MULTILEVEL GOVERNANCE AND THE DIGITAL PRODUCT PASSPORT: IMPLICATIONS FOR THE CIRCULAR ECONOMY AND GREEN DEAL IN THE EUROPEAN UNION

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Abstract

This study investigates the role of data sharing and digitalization in enabling the transition towards the circular economy.

Climate change, loss of biodiversity, pollution and environmental degradation threaten the well-being of people and the planet. Unsustainable consumption and production based on linear "take-make-waste" economic models are critical drivers of these crises. The European Union (EU) is at the forefront of efforts to improve the resource efficiency of the European economy and enable the transition towards the circular economy (CE). It has recently developed a new policy framework to regulate the production and consumption of goods placed on the EU market. A vital component of this framework is developing and implementing a Digital Product Passport (DPP). This regulatory tool aims to provide standardized information about a product throughout its lifecycle.

We use a multilevel governance (MLG) approach to analyze how different levels of EU governance have been involved in developing the DPP to provide insights into factors that have shaped the policy output.

We find that while the DPP has the potential to improve the transparency, traceability and circularity of the EU's supply chain, there are definitional challenges, risks of regulatory capture, and uncertainty on how data is shared and governed which may impact its acceptance and adoption, and ultimately the EU's accountability and democratic legitimacy.

We conclude that while DPP offers significant opportunities to drive forward the EU's CE ambitions, it can only be considered one tool in the pursuit of a more sustainable future. By addressing the challenges outlined above, and accelerating global in addition to regional efforts, can the EU facilitate the transformation required for transitioning to a more sustainable and circular economy.

Key words: circular economy action plan, multilevel governance, digital product passport, Ecodesign for Sustainable Products Regulation

Contents

Introduction

The triple planetary crises of climate change, loss of biodiversity, and pollution, along with environmental degradation, pose a threat to the well-being of people and the planet and hinder the achievement of the Sustainable Development Goals (SDGs). Consumption and production are significant drivers of these crises because they involve the extraction of natural resources, the transformation of those resources into goods and services, and the disposal of waste and emissions *(United Nations, 2022)*.

SDG Goal 12 calls for sustainable consumption and production patterns. However, total domestic material consumption (DMC) increased by over 65 per cent globally from 2000 to 2019 (United Nations, 2022). The EU has been a key contributor to this trend, increasing its consumption footprint by over 11 per cent from 2016 to 2020 *(European Environment Agency, 2022)*.

The EU's Eighth Environmental Action Programme calls for a significant reduction in the EU's consumption footprint to bring it within planetary boundaries *(European Union, 2022)*. To do this, Europe must make significant efforts to either decrease its total use of products and services or switch to ones that have a lower environmental impact, or both.

With the introduction of the Circular Economy Action Plan (CEAP) as a vital pillar of the European GD, and the inclusion of circularity and climate neutrality as fundamental principles of its New Industrial Strategy for Europe, the EU has expressed its political ambition to substantially improve the resource efficiency of the European economy and enable the transition towards the circular economy (CE) as an alternative economic model. The EU's objectives for the CE are to increase competitiveness, promote economic growth and create jobs while reducing environmental impacts and resource dependency (EMAF, 2020).

To support this transformation, the EU has developed a new Sustainable Product Initiative (SPI) on "*Making sustainable products the norm*" *(EC, n.d. -5, p. 4)* which includes a package of interlinked initiatives on sustainable products. A key component of the policy framework is the development and implementation of a Digital Product Passport (DPP), a new regulatory instrument which aims to provide standardized information about a product throughout its lifecycle, including its reusability, reparability, recycling content, potential for material recovery and its environmental impacts *(EC, n.d. - 4)*. The DPP aims to expand the scope of the EU's Ecodesign Directive beyond energy-related products to include as wide a range of products as possible *(Adisorn et al., 2021)*. It is intended that the EU DPP will provide different kinds of information to multiple stakeholders along the value chain for different purposes: to manufacturers, suppliers and recyclers to improve environmental performance, to consumers to make more informed choices, to public interest organizations to improve transparency and to the EU and national authorities to enable market surveillance and enforcement *(EC, n.d. - 4)*. It is also linked to a wider framework of corporate and consumer sustainability initiatives, which aim to strengthen consumer choice of sustainable products and increase the provision of standardized and verified environmental information by companies to prevent "greenwashing" *(Adisorn et al., 2021)*.

Problematizing the DPP And laying the foundation of the analysis

The implications of the DPP for the EU's CE and GD are significant. It can enhance the *tracking and traceability* of products throughout their lifecycle *(Walden et al. 2021)*. By creating a digital record of a product's composition, origin, and environmental impact, it becomes easier to implement measures to extend product lifecycles, promote repairability, and facilitate recycling in order to meet CE and GD objectives. It could support the transition to *Circular business models* by enabling better recycling and CE services such as remanufacturing, repurposing and repair *(Ibid)*, encouraging a shift from a traditional linear model to a circular model that focuses on resource efficiency and sustainable production. It can support *Consumer empowerment by* enabling reliable information to be available to a wide range of public and private stakeholders *(Walden et al. 2021)*. By providing reliable and transparent data regarding a product's environmental footprint, durability, and repairability, consumers can make informed choices and support their preference for sustainable and circular products. Increased consumer demand for eco-friendly products further incentivizes businesses to adopt circular practices. It can provide a

r*egulatory framework* and enable better enforcement tools and market surveillance mechanisms for authorities *(Ibid).*

As a legislative requirement for any product entering the EU market it will have a significant impact on global supply chains *(King et al., 2023*). Given the importance of the EU's role and influence on global manufacturing, the DPP could enable the EU to become a front-runner on global circularity standards *(Adisorn et. al, 2021).*

Nevertheless, the adoption of this kind of novel regulatory instrument at such a scale is unprecedented and underexplored. While the DPP offers numerous benefits for the EU CEAP and GD, there are also some associated risks and challenges that require action by policymakers, industry associations and service providers. These include: *Data privacy and security; t*he protection of confidential business information and intellectual property rights (IPR) while ensuring access to information for other stakeholders such as repairers, recyclers and consumers will be critical *(Walden et al., 2021)*; standardization *and compatibility:* Agreeing on standardized formats for different product types, will require a unified approach across industries, sectors and EU member states, including agreeing on the types of data to be included in the passport *(Ibid);* a*doption and compliance:* Standardizing the metrics and measurements for how carbon footprints will be measured will be important, as well as mechanisms to ensure due diligence and prevent greenwashing *(Ibid).*

Within the context of the EU, the conceptualization and development of the DPP is uncertain and evolving and has established a new venue for multi-level collaboration which brings together various actors, including manufacturers, environmental interest groups, consumer organizations, policymakers, and standardization organizations *(appendix 1).* These actors are actively engaged through feedback tools, including the open method of consultation, to create a common European framework.

The diverse capabilities, resources, experiences, and regulatory capacities of different actors influence regulatory outcomes, leading to socio-economic and governance implications *(Chatzopoulou., 2015).* Analysing how the DPP is being developed within the EU's MLG system, its institutions and regulatory processes and how different actors are involved is essential for understanding these implications and their impact on the EU's ambition for a CE.

Therefore, our research question is formulated as follows:

Research Question

How have different levels of EU governance been involved in the development of the EU's Digital Product Passport and what are the implications for the EU's circular economy and Green Deal?

Working questions:

1. What themes, concerns and suggestions are prevalent in the responses from the public consultation on the development of the DPP in 2021?
2. What are the different levels of governance involved in the development and implementation of the passport, what are their roles and how do they interact?
3. If feedback from external actors is reflected in policy revisions, what are the implications for MLG as a form of governance in the EU?
4. How would these policy changes relate to the concept of CE?

The remainder of the paper is structured as follows: In section two we provide an overview of the literature on the concept of the CE, the role of data and digital technologies in achieving CE objectives and the characteristics of Digital Product Passports. After outlining our conceptual framework of MLG and methodology, we analyze the different levels of governance involved in the development and implementation of the DPP to provide insights into factors that shaped the policy output. We will do this by combining primary data in the form of regulations, thematic data from the open consultation and add depth through secondary literature. In this section we reflect on the results of this analysis and implications of DPP implementation in relation to the CE both in the EU and globally. To conclude we summarize our main findings and contributions.

