
PRODUCT LIABILITY AMID TECHNOLOGICAL DISRUPTION: ABATING THE SURGE OF DIGITAL CONSUMER RISKS

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ABSTRACT

The rapid progression of digital technologies reshaped the global marketplace, introducing novel risks for consumers and posing substantial challenges to traditional legal frameworks.

Adapting product liability laws to address the emerging risks posed by technological advancements has become a pressing priority as new technologies introduce increasingly complex legal scenarios. This research thoroughly investigates the connection between product liability law and advancements in technology, concentrating on digital products and services like software, algorithms, and data. The various issues include instances of harm from autonomous vehicles or other AI-driven products, conflicts regarding manufacturers' responsibility for faults in software or algorithms, and safety issues linked to genetically modified foods and other cutting-edge technologies. The research emphasises the difficulties in determining liability within technological environments, where failures and data breaches often involve numerous participants, such as platform operators, data collectors, and software developers. Existing legal frameworks encompassing negligence, strict liability, and warranty law that are analysed for their limitations in addressing the intangible characteristics of digital components and the evidentiary difficulties in establishing a causal connection between defects and consumer harm. Additionally, the study explores the urgent need for effective allocation of responsibility across the digital supply chain. In response to these challenges, the research proposes extensive reforms, which involve the creation of specific legal criteria for assessing algorithmic fairness and data protection, improved regulatory supervision in critical areas like cybersecurity and data privacy, and the incorporation of self-regulation by the industry to enhance consumer safety initiatives. The research concludes with a detailed plan to balance technological advancement with consumer protection, offering essential recommendations for policymakers, legal practitioners, and industry leaders to update product liability laws for the current digital landscape.

Keywords: Digital Technologies, Product Liability Law, Technological Disruption, Regulatory Reforms, Digital Supply Chain, Consumer Risks

I. INTRODUCTION

In the contemporary landscape, digital technologies are transforming consumer goods and services, establishing a network where devices such as coffee makers, automobiles, and refrigerators interact seamlessly, enhancing convenience in daily life.¹ However, this swift evolution also introduces new challenges, including data breaches, algorithmic biases, and software malfunctions, which complicate traditional consumer protection measures. As consumers increasingly depend on interconnected digital products, the scope of potential harm has broadened, extending beyond physical defects to encompass intangible risks. This paper investigates the interplay between technological advancement and product liability, emphasising the necessity for revised legal and ethical frameworks to safeguard consumers in this digital age.

Conventional product liability laws, which are based on negligence and strict liability, frequently find it difficult to address the complexities associated with digital products, including AI-driven algorithms and interconnected devices. Complications such as algorithmic bias and security vulnerabilities in the Internet of Things (IoT) hinder the allocation of liability. This paper explores the challenges posed by emerging technologies, such as AI, blockchain, and virtual reality, and suggests potential legal strategies to alleviate these risks. By analyzing legal precedents and policy debates, the paper advocates for a proactive stance to ensure that technological advancements bolster consumer protection, fostering a secure digital marketplace where consumers can enjoy innovation without sacrificing their rights.

II. HISTORICAL DEVELOPMENT OF PRODUCT LIABILITY LAWS

The evolution of product liability laws signifies a shift from a system that burdens consumers to one that progressively protects consumer rights. At first, it explains the principle of caveat emptor, which means “let the buyer beware” prevailed, imposing the responsibility on consumers to scrutinise products and acknowledge the risks linked to defects. This methodology offered limited recourse for individuals harmed by faulty goods. Nonetheless, as

¹ John C.P. Goldberg & Benjamin C. Zipursky, The Easy Case for Products Liability Law: A Response to Professors Polinsky and Shavell, 123 Harv. L. Rev. 1919 (2010).

industrialisation and mass production developed in the 19th and 20th centuries, the inadequacies of this model became evident. Legal frameworks began to adopt principles such as negligence, strict liability, and breach of warranty, which shifted the responsibility for defects that caused harm onto manufacturers and sellers. One of the landmark cases, including *Donoghue v. Stevenson* (1932), established that manufacturers have a duty of care towards consumers, representing a significant shift from earlier legal standards.

²As the economy transitioned from physical goods to more abstract products like software and digital technologies, traditional product liability laws proved increasingly insufficient. The advent of cutting-edge technologies, including artificial intelligence (AI), cloud computing, and the Internet of Things, has given rise to unprecedented challenges in the realm of product liability. Unlike conventional physical products, digital goods often lack discernible defects, yet they may cause harm through cybersecurity vulnerabilities, algorithmic biases, or data breaches. This evolving landscape has necessitated the development of robust legal frameworks to address these complexities, exemplified by India's Consumer Protection Act of 2019, which extends liability protections to the digital domain. Furthermore, laws related to data privacy, intellectual property, and cybersecurity have evolved to address the complexities of the digital marketplace. Today, consumer protection laws must continue to adapt to this dynamic environment, ensuring that both physical and digital products are held accountable when they cause harm.

