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A First Approach to Legal Obsolescence in an Age of Technological Change

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Abstract

This article develops a conceptual framework for understanding legal obsolescence in an age of technological change. Although claims that laws become obsolete are common in law and technology scholarship, the concept is rarely defined with precision to allow consistent identification, evaluation or prevention. Addressing this gap, the article asks what it means to call a legal rule obsolete and what conditions justify that judgement. The article's main contribution is a unifying concept of legal obsolescence grounded in a rule's capacity to produce predominantly desirable social effects. Based on a critical literature review of 62 works across multiple legal fields, languages and scholarly traditions, the analysis identifies changes in circumstances as the trigger of obsolescence, insofar as they undermine the assumptions upon which legal rules depend. By comparing cases labelled as obsolete in the literature, the article shows that obsolescence manifests in four non-exclusive pathways: diminished efficacy (reduced likelihood of enforcement and compliance); diminished effectiveness (a weakened means–ends relationship); expiration of purpose (when a rule's original objectives are rendered moot by changed circumstances); and harmful operation (when continued application generates normatively problematic effects that were not anticipated by the lawmaker). The proposed framework clarifies that diagnosing obsolescence requires both empirical inquiry and normative judgement. It also shows how different manifestations of obsolescence call for different institutional responses and future-proofing strategies. By reframing legal obsolescence as a specific form of legal failure caused by unanticipated change, the article provides a shared vocabulary for evaluating existing rules and designing more resilient law-making approaches.

***Keywords**:* Legal obsolescence; legal theory; pacing problem; future-proofing.

1. Introduction

The notion that legal rules[1] can become obsolete is common in law and technology studies.[2] It fits at least three different roles. First, legal obsolescence is presented by some scholars as a powerful engine of legal change. It is articulated as a historical explanation for why certain rules were reformed, repealed or reinterpreted, connecting technological developments to the actions of lawmakers. Campbell, for example, claims the US wiretapping laws were rendered obsolete by the advent of internet-

[1] Throughout this article, the term 'legal rule' is used in a broad sense to encompass enacted statutes, administrative regulations, common law doctrines developed through judicial decisions and international legal instruments. This breadth is deliberate: the mechanism of obsolescence identified in the article is not type-specific.

[2] 'Law and technology scholarship' is used here as the broad field of study on the impacts of technological development on legal systems. That includes works on the general relationship between sociotechnical change and legal change, on the use of novel technologies by judicial bodies and law practitioners, and on the legal challenges brought by specific technologies, such as AI and the internet. For exemplary contributions that have shaped the theoretical vocabulary of this field in recent decades, see Roger Brownsword, "Rights, Regulation, and the Technological Revolution"; Mireille Hildebrandt, "Smart Technologies and the End(s) of Law"; and Ryan Calo, "Robotics and the Lessons of Cyberlaw."

based means of communication that did not fit their language, resulting in uncertainty, and eventually reform.[3] Similarly, Bennett Moses points to the development of paternity tests as a cause for the obsolescence of California's legal presumptions of paternity, which were then eventually revised.[4]

Second, some authors point to premature obsolescence as a problematic by-product of technological change outpacing law-making efforts. They warn that, as new technologies expand human capabilities and enable practices, processes, business models and social dynamics that were once viewed as impossible,[5] 'new regulations could be obsolete before they even become final,'[6] highlighting that 'obsolete regulations can be the equivalent to, or even worse than, no regulation at all.'[7] This leads to the claim that rules related to technological issues need to be thought out with special care, as they are likely to rapidly become obsolete once enacted, creating uncertainty and unintended outcomes.[8] Legal obsolescence, in this case, is articulated as a potential issue that must be delayed through law-making approaches such as technology-neutral drafting, anticipatory governance, principles-based regulation, temporary legislation and review mandates.

Finally, obsolescence caused by technological change is brought up by scholars as an argument in favor of reinterpreting, reforming or repealing existing rules. Fitzgerald, for instance, argues for the updating of the US regulatory framework for oil and gas extraction, explicitly stating that it became obsolete once technology allowed for the exploitation of unconventional resources.[9]. Villamizar Lamus, in a similar argument, points out the obsolescence of international law on aerial combat, claiming that there is a gap in the legal framework when it comes to the use of unmanned drones.[10]

Together, these perspectives underscore the significance of legal obsolescence in shaping the relationship between law and technological change, highlighting its role in the scholarship as a conceptual tool for explaining, guiding and justifying legal adaptation. The concept shares analytical space with related ideas, such as regulatory lag, legal uncertainty and gaps in the law, but seems to retain independent value. Unlike regulatory lag, which describes a process, obsolescence describes a condition of a specific rule; unlike legal gaps, which arise from the law's silence, obsolescence describes the failure of a rule that is present and operative. But what exactly does it mean to say that rules become obsolete? Attempts to define and describe the phenomenon are surprisingly rare. Most law and technology scholars take the meaning of obsolescence for granted, perhaps assuming their readers will draw on its more common use in reference to outdated products.[11]

An intuitive glance at the above examples suggests that changes in circumstances, such as the development of novel technologies, can undermine qualities of legal rules that were perceived as justified when enacted. These rules may lose their usefulness and become unfit for new realities, possibly triggering reform movements. Further inquiries, nonetheless, reveal that this intuitive definition, while not entirely incorrect, is insufficient. What changes in circumstances make rules problematic, and can they be predicted? And what conditions must be present for an existing rule to be convincingly considered obsolete (or is obsolescence purely a matter of point of view?).

While this article does not provide final answers to these questions, it argues that a deeper, unified understanding of legal obsolescence is necessary to do so. Earlier attempts to define the phenomenon in law and technology studies are lacking in different ways, making them insufficient to fill this role. On the one hand, some definitions are too vague. Obsolete rules are sometimes defined as those that 'can no longer be justified,'[12] that 'have lost their meaning'[13] or that are no longer 'apt'[14] because of technological change. These definitions do not offer criteria that allow for consistency in the identification of historical cases of obsolescence, evaluation of existing rules or prediction of potential issues.

[3] Campbell, "Protecting the Future," 538.
[4] Bennett Moses, "Recurring Dilemmas," 50.
[5] This article adopts Donald Schön's definition of technology as "any tool or technique, any product or process, any physical equipment or method of doing or making, by which human capability is extended." See Schön, Technology and Change, 1.
[6] Barefoot, "Disrupting FinTech Law," 10.
[7] Gaudet, "Administrative Law Tools for More Adaptive and Responsive Regulation," 167.
[8] Koops, "Should ICT Regulation Be Technology-Neutral?," 26.
[9] Fitzgerald, "Regulatory Obsolescence."
[10] Villamizar Lamus, "Drones."
[11] For a review on the most common uses of 'obsolescence' in reference to products and technologies, see Mellal, "Obsolescence."
[12] Bennett Moses, "Sui Generis Rules," 1.
[13] Fairfield, Runaway Technology, 53.
[14] Schwartz, "Obsolescence," 4.