Literature Review

In this section, we aim to provide an overview of the literature on the concept of the CE and the role of data and digital technologies in achieving CE objectives, the key characteristics of digital product passports and how we see our research contributing to academic efforts in this area.

Circular economy

While the CE is currently receiving considerable political attention, particularly in EU circles, there is a substantial body of literature on the concept dating from the 1960s. However, while CE definitions and approaches have developed over time, they continue to remain contested *(Kirchherr et al, 2017, Kalmykova et al. 2017, Del Rio et al., 2021)*.

Gregson et al. (2015) argue that the concept is rooted in two perspectives: industrial ecology, as promoted by Frosch and Gallopoulous, and extended product life, as promoted by Walter Stahel and featured in the work of the Ellen MacArthur Foundation *(Gregson et al., 2015)*. According to the industrial ecology approach, sustainable development can be achieved by closing material loops via the exchange of waste and by-products so that economies become more circular *(Ibid)*. The extension of product lifespan was recognized as a strategy for preventing waste and as a crucial element in the shift towards sustainable models of production and consumption *(Ibid)*.

In their study on the multiplicity of CE definitions, *Kirchherr et al (2017)*. expanded these approaches to include dimensions on reduction, reuse and recycling and sustainability *(Ibid)*. They define the CE as "*an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes" (Ibid, p. 229)*.

Del Rio et al. (2021) also link the CE concept with eco-innovation, which they define as "*innovations which reduce the environmental impact caused by production and consumption activities, whether the main motivation for development or deployment is environmental or not" (ibid, p. 11)*. The concept of the CE requires fundamental changes in products, services, and the general functioning of the economic system, therefore embracing innovations in the design or production of goods and services that optimize the use of resources, such as cleaner production and eco-design, become a key aspect of transitioning towards the CE *(Ibid)*. The authors argue that if sustainable development is the intended end goal, then "*interrelated and simultaneous changes in technologies, institutions, behaviours (both by firms and consumers) and infrastructures" (Ibid p. 29)* are needed, which requires a more radical transformation rather than incremental improvements *(Ibid)*.

Defining Circular Economy

A comprehensive study of 114 definitions has been carried out by *Kirchherr et al (2017)*, in which definitions have been discussed, critiqued, and consolidated. Some definitions focus on reuse, while others focus on recycling or reduction *(ibid)*. The consolidated definition of CE by *Kirchherr et al (2017)* therefore combines these:

"(…) as an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes. It operates at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, thus simultaneously creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations." (Kirchherr et al 2017, p. 229)

As the nature of the DPP is embedded in the EU ambitions toward a CE in lieu of the New CEAP, we find it relevant to discuss the relevance of the DPP in relation to the CE framework used by the Ellen MacArthur Foundation as we find this definition to be in line with the consolidated definition provided by *Kirchherr et al (2017)*.

CE is further elaborated as a model that strives to reuse what can be reused, recycle what cannot be reused, repair what can repaired and remanufacture what cannot be repaired (ibid). This should, according to the theoretical foundation of CE, lead to reduced greenhouse gas emissions from operations such as natural resource extraction, and limit waste production through reusing and remanufacturing (ibid).

EMAF have created a butterfly model that is especially useful for visualizing the processes of the CE *(EMAF, 2019)*.

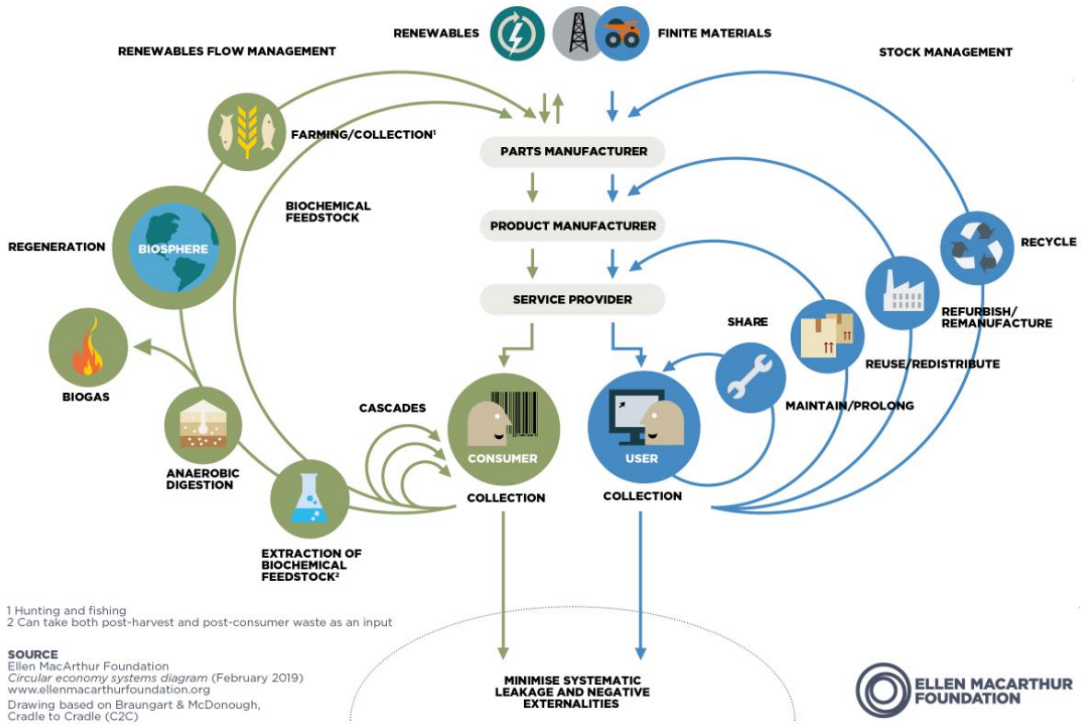


Figure 1: Ellen MacArthur Foundation Butterfly Model

By focusing on the Butterfly Model pictured above, we can deduce that the concept of CE can be split into two categories: the biological- and technical cycle. For the purpose of the DPP, we will place our focus on the technical cycle and the idea of cascading. Cascading is the primary mechanism for prolonging the life of finite materials, as it encompasses the process of: reuse what can be reused, recycle what cannot be reused, repair what can repaired and remanufacture what cannot be repaired. This is represented by arched blue arrows *(EMAF 2019)*.

The technical cycle of the Butterfly Diagram is designed to focus on items that are used rather than consumed – this could be items such as phones, cars, and buildings *(EMAF, n.d.)*. The technical cycle can be divided into sharing, maintaining, reusing, redistributing, refurbishing, remanufacturing, and recycling *(ibid)*. All these stages are part of a larger cascading system that eventually leads to a minimization of leakage and negative externalities. The purpose of the system is to keep raw materials in the loop for as long as possible and generate less waste *(ibid)*.

The innermost cascades are however the most important, as this is where most value is retained. In practice, this would mean that we should focus less on recycling by breaking products down,

and focus more on repairing, redistributing, or sharing products. In relation to the DPP, the idea is that repair manuals should be readily available, products should have a longer lifespan and outdated technology, such as computers and other electronics should be refurbished (ibid).

Critique of the model

However, one of the main critique points of the butterfly model is that it presupposes a perfect separation between biological and technical resources *(Velenturf et al 2019).* Additionally, it does not include extractive and initial processes in the lifecycle of raw materials. Finally, products are rarely made from a single type of raw material *(ibid)*. The model therefore also presupposes a perfect waste management system, that spans over entire value chains that may or may not have internalized methods of recycling. This, in turn, also limits the model's ability to design out waste. Because of these limiting factors, the model serves as a utopian and highly theoretical perfect perspective.

Data sharing and digitalization

Digitalization and data sharing are increasingly recognized as valuable tools to address market failures and support the transformation towards a more sustainable CE *(Antikainen* & Kivikytö-Reponen, *2018, Barteková & Börkey, 2022)*.

