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## Assessing the Value of Digital Product Passport: Insights from Japanese Consumers

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# Assessing the Value of Digital Product Passport: Insights from Japanese Consumers

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**Keywords:** Digital Product Passport, Circular Economy, Conjoint Analysis, Willingness-to-Pay

## 1. Background

It is widely recognized that the traditional take–make–dispose model is no longer sustainable. In response, there is a global shift toward the Circular Economy (CE), a model of production and consumption that promotes the extended lifecycle of products. As part of this transition, the European Union (EU) is introducing the Digital Product Passport (DPP), a digital system that records every stage of a product's lifecycle, from raw materials and manufacturing to distribution, consumption, and disposal. The DPP aims to improve standardization, data transparency, and information sharing, ensuring that all stakeholders have access to consistent product information (Götz et al., 2022).

The aim of this paper is to quantitatively analyze how consumers value information provided by the DPP, particularly in terms of its contribution to the United Nations Sustainable Development Goals (SDGs), with a focus on SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action).

To do so, this study applies a Choice-Based Conjoint (CBC) analysis to estimate consumers' Willingness to Pay (WTP) for specific DPP attributes (sourcing, manufacturing/distributing, recycling, and durability), offering insights into the perceived value of product information. This analysis is guided by the research question: To what extent do consumers evaluate the value of DPP information?

## 1.1 The Value of DPP

The EU's commitment to sustainability and the CE has been articulated through a series of ambitious policies. The Circular Economy Action Plan, launched in 2015, laid the foundation for transforming sustainable production and consumption. This was followed by the European Green Deal in 2019, which set the overarching goal of achieving climate neutrality by 2050. To support these targets, the Ecodesign for Sustainable Products Regulation (ESPR) was adopted in March 2022. One of its prominent instruments is the DPP.

Implementation of the DPP begins with high-impact sectors prioritized by the ESPR, namely batteries, textile, and electrical and electronic equipment (EEE), which are also the focus of this study. Among them, batteries are set to become the first sector with mandatory DPP implementation, beginning in February 2027. The CIRPASS<sup>4</sup> project has also outlined roadmaps to support the development of DPP in these priority sectors.

The DPP is expected to contribute directly to the SDGs. For SDG 12, it enables resource efficiency, waste reduction, and product lifecycle thinking. For SDG 13, it enhances climate action by making carbon emissions transparent, allowing producers and consumers to take informed steps to reduce their environmental footprints.

As such, the DPP acts as a digital bridge, reshaping communication and collaboration among all stakeholders, including producers, regulators, and consumers, while fostering innovation, accountability, and transparency across global value chains.

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<sup>4</sup> EU-funded project aimed at developing a DPP system.

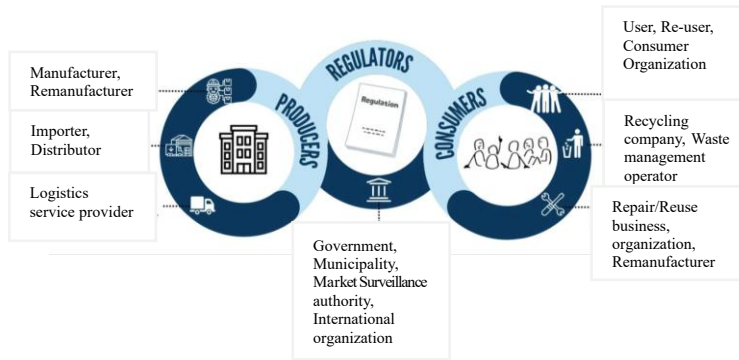


Figure 1: DPP Stakeholders

Source: Authors

However, for these benefits to materialize at scale, consumer engagement is essential. While the DPP has received growing attention in areas such as data requirements, standardization, and system architecture, the consumer perspective remains significantly underexplored. Empirical research is still limited regarding how consumers understand, evaluate, or intend to use DPP information in real-world contexts.

This study addresses that gap, recognizing that the success and wider diffusion of the DPP also depend on its usability and perceived relevance to end users.

## 1.2 Japan's Relevance in the CE

Although the DPP is a regulation introduced by the EU, its global implications are inevitable due to the interconnected nature of international supply chains. Non-EU countries are expected to be affected, particularly those that export products to the EU, manufacture for the EU market, or import EU-originating products.