Other definitions, on the other hand, are practical but too narrow, only accounting for certain scenarios of obsolescence. This is the case when obsolete rules are defined as those that are 'no longer cost-effective' (regarding their enforcement)[15] or that 'regulate practices that are no longer important.'[16] While these attempts provide much more verifiable indicators of obsolescence, they do not capture or describe the entire phenomenon.

This article attempts to fill this gap by interrogating legal scholarship on what it means to call a rule obsolete – especially, although not only, in the context of technological change. By compiling and analysing case studies from works on the topic, the article goes beyond definition attempts and identifies patterns in how legal scholars in a multitude of fields articulate the idea of legal obsolescence. It then presents these patterns as a preliminary concept, a proposal of a common vocabulary for law and technology, pointing out its implications both for prospective lawmaking and the retrospective evaluation of rules.

2. Method and Structure

The conceptual contributions of this article are the result of a critical literature review,[17] which was divided into two phases. The first consisted of compiling legal journal articles, books and book chapters in which authors used the expressions 'obsolete,' 'obsolescent,' or 'obsolescence' in reference to legal rules, statutes, regulations, policies and court decisions.[18] The deliberate choice to anchor the search in these expressions, rather than potential synonyms such as 'anachronistic,' 'outdated' or 'regulatory lag,' reflects a methodological decision: preliminary searches confirmed that texts using synonymous language almost invariably also deployed the 'obsolescence' family of terms, making the overlap sufficient for retrieval purposes. The reverse was not true: restricting searches to 'obsolescence' and its cognates captured a more precise and internally consistent body of scholarship.

Searches were conducted in June 2025 with no time range restriction, in English, Portuguese and Spanish, across four databases: Google Scholar, HeinOnline, SciELO and the Social Science Research Network (SSRN). Each database was selected for a specific retrieval purpose. Google Scholar provided the broadest initial coverage across disciplines and languages. HeinOnline ensured comprehensive access to legal journals, including older periodicals not indexed elsewhere. SciELO extended coverage to Iberian and Latin American legal scholarship, which is under-represented in Anglophone databases. SSRN was included to capture working papers and preprints circulating within the scholarly community, given that a significant portion of law and technology research is first disseminated in that format. Where a work retrieved from SSRN had a subsequently published version in a peer-reviewed journal or edited volume, the published version was cited and consulted. False positives were then excluded after a preliminary reading of the findings.[19]

To further develop the sample, the reference lists of retrieved works were probed for additional relevant texts – a backward citation snowball.[20] This process was repeated until no further relevant works were found, resulting in a final sample of 62 texts.[21] The second phase of this research involved collecting, organising and comparing excerpts that mentioned legal obsolescence to develop a deeper understanding of the concept. These excerpts were arranged into two categories: definitions and cases.

Definitions included any attempt by authors to explain what it means for a rule to be obsolete. Tristano, for instance, believes an obsolete rule is one that 'is considered effective and useful at the time of its amendment, is affected by the passage of time and becomes useless or even counterproductive.'[22] While efforts such as these should be the most useful sources of data for

[15] Bennett Moses, "Recurring Dilemmas," 48.
[16] Bennett Moses, "Agents of Change," 767.
[17] As Grant and Booth explain, a critical literature review is one that 'goes beyond mere description of identified articles and includes a degree of analysis and conceptual innovation.' See Grant, "A Typology of Reviews," 93.
[18] Non-academic primary sources – including court decisions and legislative materials – were excluded from the sample, as the object of inquiry was scholarly discourse on the concept of legal obsolescence rather than legal practice itself; primary sources appear in the article only where directly cited by sampled authors.
[19] Works that discussed the regulation of 'planned obsolescence' practices by tech companies, for example, were common among the results of the database search, but did not fit the scope of this research, given that 'obsolescence' did not refer to legal rules.
[20] Forward citation searches – identifying works that cite the retrieved texts – were not conducted, which means the sample may under-represent more recent scholarship that builds on works already included.
[21] See Table S1 – Literature Review Corpus in the Supplementary material, Open Science Framework, https://osf.io/p6hm9/files/osfstorage/6a0c491a505244f586a06680
[22] Tristano, The Shadow of Obsolescence, 633.

this research, they were rare[23] and usually limited in scope. Further material was essential for a comprehensive description of the phenomenon.

Cases, however, were much more common and sometimes richly detailed, allowing for inferences regarding what the authors meant when they talked about obsolescence.[24] They included all instances in which authors identified a rule as obsolete and described the facts and reasoning that led to that conclusion. For example, Janis and Smith's account of the obsolescence of intellectual property regimes that protect plant phenotypical varieties[25] explains how advances in the biotechnology industry and the rise of a genotype-based seed market have challenged the effectiveness of existing regimes. Most of the conceptual contributions from this article were a result of comparing cases such as this.

Taken together, the collected definitions and cases provided insight into how the legal scholarship describes legal obsolescence. This article presents these insights as follows.

Section 2 provides a general overview of the output of the literature review, arguing that it can be divided into two 'waves.' Legal obsolescence became relevant when common law systems began producing statutes instead of relying primarily on court rulings as the primary source of law. Because statutes are much harder to reform, scholars were motivated to discuss how to efficiently address those that would become obsolete as circumstances changed. More recently, however, legal obsolescence has become a concern primarily among scholars focused on the transformative power of new technologies. Rather than simply seeking ways to eliminate or reform obsolete rules, this 'second wave' of literature is concerned that the rapid pace of technological change may overwhelm legal institutions. As a result, it proposes strategies to prevent obsolescence through statute drafting techniques and institutional arrangements.

Section 3 contains the conceptual contributions of this article. It turns to the compiled cases from the literature for a deeper understanding of the phenomenon. It argues, first, that changes in circumstances (technological, scientific, social, economic, legal or otherwise) that challenge the underlying assumptions of legal rules are the trigger for obsolescence. It also argues that obsolescence can manifest in four non-exclusive ways: a rule's efficacy can be undermined (a reduced likelihood of it being obeyed), its effectiveness weakened (a defect in the causal link between the means chosen by the lawmaker and the rules' intended effects), its continued operation rendered purposeless or its continued operation rendered actively harmful by interaction with changed circumstances. Based on these insights, it then suggests a preliminary concept of legal obsolescence that encapsulates these different possibilities: an obsolete rule is one that has become less likely to produce predominantly desirable social effects because of changes in circumstances that rendered its underlying assumptions incorrect.

