The Role of the Precautionary Principle in Mitigating Financial and Banking Crisis

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Abstract:- The theory of the precautionary principle has developed. In its implementation, the precautionary principle is used to deal with hazards in the environmental fields and has been widely used in health and food technology.In general, the precautionary principle is understood as making decisions in encountering threats or situations that are dangerous and uncertain. Likewise, the financial and banking crisis is a phenomenon that dangerous and often threatens the stability of a state. In extreme cases, crises create a panic that makes no sense or can even be made an economic of the state to collapse.This article will discuss the precautionary principle theory and its rolein mitigating the threat of a financial and banking crisis.

Keywords: *Banking Crisis; Emergency; Law Principle; PrecautionaryPrinciple; Prevention.*

I. INTRODUCTION

In general, the precautionary principle is understood as making decisions in encountering threats or situations that are dangerous and uncertain. In Latin, the term precaution consists of the word "prae" which means "before" and "cautio" which in Roman law and civil law means "security" or "security." Meanwhile, "caution" is defined as: (1) "security is given to ensure the performance of an obligation"; and (2) "the person who gives the security." Thus, in linguistic terms, the precautionary principle can be interpreted as a precautionary principle for an action to prevent a threat or danger.

In some literatures, the precautionary principle is also called the "precautionary approach," there are at least 14 (fourteen) definitions in international law[1]. With so many definitions, there is an assumption that the absence of a standard definition is one of the precautionary principle characteristics. On the other hand, various formulations are used by critics to help uncover problems in applying the principle[2].However, the simplest interpretation of the precautionary principle is "it is better to be safe than sorry." When the threat of harm cannot be ascertained, and even when highly speculative, the precautionary principle is applied to avoid damage. By implementing precautionary principles, in whatever form and scope, it can significantly influence strategies and policies that result from decision-making, especially to assist decision-making in difficult or emergency situations.

Likewise, with a difficult situation to avoid a crisis. It is recorded in history that in 1997 East Asia and Southeast Asia were hit by a financial crisis. One of the most exposed countries is Indonesia, starting from a currency crisis to a banking crisis. The banking crisis experienced by Indonesia was triggered by the financial crisis that hit Thailand, spreading to several countries, including Indonesia[3].The signs of a currency crisis in Thailand actually began to be felt in 1996, becoming increasingly between March 1997 and July 1997. Thailand's economy became increasingly sluggish when, in 1996, there was high property development without being accompanied by high demand, so Thailand experiencing a housing vacancy rate of 5-30%[4]. After the Thai currency fall in July 1997, respectively, Malaysia, Indonesia, Singapore, the Philippines, and Korea experienced asset deflation of 40% to 70% and currency depreciation of 18% to 85%. Of several countries in Southeast Asia, Indonesia experienced asset deflation of 40% to 70%, and the rupiah depreciated by 83.6%. The rupiah exchange rate against the US dollar experienced a free fall, from Rp. 2,432.00 on July 1, 1997, to Rp. 14,800.00 on January 24, 1998[5].

In the financial sector, the government carried out a comprehensive restructuring of troubled financial institutions. Non-performing loans from the banking system at that time were quite high, more than 8 percent of total loans, mostly dominated by state-owned enterprises (SOE) banks. The banking system's health will deteriorate even further with the depreciation of the exchange rate, rising interest rates, and slowing economic growth. As a follow-up, the government, assisted by the International Monetary Fund (IMF), closed 16 troubled banks, implemented a customer guarantee program, and prepared an effective asset recovery plan for Bank Indonesia[6].However, the efforts made by the Indonesian government at that time could not improve the situation. The trust of customers and investors has faded due to policies that cannot accommodate their wishes[7]. Even the Indonesian government's actions regarding the crisis in the value of the currency are considered to have damaged confidence in the rupiah. After the 16 banks' closure, public trust in banking fell dramatically, depositors made large withdrawals (rush) and worsened Indonesia's banking conditions. As a result, the crisis was increasingly unstoppable and impacted the economic sector and developed into a banking crisis[8].