In this context, Japan represents a key non-EU country for examining the relevance and applicability of the DPP, given its strong trade relationship with the EU in DPP-regulated sectors. In 2023, Japan's top exports to the EU were machinery and appliances (35.0%), transport equipment (27.5%), and chemicals (11.3%), categories directly targeted by the initial phase of DPP regulation (European Commission, 2025).

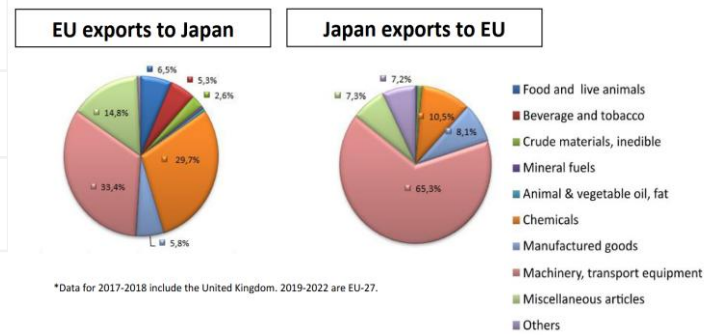


Figure 2: Trade between the EU & Japan

Source: Vannicola & Wulsten (2024)

Beyond trade, Japan has long been a frontrunner in CE policy. It introduced the Circular Economy Vision in 1999 and enacted the Basic Act for Establishing a Sound Material-Cycle Society in 2000, laying the foundation for a CE framework. Foundational legislation such as the End-of-Life Vehicle Recycling Act<sup>5</sup> and Home Appliance Recycling Act<sup>6</sup> reflect the country's early commitment to product-level circularity and extended producer responsibility (EPR). These laws, alongside widespread public engagement in waste separation and recycling, illustrate Japan's mature CE ecosystem.

Building on this foundation, Japan revised its Circular Economy Vision in 2020 to align more closely with international developments. In recent years, Japan's CE transition has also been supported by digital innovation under the Society 5.0 agenda, which promotes the integration of digital technologies, resource efficiency, and business-led innovation to advance sustainability across both upstream and downstream stages of the product lifecycle.

However, Japanese society still faces several pressing challenges. These include not only the need for broader implementation of digital technologies, but also stronger multi-stakeholder collaboration to translate policy ambitions into everyday practice. For example, despite existing laws and guidelines on recycling and disposal, small electronics containing lithium-ion batteries

<sup>5</sup> The End-of-Life Vehicle Recycling Act (enacted in 2002 and enforced in 2005) requires automobile manufacturers and importers to collect and recycle key components generated during the disposal of vehicles. This includes airbags, automobile shredder residue (ASR), and the destruction of chlorofluorocarbons (CFCs) used in vehicle systems.

<sup>6</sup> The Home Appliance Recycling Law (enacted in June 1998 and enforced in April 2001) mandates the recycling of designated home appliances, assigning specific responsibilities to retailers, manufacturers/importers, and consumers.

are still sometimes improperly sorted, leading to safety incidents during recycling, as recently warned by the Environment Ministry (Ministry of Economy, Trade and Industry, 2020; The Japan Times, 2025).

Efforts toward a CE are underway in both Japan and the EU. The DPP presents a timely opportunity to help address these challenges. Consumer valuation of the DPP serves not only to encourage greater action within Japanese society, but also to inform its future implementation globally.

## 2. Literature reviews

### 2.1 Barriers to Environmental Behavior

Even though product information is often delivered to consumers, it does not always lead to sustainable practices. Behavioral studies suggest that this may be due to a persistent gap between attitude and behavior, in which individuals remain passive despite being exposed to sustainability messages. From a behavioral economics perspective, this insufficient action may be attributed to factors such as limited memory retention and a lack of perceived urgency. People tend to forget information over time, or the issue simply does not feel immediate enough to motivate behavioral change (Mitomo & Otsuka, 2012).

As emphasized in a report by the Centre d'Estudis d'Informació Ambiental (1999), there is a need to “convert information of consumption into information of use.” This idea aligns with the intended role of the DPP, which is designed to make relevant product information digitally accessible in the appropriate context, such as when individuals are deciding what to buy, or when they need guidance on how to maintain or dispose of a product responsibly.