3. Two Waves of Legal Obsolescence Studies: An Overview of the Literature

The resulting sample of 62 works spans nearly a century of legal scholarship, from 1930 to 2024, and reflects an uneven temporal distribution (Figure 1). Only 12 works were published before 2000. The remaining 50 works were published from 2000 onwards, with a pronounced acceleration visible from 2011. The most recent works date from 2024, confirming that scholarly attention to legal obsolescence remains active at the time of writing. This temporal pattern is not incidental: it maps closely onto what will be referred to in this section as the two 'waves' of scholarly concern.

[23] Besides Tristano, only six other authors from the sampled literature attempted to define legal obsolescence: Calabresi (*A Common Law for the Age of Statutes*), Super ("Against Flexibility"), Bennett Moses ("Agents of Change"; "Recurring Dilemmas"; "Sui Generis Rules"), Schwartz and Scott ("Obsolescence"), Verma ("Repeal of Obsolete Laws"), Han ("Constitutional Rights and Technological Change") and Fairfield (*Runaway Technology*).
[24] See Table S2 – Case Studies in the Supplementary Material, Open Science Framework, https://osf.io/p6hm9/files/osfstorage/6a0c491a505244f586a06680.
[25] Janis, "Obsolescence in Intellectual Property Regimes."

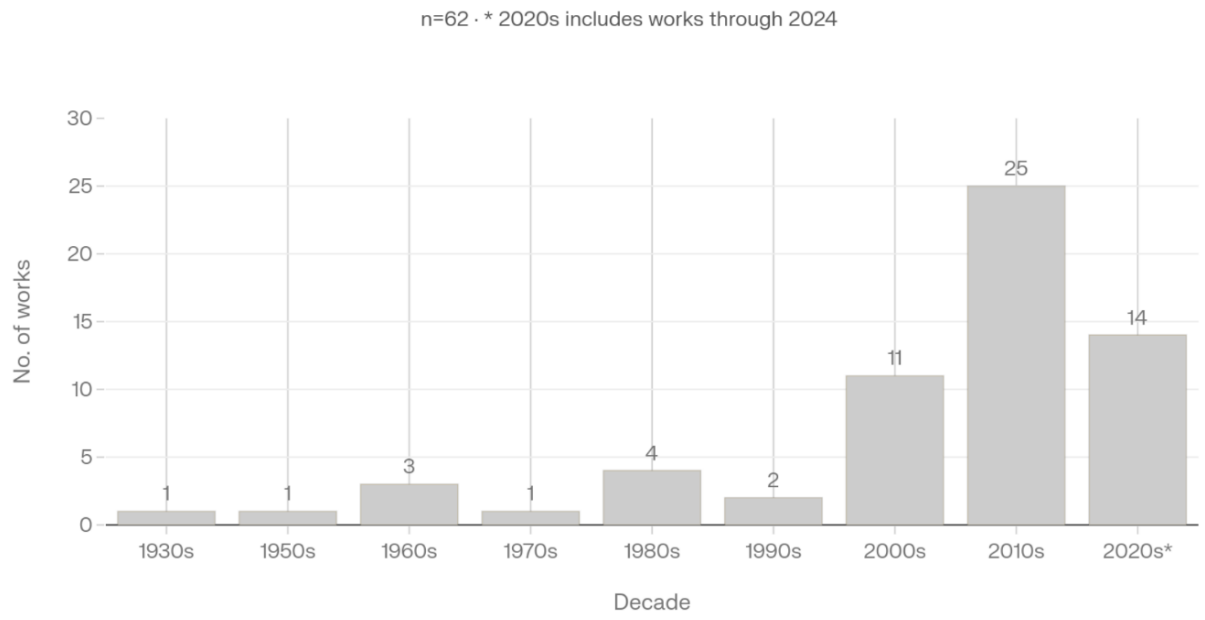

Figure 1. Corpus distribution by decade (1930-2024)

Thematically, the sample can be divided into three categories (Figure 2). Fourteen works invoke obsolescence exclusively as an argument for reforming a specific rule, without discussing the concept in the abstract. Examples abound, from authors suggesting that the trimester framework for legal abortion can become obsolete as developments in medical technology allow for earlier fetal viability[26] to others arguing that consent-based data protection regimes are no longer compatible with the contemporary dynamics of the internet.[27] Because these works centre around specific rules, they were found to be quite useful sources of cases. More importantly, the remaining 48 works engage with legal obsolescence as a general phenomenon, and it is among these that two historically and thematically distinct 'waves' can be identified. Twelve works address the problem of enduring obsolete statutes and the institutional mechanisms for removing them: this is the first wave. Thirty-six works seek to understand and propose strategies for delaying legal obsolescence: this is the second wave. The sections that follow provide a descriptive overview of these two waves.

[26] Mangel, "Legal Abortion."
[27] Monteiro, "Privacy at a Crossroads."

