McGill Law Journal
Revue de droit de McGill

Risks and Uncertainties of Scientific Innovations in French Liability Law: Between Radical Departure and Continuity

Etienne Vergès

Volume 59, numéro 4, june 2014

Technological Innovation and Civil Responsibility
L'innovation technologique et la responsabilité civile

URI : https://id.erudit.org/iderudit/1026132ar
DOI : https://doi.org/10.7202/1026132ar

Aller au sommaire du numéro

Éditeur(s)

McGill Law Journal / Revue de droit de McGill

ISSN

0024-9041 (imprimé)
1920-6356 (numérique)

Découvrir la revue

Citer cet article

Vergès, E. (2014). Risks and Uncertainties of Scientific Innovations in French Liability Law: Between Radical Departure and Continuity. *McGill Law Journal / Revue de droit de McGill*, *59*(4), 889–912. https://doi.org/10.7202/1026132ar

Résumé de l'article

L'objectif de cette étude est de mesurer l'influence des sciences et technologies sur les évolutions du droit de la responsabilité en France depuis la première révolution industrielle jusqu'à nos jours. Cet article étudie comment le droit de la responsabilité a réagi face aux nouveaux problèmes posés par les sciences et les technologies. Plus précisément, il s'interroge sur le fait de savoir si les innovations scientifiques ont provoqué des ruptures radicales dans le droit de la responsabilité ou si celui-ci a pu s'adapter en appliquant ses principes généraux à des problèmes nouveaux. L'étude montre que les deux phénomènes peuvent être observés (rupture et continuité).

RISKS AND UNCERTAINTIES OF SCIENTIFIC INNOVATIONS IN FRENCH LIABILITY LAW: BETWEEN RADICAL DEPARTURE AND CONTINUITY

*Etienne Vergès**

The author investigates changes in French liability law that have occurred since the end of the nineteenth century as a result of innovation in science and technology and, in particular, of the risks and uncertainties attached to this phenomenon. This text explores the extent to which scientific and technological innovation has influenced legal innovation in the field of civil liability. The author seeks to address whether science- and technology-based legal developments resulted in radical departures from the general principles of civil liability, or rather take place within a continued evolution of the law. This study demonstrates that the impact of scientific and technological innovation on liability is ambivalent; changes in the French law of civil liability have constituted both a radical departure and a continuity of orthodox practice.

L'objectif de cette étude est de mesurer l'influence des sciences et technologies sur les évolutions du droit de la responsabilité en France depuis la première révolution industrielle jusqu'à nos jours. Cet article étudie comment le droit de la responsabilité a réagi face aux nouveaux problèmes posés par les sciences et les technologies. Plus précisément, il s'interroge sur le fait de savoir si les innovations scientifiques ont provoqué des ruptures radicales dans le droit de la responsabilité ou si celui-ci a pu s'adapter en appliquant ses principes généraux à des problèmes nouveaux. L'étude montre que les deux phénomènes peuvent être observés (rupture et continuité).

* Professor at the University of Grenoble, member of the Institut universitaire de France.

Citation: (2014) 59:4 McGill LJ 889 — Référence : (2014) 59 : 4 RD McGill 889

Introduction

A fundamental feature of the fields of science and technology is innovation.[1] Innovation generates the unknown, and creates risky situations and uncertainty. These risks and uncertainties have caused some of the most significant changes in French civil liability law since the end of the nineteenth century.[2] The central question consequently becomes, to what extent does this innovation in science and technology create new developments in French liability law? More precisely, the purpose of this paper is to determine whether changes in the law of civil liability influenced by scientific innovations have translated into radical departures from general principles of civil liability[3] or, rather, have formed part of a continued evolution of these general principles.[4]

To answer this question, this article will analyze French liability law from a historical perspective, presenting an overview of this area of law. It will begin from the first pre-eminent case resulting from a technological accident (the *Teffaine* ruling of 1896) and will finish with the most recent rulings handed down in the areas of medical and environmental disputes. From a methodological perspective, this article will not scrutinize each legal mechanism in great detail. Rather, it will review a select group of momentous laws and precedents chosen for their significance and importance. In this way, it will be possible to present an overview of the subject in a comprehensive manner.[5] Taking as a baseline these notable examples, this article will show that technological and scientific innovation has not always led to legal revolutions.[6] The influence of science and tech-

---

1 In this study, "science and technology" includes scientific research activities (such as medical research), technological activities (such as industrial, space, nuclear activities), technical procedures (such as medical procedures), and technological objects (such as computers, chemical products, hydrocarbons, or GMOs).

2 On the influence of risk theory, see e.g. Philippe Brun, *Responsabilité civile extracontractuelle*, 2d ed (Paris: LexisNexis, 2009), n° 153.

3 Such as the changes to the grounds of liability, appearance of new principles.

4 For instance using existing legal mechanisms and adapting them to new situations.

5 This article focuses only on those rulings that have set precedent. Otherwise, the article would become tied up in detailing sometimes voluminous case law where the applied solution is found in the precedent.

6 The choice of a comprehensive approach is justified by the fact that numerous publications have already been published on more specific subjects in French civil law. For example, causation has already been the subject of two influential doctoral theses in France: Christophe Quézel-Ambrunaz, *Essai sur la causalité en droit de la responsabilité civile* (Paris: Dalloz, 2010); Florence G'sell-Macrez, *Recherches sur la notion de causalité* (doctoral thesis, Université Paris 1, 2005) [unpublished]. Special civil liability regimes linked to science and technology have also been the object of extensive studies: see e.g. Jean-Sébastien Borghetti, *La responsabilité du fait des produits: Étude de droit comparé* (Paris: Librairie Générale de Droit et de Jurisprudence, 2004); Laurent

nology on French civil liability has resulted in both disruption and continuity in the system.

This observation may seem paradoxical, but it is illustrated in one of the most famous rulings of French civil liability—the *Teffaine* decision. This ruling was the first important legal innovation in the area of liability law.[7] In this case, the explosion of a steam machine on a towboat killed a mechanic. The Cour de cassation attributed the cause of the accident to a "structural defect". The trial and appeal courts found that a faulty welding joint had caused the explosion. This case illustrates the link between technological advancement and uncertainty, as it was not possible to prove that the accident had been caused by unintentional fault.