With the 1998 banking crisis background as described above, this article aims to discuss the precautionary principle and the causes of the financial and banking crisis. Furthermore, this article will analyze the possibility of applying the precautionary principle to prevent a financial or banking crisis.

II. LITERATURE REVIEW

The precautionary principle is more widely applied in environmental protection. During its development, the precautionary principle began to be used more frequently, especially in decision-making. Thus, it should be, the precautionary principle can also be applied in an economic emergency, especially when a financial system crisis threatens the country.

Jordan and O'Riordan stated their support for the precautionary principle. They stated that the principle has many uses because it can understand the fundamental mistakes of technical developments in environmental management that ignore ethics and open discussion about the environment and manipulation of cost-benefit analysis[9].Support and affirmation also came from Mark Geistfeld, a Professor of Law from the New York University School of Law. Geistfeld reaffirmed Principle 15 of the Rio Declaration and argued the potential for harm cannot be ignored simply because of scientific uncertainty. Scientific uncertainty is not a reason to deter. Any concerns regarding any risk to environmental degradation must be managed to prevent harm. With the note, the benefits obtained must be compared with the risk of costs incurred to avoid the application of unnecessary protection.[10].

Apart from Geistfeld, Ellis and FitzGerald also discussed the precautionary principles as in the Rio Declaration. According to them, there are important things: the danger of serious or irreversible damage and a reference to the cost-effectiveness of the actions to be taken based on these principles. By applying the precautionary principle, scientific uncertainty in certain situations is not a reason for the government not to take action against certain risks. The threat of danger and scientific uncertainty is not an obstacle for the government to act immediately to protect the state and society's interests. The principle only states that uncertainty is not a reason for not acting, nor is it a reason to act sluggishly, but the principle's formulation does not provide guidance regarding uncertainty parameters, and "cost-effective" parameters are delayed due to scientific uncertainty[11].

Hann and Sunstein in *The PrecautionaryPrinciple as a Basis for Decision Making*, discusses that the precautionary principle is increasingly popular over the next few decades and is likely to have a significant impact on policy making around the world. Applying the precautionary principle can lead to dramatic changes in decision making. Both Hann and Sunstein argues that the precautionary principle does not help individuals or countries make difficult choices in a way that is not arbitrary. On the other hand, this principle can balance costs and benefits in making a difficult decision. Of course, a proper cost and benefit analysis can and should take into account preventive measures. Uncertainty about costs and benefits can also be included by determining the various possible outcomes with various options, or perhaps by calculating the worst-case scenario and showing the level of risk associated with that scenario. Furthermore, Sunstein emphasized that implementing the precautionary principle can be paralyzing and provides no direction or benefit at all. However, for the sake of consideration, the balance between cost and benefit should not be understood as a way of placing regulators into mathematical calculations. The precautionary principle's application offers a principled method or approach to make it easier to make difficult decisions.In connection with the increasing role of the precautionary principle in the decision-making process, Sunstein discussed that over the next few decades, the precautionary principle has grown in popularity and is likely to have a significant impact on policy-making worldwide increasingly. Applying the precautionary principle can lead to dramatic changes in decision making[12].

In the context of food safety, Sandin emphasizes several things that need to be considered to understand the precautionary principle. First, the term precautionary principle refers to the principles that have been included in international law and national law. Second, the term precautionary principle is often used more broadly, depending on policymaking principles in general, without having to have a certain legal status. Although in a regulatory and more general context, this version of the principle has some common elements and structures[13].

In order to adopt the precautionary principle, Roberto Andorno specified 5 (five) conditions as follows: 1) uncertainty of risk; 2) scientific assessment of risk; 3) serious or irreversible damage; 4) proportionality of measures, and 5) a shifting burden of proof.The uncertainty of risk is an important element of the precautionary principle; it's relevant when the risks can not be verified due to inconclusive scientific data.The precautionary principle should be implemented with a complete scientific assessment, and if possible, identifying at every stage the degree of scientific uncertainty. Serious or irreversible damage means that the damage should be significant and non-negligible. Proportionality of measures means that not every circumstance of risk justifies taking precautionary measures, only circumstances that impact society. A shifting burden of proof means to shift the burden of proof towards those whose actions may seriously threaten the public or society[14].