### 2.2 Types of DPP Information

Several questions remain regarding the types of information required under DPP (Götz et al., 2022). This study investigates attributes that align with the core elements emphasized in the ESPR, such as durability, recycled content, environmental footprint, and reusability (European Commission, 2022).

To enhance consumer relevance, this study also incorporates information that reflects emerging consumer priorities, particularly in the areas of traceability of origin and product authenticity. Product origin is receiving increased attention in both EU policy and industry practice. While many brands already indicate the country of manufacture, some go further by offering traceability back to the raw material stage (Legardeur & Ospital, 2024). In parallel, product authentication has become critical, especially in premium and luxury categories, as well as in the expanding online and second-hand markets, where trust is essential for responsible purchasing decisions.

Together, these information types reflect the expectations of both regulators and consumers. Moreover, they correspond with the four-phase circular product lifecycle proposed by Wan and Jiang (2025) for DPP information: (1) raw material sourcing and processing, (2) manufacturing and design, (3) product use, and (4) end-of-use or disposal.

## 3. Methodology

### 3.1 Conjoint Analysis

This study follows Lancaster's theory of value (Lancaster, 1966), which assumes that products can be described in terms of their attributes and the levels they take. Building on this foundation, Random Utility Theory (RUT) models consumer choice as the selection of the alternative that provides the highest utility (McFadden, 2001). The deterministic component of utility, based on observable product attributes, is expressed in Equation (1).

$$\text{Utility function : } U = a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 \quad (1)$$

$U$ : Overall utility

$X_1$ : Level of Attribute Sourcing

$X_2$ : Level of Attribute Distributing

$X_3$ : Level of Attribute Recycling

$X_4$ : Level of Attribute Durability

$X_5$ : Level of Attribute Price

$\alpha_1$ : Parameter for Attribute Sourcing

$\alpha_2$ : Parameter for Attribute Distributing

$\alpha_3$ : Parameter for Attribute Recycling

$\alpha_4$ : Parameter for Attribute Durability

$\alpha_5$ : Parameter for Attribute Price

This theoretical framework underpins Choice-Based Conjoint (CBC) analysis, where each attribute contributes a “part-worth utility” reflecting its relative importance (Orme, 2010). Respondents choose from sets of hypothetical product profiles, simulating real-world trade-offs. CBC has been widely applied in sustainability research (Heck et al., 2024), making it well suited for evaluating consumer responses to DPP information.

To estimate preferences from the CBC data, this study employs a Conditional Logit (CL) model. The CL model views the utility arising from the utility function depicted in (1) as probabilistic, and is expressed in Equation (2):

$$V_{ij} = U_{ij} + \varepsilon \quad (2)$$

$V_{ij}$ : Utility

$U_{ij}$ : Deterministic component of the utility function

$\varepsilon$ : Error term

The probability that respondent  $i$  chooses an information set  $j$  when faced with  $J$  DPP services is represented by the following Equation (3):

$$prob[V_{ij} > V_{ik}] = \frac{\exp(A'Z_{ij})}{\sum_{j=1}^J \exp(A'Z_{ij})} \quad (3)$$

where  $j \neq k, j, k = 1, 2, 3, 4$ .

$prob[V_{ij} > V_{ik}]$ : Probability that individual  $i$  selects DPP information set  $j$  from  $J$  DPP information set.

In standard utility models, the price coefficient is typically negative, reflecting the assumption that higher prices lower utility. However, as observed in this study (see Results), positive price coefficients appear in some segments, possibly indicating that consumers interpret higher prices as a signal of quality (Leavitt, 1954; Van Westendorp, 1976). To ensure that Willingness to Pay (WTP) is interpreted as a positive monetary value, it is calculated using the absolute value of the price coefficient, as shown in Equation (4):

$$WTP_{DPP} = \left| \frac{a_{\text{with DPP}}}{a_{\text{price}}} \right| \quad (4)$$

