A Broken Notion: Impact of Modern Technologies on Product Liability

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Modern technologies enable traders to design more personal and comprehensive product labelling, as well as to improve product traceability through the supply chain. Personalised and comprehensive product information could raise consumers' product awareness, shaping new consumers' product and safety expectations. The improved product traceability through the supply chain could extend the producers' control over the product, beyond the moment the product left the manufacturing process. This paper examines the impact of modern technologies on European rules of product liability. Specifically, it considers whether the recognition of a defective product in the currently reviewed Product Liability Directive should continue to follow the test of the public's safety expectations, as well as whether producers could continue to rely on the defence of a product not being defective when they put it into circulation.

I. Introduction

The Product Liability Directive[1] is one of the oldest applicable measures in the EU consumer protection acquis. Over the years, in its various reviews, stakeholders insisted that it remained up to date and capable of handling new challenges in the field of product liability.[2] Last year, a new review was conducted assessing the applicability of this Directive in the digital market era.[3] The review acknowledges that the challenges we

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[1] Council Directive 85/374/EEC on the approximation of laws, regulations and administrative provisions of the Member States concerning liability for defective products [1985] OJ L210/29 (Product Liability Directive).

[2] See European Commission, "Report from the Commission on the Application of Directive 85/374 on Liability for Defective Products" COM (2000) 893 final, 28; European Commission, "Third Report on the Application of Council Directive Concerning Liability for Defective Products" COM (2006) 496 final, 11; European Commission, "Fourth Report on the Application of Council Directive 85/374/EEC Concerning Liability for Defective Products" COM (2011) 547 final, 11.

[3] European Commission, "Report on the Application of the Council Directive Concerning Liability for Defective Products" COM (2018) 246 final; European Commission, "Evaluation of Council Directive 85/374/EEC Concerning Liability for Defective Products" (Staff Working Document) SWD (2018) 157 final. See further the analysis of the review outcomes in D Fairgrieve, "Reforming the European Product Liability Directive: plus ca change, plus c'est la meme chose?" (2019) 1 Journal of Personal Injury Litigation 33.

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face today differ from those of the analogue world of 1985.[4] Consequently, it calls upon European policy-makers to, at the least, provide further guidance on the interpretation of the main concepts of the Product Liability Directive in light of technological developments. However, it might not be amiss to rethink the whole framework of the Product Liability Directive or to design a separate set of liability rules for products using modern technology.[5] At present, 43.7% of consulted consumers are in favour of the revision of the current Product Liability Directive.[6] In order to further evaluate the compatibility of the current liability regime with the uptake of new technologies, the European Commission has launched an expert group on liability.[7]

This paper urges that the upcoming review reconsiders one of the main concepts that currently leads to the recognition of product liability, namely the notion of a defective product. Article 6 Product Liability Directive specifies that a product is defective when it does not provide the safety that a person is entitled to expect, taking into account all circumstances, including the product's presentation. The intention behind basing the test for product liability on the breach of the public's safety expectations was to rely on an objective rather than an individual assessment of product risks.[8] As this paper will illustrate, if the notion of a defective product remains based on the public's safety expectations, it is likely to become too far removed from the digital market reality, in which producers may more easily shape general consumers' safety expectations. In order to maintain the objectivity of the assessment of the product's defect, it may be necessary to decouple the notion from the test of consumers' safety expectations or, at least, to put in place some safeguards against producers' manipulation of such expectations.

Moreover, due to the use of new technologies, producers could have better insights as to the product's quality after it leaves their manufacturing process. This paper questions, therefore, the current application of the producers' strict liability defence, based on the fact that the defect occurred in the product after the product was put into circulation, pursuant to Article 7(b) Product Liability Directive. The justification for the introduction of this defence was the fact that when a product was put into circulation, it left the producer's sphere of control.[9] This justification would no longer apply when improved product traceability and monitoring significantly broadened the producers' sphere of control over the product.

In order to make these two claims, Section II of this paper first introduces the current notion of a defective product. It illustrates how the notion of a defective product is based on product and safety expectations, and then clarifies what part this notion plays in the apportionment of product liability. Section III explains how the use of modern technologies provides traders with the capability to convey more personal and comprehensive information to consumers through product labelling, as well as to

[4] Commission, "Report", supra, note 3, p 8.

[5] ibid, 9–10.

[6] Fairgrieve, supra, note 3, pp 35–36.

[7] Commission, "Report", supra, note 3, pp 9–10.

[8] See eg D Wuyts, "The Product Liability Directive – More Than Two Decades of Defective Products in Europe" (2014) 5(1) Journal of European Tort Law 15.

[9] On the "fabrication theory", see eg H-W Micklitz, "Liability for Defective Products and Services" in N Reich et al (eds), *European Consumer Law* (Cambridge, Intersentia 2014) p 251.

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monitor the product throughout the supply chain. Section IV then shows how personalised and comprehensive information could raise consumers' awareness of a product, shaping not only individual but also general consumers' product and safety expectations. Finally, Section V examines the impact of modern technologies on rules of product liability. Specifically, it considers whether the recognition of a defective product should continue to follow the test of the public's safety expectations, as well as in what circumstances producers could rely on the defence of a product not being defective when they put it into circulation.

This examination of the impact of modern technologies on product liability rules leads to a claim that the gap between the market reality and the legal fiction of an objective character of the assessment of consumer expectations may be widening. This widening gap should inspire the rethinking of the use of the current notion of a "defective product" in the Product Liability Directive. Changing the notion or the test it is based on could reinvent this directive and increase its importance in legal practice. Therefore, the paper concludes with recommendations to the expert group on liability and to European policy-makers on how to adjust certain elements of the Product Liability Directive to the digital market era.

II. A DEFECTIVE PRODUCT

Article 6(1) Product Liability Directive states:

> "A product is defective when it does not provide the safety which a person is entitled to expect, taking all circumstances into account, including:
>
> (a) the presentation of the product;
> (b) the use to which it could reasonably be expected that the product would be put;
> (c) the time when the product was put into circulation."

Whilst the Directive does not attempt to establish a specific safety standard, it connects the objective existence of a defect, representing a safety risk, to product liability.[10] The assessment of general safety expectations should consider the intended purposes of the product, its objective characteristics and specific requirements of its intended users' group.[11] Whilst the product's (lack of) quality may influence how safely a consumer could use that product, the recognition of the low quality of a product does not always result in the finding of a product's defect.[12] The definition of a product defect aims thus to separate tortious (for the lack of product safety) from contractual (for the non-conformity with a contract) claims. It also remains peripheral whether the producer introduced a given product on the market whilst anticipating safety issues.[13]

[10] See also Micklitz, supra, note 9, p 243.

[11] Joined Cases C-503/13 and C-504/13 *Boston Scientific Medizintechnik* EU:C:2015:148, para 38.

[12] Micklitz, supra, note 9, pp 246–47.