III. EMERGING DIGITAL CONSUMER RISKS AMID TECHNOLOGICAL DISRUPTION

³Rapid advancements in technology, particularly in AI, IoT, and algorithm-based systems, have significantly altered consumer products, enhancing convenience but also presenting new challenges. Existing product liability laws are often inadequate in addressing concerns such as AI failures, security vulnerabilities in IoT devices, and mistakes in automated decision-making processes. As smart devices and autonomous systems become more prevalent, the potential for harm—ranging from data breaches to physical injuries—continues to grow. These emerging risks put pressure on current legal definitions of defects and accountability, especially as the

² Christian Twigg-Flesner, Guiding Principles for Updating the Product Liability Directive for the Digital Age, European Law Institute (Jan. 2021).

³ D.K. Pandey, Product Liability in the Digital Age 101 (2022).

distinction between products and services becomes increasingly ambiguous due to software integration.⁴ This chapter emphasises the critical need to revise legal frameworks to safeguard consumers while ensuring a balance between innovation and responsibility. Key digital consumer risks include:

III.1. Rise of AI-Powered and Automated Products

AI-driven innovations, such as self-driving cars and virtual assistants, promise enhanced efficiency and convenience yet pose significant legal and ethical dilemmas.⁵ A primary concern is autonomous decision-making, where AI functions independently without direct human oversight. This autonomy raises the risk of unforeseen errors, such as accidents involving self-driving vehicles, complicating the issue of liability—should responsibility rest with the manufacturer, software developer, or end-user? Another critical challenge is AI bias, wherein systems trained on historical data may perpetuate discrimination, impacting sectors like employment and financial services. These complexities underscore the urgent need for modernised legal frameworks that strike a balance between fostering innovation and safeguarding consumer rights, ensuring clear accountability and fairness in AI implementation.

III.2. Cybersecurity Challenges in the Internet of Things

The smart device ecosystem seamlessly integrates smart devices for enhanced convenience but also presents serious cybersecurity risks. Data breaches can compromise sensitive information, leading to identity theft and financial fraud. Cyberattacks on device network systems may result in critical failures, such as hacked autonomous vehicles causing accidents or compromised medical implants endangering lives. Determining liability is complex, involving manufacturers, software developers, and users. To mitigate risks, robust encryption, regular security updates, and well-defined legal accountability are essential. Strengthening cybersecurity measures ensures consumer safety while allowing society to reap the benefits of IoT innovations without undue risks.

⁴ Bangia, Law of Torts Including Motor Vehicles Accident and Consumer Protection Laws 450-55 (24th ed. 2019)

⁵ Coleman, Benjamin C. "The Internet and Product Liability: A Reconsideration." *The Journal of Law, Economics & Policy* 6, no. 1 (2000): 143-163.

III.3. Software Defects and Algorithmic Failures

⁶As software-driven products become more common, defects and algorithmic failures raise product liability concerns. Software updates can introduce bugs that compromise safety, while AI errors in healthcare and finance can cause serious harm. Inadequate testing, driven by rapid innovation, increases these risks, as seen in self-driving car failures. Determining liability, whether manufacturers, developers, or companies, will remain complex. To ensure consumer safety, legal frameworks must evolve with clearer accountability, stronger testing standards, and better protections while balancing innovation.

III.4. Data Privacy Concerns and Liability Implications

Data privacy and liability risks are growing as companies collect and use vast consumer data. Unauthorised data collection and sharing without consent can violate laws like GDPR, leading to legal penalties. ⁷Data breaches expose sensitive information, causing identity theft and financial loss, with companies facing lawsuits for negligence. Many consumers struggle to understand complex privacy policies, limiting their control over personal data. To reduce risks, businesses must follow data protection laws, ensure transparency, and strengthen security. Regulators should also enhance consumer rights to balance innovation with privacy protection and build trust.