$a_{\text{price}}$ : Utility coefficient for price

$a_{\text{with DPP}}$ : Utility coefficient for DPP information

WTP is interpreted as Marginal Willingness to Pay (MWTP), the additional amount a consumer is willing to pay for a one-unit increase in a given attribute (e.g., recycling or durability). This trade-off can also be expressed as the marginal rate of substitution (MRS) between price and the attribute, shown in Equation (5):

$$WTP_{DPP} = \left| \frac{a_{\text{with DPP}}}{a_{\text{price}}} \right| = \left| \frac{\partial U / \partial X_{\text{with DPP}}}{\partial U / \partial X_{\text{price}}} \right| = \frac{\partial X_{\text{price}}}{\partial X_{\text{with DPP}}} \quad (5)$$

In contrast to Contingent Valuation Methods (CVM), which rely on explicit WTP statements and are susceptible to anchoring, particularly when evaluating unfamiliar concepts like DPP, CBC infers WTP from actual choices, offering a behaviorally grounded approach.

### 3.2 Survey Design

The CBC experiment included five attributes, each with four levels, as summarized in Table 1. These attributes cover key areas of DPP information: sourcing, manufacturing/distributing, recycling, durability, and price. Price was included to reflect trade-off and to enable the estimation of consumers' WTP for each feature.

Attributes	Levels
<b>Sourcing</b> (What the product is made of)	1. None 2. Use recycled materials 3. + Verified standards 4. + 100% authenticity verified
<b>Manufacturing / Distributing</b> (How it is made/delivered)	1. None 2. Low CO2 3. + Verified labor conditions 4. + Traceability of origin
<b>Recycling</b>	1. None 2. Recyclable 3. + Disassemble instruction 4. + Traceability of EoL
<b>Durability</b>	Textile: 1. None 2. Repairable EEE: 1. 1 year 2. 2 years 3. 3 years 4. 4 years Batteries: 1. 5 years 2. 10 years 3. 15 years 4. 20 years
<b>Price</b>	1. +0% 2. +3% 3. +6% 4. +9%

Table 1: Attributes and Levels

In each choice task, respondents were asked to select one product from a set of four alternatives. The product category and baseline price varied by segment: Textile (overcoat), EEE (smartphone), and Batteries (electric vehicle).

Each respondent completed six choice sets, drawn from a total of 96 sets (16 per segment), using a fractional factorial design with orthogonality to ensure unbiased estimation while minimizing respondent burden.

To examine price sensitivity, two price levels were used for each product category: ¥10,000 and ¥100,000 for overcoat, ¥50,000 and ¥200,000 for smartphone, and ¥2,000,000 and ¥10,000,000 for electric vehicle. For example, in the low-priced textile segment, respondents saw the following question: *“Please choose one overcoat from the options that you would like to purchase. The product is an overcoat (Textile), priced at ¥10,000.”*

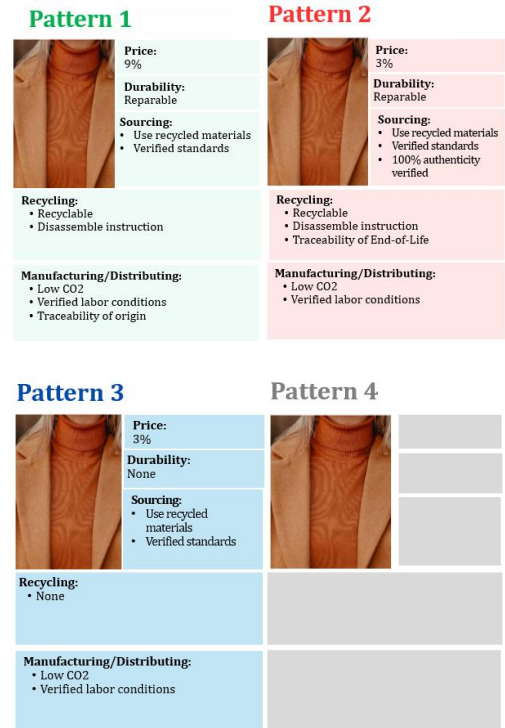


Figure 3: Example of Choice Task in CBC

This design was intended to reduce anchoring effects and to explore differences in consumer valuation across typical and premium price ranges. For the battery segment, EV pricing was used, as consumers are generally more familiar with the overall vehicle price than with the value of the battery as a standalone component.

