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Balancing Progress and Protection: The Precautionary Principle in Global Environmental Governance

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Abstract

The precautionary principle is based on the premise that the lack of scientific proof does not justify ignoring potential environmental harm. It advocates for taking precautions to avoid damage rather than dealing with the consequences. Therefore, the precautionary principle is a useful guide when governments need to create policy and regulations in the face of scientific uncertainty. This is especially important with regards to sustainable development as it provides legislators with a framework to enact environmental protections even in the absence of scientific certainty regarding the harm caused by specific industrial activities.

Regulators across the world need to strike a balance between the economic benefits of some industrial activity and its social and environmental costs. Imprecise knowledge of health risks, inadequate data, lack of definitive proof, unclear priorities, and public debate all complicate the assessment and regulation of these costs.

This article draws attention to the ongoing discussion around particulate matter, specifically around the nature of the exposure-response relationship for different health endpoints, the underlying causal mechanisms of the health impacts caused by different types of particles, and the effects of these impacts on diverse populations. It could lead to different reactions from the judiciary. Due to this uncertainty, those in charge of making decisions about regulations and adjudications about health, well-being, and the environment face governance issues.

1. INTRODUCTION

1.1 Global applicability

Historically, environmental regulations were often enacted in response to specific incidents rather than as a proactive measure. In the United States, for instance, landmark environmental laws such as the Environmental Protection Agency (EPA) Act, the Clean Water Act, and the Endangered Species Act were created following events like persistent photochemical smog in Los Angeles and fires on the Cuyahoga River in Ohio. These laws established regulatory agencies with the authority to implement prospective rules aimed at preventing future environmental disasters. However, the efficacy of these rules has been debated, as they often involve balancing the costs of missed industrial opportunities against the savings in environmental remediation and public health expenditures.

In the 1970s, a shift in environmental policy emerged with the German concept of "Vorsorge," or "foresight," which became the foundation of their environmental law under the principle known as "Vorsorgeprinzip." This principle advocated for the prevention of environmental harm through meticulous

planning and was used to justify strong measures against issues like climate change, acid rain, and pollution in the North Sea[1].

Since then, the precautionary principle has influenced environmental and public health policies in various nations, even when not explicitly mentioned in official documents. The principle has become a key component in shaping regulations designed to anticipate and prevent potential environmental harm.

However, the global application of the precautionary principle remains a topic of ongoing debate. While the principle provides a framework for health and environmental decision-making, achieving consensus on how to manage the associated risks, benefits, and costs is challenging. This complexity has led to differing views on the extent to which the precautionary principle should be applied, as stakeholders must weigh potential long-term benefits against immediate economic impacts.

1.2 Rationale and Necessity

"To protect the environment, States shall widely apply the precautionary approach according to their capabilities," reads the Rio Declaration on Environment and Development (RDEC)[2]. "*Principle 15 of the Rio Declaration 1992*" states that when there is a risk of severe or permanent harm, the delay of cost-effective actions to stop environmental degradation should not be justified by a lack of complete scientific confidence.

These important international declarations are derived from the precautionary principle and its emphasis on preventing irreversible damage[3]. This principle posits that the responsibility to provide evidence of safety for potentially harmful operations undertaken by industry or government is with them. Furthermore, when there are risks of significant harm, any scientific uncertainties must be resolved in favour of taking preventive measures. Throughout history, the failure to follow this principle has resulted in substantial unforeseen adverse outcomes.

For example, the introduction of methyl tert-butyl ether into gasoline in the United States to reduce air pollution – intended to reduce air pollution, led to significant groundwater contamination due to its high solubility in water, causing widespread concerns over potential health risks, including cancer – the installation of tube wells in Bangladesh[4] to prevent contamination of surface water by microorganisms, and the implementation of villagewide parenteral anti schistosomiasis therapy in Egypt[5] all led to significant negative consequences that could have been minimized with a more cautious approach[6]. These instances emphasize the significance of utilizing multidisciplinary techniques, doing risk-benefit analysis, implementing public health surveillance, and maintaining a functional tort system. All of these factors can

[1] Jordan, Andrew, and Timothy O'Riordan. "The Precautionary Principle in Contemporary Environmental Politics." *Environmental Values*, vol. 4, no. 3, 1995, pp. 191–212.