[13] Under the current framework, producers could try to escape product liability by claiming the so-called development risk defence (ie that they could not have been aware of the risk considering the state of knowledge at the time of putting a product into circulation), see Art 7(e) Product Liability Directive. Alternatively, they could prove that a product was not defective when they put it into circulation, see Art 7(b) Product Liability Directive.

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The first drafts for the Product Liability Directive actually only related the notion of a defect to the product not being suited for purposes intended by producers. However, as Micklitz indicates, drawing such a correlation not only confuses the lack of conformity with the lack of safety, but also grants producers too much discretion to determine the existence of a defect.[14] They could abuse this discretion by narrowly describing how consumers should use their products and claiming misuse with the slightest deviation. Although they would not be able to fully exempt themselves from product liability through the use of disclaimers, they could significantly lower the scope of their liability. In the following paragraphs, this paper shows that the use of modern technologies may similarly enable producers to shape general safety expectations through the use of personalised and comprehensive labelling. Their protection against consumers' claims could become stronger in circumstances where the presentation of the product manages to limit consumers' expectations as to the product's characteristics and properties.[15] This leads to questions as to the feasibility of maintaining the current notion of a defective product as an objective test.

This risk arises from the reference in the above-mentioned definition of a defective product to the presentation of a product, which also clearly encompasses any information that consumers could acquire by reading the product's label.[16] Therefore, if a product's label does not provide complete and accurate information or warnings on the use of the product and its characteristics, this may lead to the determination of this product as defective.[17] Moreover, any product information on the label will shape consumers' product and safety expectations. Admittedly, as the test requires establishing general rather than individual product safety expectations, it should not matter whether individual consumers have read the additional available and personalised information on the product's label or what actual expectations they have formed.[18] The focus is rather on the safety that the "public at large" is "entitled to expect", as Recital 6 Product Liability Directive specifies. Therefore, after introducing the benefits of personalised and comprehensive information provision for individual consumers in Section III of this paper, Section IV anticipates how this would impact consumers' general product and safety expectations.

We can easily imagine that, when choosing a representative of the public at large, courts would apply the benchmark of an average consumer (ie a reasonably well-informed, observant and circumspect consumer[19]) following the example set in other areas of European consumer law.[20] Consequently, in the absence of product safety standards, the public's safety expectations are likely to be determined based on the information that a well-informed, observant and circumspect consumer should

[14] See Micklitz, supra, note 9, p 246.

[15] ibid, 248.

[16] ibid.

[17] See eg Wuyts, supra, note 8, pp 15–16.

[18] ibid, 8.

[19] See eg Case C-210/96 *Gut Springenheide* EU:C:1998:369, para 31.

[20] On the ever-widening application of the average consumer benchmark in EU consumer law, see eg E Théocharidi, "Effectiveness of the ADR Directive: Standard of Average Consumer and Exceptions" (2016) 1 European Review of Private Law 103.

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have read and could have understood. Unfortunately, an average consumer does not reflect an everyday consumer, as everyday consumers do not have interest in the information provided to them and do not read it.[21] This fictitious average consumer may, however, on the basis of their characteristics, be expected to make use of the opportunities created by modern technologies in personalised product labelling.[22] The benchmark would be different if a given product was intended for a particular group of users, who may suffer from a particular vulnerability. In such circumstances, a member of that targeted group should be taken as a benchmark consumer. Representatives of such targeted groups of consumers have already been used as benchmark consumers by the Court of Justice of the European Union (CJEU).[23]

The definition of a defective product requires that a product is defective at the moment of being put into circulation by its producer. Consequently, one of the main defences that producers could use to refute a claim of product liability is to rely on the fact that the product was not defective at that moment. The exact moment of when a given product has been put into circulation is not always easy to ascertain.[24] Pursuant to the CJEU's case law, a product is put into circulation when it "enters a marketing process in the form in which it is offered to the public in order to be used or consumed".[25] However, already in this judgment the CJEU considered a possibility that the distribution of the product would remain within a manufacturing rather than a marketing process, especially when it occurred under the producer's control (ie through its wholly owned subsidiary).[26] As modern technologies could allow producers to maintain more control in ensuring the product's quality throughout their distribution and supply chains, this adds weight to the argument that the moment when producers should stop being responsible for products' defects should come later than when products leave their warehouses. Previously, the CJEU has justified the attribution of liability for a defective product to producers rather than suppliers precisely for the reason of producers being "able to influence its quality".[27] How modern technologies enable producers to further monitor the product's quality is further considered in Section III of this paper and the impact thereof on the recognition of a defective product and the apportionment of liability in its Section V.

[21] See eg O Ben-Shahar and CE Schneider, *More Than You Wanted to Know: The Failure of Mandated Disclosure* (Princeton, NJ, Princeton University Press 2014); I Ayres and A Schwartz, "The No-Reading Problem in Consumer Contract law" (2014) 66(3) Stanford Law Review 545; Y Bakos, F Marotta-Wurgler and DR Trossen, "Does Anyone Read the Fine Print? Consumer Attention to Standard-Form Contracts" (2014) 43(1) Journal of Legal Studies 1; E Seira, A Elizondo and E Laguna-Müggenburg, "Are Information Disclosures Effective? Evidence from the Credit Card Market" (2017) 9(1) American Economic Journal: Economic Policy 277.

[22] The fact that observant and circumspect consumers should pay attention to personalised information does not, of course, take away the producers' obligation to provide this information in a transparent manner. On the principle of transparency, see eg O Seizov, AJ Wulf and J Luzak, "The Transparent Trap: A Multidisciplinary Perspective on the Design of Transparent Online Disclosures in the EU" (2019) 42 Journal of Consumer Policy 149.

[23] On using patients as a benchmark for determining defects of medical products, see eg *Boston Scientific Medizintechnik*, supra, note 11, paras 38–40; Case C-621/15 *W and Others* EU:C:2017:484, para 41.

[24] See eg Case C-127/04 *O'Byrne* EU:C:2006:93, paras 27–32.

[25] ibid, para 27.

[26] ibid, para 29.

[27] Case C-402/03 *Skov v Bilka* EU:C:2006:6, para 28.

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A few of the recent CJEU's judgments[28] highlighted the difficulties in applying the original concepts of the Product Liability Directive to modern product liability issues and underscored the need for reform, although the CJEU did not yet question the workability of the reliance of the notion of a defective product on the safety expectations of the public at large. The following paragraphs focus on how the current notion of a defective product, which revolves around the concept of general safety expectations, may be influenced in the digital market era.

III. The era of modern technologies

The digital market era signifies an increased use of technologies by traders. This paragraph outlines how modern technologies may facilitate the producers' provision of more comprehensive and personalised labels on consumer products, as well as how producers may track and collect more data on a given product. This could be achieved, for example, through the application of radio-frequency identification (RFID), automated facial recognition systems (AFRS) or other various technologies creating the Internet of things (IoT). Previously, many concerns have been expressed in the academic scholarship about the negative influence of the use of these technologies on the protection of consumer privacy.[29] Undoubtedly, the limits to the legitimate use of modern technologies should be further refined, acknowledging ethical concerns. This issue is, however, not the focus of this paper, which instead takes a different, novel angle, and in the following sections analyses the impacts of the current use of modern technologies in the monitoring and labelling of consumer products on product liability rules.