### 3.3 Data Collection

The survey was conducted in March 2025 through a private research company (Macromill, Inc.) with Japanese respondents. A screening question ensured that all participants had no prior awareness of the DPP. A total of 1,036 responses were collected using quota sampling, ensuring equal representation of male and female respondents aged 18 and older. This sampling approach was intended to reflect how everyday consumers might respond to DPP information upon its introduction, providing insights useful for early-stage communication and implementation strategies.

In addition to the CBC tasks, the questionnaire collected data on demographic characteristics and self-reported preferences for various types of product information. These items were included to complement the CBC analysis by providing additional insights into how respondents perceive the importance of such information.

## 4. Results

Out of 1,036 total respondents, 36 who selected the 'None' option for all choice tasks were excluded from the analysis. The final sample for model estimation included 1,000 respondents. Conditional Logit models were estimated using R, based on the CBC data. Detailed estimation results, including coefficients, standard errors, and significance levels, are provided in the Appendix B.

### 4.1 Part-Worth Utilities

(1) Textile: In the low-priced textile segment, respondents showed significant positive utilities for sourcing and recycling information. In the high-priced segment, sourcing and manufacturing/distributing were preferred. These results indicate that sourcing was consistently valued across both segments, while recycling was

more preferred in the low-priced segment and manufacturing/distributing in the high-priced one.

The price coefficient was also positive in both price tiers. This suggests that respondents may have perceived higher prices not merely as a cost burden, but as an indicator of product quality, especially when accompanied by DPP information. This interpretation is consistent with earlier work on price-quality associations (Leavitt, 1954) and aligns with Van Westendorp's (1976) Price Sensitivity Meter, which suggests that higher prices can enhance perceived value when they fall within an acceptable quality range.

(2) EEE: In the low-priced electronics segment, respondents valued recycling, durability, and sourcing. In the high-priced segment, durability, manufacturing/distributing, and recycling were significant. These findings indicate that durability and recycling were consistently valued across both segments, with sourcing more relevant in the low-priced segment and manufacturing/distributing in the high-priced one.

The price coefficient was also positive in both tiers, similar to textile. This is in line with Kulshreshtha et al. (2017), which conducted a conjoint study on electronics and found that consumers preferred mid-priced options and were prepared to spend more for their preferred choice products if the features matched their preferences.

(3) Batteries: In the low-priced battery segment, significant utilities were observed for sourcing, manufacturing/distributing, and recycling. In the high-priced segment, manufacturing/distributing, durability, and recycling were valued. These results show that manufacturing/distributing and recycling were consistently valued, while sourcing was more relevant in the low-priced battery segment and durability in the high-priced one.

Unlike textile and EEE, the price coefficient was not statistically significant in either price tier. This may be because respondents viewed the electric vehicle as a bundled product, making it harder to evaluate battery-specific information. This aligns with the observation by Sheldon and Dua (2024), who note that it remains unclear how battery costs are reflected in electric vehicle prices.

#### 4.2 The estimated WTP

Using the utility coefficients obtained from the CBC, MWTP was estimated to quantify the monetary value consumers assign to each DPP attribute. It was calculated by dividing each attribute's utility coefficient by the price coefficient, then multiplying by the price increment, as price was included as a categorical variable (0%, 3%, 6%, and 9%).

(1) Textile: Respondents were willing to pay approximately 2–4% of the product price for DPP attributes in textiles. Sourcing was the only attribute consistently valued across both segments, with MWTP reaching 4.54% in the low-priced segment and 3.96% in the high-priced one.

These results suggest that information on material composition and authenticity is a key consideration for textile, particularly in affordable products. This may reflect greater consumer concern about how the product was made, as an indicator of clothing quality. Overall, MWTP was only slightly higher in the low-priced segment (around 4%) compared to the high-priced one (2–3%).

	MWTP Sourcing	MWTP Manufacturing / Distributing	MWTP Recycling	MWTP Durability
Textile (¥10,000)	¥454	---	¥406	---
Textile (¥100,000)	¥3963	¥2626	---	---

(2) EEE: Respondents were willing to pay up to 7% of the product price for DPP attributes in electronics. In the low-priced segment, MWTP reached 7.55% for recycling and 6.29% for

durability, compared to 0.81% and 2.11%, respectively, in the high-priced segment.