With regards to the economic change, Joseph A. Schumpeter discusses it from a historical perspective, whose main goal is to see history as a process that makes sense in changing economic dynamics in all aspects. Schumpeter rests on theories of economic development produced by a cyclical economic system. For Schumpeter, capitalism is a form of private property economy where innovation is carried out by borrowing money, which, in general, indicates credit creation. What is capitalism that needs to be determined by looking deep into the elements of credit creation? It is necessary to do this to remove the contradictions that arise in viewing economic or social change and the principle of historical continuity in historical analysis and to an equal degree as research methods have increased. From a more dynamic and natural view, Schumpeter considered crisis or depression occurs whenever an unfortunate event is of sufficient importance and cannot be ignored a priori[15].

A financial crisis can be described simply as the turmoil or chaos that occurs in a financial system from the aforementioned opinions. The turmoil or chaos that occurs can be caused by a fall in the value of currencies, asset values, and the bankruptcy of market players in a financial system, thereby disrupting the financial system's capability and stability[16].Meanwhile, Frederic S. Mishkin linked the financial crisis to the problem of asymmetric information or information gaps faced by market players in the financial system from choice and information[17]. A market participant is very likely to have different information than other market participants. According to Mishkin, this leads to two basic financial system problems: adverse selection and moral hazard[18]. Furman and Stiglitz explained that the crisis could be caused by several factors, mainly the contagion effect and irrational behavior of investors or customers[19]. Meanwhile, Yandle emphasized that the cause of the financial crisis was a matter of trust[20].

In general, the banking crisis was caused by a large-scale bank run that prompted banks to postpone convertibility of their liabilities or force the government to intervene. The bank run happened because of loss confidence or trust of investors/depositors. Intervention is carried out by providing liquidity assistance, freezing customer deposits, and/or capital assistance on a large scale. Both types of crises are crises with variables that are not easily measured, so they depend on qualitative analysis and evaluation[21]. That is why the banking industry requires close attention and vigilance.

Based on the literature review described above, there has been no study or study regarding the precautionary principles in the prevention of financial crises or banking crises. This article is expected to provide input or fill gaps in discussing the precautionary principle and the prevention of banking crises.

III. DISCUSSION

A. PrecautionaryPrinciple

The precautionary principle approach method was first used in London in 1854. From 31 August to 9 September 1854, there was an outbreak of cholera around St. Petersburg. James and Golden Square London caused the death toll of around 500 people. A doctor in London named John Snow investigates the cholera outbreak and studies the relationship between the water supplies of two different water companies and cholera. Snow's investigation revealed that 83 of those who died in the Golden Square area took water from a Broad Street water pump. From these results, Snow recommended that authorities remove the pump handle to prevent further infection and stop the cholera epidemic[22]. From what he had investigated and studied, Snow created the first epidemiological map of the disease and its possible causes, presented to the Epidemiological Society of London on 4 December 1854[23].What John Snow had done in 1854 was a precautionary measure, with a precautionary approach to uncertainty. Although the link between polluted water and cholera was not scientifically proven, the London city government still decided to shut down its water pumps. While Snow was unable to prove his theory at the time, the results obtained from his research were sufficient evidence for Snow to recommend a course of action. The number of victims may be much greater if no action is taken[24].

The precautionary principle was first used in a German Environmental Protection Program in 1971, namely using the term vorsorgeprinzip. The term vorsorgeprinzip was again adopted and used in Germany to regulate or relate to the environment. The German government applies the Vorsorgeprinzip idea in a balanced way with economic considerations. Even in practice, the implementation of Vorsorgeprinzip is often associated with the Grundsatz der Verhältnismäßigkeit principle or the principle of proportionality. This principle covers issues such as economic costs, technical feasibility, and administration[25].

From Germany, the precautionary principle was then used in the legal systems of other European countries [14]. The use of the precautionary principle in Europe is also increasingly widespread, not only covering the environmental protection but starting to spread to the fields of health, food security, and development. It can be seen that over the past few years, the precautionary principle has been used as a basis for consideration in international agreements and declarations in the sustainable development, environmental protection, health, trade, and food security [26].