[2] *United Nations Conference on Environment and Development*. *Rio Declaration on Environment and Development*. 1992, Principle 15,

[3] Gollier, Christian, and Nicolas Treich. "Decision-Making Under Scientific Uncertainty: The Economics of the Precautionary Principle." *Journal of Risk Research*, vol. 6, no. 2, 2003, pp. 135-144. National Center for Biotechnology Information, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446778/#:~:text=It%20is%20a%20form%20of,uncertainty%20about%20its%20potential%20impact. Accessed 28 July 2024.

[4] Smith, Allan H., et al. "Contamination of Drinking-Water by Arsenic in Bangladesh: A Public Health Emergency." *Bulletin of the World Health Organization*, vol. 78, no. 9, 2000, pp. 1098–1102. https://www.who.int/bulletin/archives/78(9)1093.pdf.

[5] Hunter, Joanne M., et al. "Parenteral Antischistosomal Therapy: A Villagewide Experiment in Egypt." *American Journal of Tropical Medicine and Hygiene*, vol. 62, no. 3, 2000, pp. 348–354.

[6] U.S. Geological Survey. "Environmental Behavior and Fate of Methyl Tert-Butyl Ether (MTBE)." *U.S. Geological Survey*, 1 Jan. 1996, https://www.usgs.gov/publications/environmental-behavior-and-fate-methyl-tert-butyl-ether-mtbe. Accessed 28 July 2024.

collectively lead to the development of effective preventive strategies. Public health advocates worldwide are increasingly invoking the precautionary principle, especially in matters related to environmental and food safety.

The fundamental tenet of the precautionary principle is that an action should not be carried out if there is scientific doubt regarding its potential consequences. Professionals in public health must also acknowledge that the precautionary principle also applies to their own activities. This means that when they suggest a public health activity, they have the responsibility to provide sufficient evidence and consider all potential risks and repercussions. This burden of proof is equally shared by ourselves and everyone involved. The use of this is crucial in ensuring that current acts do not have detrimental effects on future generations.

2. ANALYSIS

2.1 Conceptual Framework

According to conventional wisdom, a legal principle provides guidance by indicating a general direction or preferred course of action in a given situation, but it does not dictate the final outcome. The relevance of a principle may change depending on the circumstances; it may be at
odds with other principles, and decision-makers are free to weigh and prioritize the principles they believe to be most important.

The concept of preventative action is another long-standing tenet of environmental law that must be differentiated from the precautionary principle. Unfavourable results, which might or might not materialize, constitute risk. By analyzing previous events quantitatively, it is feasible to consistently determine potential scenarios and give each one a probability of occurring. Here, we have what is known as "classic" risk: we have a good grasp of the system, we see what might happen and how likely it is, and we should focus on prevention rather than precaution. In comparison, if the likelihood of various outcomes is unknown, then identifying outcomes and assigning probabilities to them needs a clear rational basis. The relevant principle here is precaution. Thus, while precaution aims to forestall unknown dangers, prevention focuses on averting known ones[7].

So, the precautionary principle will not dictate an outcome or conclusion unless a particular formulation calls for it. It also won't demand a single decision that would ensure complete protection. However, in its most extreme form, the precautionary principle might lead to outright bans on any activity that could harm the environment and require those proposing such an activity to provide evidence that it is safe. Opponents of the precautionary principle tend to hold wildly divergent views on the principle. Their positions fall anywhere on a spectrum from completely opposed to each other; The spectrum of opposition to the precautionary principle ranges from those who argue that the principle is too restrictive and stifles innovation and economic growth, to those who believe it is overly cautious and leads to unnecessary regulation that can hinder progress. On one end, critics may see it as an obstacle to technological advancement, while on the other, some may view it as an overreach that imposes excessive burdens on businesses and industries without sufficient scientific evidence.

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[7] MICHAEL D. ROGERS, THE REALITY OF PRECAUTION 298-308 (Taylor & Francis 2013).

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The overarching goal of these principles is to safeguard the environment. They signify a development in how the law handles environmental damage: from polluter-pays, which deals with damages that have already occurred, to prevention, which deals with known risks before they happen, and finally, precaution, which aims to anticipate and avert unknown, uncertain dangers.

