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Do digital product passports empower sustainable choices? Exploring consumer use and acceptance

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The European Union (EU) has decided to introduce a Digital Product Passport (DPP), which distributors will be required to use to transparently document the properties, materials used and environmental impact of products along the entire supply chain. Depending on its configuration, the DPP could, in future, enable consumers to compare the sustainability properties of products. The exact requirements for the DPP have so far only been defined for industrial and electric vehicle batteries larger than 2 kWh placed on the market starting on February 18, 2027. However, the introduction of the DPP to other product groups - including textiles, electronics and furniture – is planned as part of the Ecodesign for Sustainable Products Regulation (ESPR), whose detailed implementation is currently being developed. Against this background, the article primarily discusses psychological factors that can influence the benefits and acceptance of consumers.

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EU ecodesign requirements and digital product passes

Among the world's largest economies, Germany belongs to the countries with a particularly large ecological footprint, meaning a particularly large burden on ecosystems due to the local economy and way of life (Global Footprint Network 2022, Unnerstall 2021).

The EU is trying to counteract through the European Green Deal, its overarching strategy for climate neutrality by 2050. To support this goal and as part of the core measures for implementing the 2020 European Circular Economy Action Plan, the Ecodesign for Sustainable Products Regulation (ESPR) came into force in 2024. The ESPR establishes a framework for setting ecodesign requirements that products must meet before they can be placed on the European market or put in use in the European Union – for example consuming less energy, lasting longer or containing fewer substances of concern and more recycled materials. They must be designed for disassembly and are therefore easier to repair and to recycle. In addition, information and labeling requirements are intended to enable consumers to make informed purchasing decisions, thereby strengthening consumers' right to information. A set of data specific to a product will be included in a so-called 'digital product passport'.

Table 1: Customer information needs according to Jensen et al. (2023), excerpt

Product identification	Country of origin
Products and materials	Recycled content
	Average lifetime expectance
	Number of life cycles
	Availability of spare parts
Supply chain and reverse logistics	Suppliers of components
	Costumer return channels
Environmental impacts	Environmental footprint
Compliance	Labour conditions

Tool for building trust for all actors along the supply chain

What is the Digital Product Passport (DPP) and what information will it provide? The DPP will offer digital, tamper-proof product information covering all phases of the supply chain, including details such as product origin, material composition, repairability and dismantling options, and end-of-life handling (see Table 1 for further example information). This comprehensive data enables all actors in the supply chain – whether producers, retailers or consumers – to contribute to a circular economy in line with their respective role. In particular, with

the DPP, the ESPR aims at providing for the setting of mandatory green public procurement requirements and preventing unsold consumer products from being destroyed.

In what ways does the DPP enhance transparency and address consumer concerns? Environmental product information can be difficult to interpret and overwhelming, even for consumers who actively seek for sustainable options. At the same time, the success of environmental marketing relies on consumer trust in the accuracy of the information provided (Peattie, 2015). When consumers are skeptical, they may question the credibility of companies' environmental claims, which can result in sustainable products being rejected. Consumer skepticism poses, for example, a significant challenge to the market acceptance of organic products (Golob et al, 2018).

One aim of the increased transparency enabled by the DPP is to promote fairer competition in the sustainability sector. Easy access to comprehensive product information can enhance trust in sustainability claims and give legitimate actors a competitive advantage and increased market power. However, this requires functioning market surveillance systems across EU member states and beyond at international level to verify the accuracy of product data along the entire supply chain.

A psychological perspective on the DPP

The DPP and convincing Green Marketing

Given the potential high complexity of the environmental information contained in the DPP, the key question is: Under what conditions will consumers be willing to engage with DPP data?

This issue can be illustrated using an example. Imagine a middle-aged individual seeking to purchase a washing machine. Up until this point, they have always opted for low-cost household appliances. They are concerned that investing in a more energy-efficient model may not be worthwhile, especially due to the perceived risk of failure before the additional investment has paid off. At the time of purchase, they see an advertisement for an appliance promising not only good washing performance, but also highlighting energy-efficiency, durability and ease of repair. This prompts them to consider: "*Is it worth investing in a higher-quality model after all?*"

Whether and to what extent an individual will use information provided by the DPP in their decision-making can be explained with the help of the Elaboration Likelihood Model (ELM) (Petty and Cacioppo 1986). The ELM further predicts the conditions under which individuals may be persuaded to change their attitudes in a stable and enduring way. According to the model, there are two distinct paths of information processing, and the path taken depends on the individual's *motivation* and *ability* in a given situation (Figure 1).

At higher levels of motivation and ability, the information is processed via the *central route*. In this case, the individual carefully evaluates the content of the information rather than relying on superficial cues. In the context of the Digital Product Passport, this could involve a consumer accessing the DPP information at the time of purchase, for example scanning a QR code. This access would enable consumers to directly compare different models based on specific (sustainability) features. If the advertised claim of long life expectancy, supported by the DPP data, convinces the consumer to choose the higher-quality appliance, it would constitute a successful persuasion, probably resulting in a stable and lasting change in attitude.