These results highlight that post-use and lifespan information are key drivers of value across both EEE segments. Respondents appear to seek stronger reassurance about longevity and disposal in lower-priced electronics. Overall, MWTP ranged from 5–7% in low-priced electronics and up to 2% in high-priced ones.

	MWTP Sourcing	MWTP Manufacturing / Distributing	MWTP Recycling	MWTP Durability
EEE (¥50,000)	¥2569	---	¥3774	¥3144
EEE (¥200,000)	---	¥3299	¥1617	¥4211

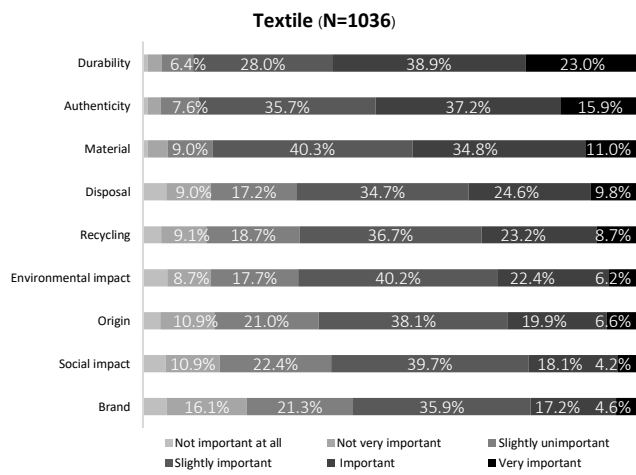
(3) Batteries: Although information related to low CO<sub>2</sub> emissions, verified labor conditions, traceable origin, and post-use information were consistently valued across both price segments, the price (reflecting the full EV price) was not statistically significant in either segment. Consequently, MWTP could not be reliably calculated for batteries.

#### 4.3 Comparing Self-Reported and CBC Preferences

As a follow-up to the CBC analysis, respondents were asked to rate the importance of each type of product information using a six-point Likert scale, which excluded a neutral midpoint to encourage more decisive responses.

(1) Textile: Durability, authenticity, and material were the top-rated types of information in the Likert-scale responses. This pattern generally aligns with the CBC results, although durability presents a notable exception. While respondents rated product lifespan as highly important, information about whether a product is repairable did not significantly influence their actual choices in the CBC tasks.

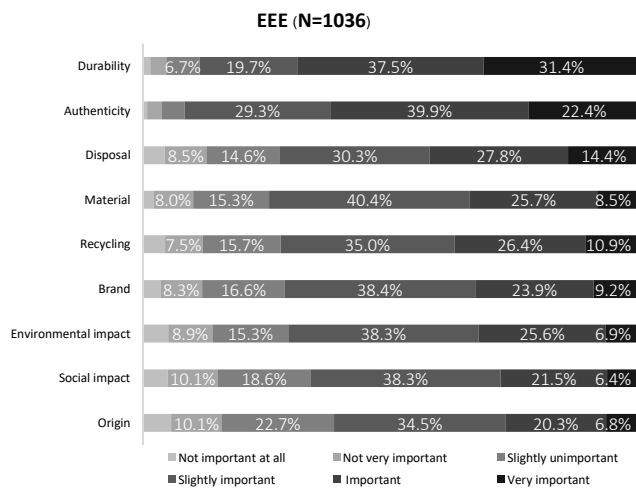




Mean: Durability 4.70, Authenticity 4.53, Material 4.37, Disposal 3.95, Recycling 3.93, Environmental impact 3.85, Origin 3.80, Social impact 3.69, Brand 3.58

Note: Percentages below 5% are not shown due to space constraints.

(2) **EEE: Durability, authenticity, and disposal** were the most highly rated in the self-reports. Among these, durability and post-use information (recycling and disposal) showed alignment with the CBC results, reflecting a consistent concern for product longevity and electronic waste management across both evaluations.