1. Radiofrequency identification

Whilst most consumer products still bear a traditional label, some companies have decided to upgrade their labelling practices by using the RFID technology.[30] This involves placing a tiny – often invisible to a human eye – device on a product, called an RFID tag, which collects and stores information. When an RFID tag is activated by radio waves through another device, called an interrogator or a reader, this

[28] *Boston Scientific Medizintechnik*, supra, note 11, para 43; *W and Others*, supra, note 23, paras 28–31, 43.

[29] For an overview, see eg S-A Elvy, "Commodifying Consumer Data in the Era of the Internet of Things" (2018) 59 Boston College Law Review 439; J Luzak, "Is All Fair in War against Unhealthy and Unsustainable Lifestyles? The Right to Privacy Vs Modern Technology in Consumer Contracts" in L Siliquini-Cinelli and A Hutchison (eds), *The Constitutional Dimension of Contract Law. A Comparative Perspective* (Berlin, Springer 2017) pp 39–59; P Lewinski, J Trzaskowski and J Luzak, "Face and Emotion Recognition on Commercial Property under EU Data Protection Law" (2016) 33(9) Psychology & Marketing 729; SG Stein, "Where Will Consumers Find Privacy Protection from RFIDs?: A Case for Federal Legislation" (2007) 6 Duke Law & Technology Review 1. See also The European Data Protection Board, "Guidelines 3/2019 on Processing of Personal Data through Video Devices" (10 July 2019), available at <https://edpb.europa.eu/sites/edpb/files/consultation/edpb_guidelines_201903_videosurveillance.pdf> (last accessed 1 November 2019), especially the examples on pp 16–17.

[30] On the current application of RFID technology by traders, see eg Stein, supra, note 29, p 5; J Weinberg, "Tracking RFID" (2007) 3 Journal of Law and Policy for the Information Society 835; C Mieling, "Are You Really Going to Eat That – Product Tracing, the Food Safety Modernization Act, and the Promise of RFID" (2014) University of Illinois Journal of Law, Technology & Policy 272; JM Schmidt, "RFID and Privacy: Living in Perfect Harmony" (2007) 34 Rutgers Computer & Technology Law Journal 255.

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information may then be read.[31] Furthermore, it could be stored in a database system.[32] The RFID technology could replace traditional barcodes on labels for consumer products, facilitating consumers' access to product information. Currently, especially in bigger supermarkets, consumers may scan barcodes on products themselves, either through the use of handheld devices provided by a supermarket or by using wall-mounted barcode scanners placed in stores, or even through mobile apps. The scanning of barcodes may provide consumers with additional product information (eg its unit price or an ingredients list). Moreover, by scanning barcodes, consumers may be adding goods to their virtual basket, which expedites checkout procedures.

The RFID technology may further improve the shopping experience by eliminating the need to search for and scan barcodes on labels, as it does not require a line of sight or the precise aiming of a scanner. This saves time and is more convenient for consumers. It would also be able to store and relay more information to consumers than a barcode allows for, and to edit or delete no longer pertinent information, as the device placed on a product could have a bigger and reusable memory disc. Consequently, the information provided to consumers on labels could be more up to date and more comprehensive, especially if RFID tags are coupled with various sensors, monitoring the product and collecting data on its characteristics.[33]

The biggest advantage of using the RFID technology consists, however, in the enhanced product traceability and product tracing.[34] Once activated by radio waves, an RFID device will continue to emit a signal, which, if picked up or unless turned off, will allow the product's location to be followed.[35] This part of the RFID technology may also allow consumers to be identified. As Article 29 Working Party has previously observed, a consumer may enter a shop carrying at least one product with an RFID tag.[36] If they carry the same product during their subsequent visits to this store (eg because it is an everyday object such as a watch or a wallet), the store will be able to identify this consumer and learn their shopping habits. This could subsequently lead to the personalisation of the information provided to this consumer during their future product enquiries.[37] If data protection rules allowed for the collection and processing of consumers' purchase history, it could then, for example, be possible to explicitly warn consumers if a product they were purchasing could cause a risk of injury if used in combination with one of their previously purchased

[31] See eg Schmidt, supra, note 30, p 247.

[32] Mieling, supra, note 30, p 267.

[33] See eg F Bibi et al, "A Review: RFID Technology Having Sensing Aptitudes for Food Industry and Their Contribution to Tracking and Monitoring of Food Products" (2017) 62 Trends in Food Science & Technology 91.

[34] Traceability has been defined as allowing a product to be traced within a single firm, whilst product tracing refers to tracking a product throughout the supply chain; see Mieling, supra, note 30, p 264.

[35] This has led scholars to express privacy concerns in the offline world, similar to the ones expressed about behavioural online advertising, which remain, however, outside the scope of this paper's enquiry. For further details, see eg Schmidt, supra, note 30; Article 29 Data Protection Working Party, "Working Document on Data Protection Issues Related to RFID Technology" (19 January 2005) 10107/05/EC WP 105, 7; E Gratton, "If Personal Information Is Privacy's Gatekeeper, Then Risk of Harm Is the Key: A Proposed Method for Determining What Counts as Personal Information" (2014) 24 Albany Law Journal of Science and Technology 105.

[36] Article 29 Data Protection Working Party, supra, note 35, p 7.

[37] See also KM Willingham, "Scanning Legislative Efforts: Current RFID Legislation Suffers from Misguided Fears" (2007) 11 North Carolina Banking Institute 315.

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products. Without such personalisation of the product information, consumers could only learn about any dangerous correlations between products from analysing their respective labels, instructions of use or other product information. This then begs a question: whether a producer who had the possibility to personalise product information and provide an explicit warning of a risk of an injury, but did not do so, introduced a defective product onto the market by not limiting the risk of an injury occurring. This question will be revisited in Section V of this paper.

Moreover, effective product tracking provides more insight into the operation of the supply chain.[38] This information could be made available to consumers, giving them more comprehensive data on, for example, the product's authenticity, sustainability and origins. Furthermore, as mentioned above, producers could install RFID tags in various product sensors, allowing them to control conditions of, for example, the product's transport in real time. Producers could, therefore, be more aware not only of the existence of a defect in a product after it leaves their manufacturing process, but also of which parts of the supply chain might have caused a particular defect in a product. This could leave producers with some control as to the product's quality after it has left their manufacturing process, which may impact the scope of their liability, as will be further argued in Section V of this paper.