To understand the significance of this decision, it is important to note that at the time of the *Teffaine* ruling, the notion of fault constituted both the legal and philosophical foundation of civil liability. The French *Code civil*, promulgated in 1804, established a general principle of liability for fault. This regime corresponds to a moralistic philosophy of liability.[8] This general principle is maintained in the current *Code civil* at article 1382. In conjunction with this general principle, article 1384 of the *Code civil* contains several specific regimes of liability. In *Teffaine,* the Cour de cassation used paragraph 1[9] of article 1384 to create a new strict liability regime. This decision represents both a departure from and continuity with the general principles of civil liability. The departure is caused by the creation of a strict liability regime[10] that deviates from the general principle of fault-based liability found in article 1382 of the *Code civil*. However, the new legal rule created in *Teffaine* took its source from a forgotten para-

---

Neyret, *Atteintes au vivant et responsabilité civile* (Paris: Librairie Générale de Droit et de Jurisprudence, 2006). Additionally, the precautionary principle has been studied in the authoritative thesis by Mathilde Boutonnet, *Le principe de précaution en droit de la responsabilité civile* (Paris: Librairie Générale de Droit et de Jurisprudence, 2005) [Boutonnet, *Précaution*]. One such French civil law concept which characterizes a recent innovation is *la résponsabilité préventative* (preventive liability): see Cyril Sintez, *La sanction préventive en droit de la responsabilité civile: Contribution à la théorie de l'interprétation et de la mise en effet des normes* (Paris: Dalloz, 2011). In contrast, no comprehensive review has been carried out on the links between scientific innovation, technology, and civil liability law in the area of French civil law, which justifies this article's selected approach.

7 Cass civ 1re, 16 June 1896, (1897) DP I 433 (Annotation R Saleilles).

8 See Geneviève Viney, *Traité de droit civil: Introduction à la responsabilité*, 3d ed (Paris: Librairie Générale de Droit et de Jurisprudence, 2008) at 2.

9 "One is responsible not only for the injury caused by one's own actions, but also for that which is caused by the actions of entities for which one is responsible or things in one's custody" [translated by author].

10 This departure would not take final shape until the *Jand'heur* ruling: see Cass Ch réun, 13 February 1930, (1930) Sem Jur 271.

graph of the *Code civil*. In relying on the *Code*, the Cour de cassation gave this new regime a certain degree of continuity.

Following the *Teffaine* decision, major legislative developments dealt with liability associated with science and technology. French legislation created various liability regimes in a wide variety of fields: aircraft operators (1924), damage caused by cable cars (1941), compulsory vaccination (1964), nuclear energy (1965 and 1968), hydrocarbon pollution (1977), highway accidents (1985), biomedical research (1988), defective products (1998), medical liability (2002), genetically modified organisms (2008), environmental liability (2008), and nuclear testing (2010).[11] The development of special statutes was marked by an increased number of strict liability cases, the appearance of new types of injury, and the recourse to presumptions of causality; each of these features will be explored below.

Since the 1980s, France has witnessed new trends in liability under the influence of a number of health and environmental controversies that provoked a public reaction: contaminated blood (HIV and hepatitis C, which involved suppliers and national solidarity), diethylstilboestrol

---

[11] *Loi du 31 mai 1924 relative à la navigation aerienne*, JO, 3 June 1924, 5046; *Loi nº 2621 du 8 juillet 1941 établissant une sevitude de survol au profit des téléfériques*, JO, 27 August 1941, 3614; *Loi nº 64-643 du 1er juillet 1964 relative à la vaccination antipoliomyélitique obligatoire et à la répression des infractions à certaines dispositions du code de la santé publique*, JO, 2 July 1964, 5762; *Loi nº 65-956 du 12 novembre 1965 sur la responsabilité civile des exploitants de navires nucléaires*, JO, 13 November 1965, 9996; *Loi nº 68-943 du 30 octobre 1968 relative à la responsabilité civile dans le domaine de l'énergie nucléaire*, JO, 31 October 1968, 10195; *Loi nº 77-530 du 26 mai 1977 relative à la responsabilité civile et à l'obligation d'assurance des propriétaires de navires pour les dommages résultant de la pollution par les hydrocarbures*, JO, 27 May 1977, 2993; *Loi n° 85-677 du 5 juillet 1985 tendant à l'amélioration de la situation des victimes d'accidents de la circulation et à l'accélération des procédures d'indemnisation*, JO, 6 July 1985, 7584; *Loi n° 88-1138 du 20 décembre 1988 relative à la protection des personnes qui se prêtent à des recherches biomédicales*, JO, 22 December 1988, 16032; *Loi n° 98-389 du 19 mai 1998 sur la responsabilité du fait des produits défectueux*, JO, 21 May 1998, 7744; *Loi n° 2002-303 du 4 mars 2002 relative aux droits des malades et à la qualité du système de santé*, JO, 5 March 2002, 4118; *Loi no 2008-595 du 25 juin 2008 relative aux organismes génétiquement modifiés*, JO, 26 June 2008; *Loi no 2008-757 du 1er août 2008 relative à la responsabilité environnementale et à diverses dispositions d'adaptation au droit communautaire dans le domaine de l'environnement*, JO, 2 August 2008; *Loi nº 2010-2 du 5 janvier 2010 relative à la reconnaissance et à l'indemnisation des victimes des essais nucléaires français*, JO, 6 January 2010.

For this study, the domains of science and technology have been selected where a technologically innovative tool—and not human activity—is the determining factor of liability. For this reason, the law applicable to road traffic accidents is not studied here, because human behavior tends to be their primary cause. For the same reason, civil liability suits linked to information technology tools will not be outlined here, as they are linked to the law of digital piracy, invasion of privacy, or libel. These are related to human behaviour where technology has been intentionally misused by a human. In these cases, science and technology cannot be considered to be the determining factor of liability.

(DES, which involved producers), asbestos (which involved employers, state, custodians of the thing, and national solidarity), growth hormone (which involved producers), nosocomial infections (which involved health institutions and national solidarity), multiple sclerosis related to vaccination against hepatitis B (which involved producers), waves (relay antennas/high tension electric lines, which involved GSM operators or electricity producer), oil spills (*Erika* case 2012, which involved producer and charter company), and industrial accidents (AZF Toulouse plant case 2012, which involved the operator).

Some of these cases were decided under the general principles of civil liability. For others, the courts relied on special liability regimes. The commonality between these decisions is that they created changes in civil liability rules, whether they concern the factual bases of liability (*faits générateurs*—see Part I below), the injury (Part II), or the chain of causation (Part III).

I. The Factual Bases of Liability (*faits générateurs*)

Since the development of a general principle of strict liability at the turn of the twentieth century, classic civil liability as it applies to scientific and technological innovation has included two distinct systems: liability for "one's own actions" (fault-based liability)[12] and liability "for injury caused by things in one's charge" (strict liability).[13] An analysis of the jurisprudence demonstrates the dual phenomenon of continuity with and radical departure from general principles of civil liability (see Subsection A, below). Conversely, specific legislation has developed in one direction—that of an increase in strict liability regimes (see Subsection B, below).

