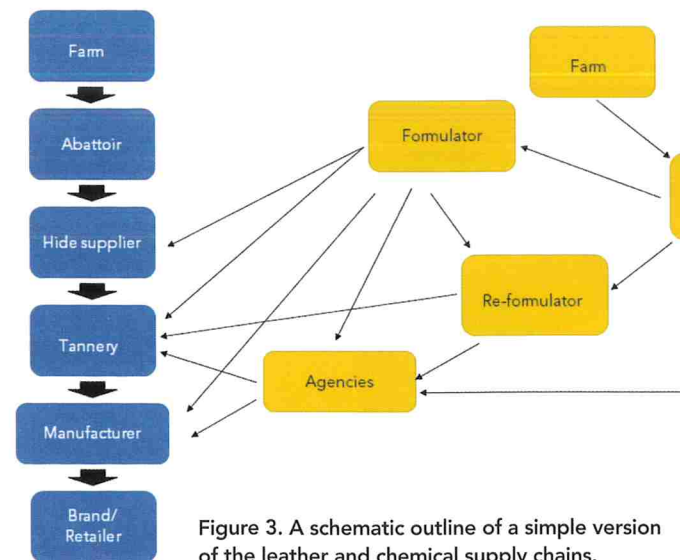


Figure 3. A schematic outline of a simple version of the leather and chemical supply chains.

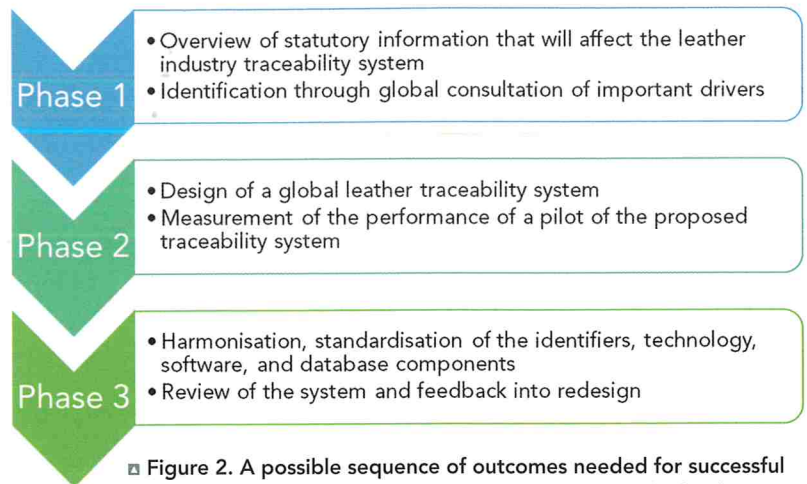


Figure 2. A possible sequence of outcomes needed for successful funding and research leading into the development of a leather traceability system.

for public consumption and forms the basis of industry discussions. Since the 2017 report, the industry and traceability systems have moved on and a few other features can be added:

Development of appropriate farming (hide/skin) tracing systems – realistic levels of technology that allow tracking of materials. These tracking systems need to be mindful that a lot of farming and slaughter activities are illegal. The system also needs to compensate for ritual, cultural, informal slaughter. Low technology and high technology systems must be created. See the GRAPENET traceability system used to track Indian grapes destined for export into the European Union (Sharma et al., 2017).

Chemical traceability must form part of the bigger tracing story. Uncertainty of restricted substances is a critical part of leather supply and trust. The complexity of chemical supply chains is shown in Figure 3.

Waste and by-products entering downstream chains need to be discrete (they must be able to be separated) so that full provenance can be done on individual components. This will be difficult to do on trimmings, fleshings, buffing dust and shavings. Creative solutions can be found to the tracing of these components which include batch accumulation and testing performed on batches.

What is the current technology being used?

The technology used in traceability systems ranges from very high technology to paper-based systems that simply monitor material flow. These systems can be paper databases or on-line systems. As time progresses, the systems will become more sophisticated and additional layers of complexity can be built in:

- Hide/skin stamping
 - Radio-frequency identification (RFID) chips
 - DNA markers that are placed onto the hides/skins/leather
 - Hot stamp marking
 - Bar codes and QR codes
 - Near field communication (NFC)
- Verifications systems:
- DNA
 - Microscopic photographs
 - Physical unclonable function, PUF (atomic security tags), including lanthanide luminescence techniques

The tracing systems all form part of the supply chain movement and tracking. They are often integrated into a Production Planning/ Control System, Warehouse Management System, or a Supply Chain Management tool. ■