Digitalization has been defined as "*the use of digital technologies and data as well as interconnection that results in new or changes to existing activities*" (*Barteková & Börkey, 2022).* Within the context of the CE, there is a growing body of research on how digital technologies such as artificial intelligence (AI), blockchain and the Internet of Things (IoT) can be applied to CE strategies and practices during each phase of a product's lifecycle to redesign products, business models and supply chains *(Bressanelli et al., 2022, Chauhan et al., 2022)*.

Many scholars argue that the transformation towards a CE is intrinsically linked to digital transformation *(Chauhan et al., 2022)*. This is because digital technologies help to "*close the loop, slow the material loop and narrow the loop with increased resource efficiency*" *(Antikainen & Kivikytö-Reponen, 2018. P. 1)*. Therefore, digitalization is not an end, but a way to enable the systematic design of products, business models and supply chains for the CE *(Bressanelli et al., 2022)*.

While the term data sharing is in common use, we did not find a standard definition in scholarly literature. Therefore, we draw on the definition provided by the Global Data Barometer Handbook Data, whereby data sharing involves "*making data accessible to a defined group of other stakeholders with certain controls and restrictions on use*" *(Global Data Barometer Handbook, n.d.).*

Data sharing across value chains has been identified in the literature as a key enabler for promoting CE business models *(Bressanelli et al., 2022)* and addressing information asymmetries *(Jäger-Roschko & Petersen 2022).* Access to CE information can enable improved product design, more reliable maintenance, more accurate procurement, and treatment of disposed of products which can lead to economic and environmental benefits *(ibid).* Digitalization can also play a key role in promoting consumer involvement in the design and adoption of new products and services (Antikainen & Kivikytö-Reponen, 2018, *Bianchini et al., 2019).*

Creutzig et al., emphasize that digitalization is a "*double-edged sword" (Creutzig et al.,2022, p. 481)* and point to the indirect and negative equity and distributional effects of digitalization, in addition to the direct environmental impacts of digital technologies on energy and resource exploitation *(Ibid).* Linking digital applications to emissions impacts, redesigning value chains for closed-loop production and mandating data sharing as a function of market power are identified as opportunities to redirect digitalization towards a public purpose *(Ibid).*

Digital Product Passports

There are several mandatory and voluntary or industry-led Passport-type systems currently under development and implementation, for different sectors, and they differ in scope, application, and technologies *(King et al., 2023).* There is currently no universal definition of a DPP *(Ibid),* however *Van Capelleveen et al (2023)* propose six common characteristics: *"Passports (1) are digital, (2) act as an interface rather than a single system, (3) create a certified identity (4) address a single identifiable product (5) construct this identity via the life cycle registrations of its components and (6) are used for gaining insight into sustainability and circularity characteristics, value estimation and identifying opportunities" (Van Capelleveen et al., 2023 p. 15).*

This section provides an overview of the literature on the CE, highlighting its contested nature and various definitions. It explores the role of data and digital technologies in achieving CE objectives, emphasizing the potential of digitalization to enable resource efficiency and support sustainable practices and the characteristics of digital product passports.

The involvement of diverse stakeholders, including policymakers, businesses, NGOs, and consumer groups, is vital in shaping the DPP and ensuring its success. However, our review of the literature shows that research in this area has been neglected.

Using an MLG approach, we will analyze how different actors have been engaged in the development of the DPP, at different levels of governance to provide insights into factors that have shaped the policy output.

Overall, our study aims to contribute to the existing literature by providing a deeper understanding of the multi-stakeholder dynamics and the challenges, risks, and opportunities associated with involving diverse actors in shaping digital solutions for the CE. We hope it will provide valuable insights for policymakers, industry stakeholders, and researchers interested in advancing the CE agenda and leveraging digital technologies to promote sustainability.

Conceptual Framework

We will be using MLG as our theoretical framework. This approach is characterized by a dispersion of formal authority, alongside an increase in public-private networks *(Enderlein et al., 2010)*. It acknowledges the involvement of various actors and authorities at different levels of governance, ranging from local to international, as well as supranational institutions and external actors, and their interactions in decision-making processes *(ibid)*. This is different from traditional governance, which is characterized by a centralized jurisdiction under a single government *(ibid)*

Enderlein et al (2010) are suggesting two types of MLG, however type I is heavily influenced by federalism, and a lack of horizontal cooperation. Because of this, we will only use Type II MLG for this project.

Type II MLG

Type II governance is a decentralized system where various jurisdictions offer unique public services to citizens. The jurisdictions in Type II governance can range in size and scope, from local to international, and may overlap. This flexible structure allows for adaptation to changing citizen preferences and needs and is referred to as polycentric or multi-centered governance *(Enderlein et al., 2010).* The goal of this form of governance is to minimize negative externalities by adjusting the size of public jurisdictions *(ibid)*.

Type II governance is additionally characterized by many general-purpose and task-specific jurisdictions. These jurisdictions are comprised of functional associations of multiple public service industries. By creating this dispersion of formal authority, MLG Type II seeks to optimize the outcome of policy output, by including relevant external actors *(Enderlein et al., 2010).* Effectively, the citizen is not served by the government, but by a network of public-private partnerships. Although the raw concept of MLG is not specifically aimed at structures such as the EU, we view the EU as the 'government' in the case of the DPP.

- Dispersion of formal authority serves as an independent variable, which allows us to measure the distribution of decision-making power. We can achieve this by triangulating the open consultation responses with the final regulation proposal and MLG theory.

Type II MLG should also have intersecting memberships by smaller and large actors, as well as public and private. Borders and jurisdictions will, according to MLG Type II, inherently overlap and create polycentricity which also serves as a dispersion of authority and less of a hierarchical structure *(Enderlein et al., 2010).* Type II MLG is highly flexible due to its dispersion of authority. By focusing on who can deliver the needed service in the best way, it is somewhat similar to market competition *(ibid)*. In relation to the DPP, the external actors will effectively implement the regulation. These thus serve as the flexible units that establish themselves in relation to the DPP, as the nature of the policy is focused not just on the consumer, but also the economic operator.

- Therefore, another independent variable of MLG type II is that of public-private partnerships and their level of integration in the decision-making process. These are according to *Enderlein et al. (2010)* split into five levels, namely:

    - Private actors are consulted or co-opted by public actors, such as in a public consultation
    - Private actors are seen as equal to public actors and serve as negotiation partners, effectively giving them a level of authority over the decision-making process
    - Public actors delegate functions to private actors. This level is also referred to as institutional business power, where public services are delegated to private parties *(Busemeyer & Thelen, 2020)*. In the case of the DPP we assume that due to the nature of its scope, it may be forced to delegate some institutional business power to the producers of goods.
    - Private actors can be authorized to function as self-regulating bodies. If business associations are allowed to self-regulate, it can eventually lead to enforceable policies, as the relevant actors have already agreed upon the scope and consequences *(Szulecka & Strøm-Andersen, 2022).*
    - Private actors as the predominant actors of policy. At this level of integration, the regulatory bodies are restricted to adopting privately negotiated regimes. This final level is closely related to the fourth, but the private actors take the initiative (Enderlein et al., 2010).
- To analyze the level of private involvement, we will focus on feedback from the EU-arranged open consultation.

Overall, MLG provides a useful framework for analyzing governance arrangements in different policy domains and understanding how different levels of governance interact to achieve policy goals. This makes MLG relevant in modern policymaking, as increased interdependency and complexity of cross-border issues requires more significant coordination and cooperation between different levels of governance *(Enderlein et al, 2010, Jordan & Gravey, 2021)*

Limitations to MLG

Although type II governance promises the involvement of a wide range of stakeholders, a significant theoretical critique of MLG is that it fails to take the Westphalian desire for state sovereignty into account. It is argued, although in a very realistic sense, that MLG will inevitably be used as a tool to promote current state projects, rather than an open and collaborative process

(Phythian 2007). Additionally, MLG may have a negative impact on democratic accountability, as problem-solving capacity may supersede democratic inputs (*ibid*).