III.5. Recent Case Studies of Product Liability Issues in the Digital Space

In India and globally, recent case laws and landmark judgements illustrate the evolving judicial response to product liability issues in the digital space.

a. Manjeet Singh vs National Insurance Company Ltd. (2018)

In this case, the NCDRC adjudicated on a contention regarding a flawed digital vehicle tracking system under the Consumer Protection Act, 1986. Singh asserted that the system was ineffective in averting the theft of his truck, resulting in the rejection of his insurance claim. The insurer argued that the policy did not cover losses due to the tracking system's failure. The court dismissed Singh's petition, stating that the malfunction was not an actionable defect

⁶ L. L. Thompson, *Legal Aspects of Digital Product Liability* 90 (2d ed. 2021).

⁷ Cohen, Paul B. "Product Liability: The Search for the Holy Grail." *University of Chicago Law Review* 47, no. 4 (1980): 797-867.

under the policy. The judgement highlighted the difficulty of applying traditional product liability to digital systems and the need for clearer legal standards.

b. Shoda Devi v. DDU Hospital (2020)

In *Shoda Devi v. DDU Hospital (2020)*, the NCDRC ruled on medical negligence involving a faulty diagnostic device. Shoda Devi claimed the device led to a misdiagnosis, worsening her condition. The hospital argued the issue was due to operational misuse, not a defect in the equipment. The court held the hospital liable for deficient service but did not classify the malfunction as a product defect. Compensation was awarded for service failure, emphasising that hospitals must ensure proper device operation. The case highlights the judiciary's cautious approach to digital equipment liability, focusing more on service negligence than product defects.

c. United States, Lemmon v. Snap, Inc. (2020)

The court held that, was liable for a defective design claim related to its "speed filter" feature. The court rejected Snap's defense under Section 230 of the Communications Decency Act, ruling that the plaintiffs' claim did not concern third-party content but rather Snap's own product design. Applying California's strict product liability principles, the court determined that software features causing foreseeable harm, such as encouraging reckless driving, could be treated as defective products. This decision set a significant precedent for holding tech companies accountable for hazardous digital designs.

d. Amit Jain v. Flipkart & Ors. (2022)

The Delhi High Court held that the seller was liable under Section 86 for the defective smartphone sold on Flipkart. However, the court did not impose strict liability on Flipkart, recognising its role as an intermediary. Despite this, the court acknowledged Flipkart's duty under the Consumer Protection (E-Commerce) Rules, 2020, to ensure transparency and quality in e-commerce transactions. This ruling suggested that future cases might hold e-commerce platforms more accountable. The court awarded compensation to Amit Jain for the defective product.

IV. REGULATORY CHALLENGES AND LEGAL FRAMEWORK FOR PRODUCT LIABILITY

Product liability under consumer protection law guarantees that manufacturers, sellers, and service providers are responsible for defective products that cause harm to consumers.⁸ In India, the Consumer Protection Act, 2019 predominantly addresses physical goods and services but does not contain specific provisions for AI risks, cybersecurity failures, and data breaches. Although the Information Technology Act, 2000, and E-Commerce Rules, 2020, offer some degree of oversight, a more comprehensive legal framework is necessary to tackle digital liability and improve consumer safety in the advancing digital marketplace.

IV.1. Legal Framework governing Product Liability in India

The different legislations that support and protect digital consumers from the different product defects and liabilities are as follows:

1. The Consumer Protection Act, 2019

It is India's main provision for protecting consumer rights and holding manufacturers, service providers, and sellers responsible for defective products or poor services. It requires them to compensate consumers for harm caused by faulty products or inadequate services. Manufacturers are liable for defects, poor design, lack of warnings, or failure to honour warranties. Service providers must ensure quality, and sellers can be held accountable if they knowingly sell defective products. This legislation also has Consumer Dispute Redressal Commissions at different levels, such as district, state, and national level.

2. The Legal Metrology Act, 2009

In order to stop dishonest business activities, the Legal Metrology Act of 2009 guarantees precision in weights, measures, and product labelling. It protects customers from being taken advantage of by establishing consistent standards for weighing and measuring devices. In order to prevent deceptive activities, the Act also requires that pre-packaged commodities be clearly labelled with the amount, price, and manufacturing date. It indirectly supports product responsibility by requiring manufacturers and traders to provide accurate product details. Following these guidelines supports fair trade and protects consumer rights.

⁸ Bazelon, Judith L., and Lisa M. Bernstein. "Product Liability in the Internet Age." *The Yale Law Journal* 107, no. 5 (1998): 1247-1311.

3. The Drugs and Cosmetics Act, 1940

This framework establishes standards for Ayurvedic, Siddha, and Unani medicines and regulates cosmetics for consumer safety. It also sets strict licensing, quality control, and compliance rules to prevent substandard or counterfeit drugs from reaching consumers. The Act also gives authorities the authority to inspect manufacturing facilities, test drug samples, and take action against violators. Amendments have strengthened its regulatory framework to address changing challenges in the pharmaceutical industry.