2. Automated facial recognition systems

The personalisation of information provided to consumers is further facilitated by the increased popularity and accuracy of facial recognition technology. AFRS can detect and analyse facial features foremost to identify consumers, but traders could also use them to gather information on consumers' emotions and well-being.[39] Therefore, AFRS fit within the scope of biometrics, as they allow automated tracking, tracing or profiling of persons, not just on the basis of their gender or ethnicity, but also on more complex characteristics, such as emotions.[40] In order to briefly illustrate how AFRS work, it is necessary to realise that current technologies may quite accurately model faces in order to extract consumers' features. Subsequently, AFRS would compress these features in order to reduce dimensionality and then would deduce emotions by comparing specific expressions of a given consumer to a baseline.[41] It has already been argued that the traders' capability to track consumers' facial features and the emotional responses displayed on them facilitates the provision of more personalised services.[42]

AFRS could play a significant role in making labelling more comprehensive and personalised, matching individual consumers' needs. The possibility of making consumer information more personalised through the use of the AFRS is almost self-explanatory, as this technology aims to identify consumers. Consequently, a consumer

[38] See Mieling, supra, note 30, p 268.

[39] Lewinski et al, supra, note 29, p 729.

[40] Article 29 Data Protection Working Party, "Opinion 02/2012 on Facial Recognition in Online and Mobile Services" (22 March 2012) 00727/12/EN WP 192, 1.

[41] Lewinski et al, supra, note 29, pp 731–32.

[42] ibid, 730.

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would not need to carry a product with an RFID tag to be recognised in a given shop. Instead, cameras located in a shop would transmit an image of a consumer's face to a shop computer, which would identify the biometrics of that consumer and add them to the database. Upon a repeat visit, this consumer could be identified and if their previous preferences have been recorded, they could be recalled. Moreover, certain biometrics could allow traders to assign a given consumer within the database to a specific consumer group (eg based on their assumed gender or age category).[43] With further digitalisation and connectivity of the shopping environment, labels in the shop could then be automatically adjusted to the needs of the consumer group, to which this this particular consumer belongs. This further enhances the possibilities for the provision of personalised, explicit warnings as to the most likely risks of injuries that could occur for a particular consumer with the use of RFID tags. For example, we could imagine that if the biometrics identified a consumer as an elderly consumer, the font on the label could be enlarged to enhance the possibility of the warning reaching the consumer. Furthermore, if the use of a particular product could bring an enhanced risk of an injury to an elderly consumer, such a risk could be flagged first on the label.[44]

It is, however, also possible that the AFRS would contribute to making information on consumer products more comprehensive. Imagine a consumer frowning when looking at the packaging of a certain product. When the AFRS registers this frown, it could infer from it that this consumer was confused about some information revealed on the label and could, for example, notify a shop clerk to provide further advice to this consumer on the risks associated with the product's use. Alternatively, with more advanced technology it could send an update to the RFID tag, expanding the information provided on the label. This would give consumers access to more comprehensive information on the product's characteristics and the risks associated with its use.

3. The Internet of things

Whilst the IoT does not refer to the use of any specific technology by traders, in contrast to the above-given examples, it denotes the enhanced interconnectivity of common objects through the use of various technologies. Since the result of this interconnectivity is the uptake in the collection and sharing of consumer data, its use may facilitate more advanced options of personalising labelling, combining insights gathered through RFID, AFRS and other technologies.

[43] See eg A Hawkins, "KFC China Is Using Facial Recognition Tech to Serve Customers – But Are They Buying It?" (*The Guardian*, 11 January 2017), available at <https://www.theguardian.com/technology/2017/jan/11/china-beijing-first-smart-restaurant-kfc-facial-recognition> (last accessed 11 November 2019). On the extent to which this could be allowed under the current EU data protection rules, see also The European Data Protection Board, supra, note 29, pp 16–17.

[44] For example, the use of carpets and rugs has been flagged as a cause of many injuries of elderly consumers as a result of tripping and falling; see W Watson et al, "Consumer Product-related Injuries in Older Persons" (Monash University Accident Research Centre Report No. 162, 1999), available at <https://www.monash.edu/__data/assets/pdf_file/0020/216461/muarc162.pdf> (last accessed 11 November 2019); M Lashbrook, "The Most Dangerous Products for the Elderly" (*Houston Chronicle*, 27 October 2015), available at <https://www.houstonchronicle.com/life/healthzone/article/Products-most-likely-to-cause-injury-or-death-to-6593432.php> (last accessed 11 November 2019).

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As the IoT further increases traders' access to biometric and highly sensitive consumer data, it seems likely that producers could use it to increase the provision of personalised and comprehensive labelling to consumers.[45] This results from IoT products not only collecting and storing consumer data on how consumers use these and other interconnected products, but also using biometrics (eg fingerprints or voice prints) for identification purposes. Consequently, IoT devices further simplify the process of producers identifying consumers, leading to a possibility of easier personalisation of consumer services. This is compounded due to the fact that the interconnectivity of IoT products allows traders to collect consumers' data at a previously unprecedented rate, as well as due to the widespread use of smart devices.[46] In practice, the IoT should then provide an even easier option for traders to adjust a label to specific consumer needs upon the identification of a particular consumer. Here, we could imagine a consumer storing on their smartphone data about their allergies and allowing these data to be transmitted to interconnected devices. If traders could connect to these data, they could then again provide explicit, personalised warnings to consumers intending to purchase a product that would expose them to a risk of an injury.

IV. Personalised labels raising consumers' product awareness

Before the impact of modern technology on product liability rules can further be discussed, it is necessary to elaborate on whether personalised and comprehensive labelling of consumer products would actually shape not only individual but also general product and safety expectations. The above-discussed technologies help traders provide consumers with more personalised and comprehensive information, which it is argued could positively impact both individual and general consumers' awareness of the characteristics, properties and risks of a consumer product. This paragraph refers to the previously conducted behavioural research showing that personalised information is more accessible to consumers and attracts attention easier. However, first it shows that the claim should not be overstated. Whilst consumers may consider the personalised information more relevant and, consequently, may attempt to process it, they would not necessarily understand it better. Moreover, for the above assumptions to hold true, personalised information disclosed on labels should not replace or copy contractual terms and conditions. Only then could the consumers' apathy to disclosures, which is the first obstacle in having consumers read and attempt to understand product information, be more likely to be overcome by information personalisation.

[45] Elvy, supra, note 29, p 435.

[46] For example, it has been argued that collecting and selling data from interconnected cars will be more profitable in 2020 than the business of selling these cars; see M McFarland, "Your Car's Data May Soon Be More Valuable Than the Car Itself" (7 February 2017) CNN Business, available at <https://money.cnn.com/2017/02/07/technology/car-data-value/index.html> (last accessed 11 November 2019). Moreover, an estimation put the number of biometric sensors in IoT devices by 2018 at a minimum of 500 million; see Elvy, supra, note 29, pp 436–37.