A. Continuity and Radical Departure in the Application of the General Principles of Civil Liability

1. Changes to the General Principles of Civil Liability in Response to Innovation

a. Fault-based Liability

Liability for one's own actions (fault-based liability) is the principal regime of French civil law, originating in the 1804 *Code civil*. Even though this code was conceived in the nineteenth century, it is still adaptable to

---

[12] Arts 1382–83 C civ [translated by author].

[13] Art 1384, para 1, C civ [translated by author].

the specific features of scientific and technological innovation. In this field dominated by risk, the duties of vigilance are wide and varied. Scientists must be aware of the risks and must act to limit negative outcomes. The requirement for scientific vigilance within the fault-based regime is illustrated by two major rulings handed down by the Cour de cassation in 2006 in the *Distilbène* decision.[14] In France, until the 1970s, the industrial firm UCB Pharma produced a drug (Distilbène) to prevent premature births and spontaneous abortions. However, the use of this drug by pregnant women was proven to cause cancer in their female offspring later in life. Two decisions of the Cour de cassation determined that the drug manufacturer had knowledge of this danger. Scientific literature had been highlighting the greater risk of cancer correlated with Distilbène use since the 1950s. The Cour de cassation determined that UCB Pharma had "failed in its duty of vigilance" by not taking precautionary measures in the light of "scientifically known and identified risks."

In handing down these two decisions, the Cour de cassation imposed a general duty of vigilance on the pharmaceutical industry. Consequently, an omission by an industrial firm in light of a known risk became classified as a civil wrong. This solution falls within the continuity of the general principles of civil liability, which accept that an omission may constitute a fault.[15]

Furthermore, the state's liability for fault by omission was used again in four 2004 rulings concerning human contact with asbestos.[16] In these decisions, the French Conseil d'État (French Administrative Court) found the state at fault for "failing to prevent risks."[17] Employees who developed cancer associated with exposure to asbestos in their workplace accused the state of not having taken the necessary measures to prohibit this harmful substance. The Conseil d'État declared:

> The public authorities are responsible for preventing occupational hazards and to this end must keep informed of the dangers that workers may face in the context of their occupational activity, considering chiefly the products and substances they handle or with which they come into contact, and to take the most appropriate measures, in the state of scientific knowledge, if necessary using ad-

---

14 Cass civ 1re, 7 March 2006, (2006) Bull civ I 131, No 143 [*Distilbène*].

15 This solution had been accepted in *Branly*: Cass civ, 27 February 1951, (1951) RS Jur I 158.

16 This is a case of official liability.

17 CE, 3 March 2004, *Ministre de l'emploi et de la solidarité*, (2004) 241151, 241152, 241150 [translated by author].

> ditional studies or investigations, to limit and if possible eliminate these dangers.[18]

Therefore, in scientific and technological innovation matters, the state is subject to a twofold obligation: first, to assess the harmfulness of the substances present in its territory, and second, to institute measures to limit or prohibit these substances in accordance with the known risk. The dangers of asbestos have been known since the early twentieth century. Illnesses attributed to asbestos exposure have been listed among occupational illnesses since 1945. In light of this knowledge, the French State committed a fault of omission.

The asbestos and the *Distilbène* decisions show that the conventional principle of fault-based liability has adapted to cases involving accidents associated with scientific and technological innovations. Fault is a sufficiently flexible concept for courts to apply orthodox legal solutions without the need for recourse to special liability regimes. However, this notion of fault could change more significantly in the future if it is studied in legal scholarship. In this manner, more researchers are beginning to broach the idea of introducing the concept of precaution into civil liability law.[19] Thus, some academics have raised the notion that fault can result not only from negligence due to a known risk, but also from failure to deal with an unknown risk. This *faute de précaution* (precautionary fault) might arise, for example, from the fact that a product is placed on the market without sufficient scientific tests being carried out to ensure that it is harmless.[20] The practical application of this concept has been rare in French jurisprudence—even if a detailed study of litigation shows that certain trial and appeal courts appear to be tying the concepts of fault and the precautionary principle together.[21] The precautionary principle has not yet resulted in any noteworthy changes in the factual bases of liability, as this remains ingrained in traditional practices, as shown by the example of liability for damage caused by things in one's charge.

---

18 *Ibid* [translated by author].

19 Among the most important articles that have been published in France on the subject are Gilles J Martin, "Précaution et évolution du droit" [1995] D Chron 299; Catherine Thibierge, "Libres propos sur l'évolution du droit de la responsabilité: (vers un élargissement de la fonction de la responsabilité civile?)" [1999] 3 RTD Civ 561; Anne Guégan, "L'apport du principe de précaution au droit de la responsabilité civile" [2000] RJE 147; Denis Mazeaud, "Responsabilité civile et precaution" [2001] 6 Resp civ et assur 72; Boutonnet, *Précaution*, *supra* note 6; Daphné Tapinos, *Prévention, précaution et responsabilité civile: Risque avéré, risque suspecté et transformation du paradigme de la responsabilité civile* (Paris: L'Harmattan, 2008).

20 See Martin, *supra* note 19 at 301.

21 See Mathilde Boutonnet, "Bilan et avenir du principe de précaution en droit de la responsabilité civile" (2010) 186:24 D Chron 2662 [Boutonnet, "Bilan"].

b. Liability for Damage Caused by Things in One's Charge

The general principle of liability for damage caused by things in one's charge was created at the end of the nineteenth century in response to the increased occurrence of industrial accidents. Since then, it has become a general principle applicable to all cases of injury caused by things. As a result, liability for injury caused by things has been the legal principle used in many cases involving accidents associated with technological innovations. In 2000,[22] the Cour de cassation dealt with a case in which nitric acid was spilled onto fertilizer in a warehouse; the resulting chemical reaction caused a fire. The firemen transported the melting fertilizer into a neighbouring field, consequently polluting the land. The Cour de cassation held liable the company that owned the chemical product and the fertilizer, stating that the pollution was due to damage caused by things in their charge. Here again, the court made an entirely conservative analysis of the liability for damage caused by things in one's charge, which requires proof of the deeds of the thing and custody of the thing.

Thus, general principles of civil liability have the capacity to absorb part of the scientific and technological innovation liability cases in continuity with the principles of the *Code civil*. Conversely, scientific and technological innovations have also provoked changes to the general principles of civil liability.