Even though precaution offers a policy approach to scientific uncertainty, science still plays a significant role. Initial scientific evaluation of hazards as a foundation for decision-making is stressed in many versions or debates on applying the precautionary principle. Language describing the level of indication of danger required before cautious action is appropriate is common in many formulations of precaution or guidelines for its application; this level of assessment is often based on scientific findings.

A "sound science" based approach to risk regulation, in contrast to the precautionary principle, emphasizes the need for solid scientific proof of environmental danger when implementing ecological protection measures instead of taking precautions in response to hypothetical or unknown threats. Regulations may be driven by trade protectionism and other economic or political agendas rather than solid scientific evidence of risk.

However, many maintain that precautionary regulation does not compromise the integrity of rigorous scientific inquiry in the least. While presenting evidence that technology or intervention does not cause harm, this group stresses that scientific knowledge of the risks is incomplete and that tests for negative impacts should be considered. They also mention that the scientific investigation culture may place too much emphasis on quantifiable risk factors and not enough on uncertainty and ignorance. Putting aside rhetoric, it is reasonable to consider the precautionary principle to be scientifically neutral when viewing it in isolation from its application in any given situation.[8]

For example, a non-precautionary system needs solid scientific proof of danger before an activity is banned. In contrast, in a precautionary regime, strong scientific evidence of low risk is required before an activity is authorized to go forward. Choosing one over the other is not indicative of divergent views on the usefulness of science but instead of which goals should take precedence when the state of the research is unclear.

2.2 The development and status of the precautionary principle

2.2.1 USA

From official rhetoric on both sides of the Atlantic to recent international trade wars, it is clear that the U.S. and E.U. have different views on the precautionary principle. U.S. officials claim that the precautionary principle, as formulated by the European Union, impedes technological progress and global trade. In contrast to the perceived risk aversion in the E.U., the United States needs strong scientific proof of harm before acknowledging the necessity for regulation.

In addition, scientific uncertainty is evolving, and the types of hazards considered problematic are also changing. As a result of these changes, several fields of environmental and public policy are giving more attention to prevention and caution. Disruption of the endocrine system and other low dose effects of

[8] Sands, P., *The Precautionary Principle: Coping with Risk*, 40 INDIAN JOURNAL OF INTERNATIONAL LAW 1-13 (2000).

"chemical exposures; substances, like nanoparticles, that can cross the blood-brain barrier; resistance to antibiotics, drugs, and pesticides; disruption of the climate; interactions between harmful chemicals, nutritional factors, infectious agents, and genetics"; and so, on are all
new damage mechanisms that have contributed to our growing knowledge of disease causes[9]. "Green chemistry, engineering, predictive toxicology, structure-activity correlations, and quick in vitro screens" are all scientific advancements that have improved risk assessment[10]. Sustainable technology, goods, and system design are examples of technical advancements. The types of uncertainty faced by government organizations tasked with protecting health, safety, and the environment have evolved alongside scientific and technological progress. Classical uncertainty, indeterminacy, and ignorance all fall into this category. Classical uncertainty is when we need to learn more to draw firm conclusions; contradictory evidence makes it hard to draw firm conclusions, and knowledge gaps about causal mechanisms and pathways make it hard to draw firm conclusions.

Classical uncertainty, which has proven to be more complicated and challenging to apply in many fields, has given way to indeterminacy (like the extent of global warming) and ignorance (like the potential dangers to ecosystems from intentionally released genetically modified (G.M.) crops), the dominant forms of uncertainty. Citizens, consumers, non-governmental organizations (NGOs), and the general public are increasingly calling for their input into decisions about health, safety, and environmental protection as a result of a loss of faith in government regulators and industry, which is attributable in part to evolving scientific understanding and insufficient government response.

More people are looking critically at the reasoning behind government choices because of the rising need for participation. The government's two-pronged strategy for dealing with potentially harmful technology and goods consists of a risk assessment and management plan. Choosing the facts and models to inform risk assessment and selecting whether, to what extent, and how to give protection are both procedures that involve value judgments; the precautionary principle could also be employed in these decisions.[11]

Regardless of whether someone is guilty, the strict liability theory makes them legally liable for whatever harm they cause and requires them to pay for it. Put another way, people are responsible for making amends to victims, regardless of whether they have taken all the necessary safety precautions. Permissions that authorize such operations often are seen as requiring the inclusion of this concept.