Methodology

In this study, a qualitative research design will be used to explore the role of the DPP in enhancing data sharing and recycling in the context of the EU CEAP. A qualitative methodology is suitable for exploring complex social phenomena, such as the perceptions of stakeholders.

Flick (2018) describes a qualitative methodology as an overarching approach to understanding the social world, and more specifically the complexity of social phenomena. Furthermore, the qualitative methodology and its' research is characterized by *Flick (2018),* as being highly contextualized in its' physical, social, cultural, and historical environment. In relation to the topic of this project, we are seeking to make a deep analysis of how the relevant stakeholders perceive and experience the prospect of a DPP.

Case Study Methodology: Understanding Flyvbjerg's Five Misunderstandings

Case study research is a qualitative methodology that involves in-depth analysis of a particular case, which could be an individual, a group, an organization, or even a policy or program. According to *Flyvbjerg (2006)*, there are some common misunderstandings of the case study methodology that researchers should be aware of when conducting case study research. These misunderstandings are, among others *(Flyvbjerg 2006, p. 221)*:

***"Misunderstanding**: One cannot generalize on the basis of an individual case; therefore, the case study cannot contribute to scientific development. "*

***"Misunderstanding**: The case study is most useful for generating hypotheses; that is, in the first stage of a total research process, whereas other methods are more suitable for hypotheses testing and theory building."*

By understanding these common misunderstandings, researchers can better design and conduct case study research that is rigorous, reliable, and valid.

Avoiding *Flyvbjergs (2006)* understandings

To avoid these misunderstandings, we will focus on the specific case and its context-dependent knowledge. This should allow us to generate new hypotheses as a result of our findings and thus contribute to the scientific development of the field. Similarly, by applying the MLG framework to the DPP through an inductive approach, taking our departure from observations, we can avoid another misunderstanding.

Case selection - the EU Digital Product Passport

We have selected the EU DPP as an exemplifying case of MLG in the EU.

Firstly, because the DPP aims to provide relevant technical insight and social impact of product lifecycles to promote sustainable production and consumption patterns. Due to the broad and cross-sectoral nature of the proposal combined with an EU ambition to build stakeholder consensus *(DIGITAL EUROPE, 2022),* the DPP is a relevant case for studying MLG in promoting sustainability goals. Secondly, the DPP involves collaboration between multiple levels of governance, including the European Commission, member state governments, industry actors, and NGO's. *(Walden et al., 2021).* This highlights the complexity involved in the DPP's deliberation, adoption and implementation, and the need for effective MLG.

By pursuing the DPP as an exemplifying case study of MLG, we can explore the contextual factors that shape its development and implementation, as well as the perspectives and experiences of the various actors involved.

Methods of data collection:

As this study will make use of document analysis, our sources of data must be categorized into primary and secondary. Primary sources of data provide direct or firsthand information about the phenomena and are not instigated by a researcher *(Benedictine University Library, n.d.)*. Primary data sources must therefore exist independently of research to be classified as such. Primary data often express the individual viewpoint of the participant (ibid). Secondary data are, on the other hand, primary data that has been gathered, interpreted, and concluded upon by other researchers *(formpl, 2020)*. The study will cover a time period from 2014, the launch of the CEAP, to the present day, to capture the latest developments related to the implementation of the DPP.

Sources of primary data for this project are thus:

1. Responses to open consultations regarding the DPP in the EU: This source of data refers to the feedback and opinions collected from various stakeholders, such as interest organizations, private corporations, and EU individuals through an open consultation platform. This platform allows relevant actors to voice their concerns, suggestions and recommendations and provide an overview of the attitude towards a DPP.
2. Current policies, such as the CEAP: As the DPP is yet to be implemented earlier but similar policies can provide insights into the broader policy context within which the DPP is situated.
3. The development process of the DPP found in the EU Legislative Train Schedule, combined with Open Consultation responses, will be used in the synthesis of MLG influence.

Sources of secondary data:

1. Published peer-reviewed research articles
2. Scientific journal entries

Methods of data analysis:

Thematic Analysis

For this project we have opted to conduct a thematic document analysis. A Thematic analysis seeks to identify patterns and themes in qualitative data. It involves the process of coding and categorizing data into common themes by reading and re-reading documents *(Braun & Clarke, 2006)*. The process, in relation to our project, seeks to identify recurring topics, ideas and issues related to the DPP's potential to enhance data sharing and recycling.

Feedback sampling

In total, 626 responses have been received in response to the 2021 Open Consultation on the SPI *(EC, n.d. -6)*. The consultation's scope was aimed at gathering broad feedback from as many stakeholders as possible focusing on opinions and evidence-based arguments. Because of the extensive number of responses, we have decided to implement a sampling strategy.

We chose to only consider extended instances of feedback. We decided to do this, as the public consultation is a questionnaire and would require quantitative methods to code and analyze, which is out of scope for this project. Out of the 626 responses, 153 qualified under this requirement. To further reduce the amount of material, we created an 'irrelevant' group of responses. This group is identified by responses that:

1. Are written in a language other than English
2. Do not contain reference to the contributor of the feedback
3. Do not contain contextual information

After separating irrelevant responses, we split the remaining 132 responses into three main categories: Business associations & individual firms, NGOs, and public authorities.

As we are not under the constraints of a quantitative methodology, we opted to conduct small-n sampling. We did this, because the objective of this thematic analysis is to find themes, not to provide a generalizable conclusion. Furthermore, we found that the instances of feedback were highly skewed towards Business Associations, which would inevitably lead to a statistically skewed result. Therefore, we opted to sample 10 instances of feedback per group, as this was the mean amount of feedback.

Categorizing in this way netted us three instances of n=10 (30 responses) out of a total p=132 of qualified responses, or around 22%. This amount of feedback would qualify as sufficient in qualitative small-n studies, as the range is typically between 10 and 30 instances of data (*GreenBook, n.d.)*. In total, 203 pages of feedback have been thematically coded (appendix 1).

Finally, we used a random number generator to identify the articles we ended up using. This eliminates some bias, however we only identified 10 public authorities in total, making the random number generator redundant for this category.

Results

As a result of thematic coding, by reading and rereading all feedback, we found four applicable themes:

- Governance challenges/suggestions: -----
- Information-sharing challenges/suggestions: -----
- Market-related challenges/suggestions: -----
- Self-regulating private sector: -----

These themes are consistent with the scope of the Open Consultation and follow the questionnaire format.

Applying these themes by marking relevant sections of the extended responses we found that:

1. **Across all types of responses,**
    a. The scope of the regulation is too wide, it should address standardization/harmonization to prevent policy-fragmentation, be much more concrete in its definitions to improve enforcement, and clearly outline how it will operate alongside existing regulations.
    b. Concrete minimum requirements should be established.
    c. A more thorough analysis should be undertaken for all relevant products.
    d. Green Public Procurement must be the leading factor in implementation, as this will ensure the competitiveness of European manufacturers while limiting outside influence in the implementation period.
    e. Existing information databases should be consolidated before investing in new infrastructure. Additionally, these databases should be accessible to all, and must have clear guidelines.
2. **Business associations and public authorities**
    a. Are hesitant to implement the regulation if issues of intellectual property rights are not thoroughly addressed. Specifically, these groups point out that data requirements in the DPP are too extensive and may include proprietary information, especially in relation to repair and remanufacturing guides. They suggest that rather than including the specific percentage of materials included in a product, this information should remain at the general level.
3. **Public authorities**
    a. Have provided paradoxical governance feedback, calling for sovereignty in implementation and enforcement, but also criticizing a lack of policy-harmonization. Furthermore, it is argued that a lack of policy-harmonization could result in challenges to free and fair competition.

4. **NGOs**
    a. Fear that the ability to self-regulate may end up with repair and remanufacturing monopolies. They call for centralized governance and enforcement.