2. Adjustment of the General Principles of Civil Liability to the Specific Features of Scientific and Technological Innovation

a. Changes to Gross Negligence

Several modifications in conventional legal principles have occurred in response to accidents associated with technological innovations. The first of these changes concerns the employer's negligence in cases of occupational accidents. The legal regime governing occupational accidents was created by the *Loi du 9 avril 1898 sur l'indemnisation des accidents de travail*,[23] which stipulates a capped automatic compensation mechanism for damages resulting from accidents in the workplace. The employee can benefit from additional compensation if the employer has committed gross negligence.[24] Gross negligence was first defined in a decision of the Cour

---

22 Cass civ 2e, 24 February 2000, (2000) D Jur, No 98-17.861.

23 JO, 10 April 1898, 2209.

24 Arts L 452-1–L 452-5 *Code de la sécurité sociale*. For a more detailed explanation, see Christophe Quézel-Ambrunaz, "Faute inexcusable de l'employeur et droit des victimes d'actes fautifs" [2012] 11 *Revue des droits et libertés fondamentaux*, online: RDLF <rdlf.upmf-grenoble.fr>.

de cassation of 15 July 1941 as an "error of exceptional seriousness, caused by a deliberate act or omission, the danger of which the person responsible should have been aware."[25] Thus the subjective concept of gross negligence was established. Yet this definition was challenged by the rise of occupational illnesses due to asbestos. In several decisions in 2002, the Cour de cassation declared:

> By virtue of the employment contract binding employer and employee, the employer has a duty of care (obligation of result)[26] toward the employee, in particular concerning occupational illnesses contracted by the employee due to products manufactured or used by the company. A breach of this duty is considered gross negligence[27] when the employer was or should have been aware of the danger to which the employee was exposed and did not take the necessary measures to protect him from it.[28]

This new definition of gross negligence, initially linked to asbestos cases, profoundly changed the theory of civil liability. In this definition, the Cour de cassation refers to an obligation of result, which is in turn linked to the concept of contractual liability. When a contractual obligation is described as one of result, this obligation entails strict liability.[29] The person who owes the contractual obligation has undertaken to provide a result, and becomes liable if that result is not achieved, whether or not a fault is committed. However, in its decision of 28 February 2002, the Cour de cassation assimilates the obligation of result to gross negligence. While this move was motivated by a desire to improve the situation of asbestos victims, it defies civil liability theory. By qualifying as objective gross negligence, the Cour de cassation radically departed from the general principles of civil liability in matters concerning occupational accidents. This type of legal innovation in response to technological innovation is also found in matters concerning liability for injury caused by things in one's charge.

---

25 Cass Ch réun, 15 July 1941, *Veuve Villa c Compagnie des Assurances générales*, (1941) JCP II 1705 (Annotation Jules Mihura) [translated by author].

26 This is the French notion of *obligation de résultat*, which compels the contracting parties to fulfill a result defined in the contract.

27 In French, a *faute inexcusable*.

28 Cass soc, 28 February 2002, (2002) JCP II 614 at 614–15, No 10053 [translated by author]. See Gérard Vachet, "Faute inexcusable dans le cadre des accidents du travail et des maladies professionnelles" [2010] Supp 1452 Semaine sociale Lamy 10.

29 See Christian Larroumet, *Droit civil: Les obligations, le contrat*, t 3, 6th ed, 2d part (Paris: Economica, 2007), n° 606 (the author is in favour of this analysis).

b. Separation of Custody of the Thing

Liability for injury caused by things in one's charge is borne by the custodian of the thing. The notion of custody is the subject of legal theory scholarship that distinguishes the *garde de la structure* (custody of the structure, akin to product liability) from *garde du comportement* (custody of the behaviour, akin to negligent use) of a thing.[30] This theory was judicially developed to adapt the rules of civil liability to the particular characteristics of technological innovations. In the *Oxygène Liquide* case, which came before the Cour de cassation in 1956,[31] a cylinder of liquid oxygen exploded when being unloaded by its carrier. The cause of the explosion, "according to the expert witness, has remained unknown."[32] The issue therefore was whether the custody of this cylinder should be attributed to the manufacturer or to the carrier. The Cour de cassation decided that the manufacturer was the cylinder's custodian because the manufacturer had maintained supervision of and control over it, "considering the particular nature of the containers."[33] In the jurisprudence, determining which party had custody of the product makes it possible to attribute liability to the owner or to the maker of technological objects that might explode or implode when the cause of injury is a structural defect in the thing. Thus, the Cour de cassation applies the distinction between *garde de la structure* and *garde du comportement* when a thing presents a "dynamisme propre capable de se manifester dangereusement" (a danger by their nature or performance).[34] The theory of *garde de la structure* is not a departure from the regime of liability for injury caused by things in one's charge, but it is an adaptation of this regime to the specific nature of objects resulting from dangerous technology. This legal adaptation can again be found in the increasing number of special liability regimes.

---

30 See Bertold Goldman, *De la détermination du gardien responsable du fait des choses inanimées* (Paris: Librarie du Receuil Sirey, 1947) at 51. For an explanation of this theory and its applications, see Geneviève Viney & Patrice Jourdain, *Traité de droit civil: Les conditions de la responsabilité*, 3d ed (Paris: Librairie Générale de Droit et de Jurisprudence, 2006) at 749–57.

31 See Cass civ 2e, 5 January 1956, *Bouloux c Sté Oxygène Liquide et autres et veuve Lathus c Sté Oxygène Liquide*, (1956) JCP II, No 9095.

32 *Ibid* [translated by author].

33 *Ibid* [translated by author].

34 Cass civ 1re, 12 November 1975, (1976) JCP II, No 18479 (Annotation Geneviève Viney). See also Cass civ 2e, 23 September 2004, (2004) Resp civ et assur, No N 03-10.672. *Contra* Cass civ 2e, 4 February 2010, LexisNexis SA, No 08-70.373 (rejection of this theory concerning new technological devices that do not represent a danger by their nature or performance) [translated by author].

B. Departure in the Development of Special Liability Systems

As was outlined in the introduction, many statutes define special liability rules related to scientific and technological innovations. Most of this legislation creates strict liability regimes, as the following examples demonstrate.

1. Nuclear Energy

In the nuclear energy field, French law is bound by the international commitments of the *Paris Convention* of 29 July 1960.[35] Because of these international obligations, several national laws have been made[36] in these matters and some have now been incorporated into the *Code de l'environnement*.[37] Article L.597-1 of this code provides for a regime of strict liability placed on all entities that operate a nuclear facility.[38] Operators are held strictly liable for injury caused by a nuclear accident, whether the accident originated from the nuclear facility or from the transportation of nuclear substances.

2. Space Activities

In space activities, France is bound by two international conventions: the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space*[39] and the *Convention on the International Liability for Damage Caused by Space Objects*.[40] The former stipulates that any state that launches an object (or has an object launched) into outer space is "internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its compo-

---

35 *Convention on Third Party Liability in the Field of Nuclear Energy*, 29 July 1960, 1041 UNTS 358 [*Paris Convention*].

