

Digital product passports for a circular economy: Little pain, great gain?

The drivers and barriers to digital product passports implementation

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Extended abstract

Digital product passports (DPP) are product-specific data sets that can be electronically accessed through a data carrier, e.g. QR codes or RFID tags (Götz et al., 2022). DPP are receiving increasing attention due to their potential to improve the traceability of products and components within circular supply chains (van Capelleveen et al., 2023). More specifically, DPP are expected to accelerate the transition to a circular economy by providing information such as products' technical characteristics (e.g. origin of raw materials, recycled content), their environmental impact across the product lifecycle, and their reparability and recyclability (e.g. availability of spare parts, repair history, disassembly and recycling instructions) (WBCSD, 2023).

As part of its commitment to reduce the negative environmental impact of products traded in the EU, the European Commission is mandating the adoption of DPP for most industries by 2030, with regulations coming into effect for selected product groups as early as 2026 (WBCSD, 2023). As a result, a growing body of literature is examining technical aspects of DPP such as data requirements (Adisorn et al., 2021; Jansen et al., 2023, Jensen et al., 2023), design criteria (King et al., 2022), and (data) governance arrangements (Ducuing et al., 2023; Langley et al., 2023). Limited attention, however, has been given to the factors that drive or hamper firms' adoption of DPP, beyond regulatory pressures (*cf.* Götz et al., 2022; van Capelleveen et al., 2023; Walden et al., 2021).

This research aims to fill this knowledge gap by investigating the opportunities and challenges related to DPP implementation as described by different actors in the relevant innovation ecosystem (e.g. policymakers, consultants, early adopters). To do so, we conducted an analysis of official documentation provided by the EU or related actors (e.g. academics involved in EU-funded research projects on DPP), newspaper articles and promotional/information material on DPP produced by consultancies and other business (support) organizations. The search was restricted to audio (e.g. podcasts, videos and presentations) and written content published in English before July 2023. Relevant documents were found using the keywords ‘digital product passport’ on LexisNexis, YouTube and the Google search engine, and were analyzed using a combination of inductive and deductive thematic analysis (Braun & Clarke, 2012) using the NVivo software.

Our preliminary results show that benefits outnumber and are cited more often than barriers. This may be explained by the strategic interest different parties have in getting DPP widely adopted. The drivers identified can be categorized in ‘organizational’, ‘societal’, or a combination thereof. Organizational benefits include compliance with upcoming regulation and easier reporting (e.g. of Scope 3 GHG emissions). From an economic perspective, companies can profit from new (circular) business models enabled by DPP, improving their (sustainable) brand image, strengthening customer relationships, and expanding their market share and customer base. Increasing supply chain transparency is expected to have advantages for both companies and society at large. Ultimately, DPP are promoted as a means to empower consumers (e.g. making more informed and sustainable choices), and increase resource independence and long-term competitiveness of the EU.

The barriers reported mostly relate to design features (e.g. unclear data requirements, data storage and security issues, lack of harmonized IT systems) and implementation hurdles (e.g. difficulties in obtaining data and collaborating across value chains, time requirements and costs, lack of understanding and uncertainties related to regulations). Moreover, some concerns are raised regarding their high energy consumption and the risk that, eventually, DPP may not deliver the anticipated benefits. In fact, all documents we analyzed portray the *expected* benefits of DPP and we largely lack empirical, first-hand evidence from companies that have implemented DPP at this stage. While our initial findings can help inform the DPP implementation process for both firms, regulators and intermediaries, future research will need to evaluate whether the anticipated benefits and barriers match those experienced by (frontrunner) adopters and society at large. Additionally, a comprehensive analysis of the long-term sustainability impact of DPP (Piscicelli, 2023) remains crucial for ensuring their successful deployment.

Keywords

digital product passport, drivers, barriers, circular economy

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