Limitations

- By excluding some responses, we may have missed crucial feedback that could have assisted in amending the final Ecodesign proposal. However, by sampling a reasonable number of responses, we can be fairly certain that the general findings are true.
- We may have miscategorized some responses, as some organizations overlap between NGO-status and Business Association-status.

Analysis

In this section, we aim to: 1) contextualize the EU CE policy framework; 2) identify the different levels of governance involved in the development of the DPP and analyze their interaction to provide insights into factors that shaped the policy output; and 3) discuss the implications of DPP implementation in relation to MLG and to the CE both in the EU and globally.

Background of the EU circular economy policy framework

The overarching vision and strategy for moving towards a resource-efficient CE is provided by a complex patchwork of overlapping legislation, strategies, and policy instruments. The European GD, the EU's CEAP and the new European Industrial Strategy all indicate the EU's intention to balance climate, energy, and sustainability objectives, while supporting economic growth, promoting Europe's competitiveness, and reducing resource dependency.

This policy patchwork is unsurprising, given that EU policies on production have been based on historical and non-circular objectives of competitiveness and establishing a Common Market for trade *(Knill and Liefferink, 2021)*. As a result, it has been argued that the EU became locked into a trajectory of path dependence, with little room for policy innovation to support CE objectives *(Fitch-Roy et al., 2019)*. Product regulations have tended to focus on resource efficiency, product safety, waste management and producer responsibility *(Mazur-Wierzbicka, 2021)*.

Some scholars question whether the EU has the capacity (or will) to drive forward the radical change in consumption and production patterns that the shift to a climate-neutral CE requires *(Fitch-Roy et al., 2019, Jordan & Gravey., 2021, Friant et al., 2021)*. The emergence of the

EU's new CEAP in 2020 and the inclusion (for the first time) of a sustainable product policy framework, aiming to define sustainability principles and mandating the sustainability of products entering the EU market would suggest that there is a stronger shift in ambition to drive this agenda forward. Nevertheless, owing to its MLG system the EU faces several fundamental challenges, which we outline below.

From CEAP I to CEAP II

The EU's first CEAP, adopted in 2015 under the Juncker Commission, aimed to transition the European economy from a linear to a circular model. The plan signaled a new approach by including non-energy-related products throughout the life cycle to be addressed in product design. The plan also set out a series of proposals, including targets for landfill, reuse, and recycling, and proposed a market for secondary raw materials and water reuse *(EC, n.d. -3a)*. The plan has been criticized for its "*technocratic circular economy focus*" *(Friant at al., 2021, p. 350)*, given the focus on growth and competitiveness rather than a more profound socio-ecological change.

CEAP II was developed in 2019 to align with the EU's flagship political initiative, the European GD under the new Von der Leyen Commission, which sets the EU's ambition to transition towards a climate-neutral, resource-efficient, and competitive economy by 2050 *(EC, n.d. -1)*. A core component of CEAP II is the proposal for a Sustainable Products Policy Framework and the proposal to develop a legislative initiative for product design, alongside targeted measures in key resource-intensive sectors such as electronics, batteries and vehicles, packaging and plastics, textiles, construction, and food *(EC, n.d. -3b)*. The plan identifies digitalization as a key enabler of the CE transition and recognizes the EU's position as a key market with critical mass with an ambition for Europe to "*set global standards in product sustainability and to influence product design and value chain management worldwide*" *(EC, n.d. -3b)*.

The COVID-19 pandemic exposed the EU's dependency on global supply chains and as a *policy entrepreneur*, the EC took advantage of this window of opportunity to update its Industrial Strategy and push forward the GD objectives. The plan recognizes the crucial role of industry in driving forward the CE transition, highlighting that this will require *"Agile forms of public-private partnerships and new forms of cooperation between private and public actors" (EC, n.d.*

- *2, p. 5).* Arguably this could be seen as an attempt at policy coherence, often lacking in this area *(Fitch-Roy et al., 2019)*, however it has also increased private sector access to policy space.

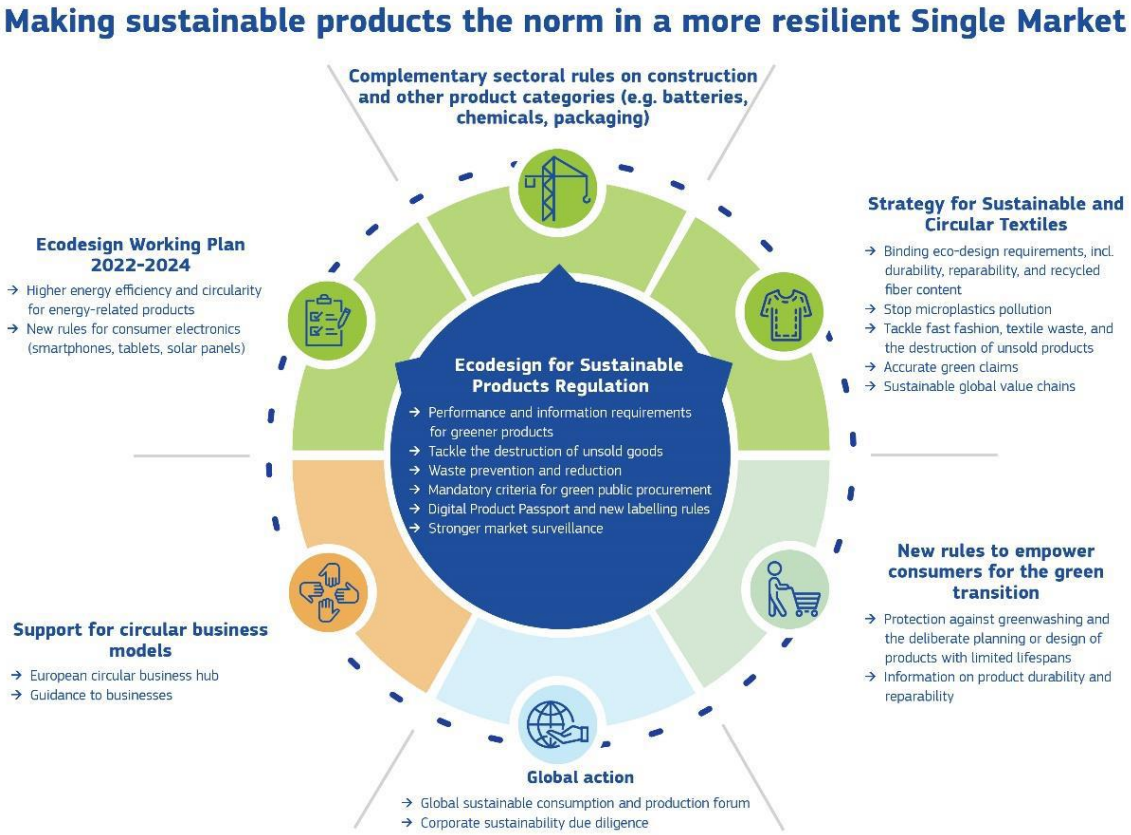
EU's Sustainable Products Initiative (SPI) sets out a "*clear and harmonised regulatory framework on product environmental sustainability*" *(EC, n.d. - 5, p. 3)* and aims to support a coherent cross-sectoral approach to sustainable production. The initiative includes legislative and non-legislative actions covering product sustainability requirements, producer responsibility, information disclosure, due diligence, and public procurement *(EC, n.d. - 5).*

Over the period September 2020-June 2021 the EC carried out several stakeholder consultations in accordance with the Better Regulation guidelines *(EC, n.d. - 4).* These included two open public consultations, a series of workshops, targeted surveys of SMEs and "a *number of stakeholder interviews conducted with selected stakeholder representatives*" *(EC, n.d. - 4, p.7).* Six workshops were carried out from 15 April to 15 June 2022 on different topics of the SPI, including a specific workshop on DPPs on 29 April 2020 (EC, n.d. -6).