36 See e.g. *Loi nº 65-956 du 12 novembre 1965 sur la responsabilité civile des exploitants de navires nucléaires*, JO, 13 November 1965, 9996; *Loi nº 68-943 du 30 octobre 1968 relative à la responsabilité civile dans le domaine de l'énergie nucléaire*, JO, 31 October 1968, 10195.

37 See *Ordonnance nº 2012-6 du 5 janvier 2012 modifiant les livres Ier et V du code de l'environnement*, JO, 6 January 2012, No 4.

38 This includes natural persons or legal entities, of public or private law.

39 *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 27 January 1967, 610 UNTS 205 (adopted by the General Assembly in its resolution 2222 (XXI) of 19 December 1966) [*Outer Space Treaty*].

40 29 March 1972, 961 UNTS 187 (adopted by the General Assembly in its resolution 2777 (XXVI) of 29 November 1971).

nent parts."[41] The liability of the state extends to space activities carried out by private companies on French territory. The second convention more precisely establishes two liability regimes. The first imposes "absolute liability" for damage caused by a space object to the earth's surface or to aircraft in flight. However, the state may incur fault-based liability[42] in the event of damage to another space object caused somewhere other than on the earth's surface. In all cases, this international liability concerns only states and excludes the liability of its nationals.[43] This state responsibility has not yet been the cause of any legal action. The involvement of nation states in this liability regime has resulted in such space activity disputes being solved through diplomatic means.

Nevertheless, since 2008, private operators are held liable and reimburse the French State when they are involved in an accident. In accordance with the French *Loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales* (concerning space activities), the operator is strictly liable[44] for all ground-based and airspace damage. Additionally, the operator is liable for any damage that occurs in outer space.[45] In this way, the liability of the private operator is modeled on state responsibility. This mechanism implies greater protection for victims of this activity. Those who have been affected by the damage caused are able to go directly to the state to receive compensation; the state then takes action against the private operator. International liability rules thus hold the state accountable for the risk created by space activity, but without exonerating the private operator that takes advantage of this economic activity; the private operator must assume responsibility for the damage caused. This system explicitly protects the victims who have not been involved in space activity, and it is for this reason that the liability of the actors (the state or the private operator) is regulated under two different regimes. In outer space, the risk is shared by all concerned. Liability in these circumstances is thus linked to fault. By contrast, on the ground and in the air, the victims are not participants in space activity. They should not have to bear the responsibility for the risk of such activity, and are entitled to a regime of strict liability, which is more likely to result in victim compensation.

---

41 *Outer Space Treaty*, *supra* note 39, art VII.

42 This liability may be incurred by the state or by an entity for which it is responsible.

43 France, Ministre déléguée à la Recherche et aux Nouvelles Technologies, *L'évolution du droit de l'espace en France* (2003) at 9, 12, online: La documentation française <www.ladocumentationfrancaise.fr>.

44 JO, 4 June 2008. Article 13 pronounces that the operator is "automatically liable for damage caused on the ground and in airspace" [translated by author]. *Responsabilité de plein droit* is an example of strict liability.

45 See *Juris-classeur transport*, fasc 1550, "Droit spatial : La loi française sur les opérations spatiales du 3 juin 2008" by Mireille Couston, No 106.

3. Medical Activities

For medical activities, France has established different liability regimes by *Loi n° 2002-303 du 4 mars 2002*, now encompassed in the *Code de la santé publique*. In principle, medical liability is a fault-based regime. However, the *Code de la santé publique* may impose strict liability in certain cases. The first of such cases concerns nosocomial infections. The statute stipulates that health institutions "are liable for the injury resulting from nosocomial infections, unless they can prove an external cause."[46] Therefore, liability is grounded solely on the occurrence of a nosocomial infection, without it being necessary to prove fault. However, this liability is only imposed on health care institutions and not on the professionals themselves.

The second strict liability regime contained in the 2002 statute concerns health products. Drugs and other health-related products fall into the more general category of defective products when they do not provide the safety that patients legitimately expect. Liability due to defective products is regulated by a Council Directive[47] and by French law.[48] In a decision of 10 May 2001,[49] the European Court of Justice considered that this framework of liability should apply to products used during the provision of a medical service. This regime is one of strict liability. The manufacturer is strictly liable for the injury caused by a defect in its product; hence, liability is grounded on the occurrence of the defect.

4. Environmental Damage

For technological innovations having an impact on the environment, the French liability system is complex. Liability in the environmental domain consists of a multitude of different liability regimes. Some of the regimes impose strict liability, as is the case for farmers who cultivate genetically modified organisms (GMOs). Article L.663-4 of the *Code rural* stipulates that a farmer is strictly liable for economic damage stemming from the spread of GMOs to the fields of neighbouring farmers. The spread of GMOs is a phenomenon that is difficult to assess and monitor.

---

46 See art L 1142-1(I) *Code de la santé publique* [C sant pub].

47 EC, *Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products*, [1985] OJ L 210/29.

48 See *Loi n° 98-389 du 19 mai 1998 relative à la responsabilité du fait des produits défectueux*, JO, 21 May 1998, 7744 (on liability for injury caused by defective products). This law was introduced at arts 1386-1–1386-18 C civ.

49 *Veedfald v Amtskommune*, C-203/99, [2001] ECR I-3586.

In view of the risks inherent in this activity, French lawmakers chose to impose strict liability.

The same choice has been made at the international level with respect to pollution by hydrocarbons. The *Brussels Convention* of 29 November 1969 was incorporated into French law at article L.5122-26 of the *Code des transports*.[50] This provision states: "[A]ny owner of a ship transporting a cargo of bulk hydrocarbons is liable for the damage by pollution resulting from a leak or discharge of hydrocarbons from this ship."[51] In this field, the carrier's liability is strict.[52] Lastly, in the environmental field, the European Union has created a generic "environmental liability" regime. A European Directive was adopted in 2004 and transposed in 2008 into the *Code de l'environnement*.[53] Strictly speaking, this regime is not one of liability; rather, it creates a policing system.[54] A victim of environmental damage can seek compensation on the grounds of environmental liability. However, the authorities may require the polluter to use preventive and remedial measures to suppress the effects of the environmental damage. The polluter is thus liable to remedy the damage caused, but is under no legal obligation to the victim;[55] liability in this situation is toward the community.

Environmental liability is divided into two systems. The first is a strict liability regime for activities that exhibit a structural risk and are listed in the *Code de l'environnement*.[56] The second is based on fault and applies

---

50 *International Convention on Civil Liability for Oil Pollution Damage*, 29 November 1969, 972 UNTS 3, art III(1).

51 Art L 5122-26 *Code des transports* [C Trans] [translation by author].

52 Unlike a charter company, which can only be render liable for recklessness. For an application in a very important ruling, see Cass crim, 25 September 2012, (2012) Bull Crim, No 10-82.938 [*Erika*]. This ruling upheld the fault-based liability of the Total company in the oil spill caused by the ship that the company had chartered (the Erika).