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1. Contrasting product information with other (pre-)contractual terms and conditions

One of the reasons that the European legislator has introduced information obligations for traders was an intention to reduce the information asymmetry in consumer-to-business transactions, thus restoring a contractual balance.[47] This was coupled with a belief that better-informed consumers would make better transactional decisions.[48] However, many scholars have disputed the assumption that information obligations help with achieving this policy goal by collecting real-life evidence of the lack of consumers' engagement with disclosures.[49] These findings pose a question as to whether traders have any incentive in investing in modern technology to improve the labelling of their products if even improved labels would continue to remain unread.

This paper does not argue that consumers would make better transactional decisions if they were provided with improved product information through modern labelling. Instead, it claims that consumers will likely pay more attention to personalised labelling and have more incentives to try to understand it. Most of the studies referred to above, criticising the effectiveness of disclosures, examined the consumers' readership and understanding of (pre-)contractual standard terms and conditions. Standard terms and conditions overwhelmingly suffer from an overabundance of non-transparent, legalised text.[50] Consumers have learned to ignore such standard disclosures, which might be seen as a cost-effective decision. After all, it would take a long time to process complex contractual information, and often consumers would not be able to prompt any changes therein, even if they had read and understood the contractual terms.[51] Even the European legislator seems to have conceded this point whilst drafting the newest European consumer law rules by no longer perceiving as transparent such mandatory disclosures, which have been made within standard terms and conditions.[52]

This differs from a situation in which we examine the consumers' interest in a product and its characteristics, which would be listed on a product's label, rather than in the terms and conditions of a sale contract. Generally, any information on the main characteristics of a product offered for sale would be considered core contractual information. Core contractual information is the main drive for consumers to conclude a particular

[47] See eg N Helberger, "Forms Matter: Informing Consumers Effectively" (2013) BEUC, available at <https://www.beuc.eu/publications/x2013_089_upa_form_matters_september_2013.pdf> (last accessed 11 November 2019), 9; Seizov, Wulf and Luzak, supra, note 21, pp 151–52.

[48] Helberger, supra, note 47, pp 8–9; L Grynbaum, "Pre-Contractual Information Duties: The Foreseeable Failure of Full Harmonization" in H Schulte-Nölke and L Tichý (eds) *Perspectives for European Consumer Law* (Munich, Sellier 2010) pp 7–12.

[49] See supra, note 21.

[50] See eg Ben-Shahar and Schneider, supra, note 21, pp 55–118.

[51] ibid.

[52] See the proposed text of Recital 19 in European Commission, "Proposal for a Directive of the European Parliament and of the Council Amending Council Directive 93/13/EEC of 5 April 1993, Directive 98/6/EC of the European Parliament and of the Council, Directive 2005/29/EC of the European Parliament and of the Council and Directive 2011/83/EU of the European Parliament and of the Council as Regards Better Enforcement and Modernisation of EU Consumer Protection Rules" (2018) COM/2018/0185 final, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1523880940100&uri=COM:2018:185:FIN> (last accessed 11 November 2019). The final text of this Directive, however, abandoned this clarification; see Recital 21, available at <https://data.consilium.europa.eu/doc/document/PE-83-2019-INIT/en/pdf> (last accessed 11 November 2019).

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transaction and thus they tend to pay more attention to it. This is one of the reasons why core contractual terms are excluded from the unfairness test under the Unfair Contract Terms Directive,[53] if such terms are provided to consumers in standard terms and conditions, as long as they are drafted in a transparent manner.[54] This transparency is supposed to facilitate consumers' understanding of such core terms. Therefore, to the extent that a product's label clearly conveys essential information about a product, consumers should be more inclined to pay attention to it. Moreover, behavioural research shows that consumers' attentiveness would increase if labelling were made more comprehensive and personalised.[55] However, other factors besides product information may impact the consumer's decision-making process on whether to conclude a particular transaction. Therefore, it would be presumptuous to draw further inferences on consumer behaviour.

A risk that needs to be noted here is that of comprehensive labels becoming non-transparent to consumers due to the overabundance of information they convey, in a similar manner to (pre-)contractual terms and conditions. For example, producers could misuse the effectiveness of conveying information to consumers in a personalised manner through a product's label and attempt to provide various liability disclaimers through this medium as well. They could attempt to manipulate consumers' safety expectations by mentioning on a label even the most remote risks that could occur if a product was defective. Section V will address these issues further and propose solutions to them.

2. From personalisation of the individual to the general consumer's awareness of a product and its risks

Research on labelling practices and their effectiveness generally showed a consumers' interest in labels, but how much attention they paid to labels and how understandable they proved to be depended on many variables. For example, the labels' design is definitely a factor that influences consumers' attention to product information.[56] The application of modern technology to the labelling of consumer products could further improve its design, making it more attractive and visible, but most importantly accurate. For instance, RFID technology has been found to improve the information flow and its processing within various supply chains, including in the agricultural food sector. RFID tags may be coupled with various sensors monitoring food quality and safety (eg by registering the food product's temperature and freshness).[57] Moreover, food products could be provided with intelligent packaging, an example of the IoT system. Intelligent packaging would facilitate monitoring of the conditions of

[53] Art 4(2) of Council Directive 93/13/EEC on unfair terms in consumer contracts [1993] OJ L 95/29.

[54] See eg Office of Fair Trading, "Unfair Contract Terms Guidance. Guidance for the Unfair Terms in Consumer Contracts Regulations 1999" (September 2008), available at <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/284426/oft311.pdf> (last accessed 11 November 2019), 87–88.

[55] See eg CV Jansson-Boyd, *Consumer Psychology* (London, McGraw-Hill Open University Press 2010) p 51; JP Peter and JC Olson, *Consumer Behavior and Marketing Strategy* (Burr Ridge, IL, Irwin 1996) p 539.

[56] See eg E van Herpen, S Hieke and HCM van Trijp, "Inferring Product Healthfulness from Nutrition Labelling. The Influence of Reference Points" (2014) 72(1) Appetite 138.

[57] See eg Bibi et al, supra, note 33, pp 91–103.

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a packaged food product and its environment during the transportation and storage of this product.[58] Both of the above-mentioned modern types of product monitoring could, for example, allow the replacement of the "best before" labelling on food products with more comprehensive and accurate information on the product's viability.[59] This would not only be beneficial to the environment, limiting food waste, but also better inform consumers, which products may meet their specific needs and expectations and what risks are involved with the purchase of a particular product. Finally, such a monitoring system could more easily detect contamination of the product, highlighting its defective character, which should provide more product safety. It would also allow producers to gain insights into the distribution and supply chains of their products, including providing them with information as to whether a product might have become defective during these processes.