Towards a new sustainable products regulation

Adopted in March 2022, the proposal for an Eco-design for Sustainable Products Regulation (ESPR) is a core component of the SPI. It amends and expands the scope of the EU's 2009 Ecodesign Directive, which has proved to be successful in improving the environmental performance of energy-using and related products in Europe *(EC, n.d. - 4).* The new regulation will include circularity requirements, for example on recycled content, substances of concern, durability, reparability, and recyclability. The EC sets out its pioneering approach and global digital standards ambition by placing the EU DPP at the heart of the proposal, enabling products to be "*tagged, identified and linked to data relevant to their circularity and sustainability*" *(EC, n.d. - 4, page 5).* While DPPs will be required for all products regulated under the ESPR, the EC proposes rolling this out gradually to specific categories or groups of products *(EC, n.d. - 4)*

An overview of initiatives in the EU CE package which relate to the EU's sustainable products policy framework and positions the DPP's role in the context of the ESPR and CEAP II is outlined below (*EC, n.d. - 5, p. 4).*



In the initial impact assessment, the EC found that there is "*no overarching, integrated EU policy instrument covering the sustainable production and consumption of all products and/or the availability and reliability of information on these products to consumers*" *(EC, n.d. - 4, p. 6)*. Therefore, the proposed regulation establishes a new legal framework for setting minimum sustainability and information requirements for different categories of products and services so that European consumers can better understand the environmental impact of the products they purchase and make more sustainable choices along the whole value chain *(EC, n.d. - 4)*. This is a significant shift in approach from the original Ecodesign Directive whereby the EU set a framework for performance criteria, which manufacturers need to meet to bring their products into the market legally. It does not prescribe specific measures or standards and sets no overarching energy saving targets.

Legal basis

The ESPR regulatory proposal is based on the EU's Article 114 of the Treaty on the Functioning of the European Union (TFEU), which gives the EU the competence to enact measures to harmonize national rules for the functioning of the internal market *(EC, n.d., - 4, EP, n.d. -2)*. This is to 1) address issues of internal market fragmentation, owing to EU member states adopting differing national approaches, 2) address the uneven and insufficient enforcement of current Ecodesign rules and 3) to support cross-border trade by reducing the regulatory burden *(EC, n.d., - 4)*.

Implementation

The aim is for the ESPR to come into force by 2024 and for the work under the existing Ecodesign Directive to continue via the adoption of a new work plan for 2022-2024 *(EC, n.d. - 4)*. The EC will draw up an implementation strategy after the legislative proposal has been adopted by the Council and the EP and including compliance tools and digital implementation *(EC, n.d. - 4)*. Therefore, while the ESPR marks a departure from the previous Eco-design directive in that it is mandatory and applies to the EU market, nevertheless in terms of application and implementation, it leaves significant scope for re-negotiation by key actors via the use of delegated acts.

The EC is empowered to establish Ecodesign performance requirements (product sustainability and information standards) for and in relation to products via delegated acts *(EC, n.d. - 4)* and has proposed several product sustainability parameters, for example, on durability and reliability, ease of repair and maintenance, re-use and recycling, environmental and carbon footprint etc. *(EC, n.d. – 4a)*. To provide technical advice, the EC has set up an expert group or Ecodesign Forum (based on the existing forum established under the previous Ecodesign Directive) comprising representatives from industry, member states, trade unions, environmental protection groups and consumer associations. This includes advice on prioritizing product groups in the workplan and preparing the Ecodesign requirements *(EC, n.d. – 4)*. In addition, industry can propose self-regulating measures "*as a valid alternative to a delegated act*" on condition of EC approval (EC, n.d. – 4, p. 23).

Pioneering the EU Digital Product Passport

The EC has established minimum information requirements for the DPP which include the provision of unique identifiers for both the product and economic operators *(EC, n.d. - 4)*. It has also specified how data and information should be shared:

- Information will be based on open standards and DPPs should be interoperable with other DPPs;
- Access to information (access rights) will be defined according to delegated acts for each product group, however economic operators and consumers should have free access to the DPP based on their access rights;
- Information in DPPs can be modified according to access rights, however "*data authentication, reliability and integrity shall be ensured*" *(EC, n.d. – 4, p. 56)*.
- Data included in the DPP shall be stored by the economic operator responsible for its creation and cannot be sold or re-used;
- DPPs shall be designed and operated securely but ensure that individual privacy is maintained, and fraud avoided *(EC, n.d. - 4)*.

Multilevel governance

What are the different levels of governance involved in the development and implementation of the passport, what are their roles and how do they interact?

The different levels of governance represented in the creation of the DPP are the EC, European Parliament and Council at the supranational level, Member States at the national level, and stakeholders at the industry level.

At the supranational level, the EC in its 2022 impact assessment report *(EC, n.d. -)* identified the main problems associated with the previous Ecodesign Directive. Firstly, there exists a lack of environmental awareness in the product design phase, thus limiting the lifetime and circularity of products *(EC, n.d. -)*. Secondly, a lack of information makes it difficult for consumers and economic operators to make sustainable choices when buying a product. Thirdly, the previous employment of the Ecodesign directive lacked proficient enforcement mechanisms towards manufacturers and retailers, rendering its application sub-optimal *(EC, n.d. -)*.

Generally, the problem-drivers identified in relation to these factors are, firstly, a market distortion where initiatives such as the polluter pays principle are applied in an inconsistent manner. Secondly, imperfect communication and lack of standardization has impacted the ability for legislators and consumers to measure the environmental impact of a product. Although this second problem has partly been addressed by proposals on Empowering Consumers for the Green Transition and the Green claims Initiative, the commission suggests that sustainability measures are insufficiently rewarded and has led to a lack of incentive for producers to produce more sustainable products *(EC, n.d. -).*

To resolve some of these issues, the EC's proposal for an updated Ecodesign Directive, in which the DPP is proposed as a mechanism, is argued to be a justified means of intervention within the inner market *(EC, n.d. -).* Firstly, the EC argues that unilateral action taken by the member states could create unequal competition and would lead to further confusion and inconsistencies. The EC argues that a harmonized and rigorous set of requirements is required to solve the identified problems. This, however, is associated with one of the major problems of implementation. We found in the thematic analysis that Public Authorities, and by extension MS, have called for sovereignty in implementation and enforcement while critiquing a lack of harmonization *(appendix 1).* Without clear, robust, and enforceable legislation from the EU, differences could arise between MS in relation to how and when to enforce.

Secondly, by arguing that EU intervention is related to the free movement of goods, EU intervention, with the EC as the policy entrepreneur, falls within the scope of EU competences and is thus justified and required *(appendix 1).* If the EU pursues this argument for absolute competence, the policy-harmonization challenge could be mitigated, although this would require wide agreement between all stakeholders, of which there is not *(appendix 1).*

The European Parliament has steadily called on the EC to show strong political ambition in its proposals to boost the CE, with a specific focus on the role of economic operators in sustainable production and in improving access to information for both consumers and to improve traceability along the value chain *(EC, n.d. - 4).* In its report adopting CEAP II on 16 February 2021 the European Parliament welcomed expanding the scope of the Ecodesign Directive, establishing sustainability principles and product requirements to address durability, reparability,

recycled content, reduction of product and environmental footprint, and supported the DPP *(EC, n.d. - 4)*. It called on the EC to develop "*binding material and environmental footprint targets for the whole product lifecycle for each product category on the marke*t" *(EC, n.d. - 4, p. 130)* and for targets for recycled content *(EC, n.d. - 4)*

In its conclusions on '*Making the Recovery Circular and Green*' adopted on 11 December 2020 and in response to CEAP II, the Environment Council supported the EC's focus on a sustainable and integrated product policy framework and proposal to expand the scope of the Ecodesign Directive *(European Council, n.d.)*. Member States urged the EC present a proposal on a digital passport, and to establish a standardized European Data Space for Smart Circular Application while ensuring standards and protocols for data sharing to ensure interoperability and safe data use *(European Council, n.d.)*. The Council also called on the EC and stakeholders to consider sustainable digitalization in the implementation of the CEAP *(European Council, n.d.)*. To achieve the best and fairest response to these issues, the EC has decided to conduct stakeholder consultations. These consultations include a balanced participation of member state representatives and non-governmental actors, such as interest organizations, industry, and individuals *(EC, n.d. - 4)*.