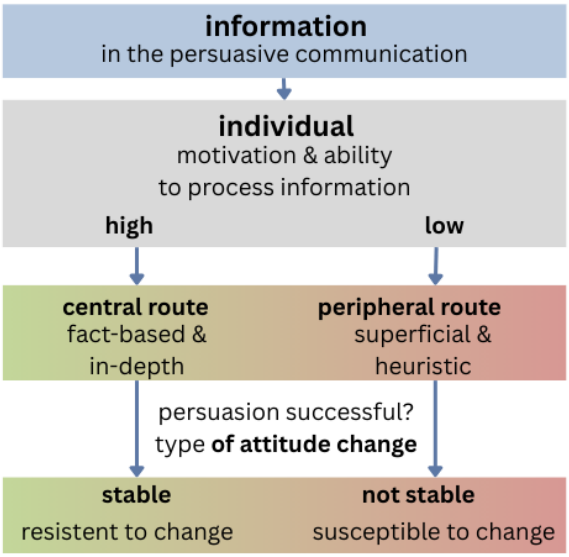

Figure 1: Paths of information processing in the Elaboration Likelihood Model (ELM). Own representation based on Guttmann, 2012

If motivation and / or ability is low, information is processed via the *peripheral route*. In this case, the information is considered more superficially, typically involving so-called judgement heuristics, which serve as shortcuts for evaluating complex information. Consumers may apply the expert heuristic, for example relying primarily on the recommendation of the salesperson at the point of sale. Other heuristics may include product ratings, test reports and eco-labels. Any of these sources could potentially incorporate DPP data. Even if consumers, based on these shortcuts, reach the same conclusion as through careful evaluation – for example that additional investment in quality pays off – the resulting attitude change is less stable. As a result, future purchasing decisions are likely to be reassessed.

In summary, the DPP information can support both routes of information processing - central or peripheral - but in different ways. When motivation and ability are high, consumers are likely to engage directly with the DPP information via the central route. When motivation and/or ability are lower, consumers rely more on simplified cues, such as sustainability labels or third-party product reviews, integrating DPP data on the peripheral route.

However, the Elaboration Likelihood Model does not specify which factors can trigger a higher motivation to engage deeply with product information during purchasing decisions. These influencing factors are discussed in the following section.

Motivation and types of purchasing decisions

Different types of purchasing decisions inherently involve varying levels of motivational potential. Four types of purchasing decisions are frequently distinguished: extensive, limited, impulsive, and habitual (e. g. Wolff and Moser 2007). Extensive purchasing decisions, typically comprising high-value products such as the previously mentioned washing machine, are most likely to result in the central route of information processing due to high level of activation, both emotional and cognitive. In the case of limited purchasing decisions, where consumers invest moderate effort in decision-making, information processing tends to follow the peripheral route. In contrast, DPP information is expected to have little to no relevance in impulsive or habitual purchasing decisions, as impulsive purchasing decisions are dominated by emotional factors, and habitual purchasing decisions involve minimal or no information processing at all.

Identity-based motivation

In addition to the type of purchasing decision, personal factors, such as identity, also have a significant influence on the decision-making process. According to Social Identity theory, the self-concept consists of two components (Tajfel and Turner 1986;):

- Personal identity refers to a person's unique personality traits and preferences.
- Social identity encompasses all social categories a person feels they belong to. Social categories are defined by specific characteristics, values and norms of the respective social group or role (Terry et al. 1999).

Social and personal identities cannot always be clearly distinguished from each other, but both shape how individuals perceive, evaluate and act (Oyserman, 2009). Someone who considers themselves environmentally conscious is more likely to engage with DPP information when it is presented as environmentally relevant, than someone with a strong affinity to technology, for example. Which identity becomes guiding in a particular situation depends on the situational context and the importance of that identity to the individual. In a purchasing decision context, sustainable advertisement could trigger a certain identity, or social cognition. For instance, if the individual recalls what family members or friends might think about the purchase, the decision could be influenced by social norms, that is, by the expectations of their social environment.

Outlook - Pioneers of DPP among consumers

Which target groups are likely to use DPP first? This question can be answered based on two key dimensions directly linked to *motivation* and *ability*: sustainable consumption and digital lifestyle. Recent representative market research surveys in Germany help to identify potential early adopters of the DPP. Sustainable or ethical consumers generally show the motivation necessary to engage with the DPP, while a digital lifestyle provides the basis for the ability and affinity to use this tool. Overall, findings from representative samples suggest that both groups are sufficiently large in Germany:

- 48% of respondents identified themselves as sustainable or ethical consumers. In terms of food, clothing and household appliances, 38%, 32% and 24% respectively stated that they were willing to pay more for sustainability (Statista 2023).
- 20% had previously searched online for product information, while in a physical store, 10% had scanned a QR code on a shelf or product (Statista 2020).

It can be assumed that there is a significant overlap between the two groups, as the proportions were higher among younger respondents. With the emerging younger generation, the number of tech-savvy and sustainably-oriented consumers is expected to grow further in the coming years.

Moreover, the potential use and acceptance among less tech-savvy groups would also increase if an EU-wide product labeling system based on the DPP were introduced. This would enable all environmentally conscious consumers to choose, according to their individual preferences in a given purchasing situation, whether to rely on a product label or to verify the information themselves.

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