4. The Food Safety and Standards Act, 2006 (FSSA)

The Food Safety and Standards Act, 2006 (FSSA) ensures food safety in India by regulating the manufacture, storage, sale, and import of food products. It established the Food Safety and Standards Authority of India (FSSAI) to set scientific standards and monitor compliance. The Act replaced multiple food safety laws, creating a unified system. It requires food businesses to obtain licenses and follow hygiene and safety rules. Authorities can take action against unsafe food, including recalls, penalties, and inspections. By enforcing strict quality controls, the FSSA aims to prevent food adulteration and contamination, ensuring safe food for consumers.

5. The Sale of Goods Act, 1930

It regulates the sale of goods in India, ensuring fairness for buyers and sellers. It includes implied conditions and warranties to protect consumers. Key conditions include the right to sell (Section 14), fitness for purpose (Section 16), and merchantable quality (Section 16), ensuring buyers receive suitable goods. If these are breached, buyers can reject the goods or claim damages. Implied warranties, like the right to quiet possession, offer additional protection. The Act helps consumers seek remedies for defective or misrepresented goods, promoting fair trade and trust in business transactions.

IV.II. Constraints of Current Legal Frameworks

⁹The rise of digital products and technological advancements has highlighted significant

⁹ Consumer Protection (E-Commerce) Rules, 2020

limitations in traditional legal frameworks governing product liability.¹⁰ Software, AI-driven devices, and cloud services are examples of digital products that pose challenges that traditional product liability laws are ill-equipped to handle. For instance, software defects may not be immediately apparent and may develop over time, making it challenging to determine when a defect occurred. These laws, which were created for physical goods, are unable to adequately address the complexities of digital consumer risks. AI adds further complexity as its behaviour changes with data inputs, creating uncertainty about whether a defect existed at the time of sale. Furthermore, varying legal definitions of "products" and "defects" across jurisdictions create additional confusion.

¹¹Furthermore, because digital flaws are abstract, it might be challenging to establish responsibility in situations involving digital products. Because digital products include several middlemen, consumers sometimes lack access to technical competence or the evidence required to demonstrate causality. Legal frameworks need to be updated, international rules need to be harmonised, and clear responsibility standards for new technologies like artificial intelligence need to be developed in order to safeguard consumers in the digital era.

¹²Consumer safety and confidence will continue to be weakened in the absence of these adjustments.

V. STATUTORY OBLIGATIONS FOR LEGAL ADVANCEMENT AND POLICY FORMULATION

V.1. Strengthening Liability Frameworks for Digital Products and Services

The growth of digital products like software, AI, and cloud services presents challenges to traditional product liability laws, which primarily focus on physical goods. In the UK, the Consumer Protection Act 1987 fails to fully address issues such as software failures, cybersecurity risks, or AI malfunctions. To modernize product liability, reforms should include expanding the definition of defective products to cover digital goods, holding developers and service providers accountable for security flaws, mandating safety checks before and after

¹⁰ Brown, Elizabeth A. "The Internet and Product Liability." *Georgetown Law Journal* 88, no. 2 (2000): 673-724.

¹¹ Green, Roger D., and Brian B. Johnson. "Product Liability and Regulation: The Case of Medical Devices." *Stanford Law Review*, vol. 40, no. 5, 1988, pp. 1179-1231.

¹² Gupta, Ravi K. "Product Liability in India: A Legal Overview." *Journal of Intellectual Property Rights*, vol. 29, no. 2, 2015, pp. 366-376.

product launches, and enforcing strict liability for software defects and cyber risks. These reforms would enhance consumer protection and raise safety standards in the digital era.

V.2. Incorporating AI and Algorithmic Accountability in Product Liability Laws

AI-driven products, such as self-driving cars and smart home systems, introduce complex liability challenges since AI systems can make independent decisions that may result in harm. The UK's Consumer Protection Act 1987 does not adequately address AI-related issues. Reforms are needed to establish AI-specific liability rules for design flaws and failures, ensure algorithm transparency to prevent bias, hold companies accountable for AI-driven discrimination, and require timely software updates to fix defects. These updates would allow UK laws to keep pace with AI developments while ensuring consumer protection.