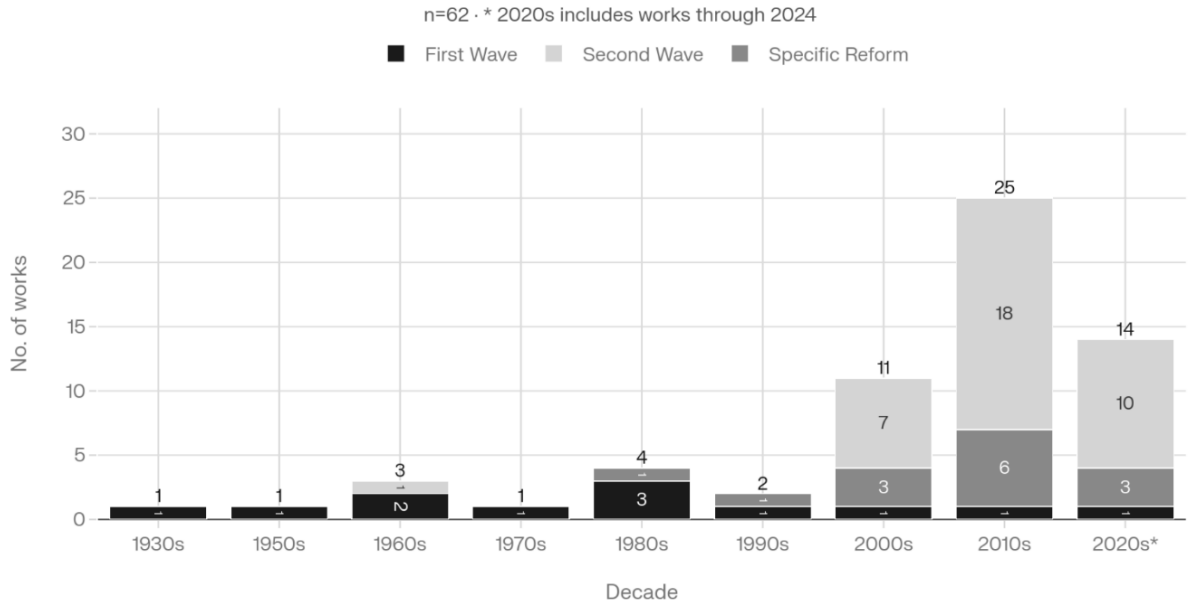

Figure 2. Thematic distribution (1930–2024)

3.1 Choking in Statutes: Obsolete Rules and Legislative Inertia

While legal obsolescence has an important role in law and technology studies, it would be a mistake to believe the phenomenon is only pointed out by this literature. About a third of the works compiled in this review include no explicit mention of technological change as a relevant trigger of legal change. That is to be expected, however, as there is no reason to believe that societal developments devaluing existing rules and provoking legal reform is a phenomenon constrained to a specific type of contextual change.

In fact, discussions on legal obsolescence go back as early as the 1930s,[28] well before most organised research on the relationship between law and technology started. These early works were motivated by how the United States and other common law legal systems changed during the twentieth century, a phenomenon described by some as 'statutorification':[29] the shift from case law to statutory law as the primary source of legal rules.

The core of the problem diagnosed by this literature was not the existence of statutes themselves, but the institutional dynamics that governed their life cycle. Legislatures were seen to be adept at creating new laws in response to societal pressures, but slow and ineffective at reviewing and repealing old ones.[30] This shift, as Gilmore suggests,[31] was accompanied by courts becoming more deferential to the legislative command, making it much harder to rewrite rules through judicial decisions. As a result, legislative and judicial inertia preserved the validity of statutes long after they no longer reflected contemporary social values, political consensus or societal demands.

This 'first wave' of obsolescence studies was worried about the dangers of enduring obsolete rules and the lack of institutional mechanisms to repeal them.[32] Obsolete statutes could produce unintended outcomes when the circumstances around them changed or even become unenforceable when the conditions for their existence were no longer present. Yet these statutes would hardly be repealed by legislatures or courts, instead remaining 'dormant.' While some of these dormant statutes could be innocuous, ending up as artefacts of a curious past that were no longer enforced by authorities, some would create 'useless

[28] "The Elimination of Obsolete Statutes."
[29] Calabresi, A Common Law, 1.
[30] Calabresi, A Common Law, 2.
[31] Gilmore, "On Statutory Obsolescence," 475.
[32] "Judicial Abrogation of the Obsolete Statute," 1181.

bulk' in books, provoking confusion.[33] Even worse, some could be 'resurrected' by governments and enforced in a discretionary manner not expected by citizens accustomed to their inactivity.[34]

Many scholars proposed solutions to these issues, including the applicability of the doctrine of desuetude,[35] reforming the power of the courts to treat statutes as precedents[36] and dynamic statutory interpretation.[37] Assessing the merits of these approaches is beyond the scope of this article; what matters is that the first wave's central concern was not the concept of obsolescence itself, but the institutional question of what to do when obsolete statutes endure.

The most substantial first-wave work is Guido Calabresi's *A Common Law for the Age of Statutes*, which defines an obsolete statute as one that would lack contemporary legislative support[38] and no longer fits the current legal topography[39] – that is, the body of common law, newer statutes, and constitutional principles that surround it. Calabresi proposed that courts should identify and correct such statutes by treating them as they would common law precedents, adapting them where they could no longer fit and shifting the burden of inertia to the legislature.[40] The proposal attracted significant criticism for its implications for judicial power,[41] and was never fully adopted by US courts,[42] but it remains the most conceptually developed diagnosis of statutory obsolescence in the first wave.

Works on how legal institutions should deal with enduring obsolete statutes seem to be less prominent in contemporary legal scholarship than they were in the twentieth century, but they still exist.[43] This specific problem clearly persists to a certain extent, even if it proved less severe than suggested by early diagnostics. Most recent works in the compiled scholarship, however, tackle a different issue altogether.

3.2 The Pacing Problem: Rapid Obsolescence and the Need for Future-Proofing

Most of the contemporary scholarship that mentions legal obsolescence discusses the development and diffusion of technologies.[44] An overview of this 'second wave' of studies reveals why: these authors share a common perception that technological change makes rules obsolete at a higher pace than other types of social change. This perception then evolves into a scepticism towards the capacity of law-making institutions to keep up and produce long-lasting decisions and into a need for re-evaluating law-making dynamics.

This 'pacing problem'[45] (the notion that technological change somehow outpaces law-making institutions) has led scholars to predict that 'new regulations could be obsolete before they even become final,'[46] and that fast technological progress 'would likely make any regulatory enactments obsolete before their ink dried.'[47] As such, the primary problem tackled by the second wave is no longer how to 'clean up' obsolete rules that endure when they should not, but how to preserve the lifespan of policies when significant change happens at an unprecedented frequency.

Technological change is brought up as a catalyst of legal obsolescence because it is concomitantly complex, unpredictable and accelerating. It is complex because the challenge of understanding technological change is multidisciplinary.[48] It is