The role of the EC, at the supranational level, is thus to coordinate and delegate the decision-making process, while considering all relevant stakeholders in relation to the development of the DPP. Additionally, the role of the EC is to establish a coherent and effective overarching policy framework for the DPP.

As co-legislators, the role of the European Parliament and Council will be to adopt the EC's ESPR regulatory proposal.

At the national level, EU Members States have, as a response to the previous Ecodesign directive, implemented multiple and diverse approaches to resource-efficiency in products. The main issue with fragmented policies is, however, that what may be considered a resource efficient product in one country may not be in another *(EC, n.d. - 4)*. Therefore, as a response to this fragmentation, the EC have decided to repeal the old regulation in anticipation of the new Ecodesign regulation that is the focus of this project *(EC, n.d. - 4)* In this new regulation, Member States are responsible for implementing the DPP, by providing technical and monetary

assistance to SME's, in a harmonized and well-functioning internal market for sustainable products *(Ibid)*.

Because of this, the national level is responsible for ensuring implementation and enforcement of standards. By delegating these competences to member states, EU limitations in relation to administrative capacity and compliance monitoring could in theory be optimized *(Walden et al., 2021)*. However, feedback suggests that there may be differences between administrative capacity and funding of public authorities in EU member states, which may lead to discrepancies in enforcement of specific product groups *(appendix 1)*. As an answer to this, business associations are generally in favor of allowing third-party inspection and enforcement, as this could resolve some capacity issues, but could in the eyes of the critical scholar also negatively affect the quality of inspection. However, this could lead to loss of sovereignty over enforcement and is thus not seen as a viable option for public authorities. This signifies a power struggle between public and private stakeholders, which could lead to stalling or compromises.

At the industry level, the new Ecodesign Directive, article 18, allows for self-regulation and standard setting by industry associations. However, a compliance evaluation must ensure that self-regulatory measures are acceptable and scientifically sound alternatives to the regulation *(EC, n.d. - 4)*. In relation to the concept of MLG, the role of industry is thus closely related to the 4th level of integration by private actors. Additionally, the EC may at their own discretion ask for updated versions of self-regulatory measures if significant technological progress is made *(ibid)*. That said, the EC encourages the need for a consensual approach between industry and governance. This corresponds to the feedback given by business associations and may have been adopted as a result *(appendix 1)*.

What challenges or conflicts have arisen during the development of the passport, and how have they been addressed?

We identify several challenges that have arisen during the development of the regulatory proposal and the DPP which we highlight below, alongside how they have been addressed in the EU proposal. They cover the areas of standards and market regulation, global supply chains and trade, compliance and enforcement, information-sharing and incentives.

Standards and market regulation

Across all responses from the open consultation, there was a demand by all stakeholders for the establishment of minimum and harmonized requirements for product categories, while refraining from a one-size-fits all approach, and to carry out a more thorough analysis for all relevant product groups prior to defining these *(appendix 1)*.

The proposed regulation responds to these concerns by increasing the EC's vertical and hierarchical competence to set minimum sustainability requirements by product category via delegated acts. This empowers the EC to adopt detailed technical specifications for product groups on the basis of no objections from the EP and Council (which cannot amend the legislation). The EC's proposed approach is already being challenged by member states in the Environment Council *(Romano, 2022)*.

At the horizontal level, the influence of the private sector will also be increased given that minimum requirements on product standardization will take place via public-private partnership per product category.

Stakeholders highlighted that the proposal could disproportionally affect smaller businesses in the EU, given the additional administrative burden of applying new regulatory standards and costs of operationalizing the DPP *(appendix 1)*. According to the proposal the EC and member states will employ mitigating measures such as awareness-raising, training, and financial support to SMEs active in the manufacturing of products for which Ecodesign requirements are set *(ESPR, n.d.)*. This could include covering the calculation of the product environmental footprint and the technical implementation of the digital product passport.

Self-regulation is also suggested as a complementary approach to the regulatory proposal and the limits and scope of this are a clear point of contention between actors involved in the public consultation. Some stakeholders argue that allowing self-regulation will result in suboptimal results, instead the EU should take note of business and MS regulatory comments but focus on strengthening mandatory requirements *(appendix 1)*. On the other hand, business associations are, unsurprisingly, strongly in favor of self-regulation and argue that technological innovation will surpass any proposed regulation and thus limit the effectiveness of mandatory requirements

(ibid). NGOs fear that the ability to self-regulate may end up with repair and remanufacturing monopolies and call for centralized governance and enforcement.

In the final proposal, a self-regulatory approach is mandated by the EC "*as a valid alternative to regulatory approaches*" *(ESPR, n.d., p. 29)* with the proviso that the EC increases its hierarchical competence to assess the measures proposed by industry considering international trade agreements and to ensure coherence with EU law and this can be repealed. A lack of robust regulation could result in businesses adopting better, but far from optimal, self-regulation – essentially resulting in an advanced method of greenwashing by e.g., manipulating life-cycle assessments *(appendix 1)*.

Global supply chains and trade

Public authorities and NGO actors emphasized the impact of the regulation and DPP on global supply chains *(appendix 1)*. Enforcement of the regulation such as requirements on the use of recycled content and the DPP could require supply chain controls beyond the jurisdiction of national Market Surveillance Authorities, for products from outside the EU. This would require better cooperation among Member States enforcement and customs authorities. In addition, given that the supply chains involved by the sectors in scope for the sustainable products initiative are global, identifying raw materials or locations outside the EU is difficult and costly to achieve *(ibid)*.

The impact of the proposal on global supply chains is therefore significant, according to the OC replies, as some sectors affected by the proposal are global actors rather than regional. The proposal may challenge these actors' ability to find sources of raw materials that adhere to the regulatory requirements. Moreover, we can anticipate that this may be a key area of contestation at the global level, given that a significant amount of goods, especially electronic consumer goods (Trading Economics, n.d.), are imported from outside the EU, with China being a significant trading partner (Figure 1).

The implementation of common sustainability standards and criteria by the EU could play a crucial role in determining the amount and quality of recyclable waste and secondary raw materials entering and exiting the EU through trade. This effort could motivate countries trading with the EU to align their own criteria and standards with those of the EU, leading to the global improvement of standards. However, EU legislation must also comply with WTO rules on

product standards and the proposal foresees that impacts on third countries and on international trade will only be examined prior to the adoption of all measures *(ESPR, n.d.)*. Therefore, without the involvement of external trading partners, such as China or the US, the environmental benefits of the DPP could be compromised, as products made outside of the EU would not be subjected to the same environmental standards. This was the fate of the, although voluntary, ISO-14001 certification which was internationally accepted, but sparsely implemented *(Delmas 2002)*.

Compliance and enforcement

Linked to the issue of standard setting, the open consultation highlighted that the current main challenges on compliance are posed by the lack of a harmonized set of EU rules and the increasing emergence of diverging national rules *"these increase the complexity of compliance and add to the cost of doing business for companies which operate across various EU Member States" (appendix 1 p.200)*. In response, the EC has highlighted that owing to the regulatory framework foreseen "*exact costs stemming from the requirement are difficult to estimate with precision"* as they will be incurred in a second stage, following enactment of secondary legislation *(ESPR, n.d., p. 19*. It is therefore proposing to develop compliance tools, and although these are not yet specified, this is likely to be horizontally via public-private partnership. The proposal increases the EC's vertical and hierarchical competence in this area by requiring supply chain actors to cooperate with manufacturers and national authorities for verification of product's compliance with eco-design requirements *(ESPR, n.d., p. 11)*

In terms of enforcement, business associations were in favor of third-party inspections and the use of name-and-shame, whereas public authorities were generally in favor of increasing their sovereignty in this area by allowing the proper agencies to inspect and enforce, although this would require these agencies to have sufficient capacity and funding *(appendix 1)*. Allowing third-party inspections could be ineffective if there is a lack of capacity for enforcement.