Significant progress in strict liability was made in the U.S. in the early 1900s. By releasing the Restatement (Second) of Torts in 1965, the American Law Institute introduced strict responsibility in cases involving abnormally damaging acts and defective products. "*Greenman v. Yuba Power Equipment"* and other seminal decisions further expanded the doctrine by establishing that manufacturers can be held fully liable for injuries caused by faulty equipment, regardless of their level of responsibility.[12]

The basic principle of tort compensation usually depends on how much care an individual takes. Therefore, the legal system may relieve an individual from compensatory damages obligation if they exert sufficient effort to limit potential harm. Strict liability, however, does not apply to this premise.

[9] Colborn, Theo, Dianne Dumanoski, and John Peterson Myers. *Our Stolen Future: Are We Threatening Our Fertility, Intelligence, and Survival? A Scientific Detective Story.* Dutton, 1996.
[10] Anastas, Paul T., and John C. Warner. *Green Chemistry: Theory and Practice.* Oxford University Press, 1998.
[11] Ibid.
[12] Greenman v. Yuba Power Equipment, 59 Cal.2d 57.

2.2.2 India

The Indian Judiciary strongly backs the Precautionary Principle. The Supreme Court expressed its urgent need for sustainable development in its ruling in the case of "*Vellore Citizens Welfare Forum v. UOI"*.[13] which dealt with the pollution caused by tanneries in Tamil Nadu, where the court ordered the closure of industries that were harming the environment and emphasized the need to balance economic growth with environmental protection. Finding a middle ground between promoting economic growth and safeguarding the environment is something the court stressed. The Court rejected the conventional wisdom that environment and development are mutually exclusive. Additionally, the Court looked at how the idea of sustainable development has evolved on a global scale. The Court concluded that the "Precautionary Principle and the Polluter Pays Principle" are essential components of Sustainable Development, citing the "1972 Stockholm Declaration, the 1991 Caring for Earth, the Earth Summit, and the 1992 Rio Declaration". Reiterating its ruling in the "Vellore Citizens Welfare Forum case", the Supreme Court of India reaffirmed in "*M C Mehta v. Kamal Nath"*that the Precautionary Principle is an element of India's environmental legislation; The Mehta case involved the illegal diversion of the Beas River by a private company for commercial purposes, where the court held that the protection of the environment must be prioritized over private commercial interests.[14]

The Supreme Court's analysis of the Precautionary Principle in the "*A.P. Control Pollution Board v. Prof M V Nayadu"*case was extensive.[15] Instead of waiting for an issue to become an irreparable problem, the court declared that it is better to take precautions and make a mistake to avert harm to the environment. According to the Court, scientific uncertainty is the sole driving force behind the development of the Precautionary Principle, which calls for taking measures to mitigate potential environmental damage. The Apex Court laid down the Precautionary Principle and the proposition of law in the case of "*Narmada Bachao Andolan v. UOI"*.[16] According to the Court, whoever claims their actions do not cause environmental harm has the burden of proof when the matter concerns such harm. Anyone claiming must prove to the same court that their actions will not harm the environment.

2.3 Legal Framework relating to the precautionary principle

2.3.1 USA

Despite ratifying the "Rio Declaration on Environment and Development", which requires states to follow the precautionary principle, the United States has yet to adopt precaution as a basis for explicit environmental policy. However, early judicial interpretations and portions of the U.S.

ecological law have expressed the need for care. Despite a lack of direct citation in U.S. legislation., the precautionary principle is present in several federal environmental statutes: "The Environmental Protection Agency (EPA)" can stop marketing a new product and request safety testing or other actions under the "U.S. Toxic Substance Control Act" if the agency thinks the material could pose an unreasonable risk or if considerable exposures are foreseen. Every new medicine must undergo testing by the "Food and Drug Administration (FDA)" before it can be sold to the public.