[33] "The Elimination of Obsolete Statutes," 1302.
[34] To illustrate this, Patrick recounts that, in Canada, the editor and the publisher of a gay newspaper were convicted of the crime of blasphemous libel in 1977, more than 50 years after the last time someone was convicted for the same crime. While it would be easy to assume that, after 50 years of non-enforcement, blasphemous libel had become a historical artefact, it was in fact 'not dead, just sleeping.' See Patrick, "Not Dead, Just Sleeping," 201–203.
[35] "Judicial Abrogation of the Obsolete Statute"; Henriques, "Desuetude and Declaratory Judgment."
[36] Davies, "A Response to Statutory Obsolescence."
[37] Eskridge, "Dynamic Statutory Interpretation"; Langevoort, "Statutory Obsolescence."
[38] Calabresi, A Common Law, 6.
[39] Calabresi, A Common Law, 2.
[40] Calabresi, A Common Law, 82–83
[41] Divine, "Statutory Anachronism," 147.
[42] "Divine, "Statutory Anachronism," 176.
[43] For works on the topic published after the turn of the millennium, see Patrick, "Not Dead, Just Sleeping"; Divine, "Statutory Anachronism"; Verma, "Repeal of Obsolete Laws."
[44] Only eight of the 50 compiled texts published after the year 2000 do not discuss technological change. By contrast, 10 of the 12 works published before 2000 do not mention technological change as a primary trigger.
[45] For a comprehensive overview of this issue and its possible solutions, see Marchant, The Growing Gap.
[46] Barefoot, "Disrupting FinTech Law," 10.
[47] Marchant, "Governance of Emerging Technologies," 1862.
[48] Herkert, "Ethical Challenges," 40–41.

unpredictable because the technological frontier is hard to monitor,[49] as research and development takes place in a fragmented manner across universities, companies and government institutions.[50] Finally, technological change is accelerating because present technologies drive the development of future technologies in a convergent manner.[51]

Complexity raises the costs for lawmakers to understand socio-technical phenomena, slowing down decision-making. Unpredictability increases the risk of lawmakers making decisions based on incorrect forecasts and fragile assumptions. Finally, accelerating technological change rapidly transforms social reality and shortens the lifespan of decisions based on costly knowledge and risky predictions. Together, these factors create a law-making environment likely to produce rules that will become obsolete quickly, rather than after extended periods of gradual change.

First-wave scholars treated obsolescence as an expected outcome of most, if not all, law-making efforts. Given the inevitability of social change, it was common sense that rules would at some point become less compatible with new realities and be replaced with more suitable ones. Its underlying assumption, however, was that obsolescence took a considerable amount of time to happen. The longer lifespan of rules meant that, even if legislatures could be ineffective in revisiting their previous decisions, at least social change would be met with effective, enduring answers.

Second-wave scholars face a different scenario. When it comes to frequent technological change, rules have shorter lifespans, which requires renovation to happen faster. Lawmakers, even so, are seen by these authors as being too slow to do so effectively. Apart from the inherent complexity of regulating technologies, legislatures can address only a limited fraction of potential issues per session.[52] Political factors, including ideological conflicts and disagreements, contribute to the ossification of the rule-making process.[53] While the challenge of eliminating obsolete statutes persists, the new problem to be tackled is how to ensure that new regulatory decisions can endure frequent change.

Recent scholarship on the topic, therefore, is more prone to discussing the delaying of legal obsolescence rather than its remediation. Law-making techniques have been proposed and evaluated by scholars of the second wave as potential remedies to the shortening of the life cycle of legal rules.[54] This is commonly referred to as 'future-proofing law.'[55]

Some authors discuss, for instance, whether drafting laws that do not mention specific technologies (technology-neutral drafting) are in most cases advantageous to postpone legal obsolescence[56] or a principle-based approach to drafting would allow rules to be adapted over time.[57] Others go beyond this, discussing broader, multi-institutional approaches, such as adaptive regulation by administrative bodies[58] and purposive interpretation by courts.[59] While these discussions can take many different paths and intrude into many different branches of the law, their end-goal is the same: to find ways to ensure that frequent technological change will not lead to premature legal obsolescence.

It is worth pausing to note what the second wave's concern actually is, and what it is not. Legal obsolescence is not, in itself, a pathology. The gradual erosion of a rule's assumptions is the ordinary mechanism by which legal systems evolve in response to changing social realities. The problem identified by the second wave is not obsolescence as such, but institutional rigidity – that is, the failure of legal systems to recognise and respond to obsolescence in time. Future-proofing, as understood in this literature, is therefore not an attempt to entrench a single regulatory solution or goal indefinitely or to foreclose the creative engagement that a changing legal landscape demands; it is an attempt to design rules and institutions that remain responsive to change for as long as possible – rules that can be revised, interpreted purposively or allowed to expire when the social conditions that justified them have shifted.

[49] Nye, "Technological Prediction."
[50] Askland, "Introduction," 9–10.
[51] Herkert, "Ethical Challenges," 40–41.
[52] Thierer, "Governing Emerging Technology," 3.
[53] Kaal, "Dynamic Regulation," 9–10.
[54] For a comprehensive list of law-making remedies to the pacing problem mentioned by the scholarship, see Kaal, "Dynamic Regulation," 10–13.
[55] See, for instance, Chander, "Future-Proofing Law"; Campbell, "Protecting the Future"; Ranchordás, "Future-Proofing Legislation."
[56] This is perhaps one of the most recurring topics in this literature. Examples of approaches to it are Koops, "Should ICT Regulation Be Technology-Neutral?"; Bennett Moses, "Recurring Dilemmas"; Ohm, "The Argument Against Technology-Neutral Surveillance Laws"; Greenberg, "Rethinking Technology Neutrality"; and Ard and Crootof, "Legal Responses to Techlaw Uncertainties."
[57] Carter, "Principles-Based Regulation."
[58] Gaudet, "Administrative Law Tools."
[59] Bennett Moses, "Recurring Dilemmas," 72–74.

4. A Conceptual Contribution: Defining Legal Obsolescence

Definitions of legal obsolescence are rare in both first- and second-wave literatures. Because these scholarships tackle different implications of the phenomenon, their attempts to describe it are also tailored for their own goals, which generally make them insufficient as comprehensive concepts that can be used for both preventing and diagnosing obsolescence.

Consider, for instance, Calabresi's description of an obsolete rule as one that would lack contemporary legislative support, and therefore no longer 'fit' new 'legal topography.' This description is useful insofar as it offers justification for why courts, with their practical knowledge of the legal landscape, would be well equipped to identify rules that stand out. This 'lack of fit' or 'inconsistency,' nonetheless, does not seem to define the phenomenon in a way that promotes consistency in decision-making, which might partially explain the negative reception to Calabresi's thesis. Also, because it was developed as a tool for identifying obsolete rules, the idea of comparing rules with contemporary legal topography is not useful for guiding future proofing efforts.