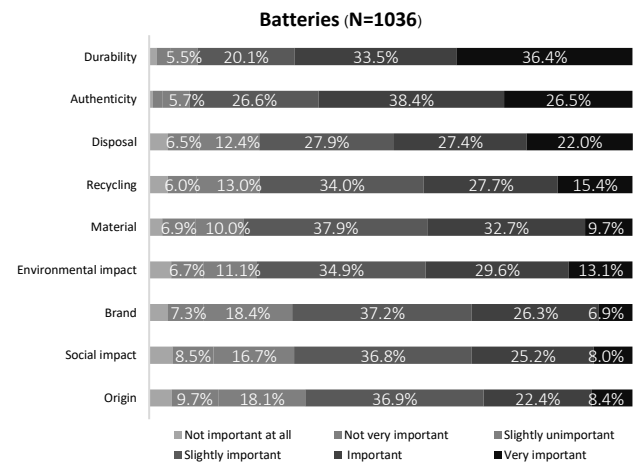


Mean: Durability 4.83, Authenticity 4.72, Disposal 4.12, Material 4.05, Recycling 4.04, Brand 3.98, Environmental impact 3.91, Social impact 3.8, Origin 3.74

Note: Percentages below 5% are not shown due to space constraints.

(3) **Batteries: Durability, authenticity, and disposal** were also top-rated in self-reports, mirroring the pattern observed in electronics. However, in this case, environmental impact, social impact, and origin, while rated as less important in self-reports, were consistently significant predictors of choice in the CBC across both price segments. This suggests that while these sustainability indicators may not be prioritized when respondents

are asked directly, they nonetheless influence behavior in trade-off contexts.



Mean: Durability 4.9, Authenticity 4.8, Disposal 4.35, Recycling 4.22, Material 4.2, Environmental impact 4.18, Brand 3.95, Social impact 3.93, Origin 3.88

Note: Percentages below 5% are not shown due to space constraints.

## 5. Summary and Conclusion

### 5.1 Summary

This study demonstrates that respondents place positive value on DPP information, highlighting its potential to contribute meaningfully to CE goals. Importantly, consumer preferences for DPP attributes varied across product sectors, reflecting different priorities. Sourcing information, such as material composition and authenticity, was consistently valued in textiles. In EEE, durability, recycling, and disposal emerged as key drivers of consumer choice. For batteries, information related to manufacturing/distributing, such as CO<sub>2</sub> emissions, labor conditions, and origin, were prioritized, along with recycling and disposal. These findings provide empirical support for the logic of sector-specific DPP implementation, confirming that consumers value different types of product information depending on the category.

The findings suggest that DPP information is particularly meaningful for low-priced products, where it may serve as a signal of quality and trustworthiness. In the low-priced textile segment, DPP attributes accounted for an estimated value of approximately 4% of the product price. In the low-priced EEE segment, the value ranged from 5–7%, especially for attributes of recycling and durability. This pattern likely reflects a greater need for

reassurance when purchasing affordable goods, where consumers may be more uncertain about product quality, such as concerns regarding longevity or end-of-life impact. The positive price coefficients observed in both categories further support this interpretation, indicating that when accompanied by DPP information, higher prices were not perceived as a burden but rather as a sign of improved product quality and responsibility.

Furthermore, self-reported preferences and CBC results were generally aligned, reinforcing the relevance of DPP in consumer decision-making. However, some gaps also emerged. For instance, while durability was highly rated in textile self-reports, it did not significantly influence actual choices in the CBC tasks. This reflects broader challenges in Japan, where efforts to extend textile lifespan remain limited despite widespread recycling norms and a growing secondhand market (Ministry of Economy, Trade and Industry, 2020). Conversely, in the battery segment, sustainability-related attributes were not highly rated in self-reports, yet significantly influenced choices in the CBC tasks. This suggests that sustainability in the production stage may be implicitly valued, even if not explicitly recognized.

For DPP implementation, these findings underscore the importance of not overlooking ‘hidden value’ information, preferences that may not be explicitly stated but still influence behavior. DPP holds strong potential to make these concerns more visible and actionable, helping to bridge the gap between consumer intention and behavior.

## 5.2 Conclusion

This study provides an early empirical perspective on consumer acceptance of DPP in Japan, contributing to the emerging academic literature on DPP and consumer valuation. By applying CBC analysis and estimating WTP, the study offers a robust methodological approach to assess how consumers evaluate DPP information

across three priority product categories (textile, EEE, and batteries) at both low and high price levels.

Findings indicate that respondents consistently assigned positive utility to DPP attributes, suggesting that DPP information is perceived as meaningful and relevant, even in a non-EU context like Japan. This is a significant contribution, as it highlights that consumer-side value for DPP extends beyond regulatory compliance. In many cases, respondents were also willing to pay a price premium for products accompanied by DPP information.