53 EC, *Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage*, [2004] OJ L 143/56; *Loi n° 2008-757 du 1er août 2008 relative à la responsabilité environnementale et à diverses dispositions d'adaptation au droit communautaire dans le domaine de l'environment*, JO, 2 August 2008, No 2.

54 For more on this analysis, see Olivier Fuchs, "Le régime de prévention et de réparation des atteintes environnementales issu de la loi" [2008] 38 AJDA 2109 at 2110; Laurent Neyret, "La réparation des atteintes à l'environnement par le juge judiciaire" [2008] D Chron 170 [Neyret, "Réparation"].

55 In this sense, there is no duty of care owed to the victim in the traditional sense of liability law.

56 Art L 162-1 C Enviro, *supra* note 49. These activities are listed in article L.162-5 of the *Code de l'environnement*—for example, waste management; discharge of pollutants into water; manufacturing of chemical products, biocides, and phytopharmaceuticals;

to activities that are not listed. These regimes clearly link innovation-related risk and strict liability. Liability is grounded in business activity that has caused damage to the environment. The *Code* specifies that the operator must provide compensation, even in the absence of fault or negligence.

In general, French law gives special treatment to scientific and technological innovations that generate a risk. The factual bases of liability are adapted according to each innovation. In some cases, it is the activity itself that is the basis of liability,[57] while in others, it is the failure of the activity that gives rise to liability.[58] These special regimes exhibit a rather sharp departure from the general principles of French civil liability (fault, injury caused by things in one's charge, injury caused by a third party). The competition between the general principles of civil liability and the special regimes described here creates a clear departure from the general theory of civil liability. This departure can also be observed with regard to the types of injury for which compensation can be claimed.

II. Injury for which Compensation Can Be Claimed

Traditionally, there are three categories of injury for which compensation can be claimed: bodily, pecuniary, and non-pecuniary. For these three categories, the injury must exhibit common characteristics: it must be direct, personal, and certain.[59] Under the effect of scientific and technological innovation, the law of compensation has undergone two major changes. The first concerns the extension of the types of injury for which one can claim and the appearance of new types of injury flowing from accidents associated with technological innovations (see Subsection A, below). The second concerns jurisprudential trends that are favourable to compensation for injury not recognized under the general principles of civil liability (see Subsection B, below).

A. New Types of Injury

Situations of risk and uncertainty generate psychological harm that we now call emotional distress.[60] In the medical field, this kind of harm is

---

transport of dangerous or polluting materials; deliberate release, transport, or sale of GMOs; etc.

57 Space activity is an example.

58 Nosocomial infections, defective health products, and the accidental dissemination of a GMO are examples.

59 On the characteristics of injury, see e.g. Viney & Jourdain, *supra* note 30 at 3–11.

60 In this article, emotional distress is used for the French *préjudice d'angoisse*.

illustrated by a case brought before the Cour de cassation in 2006.[61] In this case, a patient had been the recipient of a pacemaker insertion. It was later discovered that the pacemaker had a defective pacemaker lead and there was a risk that it might break inside the patient's body. The patient suffered no bodily injury and it was eventually possible to remove the defective element without injury. The court nevertheless recognized that the patient had suffered emotional distress "related to the realization that there were defects with this type of material,"[62] and due to the fear of suffering serious illness. Therefore, even without bodily harm, the defective medical object had caused anxiety that was compensable through an action for civil liability.

Emotional distress has also resulted in rulings awarding compensation to victims in asbestos exposure cases. In a ruling of the Douai Appeals Court on 5 June 2008, the court recognized the existence of a "psychological and emotional impact of the illness linked to exposure to asbestos and to the awareness of the progressive nature of the illness."[63] Accordingly, the knowledge that the claimant had an incurable and progressive disease caused by asbestos exposure created *une angoisse réparable* (compensable anxiety) for which the victim could claim compensation.

Some types of injury are recognized in legislation, such as in cases concerning damage caused by the spreading of GMOs.[64] This special statutory liability regime offers compensation based on a specific definition of damage, namely the depreciation in income resulting from the difference between the sale price of the harvest of a GMO product and that of a non-GMO product of the same kind.[65] This economic loss is founded on the idea that contamination by genetically modified plants may cause a depreciation of the value of a harvest. Compensation may be financial or take the form of a product exchange.

Emotional distress and damage caused by GMO spreading are specific types of injury within the scope of civil liability (non-pecuniary or pecuniary injury). They are related to scientific or technological innovation, but are incorporated into ordinary legal categories. They thus embody change within legal continuity. Other types of injury, though, clearly depart from the general principles of civil liability.

---

61 Cass civ 1re, 19 December 2006, (2007) Resp civ et assur, No Q 05-15.719.

62 *Ibid*.

63 CA Douai 3e, 5 June 2008, General register, No 08/00623 [translated by author].

64 In French, this is called a *préjudice de dissémination*.

65 See art L 663-4(II) *Code rural et de la pêche maritime*.

B. Injury Forming an Exception to the General Principles of Civil Liability

Collective injury is an exception to the usually personal character of injury. The most typical example of collective injury is that described by the expression "pure ecological damage", defined as "direct or indirect damage to the environment."[66] The jurisprudence demonstrates that this type of damage is intimately related to industrial technological innovations. The cases heard in the courts concern pollution by chemical products or hydrocarbons.

Pure ecological damage was officially recognized by the Cour de cassation in the 2012 *Erika* oil spill case.[67] In recognizing pure ecological damage, which does not exhibit a personal character, the court created an exception to the personal character requirement. As one author points out, the damage "is caused to nature and not to people, it hurts groups rather than individual interests."[68] Before its recognition by the Cour de cassation, both trial and appeal courts had also recognized pure ecological damage. The Bordeaux Court of Appeals acknowledged the existence of "damage incurred by the aquatic environment"[69] and granted compensation to environmental defence associations. Likewise, the Narbonne Court of First Instance accepted that a regional natural park could be compensated for environmental damage to the park's natural heritage subsequent to pollution by phytosanitary products discharged by a factory.[70] French legal scholarship has recently developed a nomenclature of environmental damage[71] and the French Minister of Justice has appointed a working group to investigate how to integrate ecological damage into the *Code civil*.[72] At the same time, a bill entitled *visant à inscrire la notion de préjudice écologique dans le code civil* (on how to introduce the notion of

---

66 Laurent Neyret, "Le préjudice écologique: Un levier pour la réforme du droit des obligations" [2012] 40 D 2673 [Neyret, "Le préjudice écologique"] [translated by author]. See also Mireille Bacache, "Quelle réparation pour le préjudice écologique ?" [2013] 3 Environnement et développement durable, study 10.