The definition of the precautionary principle varies widely. From a general definition intended to prevent pollution with terms and conditions that are mild for polluters to the definition intended by supporters of the Precautionary principle as a new and progressive policy instrument[27].The United Nations Environment and Development Conference on August 12, 1992, produced the Rio Declaration on Environment and Development and the 15th Principle of the Rio Declaration tried to formulate the precautionary principle by using the term precautionary Approach. The 1992 Rio de Janerio UN Conference's objectives are to reduce the risk of environmental damage, prevent the marine environment's degradation, address the environmental, social, and economic impacts of climate change and sea-level rise, and manage water quality and waste disposal[28].Shortly from the 1992 Rio Declaration, the Paris Convention for the protection of the Northeast Atlantic marine environment of September 1992 defines the precautionary principle as the precautionary principle that should be taken when on logical grounds a substance or energy is carried, directly or indirectly, to The marine environment can cause harm to human health, endanger biological resources and marine ecosystems, damage facilities or interfere with other legitimate marine uses, even when there is no conclusive evidence of a causal relationship between use and impacts.

The formulation of the precautionary principle definition from the Paris Convention focuses more on the likelihood (of) the hazard caused, even with or without conclusive evidence regarding the causal relationship between the use of a substance or energy and its impact on marine ecosystems. In simple terms, it can be said that the lack of certainty of the evidence is not an obstacle to taking preventive action.From what has been tried to formulate, in both the 1992 Rio Declaration and the 1992 Paris Convention, the precautionary principle has several benefits, including understanding technical developments in environmental management that ignore ethics and discussion of the environment the use of cost-benefit analysis.

In theory and practice, the precautionary principle is understood by referring, namely: first to one or several other national or international legal principles, where the precautionary principle has been included in several international legal documents. Second, the phrase precautionary principle has been widely used by referring to several principles generally applied by decision-makers and policymakers. In this sense, the precautionary principle is the action that may have to be taken against a hazard, even though the available evidence is insufficient to treat the existence of the hazard as a scientific fact.

The precautionary principle provides guidance, helping decision-makers decide to act on the threat of harm, even if the information or scientific certainty needed is not fulfilled. In responding to these hazardous situations and conditions, the decision to take action is a precaution-based approach[29]. So, the precondition is not always a moral principle; they emphasize the principle of decision-making that can be justified, whether based on morals or precautionary grounds[30].However, in regards to decision making, one thing that should be highlighted, the precautionary principle must be considered as a guide in action (normative). In this matter, the precautionary principle is characterized as compelling to make decisions and also drives us to believe or as a complement factor in providing confidence (epistemic)[31].

B. Financial and Banking Crises

In discussing the financial and or banking crises, it is important to understand financial instability and systemic risk. Financial instability or a high risk of the financial crisis is best understood as a financial system problem, an inability to provide payment services, or allocate credit for productive investment opportunities. At the macro level, financial instability will have a major impact on economic activity. Threats of danger or risks that are systemic in nature tend to be related to financial institutions' solvency problems and problems of liquidity and market infrastructure[32].From financial instability, there is a more dynamic and natural view of a crisis or depression occurring whenever an unfortunate event occurs, which cannot be ignored a priori. It is only natural that the concept of crisis is used only in a scientific context, although in practice, it can be influenced by political economy.

Financial crises are often associated with substantial changes in the value and amount of credits and prices of assets; disruption in financial intermediation and the availability of external financing for the economy; balance sheet problems on a large scale (be it company, household, financial intermediary and government balance sheets); as well as what form and how much government support (liquidity and recapitalization assistance). Thus, the financial crisis is a multidimensional event, and it is not easy to characterize it using global indicators[33].A financial crisis can be described as the turmoil or chaos in a financial system in short and simple words. The turmoil or chaos that occurs can be caused by the fall in the value of currencies, asset values, and market players' bankruptcy in a financial system, thereby disrupting the financial system's capability and stability[34].