The most operationally developed description of legal obsolescence in the second-wave literature comes from Lyria Bennett Moses, who argues that obsolescence happens in three ways: when rules (1) regulate practices that are no longer important, (2) can no longer be justified or (3) are no longer cost-effective.[60] While these descriptions are sound, since it is common to find cases of obsolescence in the literature that fit each of them (as we will tackle in the following sections), they overlap and could be more operational if refined into a single, comprehensive conceptual framework.[61]

These and all other identified definitions (first- or second-wave) fall into one of two problematic categories: they are either too vague or too narrow. When obsolete rules are defined as those that 'can no longer be justified,'[62] have become 'useless,'[63] 'are mismatched to their situation,'[64] 'have lost their meaning'[65] or are no longer 'apt,'[66] they do not offer criteria that allow for consistency in the identification of historical cases of obsolescence, evaluation of existing rules or prediction of potential issues. When obsolete rules are defined as those that are 'no longer cost-effective,'[67] that 'are not in use anymore'[68] or that 'regulate practices that are no longer important,'[69] these attempts provide much more verifiable indicators of obsolescence, but they do not capture or describe the entire phenomenon.

To develop a more comprehensive, nuanced understanding of obsolescence that could be useful as a shared concept, this article aims to overcome the insufficiency of definitions in the literature by turning to cases. By comparing different scenarios proposed by scholars under the banner of legal obsolescence, we can explore the diverse ways in which rules can be rendered obsolete, while also challenging ourselves to identify their similarities and explain whether and why they can be considered a single category. The next sections will present the result of this analysis while using selected cases to illustrate the developed categories.

4.1 The Causes of Legal Obsolescence

Changes in circumstances trigger legal obsolescence. Most, if not all, compiled cases from the scholarship include an account of new technologies, new market practices, new behavioral patterns or shifts in prevalent political and moral values. They highlight a wide variety of novelties as threats to existing rules, such as the fall of geographic barriers in banking,[70] the growing acceptance of diverse sexual practices,[71] the rise in popularity of the World Wide Web[72] and the development of paternity tests.[73]

[60] Bennett Moses, "Recurring Dilemmas," 48.
[61] One could argue, for instance, that being 'no longer cost-effective' and 'regulating practices that are no longer important' are just specific reasons that could make a rule 'no longer justified.'
[62] Bennett Moses, "Sui Generis Rules," 1.
[63] Tristano, The Shadow of Obsolescence, 633–634.
[64] Super, "Against Flexibility," 1423.
[65] Fairfield, Runaway Technology, 53.
[66] Schwartz, "Obsolescence," 4.
[67] Bennett Moses, "Recurring Dilemmas," 48.
[68] Verma, "Repeal of Obsolete Laws," 939.
[69] Bennett Moses, "Agents of Change," 767.
[70] Langevoort, "Statutory Obsolescence," 719.
[71] Henriques, "Desuetude and Declaratory Judgment," 1082.
[72] Podesta, "Unplanned Obsolescence," 1107.
[73] Bennett Moses, "Recurring Dilemmas," 50.

Change causes legal obsolescence because lawmakers devise rules in particular contexts to achieve desired effects.[74] To ensure success, they try to understand the world around them, envision and anticipate how these interactions will unfold and design accordingly. In doing that, however, they adopt explicit and implicit assumptions about human behaviour, about how institutions implement, enforce and apply the new rules and about the desirability of the effects they are seeking. All these assumptions depend on the circumstances of that context, and, as such, unanticipated changes can undermine them.

Kayleen Manwaring provides a good example of these dynamics when explaining the challenges self-driving cars present to existing rules. As she points out, New York legislation requires drivers to always keep at least one hand on the wheel, ensuring they can react quickly to avoid collisions.[75] This rule, of course, assumes that a car is always being driven by a person, and that if that person takes their hands off the steering wheel, the vehicle will no longer be under control. But is that true for self-driving cars? Does it make sense to ensure that drivers are holding the steering wheel if the vehicle can avoid collisions on its own? Do existing personal sanctions for traffic infractions make sense if humans are not the ones operating vehicles? What is the point of compelling drivers to act in a certain way if the outcomes do not depend on their actions? These rules were, of course, considered reasonable when they were devised. Change is what raised these questions.

Tim Wu's claim about the obsolescence of the First Amendment of the US Constitution illustrates similar dynamics. The author argues that First Amendment law was conceptualised under three main assumptions that are no longer true: informational scarcity (only a few important speakers could compete for public means of communication); interest of listeners to be influenced by publicly presented views; and the government being the main threat to free speech by use of coercive instruments to target speakers.[76] Wu's claim is that new communication technologies have created an information flood and an industry that exerts control over what listeners are exposed to and what speakers are allowed to say,[77] confining the First Amendment to a narrow and frequently irrelevant role in contemporary jurisprudence. Again, obsolescence is caused in this case by the underlying assumptions of a rule being undermined by change.

It is important to note that, while technological change is much more common in the literature for reasons already explained, any kind of change can trigger obsolescence. Cases in which long-term shifts in prevailing moral values and short-term shifts in institutional arrangements lead to obsolescence are also mentioned, especially by first-wave scholars. Authors such as Patrick, McBain, and Verma[78] describe obsolescence when commenting on the decline of prohibitions of blasphemous libel, on the decriminalisation of practices related to homosexuality and on the abolishment of laws that refer to institutions that no longer exist. Much like changes on the technological frontier, changes in social values and changes in institutional arrangements can undermine the assumptions of rules.

4.2 Four Pathways to Legal Obsolescence: Inefficacy, Ineffectiveness, Expiration of Purpose and Harmful Operation

While the compiled scholarship is consistent on the causes of legal obsolescence, it does not explicitly detail what happens to the properties of rules once their underlying assumptions are weakened. By comparing cases and classifying them on the basis of how the properties of described rules were affected, we can identify patterns and then conceptualise a single definition.

All cases found in the literature can be allocated into one or more of four groups: (1) cases in which rules have had their efficacy undermined (meaning their likelihood of being obeyed has been reduced); (2) cases in which rules have had their effectiveness undermined (meaning that the causal link between the means chosen by the lawmaker and the rules' intended effects has been weakened); (3) cases in which the continued operation of the rule has become normatively unjustifiable because its original objectives are rendered moot by changed circumstances (referred to here as 'expiration of purpose'); and (4) cases in which the continued operation of the rule has become normatively unjustifiable because its interaction with changed circumstances generates problematic effects that were not anticipated by the lawmaker (referred to here as 'harmful operation'). For a clearer illustration, consider these four cases as representatives from each group:[79]

[74] Zapatero Gómez, The Art of Legislating, 6:48.
[75] Manwaring, "Kickstarting Reconnection," 80.
[76] Wu, "Is the First Amendment Obsolete?," 554–557.
[77] Wu, "Is the First Amendment Obsolete?," 558–568.
[78] Patrick, "Not Dead, Just Sleeping" (on Canadian prohibitions of blasphemous libel); McBain, "Abolishing Obsolete Legislation" (on abolishing English law that refers to institutions that no longer exist); Verma, "Repeal of Obsolete Laws" (on the decriminalisation of practices related to homosexuality).
[79] It is also worth noting that the cases span different types of legal rule: enacted statutes (the wiretapping laws and the paternity presumption) and judge-made common law doctrine (the *ad coelum* rule). The case sample also includes the obsolescence of international law and constitutional provisions. The proposed definition is deliberately stated in terms of 'rules' rather than 'statutes' to signal that the framework applies across these categories, not only to enacted legislation.