The relevance of comprehensive and personalised labelling has been further argued for in research papers on precautionary allergen labelling (PAL).[60] PAL is currently set up in a way that is non-comprehensive for consumers. This is perhaps explained due to the voluntary character of this labelling system, which allows traders to select the design of the PAL and whether to provide agreed reference levels for specific allergens. Therefore, this labelling system is currently counterproductive for consumers with food allergens, giving them neither sufficiently comprehensive nor personalised information. As a result, such consumers will either err on the side of caution and have a reduced quality of life by purchasing only a very limited scope of products available on the market or will ignore PAL, increasing their health risks.[61] Personalised labels would be especially relevant for consumers suffering from allergies. Imagine such consumers being able to indicate their allergens and the severity of their allergic reactions in advance, and labels then clearly indicating which products would be risky for them to purchase. Here, the IoT systems in particular may come in handy, as, with the consumer's consent, smart products could connect to databases storing the consumer's medical information on their allergies.[62] If a consumer diligently filled in their medical records, their guard when purchasing consumer goods could then be lowered. Whilst generally individual consumers' allergic reactions to a particular product would not determine it defective or unsafe, the lack of accurate and comprehensive information on allergens may have such an effect, as it puts the public at large at risk. The ease with which such a gap could be verified would be improved if the element of human mistake or oversight was taken out of this equation.

[58] See eg European Commission, "EU Guidance to the Commission Regulation (EC) No 450/2009 of 29 May 2009 on Active and Intelligent Materials and Articles Intended to Come Into Contact with Food" (23 November 2011), available at <https://ec.europa.eu/food/sites/food/files/safety/docs/cs_fcm_legis_active-intelligent_guidance.pdf> (last accessed 11 November 2019).

[59] Bibi et al, supra, note 33, p 97.

[60] See eg BC Remington et al, "Unintended Allergens in Precautionary Labelled and Unlabelled Products Pose Significant Risks to UK Allergic Consumers" (2015) 70 Allergy 813; A DunnGalvin et al, "Precautionary Allergen Labelling: Perspectives from Key Stakeholder Groups" (2015) 70 Allergy 1039; Food Standards Agency, "'May Contain' Labelling – The Consumer's Perspective" (2001), available at <https://allergyaction.org/wp-content/uploads/2017/09/AC-May-contain-report-maycontainreport.pdf> (last accessed 19 August 2019), ii.

[61] DunnGalvin et al, supra, note 60, pp 1039–40.

[62] As this could cause privacy concerns, the benefits of such a solution should be carefully considered.

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Moreover, previous research indicated low levels of salience among disadvantaged consumers as one of the reasons for the lower effectiveness of labelling on consumer behaviour.[63] In these cases, the need for personalised labelling is heightened, as upon the identification of such disadvantaged consumers labels could be simplified for them. Of course, the implementation of such a solution would also need to be carefully considered, as applying different treatment to various consumers could raise questions concerning the adoption of discriminatory regulatory or market practices.[64]

May we assume, however, that consumers will use the opportunity provided to them by modern technologies and acquire additional information on a product's characteristics? And could we extrapolate this inference to mean that with better-informed individual consumers, due to the personalisation of labelling, the safety expectations of the public at large would shift as well? What if a specific consumer had no interest in this information and made no effort to understand it. After all, there are many reasons why consumers would still not pay any attention even to personalised labels. First, it needs to be recalled that from the perspective of the impact of personalisation information on product liability rules, a few exceptions to the rule would not be of significance. The assumption is that if a greater number of consumers start receiving more personal and more comprehensive information about purchased products, individual expectations of an increased number of consumers should be more accurate. With that increased awareness of product safety spreading amongst consumers, one better-informed consumer at a time, gradually the safety expectations of the public at large would shift as well, to the extent that the product's presentation would remain a factor in their determination.[65] Secondly, it is possible to minimise the risk of a consumer's continued disinterest in disclosures. For example, consumers could be further educated on the importance of labelling. The design of labelling and the prominence of its display would also play a role.[66]

Furthermore, whether consumers acquire the information presented on a label may depend on whether they may remain passive or need to become active in accessing this information.[67] We can easily imagine that if consumers have to search for additional product information that labels hint at, they will not often use this opportunity. However, only limited research has been conducted on this issue to date. For example, some readers may be familiar with the possibility of scanning labels or

[63] See eg S Pettigrew and M Pescud, "The Salience of Food Labelling Among Low-Income Families with Overweight Children" (2013) 45(4) Journal of Nutrition Education and Behavior 332.

[64] Compare with issues of personalised pricing, eg TJ Richards, J Liaukonyte and NA Streletskaya, "Personalized Pricing and Price Fairness" (2016), available at <https://ageconsearch.umn.edu/bitstream/235809/2/Richards_Price_Fairness_AAEA_Paper.pdf> (last accessed 11 November 2019); AA Miller, "What Do We Worry About When We Worry About Price Discrimination? The Law and Ethics of Using Personal Information for Pricing" (2014) 19 Journal of Technology Law and Policy 41.

[65] To the extent, therefore, that product safety standards have not been adopted for the given product type.

[66] For further details on the benefits of adopting various policy measures in labelling practices that consider their impacts on consumer behaviour, see eg J Luzak, "Who Calls the Tune? Stocktaking of Behavioural Consumer Protection in Europe" in H-W Micklitz, A-L Sibony and F Esposito (eds), *Research Methods in Consumer Law* (Cheltenham, Edward Elgar 2018) pp 239–75.

[67] For further details on the differences between active and passive consumers, see eg J Luzak, "Online Disclosure Rules of the Consumer Rights Directive: Protecting Passive or Active Consumers?" (2015) 3 Journal of European Consumer and Market Law 79.

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QR codes on wine bottles in order to submit them for a review prior to wine purchases. As wine belongs to experienced goods, which cannot be easily evaluated as to their quality prior to their consumption, similarly to how difficult it is for consumers to assess a product's safety, consumers may benefit from comprehensive pre-contractual information on this product. However, empirical research confirmed that it was mostly consumers who already had an interest in wine and would pursue additional information in any case that used modern technology for additional wine insights (eg on wine production techniques).[68] These research findings suggest that it might be important to push relevant product information (ie product information that could shape safety expectations) to consumers rather than expect them to find it. AFRS and the IoT may help here with consumer identification, which would allow traders to anticipate a consumer's interest in a particular product. If a given consumer has an average or limited interest in a particular product, the relevant information could be, for example, more prominently displayed to them.

Whilst many more scenarios could be described, the examples given above should suffice for the purpose of supporting the hypothesis of personalised information being able to raise consumers' product awareness and explaining its limitations. Since the application of modern technologies could improve both tracking of the product through the supply chain and the provision of information to consumers through product labels, this brings us to the question of the impact of modern technologies on product liability rules.