Meanwhile, the definition of a banking crisis is both systemic and non-systemic. Namely 1) Bank runs, leading to vacating, closing, merging, or taking over by financial institutions (restructuring process); 2) If there is no vacant, closure, merger, takeover, or large-scale government assistance from financial institutions. The problem is, the rescue process can be too late so that it has an impact and can lead to a crisis. This issue is because financial problems usually occur long before the bank finally closes or is restructured [35].

C. The PrecautionaryPrinciplein Financial and Banking Crisis

Of the several crises that have occurred, the impact caused by financial crises were huge. Also, the handling of financial crises usually requires expensive cost. The financial crisis has a significant impact on economic activity and can trigger a recession. The financial crisis will also make the recession worse.The financial crisis in 1997-1998 was a traumatic experience for Indonesia in facing an economic emergency that led to a banking crisis. The 1997-1998 crisis's impact was that the costs incurred to restore the banking sector at that time were high, namely more than Rp. 600 trillion.One of the high-costreasons is that Indonesia does not yet have a clear legal framework in facing the threat of a financial and banking crisis.Likewise, in terms of the existing government institutions' unpreparedness and authority, they work without clear legal framework guidelines. At this stage, the Indonesian government shall prepare a strategy, and the decision was made political since there was no available regulation or law regarding crisis prevention or crisis management.

In summary, Indonesia's 1997-1998 banking crisis management strategy was divided into 5 (five) actions of policy, namely: 1) maintaining currency exchange rates; 2) tight monetary policy and providing stimulus packages; 3) banking rescue with a bailout strategy to solve liquidity and solvency problems; 4) increasing public trust and preventing capital flight; 5) banking restructuring, credit restructuring, and bank recapitalization. The 5 (five) actions were implemented at a policy level, and in the same time, the government amended several laws, including Banking Law. Thestrategy's implementation is accompanied by a more comprehensive reform of laws and regulations, especially in the legal framework and working procedures for financial sector institutions.

The actions show that the government unconsciously implementing the precautionary principle as a basic rationale of policyto prevent deep impact of crisis. In this specific case, the precautionary principle is possible to be implemented, because of the following consideration: 1) urgent and emergency situation; 2) there was a threat with serious damage consequences; 3) the absence of legal framework to prevent or manage the crisis; 4) uncertainty of risks; 5) preventive interventions; 6) economic stabilization protection.

The above consideration has met some key elements of the precautionary principle: uncertainty of risk, serious or irreversible damage, and proportionality measures. Those key elements are the basic rationale to justify proactive measures based on the precautionary principle. Of course, the variant of elements might vary considerably, it depends on the circumstances, but the precautionary principle can still be applied consistently, non-discriminatory, and proportional. In the 1997-1998 banking crisis, the precautionary principle providesguidance, drives the decision-maker to believe, as a complement factor in providing confidence.

IV. CONCLUSION

Based on Indonesia's empiric experiences in the 1997-1998 financial and banking crises, the government has taken necessary action to prevent the crisis. They were unconsciously implementing the precautionary principle as a basic rationale of policy in mitigating the deep impact of the crisis.This can be seen clearly from how the government has implemented strategies in efforts to prevent and/or manage the crises.

From the empiric experiences as mentioned above, the precautionary principle has meant as guiding principle for policymakers to make decisions when confronting specific circumstances or threats that could be a seriously harmful or deep impact on the public and society or a state.When it comes to face any threat over the state, the essential policy choice is the chosen value of protection. Although, the value of protection is not always defined before but emphasized in aim and result.

The precautionary principle also means provisional measures and possible to apply when there is no regulatory framework, which facilitates in particular deliberation at the policy stage and actions.However, in regards to decision making, one thing that should be highlighted, the precautionary principle must be considered as a guide in action (normative). In this matter, the precautionary principle is characterized as compelling to make decisions and also drives us to believe or as a complement factor in providing confidence (epistemic).