One precautionary measure is the National Environmental Policy Act's (NEPA) requirement that all federally funded projects undergo an environmental impact assessment; another is the act's requirement

[13] Vellore Citizens Welfare Forum v. UOI, AIR 1996 SC 2715.
[14] M C Mehta v. Kamal Nath, (1997) 1 SCC 388.
[15] A.P. Control Pollution Board v. Prof M V Nayadu, (1999) 2 SCC 710.
[16] Narmada Bachao Andolan v. UOI, AIR 2000 SC 3751.

that all alternatives, including a "no-action" option, be considered. According to the NEPA, any project that could get federal funds and could cause significant environmental harm must undergo an environmental impact analysis to prove that there are no safer alternatives.[17]

2.3.1.2 U.S.A and The European Union

Upon conducting a comparison analysis (elaborating upon the previous mention that "U.S. officials claim [...] regulation") , it becomes evident that there are notable disparities between the regulatory frameworks of the United States and Europe when it comes to the implementation of the precautionary principle. The European Union (EU) incorporates the precautionary principle as a core element of its regulatory policies, frequently giving priority to preventive measures when faced with scientific uncertainty[18]. In contrast, the United States tends to require strong scientific proof of harm before initiating regulatory measures, which can lead to delays in addressing potential risks. This section provides concrete instances that demonstrate the higher level of strictness and efficacy of European rules in comparison to those in the USA.

The EU's strategy is demonstrated by its control of chemicals under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) framework. Companies are required by REACH to provide evidence of the safety of their chemicals before they can be sold. In contrast to the U.S. Toxic Substances Control Act (TSCA), which often requires authorities to prove that a chemical is dangerous before imposing restrictions, this approach is proactive. Another noteworthy instance is the governance of genetically modified organisms (GMOs). The European Union has a rigorous licensing procedure for genetically modified organisms (GMOs), which includes comprehensive risk evaluations and public consultations. This ensures that any environmental and health consequences are thoroughly examined before granting permission. In contrast, the regulatory system in the United States, overseen by agencies like the USDA and FDA, takes a more lenient approach by frequently expediting the licensing process for GMOs, relying on the concept of substantial equivalence.

The variations in regulations have substantial consequences for the management of worldwide environmental affairs and the formulation of policies. The EU's precautionary approach frequently leads to more stringent environmental standards and safer products, exerting an influence on global markets and prompting other regions to adopt comparable norms. This, in turn, fosters the harmonization of safety rules, ultimately benefiting worldwide public health and the environment. Nevertheless, U.S. officials assert that the precautionary principle, as defined by the European Union, hinders technological advancement and international commerce. They believe that strict rules can hinder innovation and establish obstacles to trade, as corporations are need to navigate through several regulatory frameworks[19].

To summarize, the precautionary principle in the European Union (EU) advocates for strict and effective regulations that prioritize safety and protection. In contrast, the regulatory framework in the United States (U.S.) places greater importance on requiring scientific evidence of harm, which can lead to delays in implementing necessary regulations. This delay has the potential to expose the public and the environment to risks for prolonged periods of time. It is essential to strike a balance between these methods in order to promote global environmental governance and ensure that regulatory regulations adequately safeguard

[17] TIMOTHY O'RIORDAN, INTERPRETING THE PRECAUTIONARY PRINCIPLE 125-131 (Taylor & Francis 2013).

[18] Kriebel, D., & Tickner, J. (2001). Reenergizing public health through precaution. *American Journal of Public Health*, 91(9), 1351-1355.

[19] Chowdhury, U. K., Biswas, B. K., Roy Chowdhury, T., Samanta, G., Mandal, B. K., Basu, G. K., ... & Chakraborti, D. (2000). Groundwater arsenic contamination in Bangladesh and West Bengal, India. *Environmental Health Perspectives*, 108(5), 393-397.

human health and the environment while avoiding undue obstacles to technological innovation and trade[20].

2.3.2 India

Under "Section 20 of the National Green Tribunal Act of 2010", the N.G.T is tasked with interpreting and implementing the preparation rule. An essential component of public natural law, the NGT declared the wise norm to be: The Tribunal must adhere to the prudent norm as a matter of law while making decisions or resolving disputes that arise from climate-related, charitable investigations. Therefore, any person appearing before the Tribunal would do well to take notice of any violation, or even a discovered violation, of this guideline. Inaction in light of the facts and circumstances of a particular case may constitute an infraction of the prudent principle, placing it within the jurisdiction of the Tribunal, as defined by the Act.