V. Impact of modern technologies on product liability rules

This paragraph provides recommendations for the newly appointed expert group to reconceptualise the current notion of a "defective product".[69] So far, the majority of deliberations during the review of product liability rules have been made in response to the challenge that complex modern technologies pose to ensuring the safety of consumer products and to consumers' understanding of these products and their risks.[70] This paper focuses on the other side of the coin: namely, it presents arguments that modern technologies could also raise the public's awareness of products' characteristics and risks. Traders could use this phenomenon to provide various disclaimers to consumers on a personalised label, shaping consumers' product and safety expectations. Moreover, they may refute their liability for a defective product, claiming the defect resulted from problems with the product's handling throughout the supply chain, even if they had control and knowledge of subsequent quality issues during the supply process. The correlations between the personalised product information and the public's safety expectations, as well as between the

[68] LM Higgins, M McGarry Wolf and MJ Wolf, "Technological Change in the Wine Market? The Role of QR Codes and Wine Apps in Consumer Wine Purchases" (2014) 3 Wine Economics and Policy 19. This is consistent with theories on consumer psychology showing that consumers tend to be interested in information already confirming their views or in the area of their already-expressed interests; see eg Jansson-Boyd, supra, note 55, p 51.

[69] The possibility of adjusting the notion of a "defect" in the revision of the Product Liability Directive has already been considered; see Commission, supra, note 16, p 21.

[70] See supra, note 3.

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product's quality monitoring and the producer's defence of the product not being within their sphere of control when a defect occurs, are further explored below.

1. Letting go of a broken notion

Ramsay previously claimed that the main reason for adopting product safety and liability rules was consumers' lack of awareness about product risks, also caused by inadequate information practices.[71] Section III of this paper showed that through the use of RFID, AFRS and the IoT, traders will have at their disposal more information about product characteristics, as well as consumer needs and expectations, which should allow them to further personalise labels and shape safety expectations. As illustrated in Section IV, improved modern labelling practices should increase the chances of consumers becoming familiar with a product's characteristics, its use and its limitations, which would ultimately determine the product's safety. Whilst the use of modern technologies has not yet eliminated the information disadvantage of consumers, as a result of their application in product labelling, product risks should become better known to consumers prior to the contract's conclusion. Consequently, if consumers proceed with a transaction, they may find it difficult to raise any contractual claims of product non-conformity, as they would be deemed to have accepted accompanying risks, which had been made known to them.[72] Their capability to raise tortious liability claims for a defective product could also be limited if producers used modernised labels to shift the legitimate expectations of the public at large as to the level of safety of a given product.[73] It should be mentioned that this is unlikely to mean that consumer products would become less safe than they currently are. Rather, in case there is a damage caused by a consumer product, consumers may find it hard to prove that product safety expectations had been high enough to warrant classifying it as a defective product. This would follow from consumers in general being deemed to have full knowledge of all product risks that producers revealed through personalised information, as consumer attention should have been drawn to it.[74] Consequently, and in order to maintain the objectivity of the assessment of product safety, the European legislator should take a good look at the current notion of a "defective product".

If modern technologies provide producers with an easier way to shape general safety expectations of consumers, the objectivity of the current notion of a defective product is in question. How could the notion of a defective product be reformulated? One idea would be to evaluate the defectiveness of a consumer product considering its adherence to product safety standards. The increased adoption of product safety

[71] See eg I Ramsay, *Consumer Law and Policy: Text and Materials on Regulating Consumer Markets* (Oxford, Hart Publishing 2012) p 582.

[72] It is impossible to fully eliminate the risks, however, and thus exclude a producer's liability; see Micklitz, supra, note 9, p 248; Wuyts, supra, note 8, p 18.

[73] See eg Wuyts, supra, note 8, p 17.

[74] This would hold true if the fictitious benchmark of an average consumer was applied in order to assess whether the information should have reached the public at large.

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standards would then replace the need to rely on general safety expectations.[75] Where such a standard had not been adopted, the assessment of whether a product is defective could be left to the court-appointed experts rather than to the public at large to decide by establishing the state of the art in a particular field.[76] Combining these two approaches should provide a more objective assessment of a product's defect than a continued reliance on the public's product and safety expectations at a time, when the manipulation thereof is increasingly easy.[77]

The objectivity of the assessment could be further ensured by reconciling the notion of a safe product between the Product Liability Directive and the General Product Safety Directive (GPSD),[78] which is also currently under review. A safe product is defined in Article 2(b) GPSD by a reference to the need to conduct a risk–utility assessment; that is, to look for whether the product presents "[. . .] any risk or only the minimum risk compatible with the product's use, considered to be acceptable and consistent with a high level of protection for the safety and health of persons [. . .]". Introduction of this notion of a safe product to the Product Liability Directive should, however, still be accompanied by improving the process of adopting product safety standards and using experts to conduct the risk–utility assessment.[79]

2. What producers (should) know

The second claim that this paper makes is that in the assessment of whether to hold the producer liable for a product's defectiveness, it may be relevant to look beyond the moment at which the producer has put the product into circulation, contrary to current Article 7(b) Product Liability Directive. Considering that when the Product Liability Directive was drafted producers generally had no clear insights into the workings of the supply chain, the adoption of the producers' defence was legitimate. After all, their sphere of control over a product was limited to the time between it left their manufacturing process and was purchased by consumers. This changes when we acknowledge that the modern technologies described in this paper facilitate more insights into the supply chain. These technologies enable producers to track the

[75] On the need to adopt more product safety standards, see also European Commission, "Liability for Emerging Digital Technologies" (Staff Working Document) SWD (2018) 137 final 18. Such standards could be adopted, for example, by the European Standardisation Organisations; for further details, see <https://www.cencenelec.eu/standards/ESOs/Pages/default.aspx> (last accessed 1 November 2019). On the problems that would have to be overcome in the current standardisation process in the example of the services sector, see eg B van Leeuwen, *European Standardisation of Services and Its Impact on Private Law: Paradoxes of Convergence* (Oxford, Hart Publishing 2017).

[76] Previously, it has been argued that a court could act as an informed representative of the public at large; see eg H Bartl, *Produkthaftung nach neuem EG-Recht* (Landsberg am Lech, Verlag Moderne Industrie 1989), as well as that more judges with technical training should be appointed and that the evidence should be provided by court-appointed impartial experts rather than experts nominated by parties to the procedure; see eg E Barbier de la Serre and A-L Sibony, "Expert Evidence Before the EC Courts" (2008) 45(4) Common Market Law Review 941.

[77] If policy-makers do not replace the current test with the newly suggested approach, they should at the very least give more weight to the court-appointed experts' testimony and existing standards when resolving any doubts or controversy surrounding the assessment of the public's product and safety expectations.

[78] Directive 2001/95/EC of the European Parliament and of the Council on general product safety [2002] OJ L11/4 (General Product Safety Directive).

[79] Recitals 14–16 GPSD already draw attention to the necessity of further improvements in the standardisation process.

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conditions in which a product is transported and stored. Consequently, a producer could have access to the data showing whether a product was defective at the moment it reached consumers, and not only when it left its manufacturing process. If we come back to the example of "best before" dates on food products, currently consumers purchasing such products would be guided by these generic due dates. These are set when products are leaving the manufacturer. Alternatively, RFID tags attached to temperature and freshness sensors could inform both producers and consumers at the moment of the purchase of an actual prediction as to the time frame in which a given product may be safely consumed.