67 *Erika*, *supra* note 52 (Annotation Philippe Delebecque). See also Mathilde Boutonnet, "L'Erika: Une vraie-fausse reconnaissance du préjudice écologique" [2012] 1 Environnement et développement durable, study 2.

68 Mathilde Boutonnet, *Les fondements et conditions de la responsabilité en matière d'environnement*, loose-leaf (consulted on 16 January 2014), (France: Wolters Kluwer, 2008), n° 370-60 [translated by author].

69 CA Bordeaux, 13 January 2006, No 05/00567 [translated by author].

70 Trib gr inst Narbonne, 4 October 2007, (2007) AJDA 2011, No 935/07 (Annotation Catherine Faivre). See generally Neyret, "Réparation", *supra* note 54 at 173.

71 See Laurent Neyret & Gilles J Martin, *Nomenclature des préjudices environnementaux* (Paris: LGDJ Lextenso éditions, 2012).

72 See Neyret, "Le préjudice écologique", *supra* note 66.

ecological damage into the *Code civil*) is under discussion at the French Parliament.[73]

The expansion of pure ecological damage into French law marks a sharp departure from the general principles of civil liability. Compensation for this injury is not based on a legal duty between the victim and the party causing the injury since the victim does not have legal personality. The compensation is paid to an association or a government agency entrusted with remedying the loss. This profoundly changes the internal logic of civil liability law. This is also the case for compensation for a risk of damage.

Risk of injury is an exception to the "certain" character of damage. Traditionally, the injury must be "certain" to be compensated. Indeed, it is difficult to imagine compensation for hypothetical injury. This condition is reconsidered, however, in the context of scientific uncertainty. In France, cases for injury related to mobile phone relay antennas prompted contradictory trends in the jurisprudence. In these cases, the proof of the harmfulness of the relay antennas was the subject of scientific controversy, hence placing the courts in an uncomfortable position. In two decisions, the trial and appeal courts imposed liability on mobile phone operators. In one decision, the Nanterre Court of First Instance[74] was petitioned by persons who were suffering from health problems, which they attributed to the presence of a relay antenna near their homes. The court recognized that the link between the antenna and the health problems had not been proven with scientific certainty, but nevertheless accepted that "the risk of health problems, as distinguished from the health problems themselves, was certain."[75] This decision is important because it provides that the *risk of injury* can be compensated. Moreover, to justify this recognition of the *risk of injury* as an injury, the court makes reference to "competent authorities" who "recommend applying the precautionary principle."

According to the court's reasoning, the precautionary principle should influence the rules of civil liability. Yet the precautionary principle is a mechanism for ex ante anticipation of risks, while civil liability is a mechanism for compensating injury ex post facto. The precautionary principle is thus in apparent contradiction with the traditional concept of civil lia-

---

73 France, Sénat, *Proposition de loi visant à inscrire la notion de préjudice écologique dans le code civil*, by Bruno Retailleau et al, Report No 546 (23 May 2012) [translated by author].

74 Trib gr inst Nanterre, 18 September 2008, [2008] D 2916 (Annotation Mathilde Boutonnet).

75 *Ibid* at 2916 [translated by author].

bility.[76] The intrusion of the precautionary principle into some decisions demonstrates a move from the traditional role of civil liability toward new functions. This is leading some authors to write of "preventive liability".[77] While this may seem contrary to the logic of civil liability, the claim for compensation based on precaution is understandable from the victim's perspective. For example, one person sued a mobile phone operator for reimbursement of expenses related to the shielding of his apartment from electromagnetic fields to stop "electro-hypersensitivity problems".[78] This person would have avoided the expense of shielding if the antenna had not been installed in his neighbourhood. Therefore, the damage had become tangible, in the form of the expense.

In the absence of proof of the connection between the damage and the relay antennas, some courts have been tempted to shift the debate by qualifying the injury as psychological. For example, in a notable ruling, the Versailles Court of Appeal ruled that the "the installation of the relay antenna near their home ... indisputably created a feeling of anxiety, the manifestation of which can be inferred from their actions."[79] Once again, psychological injury is considered in this ruling as a special type of non-pecuniary injury. By shifting the debate to the field of psychological injury, the Court of Appeal avoided the delicate question of scientific uncertainty.

Despite this judicial trend in favour of victims, a medical decision from the Cour de cassation on 28 June 2012 seems to have halted the debate on compensation for hypothetical injury.[80] In this case, the claimant had been the victim of serious medical negligence, resulting in the need to undergo a new surgical procedure. However, driven by a feeling of anxiety and loss of confidence in the medical profession, the victim refused to submit herself to the new surgery, and instead requested compensation for this injury. The Cour de cassation declared, however, "that this hypothetical injury does not give rise to compensation." The court considered that the injury experienced by the victim in this situation was only hypothetical and that the victim could not be compensated.[81] With this deci-

---

76 For an approach that attempts to reconcile the two, see Boutonnet, *Précaution*, *supra* note 6; Boutonnet, "Bilan", *supra* note 21 at 2663.

77 See e.g. Sintez, *supra* note 6.

78 Cass civ 1re, 17 October 2012, No 10-26.854 [translated by author].

79 CA Versailles, 4 February 2009, Quicklaw, No 08/08775 [translated by author]. See also Jean-Victor Borel, "Antennes relais de téléphonie mobile : un risque troublant" (2009) JCP E1336.

80 See Cass civ 1re, 28 June 2012, (2012) Bull civ I, No 148.

81 In French, *éventuel*.

sion, it would appear that the courts have returned to the traditional concept of injury and to the compensatory function of civil liability.

Although this statement by the Cour de cassation seems to dismiss compensation of victims in cases of scientific uncertainty, this does not reflect broader jurisprudential trends. Indeed, the circumstances of uncertainty are inducing lawmakers and the courts to increase the use of proof by presumptions. This phenomenon is especially visible with regard to the evaluation of the causal link.

III. Causal Link

The conventional concept of causality is based on the idea that the injury must be the certain consequence of the act complained of; however, the concept of causality has greatly evolved in French law. This evolution is illustrated by the first ruling handed down by the Cour de cassation in a case concerning the side effects of the vaccine against hepatitis B. Epidemiological data had showed a weak statistical link between the vaccine and the appearance of multiple sclerosis. In this case, scientists had not ruled out the existence of a risk, but considered that the data did not establish a causal link between the vaccine and the development of multiple sclerosis. The first decision from the Cour de cassation in 2003 placed the burden of proving the link between the vaccine and the illness on the victims.[82] Insofar as this causal link could not be established with certainty, the court considered that the claim could not succeed.