As a limitation, DPP has not yet been implemented. While efforts were made to clearly define and communicate its features through the survey and mock-up CBC tasks, participant responses were still based on simulated scenarios. This may have introduced some uncertainty in how respondents envisioned their engagement with DPP and its practical use.

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## APPENDIX A: Demographic

		N	%
GENDER	Male	518	50.0%
	Female	518	50.0%
AREA	Hokkaido	60	5.8%
	Tohoku	73	7.0%
	Kanto	352	34.0%
	Chubu	162	15.6%
	Kinki	215	20.8%
	Chugoku	59	5.7%
	Shikoku	25	2.4%
	Kyushu	90	8.7%
EDUCATION	Junior high school	53	5.1%
	High school/Technical college	354	34.2%
	Vocational school	121	11.7%
	Junior college	88	8.5%
	University (Bachelor)	373	36.0%
	Graduate school (Master/Doctoral)	34	3.3%
	Other	13	1.3%
DISPOSABLE_INCOME	0	54	5.2%
	1-999	23	2.2%
	1000-2999	46	4.4%
	3000-4999	85	8.2%
	5000-9999	166	16.0%
	10000-19999	172	16.6%
	20000-29999	198	19.1%
	30000-39999	76	7.3%
	40000-49999	81	7.8%
	50000-59999	48	4.6%
	60000-69999	8	0.8%
	70000-79999	9	0.9%
	80000-89999	4	0.4%
	90000-99999	22	2.1%
	100000-109999	12	1.2%
	110000-119999	2	0.2%
	120000-129999	0	0.0%
	130000-139999	2	0.2%
	140000-149999	2	0.2%
	150000-159999	3	0.3%
	160000-169999	2	0.2%
	170000-179999	0	0.0%
	180000-189999	1	0.1%
	190000-199999	1	0.1%
	>200000	19	1.8%

## APPENDIX B: Estimated Part-Worth Utilities

### Textiles (¥10,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1260.1

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	0.284	0.037	7.64	0.00	***
Distributing	-0.015	0.035	-0.44	0.66	
Recycling	0.254	0.037	6.94	0.00	***
Durability	0.125	0.076	1.64	0.10	
Price	0.188	0.033	5.67	0.00	***

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1

### Textiles (¥100,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1305.9

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	0.208	0.036	5.79	0.00	***
Distributing	0.138	0.032	4.25	0.00	***
Recycling	0.046	0.034	1.36	0.17	
Durability	-0.093	0.080	-1.17	0.24	
Price	0.158	0.036	4.42	0.00	***

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1

### EEE (¥50,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1286.3

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	0.149	0.035	4.30	0.00	***
Distributing	-0.026	0.036	-0.72	0.47	
Recycling	0.219	0.037	5.87	0.00	***
Durability	0.183	0.034	5.43	0.00	***
Price	0.087	0.033	2.63	0.01	**

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1

### EEE (¥200,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1298.1

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	-0.002	0.031	-0.07	0.95	
Distributing	0.133	0.037	3.56	0.00	***
Recycling	0.065	0.033	1.95	0.05	†
Durability	0.170	0.031	5.52	0.00	***
Price	0.242	0.037	6.58	0.00	***

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1

### Batteries (¥2,000,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1287.2

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	0.256	0.034	7.59	0.00	***
Distributing	0.227	0.033	6.82	0.00	***
Recycling	0.096	0.036	2.67	0.01	**
Durability	0.060	0.038	1.60	0.11	
Price	-0.019	0.033	-0.57	0.57	

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1

### Batteries (¥10,000,000)

Respondents	1036
Valid Responses	1000
log-likelihood	-1278.7

Coefficients	Estimate	Std.Error	z-value	Pr(> z )	Significance
Sourcing	0.036	0.038	0.95	0.34	
Distributing	0.229	0.032	7.08	0.00	***
Recycling	0.155	0.032	4.78	0.00	***
Durability	0.167	0.031	5.49	0.00	***
Price	0.032	0.033	0.96	0.34	

Significance: \*\*\* 0.001, \*\* 0.01, \* 0.05, † 0.1