Due to better insights into the workings of the supply chain, producers may also be able to more easily find when and why a defect in a product originated. Therefore, whilst on the one hand the complexity of modern, often interconnected products increases, the transparency of their production improves as well. This supports maintaining of the umbrella liability of producers, as they may continue to remain the best-informed parties about the quality of their products. However, this increased transparency due to the application of modern technologies should also facilitate obtaining redress by producers against other parties in the supply chain. Therefore, with further technological developments that would ultimately lower the costs of product tracking through the distribution and supply chain, producers could be made responsible for defects arising from the mishandling of a product during its distribution and supply.

This does not mean that they should be obliged to use modern technologies to monitor the quality of their products at the moment, as the costs of such processes can still be too significant for small producers, which would stifle innovation and the market if made mandatory.[80] However, the producers' defence could be adjusted only to allow them to avoid liability for a product's defect from the moment they proved that they stopped monitoring the product's quality. This would mean letting go of the presumption that the product was not defective when the implemented quality control systems confirmed the product safe at the moment of it leaving the manufacturing process.[81] Instead, the EU legislator could adopt a rebuttable presumption of the producer's control over the product's quality until the product reaches consumers.

3. Further regulation of a label's content: the "easy" solution

If the notion of a defective product is not decoupled from product safety expectations and these continue to be shaped by a product's presentation, then, at the very least, the European policy-maker should consider how more personalised and comprehensive presentation of a product's characteristics and properties could impact general product and safety expectations. Two suggestions for new rules in the area, which can be made on the basis of the analysis presented in Section IV, are: prohibiting producers from placing information other than specific product information on labels; and obliging them to make the display of essential information prominent on labels.

[80] See eg Weinberg, supra, note 30, pp 785–99. Previously, for example, English courts have held that producers are not expected to apply best practices in guaranteeing product safety; see *Worsley v Tambrands Ltd* [1999] EWHC 273 (QB).

[81] For example, such an argument was accepted as the producer's defence by English courts: *Piper v JRI (Manufacturing) Ltd* [2006] EWCA Civ 1344 CoA.

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The adoption of such rules should lower the risk of consumers misinterpreting or not paying attention to the information.

Some scholars have already argued for a standardisation of labelling practices, which would entail stipulating what information traders may include on a label and prohibiting disclosing other information thereon.[82] Such a strict regulation could, however, limit producers' opportunities to fully reach consumers with personalised product information through a label. This paper supports a less invasive regulatory measure: namely, prohibiting disclosing only anything other than product information on a label.[83] Consequently, producers could still convey comprehensive information on a product's characteristics and properties through labels and adjust it to consumers' needs. However, they would not be allowed to use modern technology to add, for example, specific contractual liability exclusions on such labels, which, due to them being less generic, could become enforceable against consumers. Moreover, regulators could specify which information, as essential, should be prominently displayed on a label.

4. One label, different messages: evidentiary problems

The concept of personalised labelling suggests that some consumers might receive different information from others. To begin with, the personalisation of labels could only pertain to the label's design. For example, one consumer would first see the information about the product's nutritional value, whilst another might see information about the product's list of ingredients. In the above-mentioned example of PAL labelling, consumers suffering from allergies could first receive information on whether a given product contains their individual allergens. In a more advanced version of personalised labelling, certain information would only be revealed to some consumers. For example, the information could be layered, and only active, interested consumers would access all of it. This may pose a problem for assessing a given consumer's knowledge of the product and their safety expectations. However, first, this paper argues for abandoning the test of consumers' safety expectations in order to determine a product's safety. Second, even if that test was retained, from the perspective of establishing product safety expectations, it has to be recalled that the standard is objective, being separate from the actual expectations of a particular consumer.

What could pose more problems is an assessment of what product and safety expectations the public at large could harbour if the presentation of a product differed amongst various consumers and whether producers complied with their information duties if they personalised product information. Here, the use of the benchmark of an average consumer could prove to be a solution. Average consumers (ie reasonably

[82] See eg E Howlett, S Burton, AH Tangari and M Bui, "Hold the Salt! Effects of Sodium Information Provision, Sodium Content, and Hypertension on Perceived Cardiovascular Disease Risk and Purchase Intentions" (2012) 31 Journal of Public Policy & Marketing 4; EATWELL, "Effectiveness of Policy Interventions to Promote Healthy Eating and Recommendations for Future Action: Evidence from the EATWELL Project" (2013), available at <http://eatwellproject.eu/en/upload/Reports/Deliverable%205_1.pdf> p 31 (last accessed 11 November 2019).

[83] The regulators should further define what information would classify as product information.

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well-informed, observant and circumspect consumers) could be expected to access and read all of the information that producers made available to them. This benchmark is a fiction, as empirical research has proven that most consumers do not read the information provided to them.[84] However, as long as this benchmark is applied in European consumer law, legally it should not matter in what order or using which design producers have revealed this information to a given consumer on a label. That would likely influence the level of attention and possibly the scope of understanding of a given particular consumer, but such differences in the presentation of a product's label could be irrelevant from a legal perspective. However, as mentioned in the previous paragraph, in order to ensure that the most essential product and safety information has a greater chance of being conveyed to consumers, EU policy-makers could impose a requirement of making its disclosure prominent.

Another issue that would need to be solved concerns the ability of producers to prove that they have provided all of the mandatory information to individual consumers, despite the disclosure not being standardised. There are, however, undoubtedly various technological approaches that producers could adopt here (eg attaching a copy of the personalised label to the contractual documents).

VI. Conclusions

The use of modern technologies to personalise product labelling could be in the interests of both producers and consumers. Producers could gain more insights into their supply chain and more control over their products, as well as reaching more consumers with their product information. Consumers should be able to rely on better product information and to form more realistic expectations regarding consumer products. Furthermore, the increased tracking and monitoring of products should raise the level of product safety, which always reduces the instances of product liability.

However, as modern labelling is bound to change the landscape of consumers' product and safety expectations, this supports the argument that the current notion of a "defective product" in the Product Liability Directive should be adjusted. This notion should be reconceptualised, and possibly even uncoupled from consumers' overall safety expectations, ensuring that it corresponds to the needs of the digital era and introduces an objective assessment of product safety. For example, the assessment of whether a product is defective could rely on this product's adherence to safety standards and experts' safety expectations instead. At the very minimum, it might be necessary to further specify the design and content of consumer product labels in order to prevent producers from manipulating consumers' product and safety expectations through modern labels. Overall, more attention should be devoted to the issues discussed in this paper, both by policy-makers and by scholars. Whilst tackling fears of digitalisation and complexity brought about by modern technology, it is necessary to consider that the digital era continuously improves production, distribution and supply processes, and such changes should start being reflected in policy-making.

[84] See supra, note 49.

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