Yet this strict position was abandoned in 2008 when the Cour de cassation declared that "while the liability action on the grounds of a defective product requires proof of the injury, of the defect, and of the causal link between the defect and the injury, such proof may result from presumptions, as long as they are serious, precise, and concordant."[83] In other words, in the absence of scientific certainty, the conditions of liability may be presumed. While this declaration may appear to deviate from the conventional principles of civil liability, in fact it is based on an article of the *Code civil* that dates from the *Code*'s creation in 1804. Indeed, article 1353 states that "presumptions that are not established by law are left to the enlightenment and prudence of the magistrate, who must admit only presumptions that are serious, precise, and concordant."[84] Evidence supporting these factual presumptions is composed of multiple clues. For exam-

---

82 Cass civ 1re, 23 September 2003, (2003) Bull civ 146, No 188.

83 Cass civ 1re, 22 May 2008, (2008) Bull civ I, No 149 [translated by author].

84 [Translated by author].

ple, in a 2009 decision,[85] the Cour de cassation accepted that proof of the causal link between multiple sclerosis and the hepatitis B vaccine was based on three facts: the temporal proximity between vaccination and the appearance of the illness, the lack of background neurological indicators in the victim's family, and elimination of other causes that might explain the occurrence of the illness by experts.[86]

While recourse to presumptions is not limited to scientific and technological innovations, in practice, the main judicial decisions where these presumptions come into play have concerned scientific and technological innovation. Such is the case of an important 2011 decision concerning the harmful effects on animals of high tension electrical lines.[87] In the absence of certainty regarding the effect of the electric lines, the owner of the animals sought compensation on the basis of the precautionary principle. The Cour de cassation decided that the precautionary principle did not challenge the traditional rules of civil liability, according to which the party seeking compensation for injury must prove that this injury is the direct and certain consequence of the cause. On the other hand, the court accepted that the proof of the conditions of liability could result from presumptions that were serious, precise, and concordant.

Scientific uncertainty is very present in the environmental and health fields. This is why French law has also had recourse to presumptions of legal origin in these fields. For example, concerning liability related to nuclear accidents, the *Code de l'environnement* stipulates that the government list the complaints that are presumed to originate from the accident.[88] Another example concerns the compensation of victims of tainted blood transfusions. The *Code de la santé publique* created two legal presumptions: the first applies to blood contamination by human immunodeficiency virus (HIV)[89] and the second to blood contamination by hepatitis C virus (HCV).[90] In order for the presumption of a causal link between

---

85 Cass civ 1re, 9 July 2009, (2009) Bull civ I, No 176.

86 This analysis of causation is criticized by certain legal scholars, who reproach judges for having adopted a "pseudo-scientific" approach (such as "junk science"). See Jean-Sébastien Borghetti, "Vaccination contre l'hépatite B et sclérose en plaques: Incertitudes scientifiques et divergences de jurisprudence" [2011] JCP G 160, No 79. See also Jean-Sébastien Borghetti, "Vaccinations contre l'hépatite B et sclérose en plaques: En cas de doute scientifique persistant, prière de s'adresser à la juridiction la plus proche!" [2010] 1 Revue des contrats 79.

87 Cass civ 3e, 18 May 2011, (2011) Bull civ III, No 80. See also Marion Bary, "Le principe de précaution et la responsabilité civile: À propos de champs électromagnétiques" [2011] 9 Resp civ et assur, study 11.

88 Art L 597-12 C Enviro, *supra* note 49.

89 See art L 3122-2 C sant pub.

90 See art L 1221-14 C sant pub.

blood transfusions and contamination by HCV to come into play, the victim must show that he or she has an HCV infection and that he or she received blood transfusions. The proof of these two elements raises a presumption of the link between the transfusion and the contamination.

These presumptions are based on a probability ratio, but at times French law encounters improbable situations. The case in point is related to diethylstilbestrol (DES) use. This drug was distributed medically by two different industrial firms but consisted of the same pharmaceutical ingredients. This medicine was prescribed for pregnant women until the 1970s. It caused cancers in their female offspring several years later. The victims were able to prove that they had suffered the side effects of the drug, but were unable to prove which of the pharmaceutical laboratories distributed it. This situation is described in legal doctrine as a case of *alternative causality*. The Cour de cassation ruled on this issue in 2009; the court found that as long as the victim had proven the link between her illness and the DES, the burden fell to the manufacturers to prove that their product was not the cause of the injury.[91] This mechanism has been described as instituting a legal fiction in favour of the victim.[92] Indeed, it is practically and scientifically impossible to know which medicine was prescribed to the mother several years before the appearance of the illness in her daughter. In the face of this absolute uncertainty, the Cour de cassation reversed the traditional burden of proof and caused a radical departure from traditional civil liability rules.

The field of evidence has been particularly affected by scientific and technological innovations. While in this area, rulings have not truly shown a departure from the general principles of civil liability, it must be acknowledged that the increased recourse to proof by presumptions is a particular characteristic of liability cases related to scientific and technological innovations. In this field, advancement and invention are inevitably accompanied by uncertainties, and the law has changed to adapt to this situation.

Conclusion

This analysis of the effect of scientific and technological innovations on the law of civil liability law demonstrates a dual phenomenon of departure and continuity. Continuity is demonstrated by decisions in which the Cour de cassation finds new solutions rooted in the *Code civil*. Such was the case of the creation of the strict liability regime for injury caused by

---

91 Cass civ 1re, 24 September 2009, (2009) Bull civ I, No 186.

92 See Christophe Quézel-Ambrunaz, "La fiction de la causalité alternative: Fondement et perspective de la jurisprudence 'Distilbène'" [2010] 19 D 1162.

things in one's charge, based on article 1384, paragraph 1 of the *Code*, and also of the development of factual presumptions found in article 1353. In the same spirit, the recognition of new types of injury, such as psychological injury, is only an extension of categories already known under the general principles of civil liability (under the category of non-pecuniary damage). More radically, civil liability has also experienced departures from general principles. One example is the association between the employer's gross negligence and the obligation of result. Recognition of ecological damage as a victimless injury is a further demonstration of this phenomenon.

Between soft adaptations and radical departures, contradictory trends emerge. Two emerging principles are the precautionary principle and compensation for the risk of injury. Some trial and appeal courts compensate for the risk of injury based on the idea that scientific uncertainty should not be detrimental to the safety of persons or property. This judicial trend is causing a revolution by creating a form of preventive liability. The Cour de cassation still appears to be resisting this trend, but it is uncertain whether this tendency will survive against a growing compensation policy in France. To reconcile compensation for injury with a respect for the principles of civil liability, lawmakers are developing more mechanisms for compensating victims outside of liability law. Liability law is thus in competition with national solidarity legislation, through which victims may claim compensation without having to establish all the conditions for liability.