1. *Efficacy-related obsolescence – copyright law:*

> Technology has promoted copyright values by increasing both the quantity of and access to copyrightable works – providing new mediums of expression, and in the process new types of authorship, as well as facilitating geometric growth in the quantity of creative expression … But technology also has undermined copyright incentives by supplanting existing markets for such works, facilitating large-scale infringement, and threatening to make existing law obsolete.[80]

2. *Effectiveness-related obsolescence – wiretapping laws:*

> In *Steven Jackson Games, Inc. v. United States Secret Service*, the Secret Service seized a computer which operated a Bulletin Board Service. Subsequently the Secret Service read and deleted a number of e-mails which were stored on the same computer. The *Steven Jackson Games* court found that the Secret Service's actions did not violate the wiretapping laws because the e-mails did not constitute protected electronic communications. The *Steven Jackson Games* court, following a plain-text reading of the wiretapping laws, stated that: '[t]he E-mail at issue was in 'electronic storage.' Congress's use of the word 'transfer' in the definition of 'electronic communication,' and its omission in that definition of the phrase 'any electronic storage of such communication' reflects that Congress did not intend for 'intercept' to apply to 'electronic communications' when those communications are in 'electronic storage.' Thus, the *Steven Jackson Games* court held that, due to Congress's formulation of the wiretapping laws, e-mail stored on a computer is not protected communication.[81]

3. *Expiration of purpose – paternity presumptions:*

> Consider section 1962(5) of the California Code of Civil Procedure, enacted in 1872: 'the issue of a wife cohabiting with her husband, who is not impotent, is indisputably presumed to be legitimate.' The purpose of this provision was presumably to avoid speculation where paternity was difficult to determine (thus protecting the institution of marriage and the children of that marriage), but to recognize alternative paternity where the husband could not have been the father. Although we cannot be sure, the rule seems to assume that impotence and lack of co-habitation are the only 'obvious' ways of knowing that the husband is not the father. But it is easier to exclude paternity today than it was in 1872. Since the 1930s, blood tests have been used as evidence in paternity suits and, more recently, DNA tests can determine paternity with a high degree of accuracy.[82]

4. *Harmful operation – the ad coelum doctrine:*

> The venerable *ad coelum* doctrine in property – which traditionally protected a landowner's airspace 'up to the heavens' … was founded on the assumption that no one could make practical use of the air; with the advent of airplanes, US courts waved away the rule as the product of 'an age of primitive industrial development.'[83]

These four accounts of legal obsolescence are obviously similar in the sense that they were triggered by technological change (the emergence of internet-based communications for cases 1 and 2; the advent of paternity tests for case 3; and the advent of airplanes for case 4), but reveal a wide range of different effects that change can have on the properties of legal rules.

In the case of copyright law (Case 1), internet-based communications have reduced the costs of copyright infringement, while at the same time raising costs for authorities to ensure compliance. Technological change, in this case, has rendered these rules much less likely to be complied with.

In the case of wiretapping laws (Case 2), legislation was enacted to protect private communications from public authorities by restricting wiretapping. However, this legislation only protected communications in transit. When email was adopted, the limited scope of these rules resulted in them failing to reach their intended goal, since communications stored on a computer were unprotected. In this case, compliance with the law was not the issue: the causal link between the means elected by the

[80] Directly quoted from Greenberg, "Rethinking Technology Neutrality," 1504.
[81] Directly quoted from Campbell, "Protecting the Future," 538.
[82] Directly quoted from Bennett Moses, "Recurring Dilemmas," 50.
[83] Directly quoted from Crootof and Ard, "Structuring Techlaw," 411.

lawmaker (restricting wiretapping by authorities only in cases of communications being transmitted) and the intended effects of the rule (protection of private communications) was weakened.

In Case 3, legal presumptions of paternity were likely established 'to avoid speculation where paternity was difficult to determine (thus protecting the institution of marriage and the children of that marriage).' The emergence of paternity tests did not incentivise disobedience, nor did it weaken the relationship between means and ends. Instead, it rendered the intended effects of the rules themselves irrelevant. There was no longer a need to protect marriages from speculation because this speculation was born from the uncertainty of parenthood. This is a case of expiration of purpose: the rule may remain technically operative, but there is no longer any social goal for it to serve.

Case 4, finally, shows how the continuous operation of a legal rule can produce new normatively undesirable outcomes when in contact with novel circumstances, even if that rule is still efficacious and effective. The *ad coelum* doctrine assumed that the air was not a usable space, but once aircraft were invented, it became a potential hurdle for diffusion. If not displaced, this rule would have led to the undesired prohibition of air traffic.

Note that, although these four pathways are analytically distinct, they are not mutually exclusive: a rule may simultaneously suffer from more than one form of obsolescence and the manifestations frequently interact. Normative misalignment (whether by expiration of purpose or harmful operation) can erode compliance and enforcement effort, feeding into efficacy-related obsolescence. Conversely, a rule's functional failure may deepen the normative case against its continued operation.

The case analysis revealed that rules rendered obsolete by change are described in the scholarship as less likely to be obeyed, less likely to achieve their intended effects or as producing outcomes that are normatively undesirable under new circumstances. On the surface, these are quite different kinds of failure: reduced compliance is an empirical condition, weakened means–ends links are a causal matter, and normative misalignment is an evaluative one. The conceptual challenge, therefore, is to account for these distinct modes of failure within a single definition of legal obsolescence.

One way to do this is to treat efficacy, effectiveness and normative adequacy not as independent properties, but as contributing factors to a rule's capacity to produce predominantly desirable social effects. This seems to capture all four examples and other similar cases: copyright law cannot impede the reproduction of protected works if it is not obeyed; wiretapping laws offer less protection to private communications if authorities are not required to comply with them when accessing email; and, of course, protecting marriages from the uncertainty of parenthood and impeding air traffic were not desirable outcomes under changed circumstances.