The National Green Tribunal views the preparation rule as a deciding factor that lets the adjudicators assess the potential for ecological corruption and harm caused by a proposed movement. A duty to manage risks and a mountain of rational evidence bolstering protection and damage denial are all part of this. Only act by gathering analytical data and investigating possible threats to human health and the environment; this information is inherently speculative, uncertain,

or contentious. Data that is speculative, uncertain, or subject to questioning logically exposes gaps in knowledge; conversely, ignorance, flawed models, logical irregularity, and the disparity between the concept of danger and the low epistemic edge of proof all work together to reduce risk.

The rule's legitimate application is advanced by making legitimacy audits accessible to the NGT. Because of its status as a fair court, the NGT assumes the role of supreme chief and has the authority to conduct a thorough investigation into the matter, considering both the law and the expert opinion that would support a conclusion. As a matter of regularization, the preliminary norm is conjured and adhered to by the master and legal persons. Additionally, it organizes the judges, particularly the expert master judges, to provide prior arrangements and tactics based on deduction that respond creatively to inadequate and impotent rules, even without such a guideline. To use the preparation rule, it is helpful to get a variety of systems, such as investigative, partner consultation, and the arrangement of specific committees.

To address environmental concerns, this promotes dynamic investment via discussion, debate, and criteria for motivating actual, real variables and expert knowledge. Experts can evaluate competing claims, stances, and reports the parties submit through on-site evaluation. Cases involving more far-reaching effects, such as significant problems like river cleaning and air pollution, are appropriate for the partner consultative engagement. The National Green Tribunal Act of 2010 established these boards to facilitate the experts' duty to apply the standards.[21]

Therefore, to detect, prevent, and moderate anticipated risks, India's preliminary standard commands opted to use. The modern threat landscape is undeniably more complex, extensive, and detrimental to human health and the environment. The rule is used as a tool in Indian environmental management to promote healthier and more eco-friendly choices. However, the guideline's irregularity (controlling viewpoints) and misapplication (legal standard of evidence) make it hard to apply and raise questions about its validity.

[20] Frank, C., Mohamed, M. K., Strickland, G. T., Lavanchy, D., Arthur, R. R., Magder, L. S., ... & El Khoby, T. (2000). The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt. *The Lancet*, 355(9207), 887-891.

[21] JOAKIM ZANDER, THE PRECAUTIONARY PRINCIPLE IN THE UNITED STATES 88 (Cambridge University Press 2010).

3. CONCLUSION

The precautionary principle is now an essential component of public international law in addition to being a component of the environmental protection laws of the United States and India. All governments will inevitably adopt concepts like this as the law gains pace in sustainable development. While the Precautionary Principle—a cornerstone of sustainable development—has received considerable attention in the realm of law, there is room for improvement when it comes to putting it into practice. Many nations still don't adhere to these rules because they think it will be too expensive and wasteful to respond ahead of time without any objective evidence. In their view, strategies and policies should be based on definitive evidence. This is done with the belief that plans and policies are at their best when they are based on final data.

The judiciary's role in establishing a connection between sustainable development and the law is enormous. Therefore, the backing of the court in these endeavours is crucial. The court's backing is necessary to ensure that environmental preservation becomes a legally protected right. The Precautionary Principle, which grew out of legal recognition, is now a guiding principle of National Environmental Policy. However, the Precautionary Principle has a way to go before correctly being recognized as an essential part of environmental law. And putting it into action will be a massive challenge until it finds its proper home.

The practical sequence of events shows that it will become easier to set a course for the general public by applying the precautionary principle. Several requirements must be satisfied for the rule to be used reasonably. Before any other consideration, the relevance and extent of the guideline's use must be clarified. A new term will soon be defined. This will keep things organized and avoid new interpretations, like the one the Commission gave to preventative actions regarding the French atomic experiments.

The following can be said regarding the scope of the standard (and its limitations). To the extent that possible harms are more accurate, more should be done to prevent them from coming to fruition; this is how the cost-effectiveness criterion is seen as a proportionality test. The expense adequacy test cannot guarantee that exact certainty on the realisticness of the estimates is achieved since the preparatory guideline is applicable in cases where the estimated damages are uncertain.

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