V.3. Enhancing Consumer Rights and Redressal Mechanisms

Many Indian customers are still ignorant of their rights with regard to data protection, digital transactions, and AI-driven services, despite the country's tremendous technological progress. The 2019 Consumer Protection Act covers unfair trade practices and e-commerce, but it makes no mention of digital responsibility, AI-related mistakes, or compensation for faulty digital products. Fast-track dispute resolution, explicit consumer rights regarding refunds and replacements, and open disclosures on digital hazards and AI limits are all necessary to strengthen consumer protection. In addition to improving accountability and redress, allowing class-action lawsuits for widespread digital faults will guarantee that India's consumer laws stay up to date with the rapidly changing digital economy.

V.4. The Role of Self-Regulation and Ethical AI Practices in Mitigating Risks

While legal reforms are vital, self-regulation and ethical AI practices are equally crucial in safeguarding consumers from digital risks. Technology companies should adopt industry-wide AI ethics guidelines to promote fairness, transparency, and accountability. Third-party audits can help detect biases, security flaws, and compliance issues, building trust in AI systems. By implementing Corporate Digital Responsibility (CDR) policies, companies would ensure ethical AI use, fair data practices, and consumer safety. Collaboration between regulators like the UK's ICO and industry leaders can create adaptive regulations that balance innovation with

consumer protection. Combining strong legal frameworks with responsible industry practices will help ensure a safer digital environment.

VI. CONCLUSION & RECOMMENDATION

Technological advancement has fundamentally reshaped product liability, creating novel risks for digital consumers. Existing legal frameworks, primarily designed for physical goods, are ill-equipped to handle the complexities of digital products, AI, and the Internet of Things. Consumers face significant hurdles, including proving liability, navigating cross-border legal disputes, and mitigating cybersecurity threats. A global review indicates a disparity in regulatory responses, with many jurisdictions failing to adequately address these emerging challenges. This underscores the critical need for modernised legal frameworks and stronger regulatory oversight to safeguard digital consumers.

A. POLICY SUGGESTIONS FOR ROBUST CONSUMER PROTECTION IN THE DIGITAL ERA

The increasing incorporation of digital technology into daily life calls for a thorough revision of UK product liability rules to guarantee their continued suitability. Current laws, such as the Consumer Protection Act of 1987, mostly deal with physical items; digital goods, technology powered by artificial intelligence (AI), and Internet of Things (IoT) devices are not sufficiently protected. Amendments should specifically broaden responsibility to include algorithmic errors, software flaws, and cybersecurity vulnerabilities included in these digital products in order to address this.

1. Lifting the Burden of Proof

It would be easier for customers to demonstrate flaws in digital products if the onus of evidence were transferred from them to manufacturers and service providers. Customers find it difficult to express problems with intricate digital systems under the existing UK system. Higher standards and more accountability in the digital industry would result from a new regulation that would force businesses to prioritise quality testing and cultivate customer confidence by compelling them to demonstrate the safety of their goods.

2. Improving the Protection of Cross-Border Consumers

India's growing digital commerce and cross-border trade highlight the need for stronger consumer protection, as many imported products pose challenges in seeking redress for defects. Jurisdictional issues and weak enforcement of product liability laws make it difficult for Indian consumers to hold foreign sellers accountable. While the Consumer Protection Act, 2019, addresses e-commerce disputes, global cooperation is crucial. Strengthening international agreements and bilateral treaties would enhance consumer safety, ensuring foreign businesses comply with Indian laws and providing legal recourse for substandard digital imports.

3. Regulations for Data Protection and Cybersecurity

Stronger laws are required to shield customers from data breaches and vulnerabilities as the use of digital products exposes them to greater cybersecurity dangers. In order to ensure basic security requirements, including encryption and vulnerability assessments, manufacturers must be subject to particular cybersecurity duties in addition to the UK's present data protection legislation. Liability for consumer harm resulting from non-compliance would encourage proactive risk reduction and increase public confidence in digital ecosystems.

4. Ethical Standards and accountability for AI

Clear liability regulations for autonomous systems are necessary given the emergence of AI-driven technology. Unpredictable AI behaviour may result in skewed judgements or mistakes. The rules in the UK do not adequately address these would be promoted. The problems. Lawmakers ought to enact legislation that holds businesses responsible for harm caused by AI and upholds moral principles, guaranteeing openness, equity, and explainability. Customers would be safeguarded, and ethical innovation in AI development

5. Expanding Access to Justice and Consumer Awareness

Improved knowledge of Indian consumers' rights and simpler access to the legal system are essential for empowering them. When it comes to defective digital items, many customers are still ignorant of their rights, and the difficulty of submitting a complaint deters them from seeking remedy. To ensure a fair digital marketplace, policymakers should fund legal literacy initiatives and streamline redressal procedures by increasing consumer dispute commissioners and establishing online portals for expedited settlement.

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