We therefore arrive at a comprehensive account of what it means for a rule to become obsolete: a rule is obsolete when, due to changes in circumstances that undermine its underlying assumptions, it has become less likely to produce predominantly[84] desirable social effects. The fully obsolete rule is one that has ceased to serve any justifying purpose, one whose efficacy, effectiveness or normative alignment has eroded to the point that no plausible pathway to predominantly desirable outcomes remains. The four manifestations described above identify the distinct routes through which this condition can be reached.

4.3 Implications

The proposed concept of legal obsolescence seems to encapsulate previous attempts to describe and articulate the phenomenon, while also revealing interesting insights into the challenges of diagnosing, remedying and delaying it.

Regarding identification, it suggests that diagnosing whether a rule is obsolete is an empirical and normative effort. Some aspects of how the rule interacts with its social environment are empirically demonstrable. One can, for instance, analyse empirical data to identify practical difficulties in enforcement or a rise in infringement rates, and attempt to establish change as a cause. That makes identifying efficacy-related obsolescence straightforward (if one does not account for the difficulties in collecting and analysing the empirical data).

Pinpointing the intended and unintended outcomes of rules to evaluate effectiveness and assess their level of desirability, however, is not a purely empirical effort.[85] The purpose of specific rules can be heavily contested by participants in the legal

[84] The qualifier 'predominantly' is intended to capture the asymmetry that characterises cases of harmful operation. A rule may continue to produce some of its intended desirable effects while simultaneously generating unintended harmful ones; where those harmful effects are severe enough to override the desirable ones, the balance tips against the rule and an obsolescence diagnosis becomes warranted.
[85] Crootof, "Structuring Techlaw," 367.

community, and these participants might also have different expectations of what social effects should be aimed for.[86] Therefore, in many cases the identification of an obsolete rule is highly dependent on what the evaluator assumes the rule should and should not achieve. Distinguishing the type of obsolescence at play is therefore a precondition for choosing an appropriate institutional response, as the evaluator must be equipped to deal with these different challenges.

It must be noted that identifying a rule as obsolete does not, in itself, mandate an institutional response. The four manifestations described above are not binary conditions: a rule may exhibit diminished efficacy or a weakening means–ends relationship to varying degrees, without necessarily justifying the costs and risks of revision, particularly when institutional capacity is limited or there is not yet a clear, better alternative to the obsolete rule. What the framework provides is not a trigger for intervention, but a vocabulary for evaluating whether and how far a rule has drifted from the social conditions that once justified it. It is a prior question that must inform any decision about revision, repeal or deliberate inaction.

Regarding prevention, recognising that legal obsolescence can manifest in different ways also has useful implications, as commonly proposed law-making techniques might be effective in delaying certain types of obsolescence, but not others. The issues in the case of wiretapping laws could have been mitigated if legislation had not limited itself to protecting communications in transit. It is hard to imagine, however, that efficacy-related obsolescence, illustrated by the case of copyright law, could be prevented in the same manner. Situations like the case of paternity tests might not even be worth preventing, as those rules no longer serve a relevant purpose.

One final advantage of this concept is that it bridges the issues of legal obsolescence to a broader literature on the properties of legal rules and their relation to their social impact. Because it frames the phenomenon as a function of a rule's likelihood of achieving predominantly desirable social effects, scholars can draw from the literature on efficacy, effectiveness and normative desirability to fill theoretical gaps and enhance its usefulness. One could even argue, in that sense, that legal obsolescence fits a broader category of 'legal failure.'[87] What differentiates it from other ways in which rules can fail to achieve desirable effects is its cause: instead of presenting, for example, a defect in design, communication or implementation, obsolete rules fail because of unpredicted changes in circumstances.

5. Conclusion

This article has sought to clarify the concept of legal obsolescence, particularly in the context of technological change, by drawing on definitions and case studies from a broad body of scholarship. The proposed framework – understanding that an obsolete rule, one with the capacity to produce predominantly desirable social effects, is diminished when changing circumstances undermine its underlying assumptions – offers a first step towards a shared conceptual vocabulary in law and technology. By distinguishing between failures of compliance, failures of means–ends alignment and cases of normative misalignment arising from a rule's continued operation, the framework also helps to explain why different forms of technological change place different pressures on legal systems.

However, as an initial conceptual inquiry, this research faces limitations. First, the qualitative synthesis relied on existing literature rather than new empirical data, and the search strategy carries inherent constraints. While the analysis of 62 works provides valuable insight into how scholars describe obsolescence, more profound cases studies could ensure a better understanding of how it happens in practice. The decision to anchor retrieval on the 'obsolescence' family of terms may also have omitted works that engage substantively with the phenomenon under a different label. The absence of forward citation searches similarly limits the sample's completeness. As such, the 62-work corpus should be understood as a major strand of the relevant scholarship rather than exhaustive of it. Other researchers are encouraged to replicate and expand this review with different keyword strategies, additional databases and other language traditions.

Second, while the article identifies different manifestations of obsolescence, it does not yet translate them into measurable indicators or diagnostic tools. The normative dimension of 'desirable social outcomes' remains especially contested and requires further theoretical grounding on different normative frameworks. Third, its reliance on English-, Portuguese- and

[86] While it could be argued that there is a 'correct' set of intended effects of rules – those envisioned by the lawmaker, as they theoretically project the will of the people – and that the effectiveness of rules should be evaluated based on these criteria rather than on the expectations of other members of the regulatory community, this also presents difficulties. As Fuller (*Anatomy of the Law*, 26) points out, the obscurity of legislative intent is perhaps one of the most pervasive causes of problems in legal interpretation. More recent research efforts indicate that, when they exist, declarations of legislative intent are usually too vague, narrow or even confusing, making it very hard to establish generally accepted purposes of a rule. See Mousmouti, Designing Effective Legislation, 22.

[87] As Maria Mousmouti proposes, 'the concept of failure invariably has two interrelated aspects: firstly, the mismatch between legislative intent and the results produced and secondly the extent of harmful effects of legislation.' Mousmouti, Designing Effective Legislation, 130.

Spanish-language sources, while methodologically broad, leaves unexplored how non-Western legal systems conceptualise obsolescence and adaptation.

Future research should therefore pursue empirical studies testing this typology across different legal systems and domains, develop indicators to measure and compare obsolescence and explore interdisciplinary approaches that integrate legal theory, data science and policy design. Such efforts would further transform legal obsolescence from a rhetorical notion into an actionable framework for diagnosing, evaluating and delaying obsolete law in rapidly evolving societies.

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