The final proposal places the responsibility on public authorities and acknowledges the need for sufficient capacity and resources *(ESPR, n.d.)* Additionally, the DPP proposal may increase the direct access by the EC and national agencies to a record of all product data (via unique identifiers and digital labels or "data carriers") for all products placed on the EU market or put into service in order to monitor compliance and ensure enforcement *(ESPR, n.d., p. 26)*. The EC also proposes setting up and maintaining a product passport registry to store the data and will

specify the data to be stored in the registry. By giving customs authorities access to this data, it is expected that this will increase efficiency and reduce the administrative burden *(ESPR, n.d., p. 27)*.

Information and data sharing

Stakeholders highlighted several data governance challenges in relation to the DPP, including security and intellectual property rights (IPR) concerns. IPR was a key challenge identified by business associations and public authorities. Manufacturers are unwilling to allow public disclosure of their repair protocols and manuals, and it can be argued that "*vigorous assertion of their intellectual property rights sustains the health of the vibrant and innovative technology industry and fosters innovation" (Appendix 1, p. 46)*. Providing individuals and independent repair shops with access to proprietary information would place sensitive protected intellectual property and trade secrets at significant risk. Consequently, stakeholders call for a balance between transparency and the preservation of business intellectual property as well as the interests of consumers who should not be overwhelmed by too much information.

In response the EC is proposing that DPP information requirements be examined on a case-by-case basis, be proportionate and enable "*differentiated access to information" (ESPR, n.d., p. 25),* depending on the type of information and the typology of stakeholders.

In terms of consumer information requirements, the open consultation responses established that informed purchasing decisions may not lead to an overall decrease in consumption, although whatever is consumed is of higher quality or has a longer life cycle *(appendix 1)*.

Incentives

There was consensus by all stakeholders that Green Public Procurement (GPP) "*can work as the starting engine in the EU*" by promoting the supply and demand for sustainable products, given that public administrations are leading buyers of EU goods and services *(Appendix 1, p. 171)*.

There were differing views on how to achieve this: business associations supported mandatory sustainability requirements in public procurement as this could ensure the competitiveness of European manufacturers while limiting outside influence in the implementation period (appendix 1). On the other hand, public authorities generally supported GPP as a tool for increased sustainability but were not in agreement with making this mandatory given the risk this could stifle innovation.

In response to Green Public Procurement, the EC have given themselves the competence to require that public procurement aligns with specific criteria and targets set in a pursuant act supplementing this proposal. However, it is unclear whether green public procurement will become mandatory for Member States and EU, or just for the EU *(ESPR, n.d.)*.

How do these challenges and responses affect the use of MLG in terms of the EU's accountability and legitimacy?

In relation to standard-setting we can anticipate several associated risks *(Römph and Cramer, 2020):* 1) that minimum standards will be developed to respond to the policy preferences of more powerful actors; 2) a risk of *"regulatory capture*" whereby regulation contradicts public interest; and 3) or be ineffective *(Vollebergh & van der Werf, 2014)*. Progress in this area will depend on the quality of the standardization process and finding consensus among stakeholders *(Römph and Cramer, 2022, p. 255)*.

If powerful industry actors are allowed to push their policy preferences and cause a regulatory capture, the democratic legitimacy of MLG may be compromised, as the industry policy preference could be interpreted as being prioritized over broad public interest. Additionally, the risks associated with standard setting could result in a lack of accountability, as smaller or external stakeholders, such as environmental NGOs, may not be included in the deliberation. If the smaller or external stakeholders are not considered, it will also impact the legitimacy of the resulting standards, as:

1. Smaller companies may not be able to comply with these standards, as they have not been able to provide their point of view. This would result in an additional risk of undermining free and fair market competition.
2. By having the power of knowledge, powerful actors may be provided an incentive to exclude significant information, leading to a suboptimal standard in environmental terms, which would undermine the efforts by the EC and by extension the broad public interest.

In relation to compliance and enforcement, the current proposal is, by not including specific minimum requirements nor an adequate cost estimate, limiting the EC's ability to fulfill these roles. This could impact the EC´s ability to hold corporations accountable. In addition to these challenges, the EC may risk the possibility of loopholes and inefficiencies because of standard-

setting, which may result in a lack of confidence in their ability to create effective regulation, impacting their perceived legitimacy.

By leaving the issue of IPR handling vague, the EC risks that companies may be unwilling to provide the requested information to the DPP. This would again hamper the EC's ability to hold companies accountable, as a lack of transparency due to claims of IPR would render the database incomplete.

Finally, as public procurement accounts for 14% of the Unions GPD, is has the potential to become a significant driver of the transition towards a CE. However, the requirements for the selection of suppliers would need to be clear and concise, to minimize selection bias. Failing to do so could result in a loss of legitimacy and integrity within the EU market.

Conclusion

In this section we will reintroduce our research question and provide a clear and concise answer to it.

Research Question:

How have different levels of EU governance been involved in the development of the EU's Digital Product Passport and what are the implications for the EU's circular economy and Green Deal?

The European Union's DPP is a digital tool aimed at providing comprehensive information about the environmental and social impact of products throughout their lifecycle. It aims to enable transparency, traceability, and circularity in supply chains. The development of the DPP involves the participation of various actors, and its implications for the EU's CE and GD are significant.

The development of the DPP is based upon *collaboration of different stakeholders*, including policymakers, businesses and industry associations, public authorities, and civil society groups. The EC has been leading the initiative and has engaged with these stakeholders through consultations, working groups, and public-private partnerships. Stakeholders' involvement aims to ensure that the DPP addresses the needs and perspectives of various actors in the CE ecosystem. However, our analysis of the EU's MLG has exposed the inherent tensions between

different actors' interests and ideas on advancing the EU's CE objectives which may impact the credibility of the DPP as a regulatory instrument.

Our findings show that in its approach towards standardization, the EU is enabling private actors to have substantial influence on defining minimum requirements for sustainability and information. This could lead to suboptimal sustainability standards and undermining EC efforts towards a CE.

The DPP aims to *enhance transparency and traceability* by providing detailed information about a product's environmental and social footprint. This includes data on the product's design, materials, manufacturing processes, energy consumption, and end-of-life options. By making this information available, the DPP could enable consumers, businesses, and policymakers to make more informed decisions and encourage responsible production and consumption practices. It also helps identify inefficiencies, prioritize improvements, and promote resource-efficient and sustainable products. Nevertheless, data governance challenges impact the willingness of industry actors to share product sustainability information which could limit the opportunity to correctly recycle products. Barriers to information sharing can thus hamper an important cascade in the technical cycle of the butterfly diagram.

The DPP has the potential to *drive market transformation* by influencing consumer choices and business practices. The availability of comprehensive product information aims to empower consumers to make sustainable purchasing decisions based on a product's environmental and social performance. It also aims to encourage businesses to adopt circular practices, as transparency and accountability become increasingly important for competitiveness and compliance with regulations. Our research shows that informed consumer purchasing decisions may not lead to an overall decrease in consumption, however, according to the main principles of CE, as presented in the literature review, we should strive to reduce overall consumption, making this argument less favorable conceptually.

In addition, there will be "winners and losers" as smaller companies in the EU may not be able to comply with these standards. This would result in an additional risk of undermining free and fair market competition and decreasing the relative economic gain from adopting a circular framework.

The DPP aligns with the European GD, which is the EU's overarching strategy for sustainable development. The GD aims to make Europe the world's first climate-neutral continent by 2050 and promote a circular and resource-efficient economy. The DPP supports the GD's objectives by providing a tool to track and measure the environmental impact of products, enabling better resource management, waste reduction, and the promotion of eco-design principles. However, our research finds that environmental performance indicators are yet to be defined, therefore the DPP does not support the GD goals in its current state.

To conclude, despite the DPP offering significant opportunities to drive forward the EU's CE ambitions, it can only be considered one tool in the pursuit of a more sustainable future. By addressing the challenges outlined above, and accelerating global in addition to regional efforts, can the EU facilitate the transformation required for transitioning to a more sustainable and circular economy.

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