REFERENCES

[1]. D. Vanderzwaag, "The Precautionary Principle in Environmental Law and Policy: Elusive Rhetoric and First Embraces," *J. Environ. Law Pract.*, vol. 8, pp. 355–375, 1999.
[2]. A. Sirinskiene, "The Status of Precautionary Principle: Moving Towards a Rule of Customary Law," *Jurisprudencija*, vol. 118, no. 4, pp. 349–364, 2009.
[3]. J. E. Leightner, "Thailand's Financial Crisis: its Causes, Consequences, and Implications," *J. Econ. Issues*, vol. 12, no. 4, pp. 395–412, 2006.
[4]. L. S. Lauridsen, "The Financial Crisis in Thailand: Causes, Conduct and Consequences?," *World Dev.*, vol. 26, no. 8, pp. 1571–1591, 1998.
[5]. M. F. Montes, *The Currency Crisis in Southeast Asia*. Singapore: Institute of Southeast Asian Studies, 1999.
[6]. A. D. Daruri and D. Edward, *BPPN Garbage In Garbage Out*. Jakarta: Center for Banking Crisis, 2004.
[7]. J. E. Stiglitz, "Knowledge for Development Economic Science, Economy Policy, and Economic Advice." Washington DC, 1998.
[8]. L. Martinez-Diaz, "Pathways through financial crisis: Indonesia," *Glob. Gov.*, vol. 12, no. 4, pp. 395–412, 2006, doi: 10.1163/19426720-01204005.
[9]. T. O'Riordan and A. Jordan, "The precautionary principle in contemporary environmental politics," *Environ. Values*, vol. 4, no. 3, pp. 191–212, 1995, doi: 10.3197/096327195776679475.
[10]. M. Geistfeld, "Implementing the Precautionary Principle," *SSRN Electron. J.*, 2005, doi: 10.2139/ssrn.289146.
[11]. A. FitzGerald and J. Ellis, "The Precautionary Principle in International Law: Lessons from Fuller's Internal Morality," *McGill Law J.*, vol. 49, no. 2004, pp. 779–800, 2003.
[12]. R. W. Hahn and C. R. Sunstein, "The Precautionary Principle as a Basis for Decision Making The Economists ' Voice The Precautionary Principle as a Basis for Decision Making," *Econ. Voice*, vol. 2, no. 2, p. Article 8, 2005, doi: 10.2202/1553-3832.1079.
[13]. P. Sandin, "The precautionary principle and food safety," *J. fur Verbraucherschutz und Leb.*, vol. 1, no. 1, pp. 2–4, 2006, doi: 10.1007/s00003-006-0002-9.
[14]. R. Andorno, "The Precautionary Principle: A New Legal Standard for a Technological Age," *J. Int. Biotechnol. Law*, vol. 1, no. 1, pp. 11–19, 2006, doi: 10.1515/jibl.2004.1.1.11.
[15]. J. A. Schumpeter, *Business Cycles, a Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York: McGraw-Hill Book Company, 1939.
[16]. A. R. P. Hamblin, "Anatomy of the financial rand," *Invest. Anal. J.*, vol. 16, no. 30, pp. 33–39, 1987, doi: 10.1080/10293523.1987.11082264.
[17]. F. S. Mishkin, "Anatomy of a financial crisis," *J. Evol. Econ.*, vol. 2, no. 2, pp. 115–130, 1992, doi: 10.1007/BF01193536.
[18]. F. S. Mishkin, "Financial Policy and the Prevention of Financial Crises in Emerging Market Countries," *NBER Work. Pap.*, vol. 3, 2001, [Online]. Available: http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.17.7179.
[19]. J. Furman and J. E. Stiglitz, "Economic crises: Evidence and insights from East Asia," *Brookings Pap. Econ. Act.*, no. 2, pp. 1–135, 1998, doi: 10.2307/2534693.
[20]. B. Yandle, "Lost Trust: The Real Cause of the Financial Meltdown," *Indep. Rev.*, vol. 14, no. 3, 2010.
[21]. B. A. Muliaman D Hadad, Wimboh Santoso, "Indikator Awal Krisis Perbankan," *Int. For. Rev.*, vol. 5, no. 2, pp. 2003–2003, 2003.
[22]. D. Kriebel *et al.*, "The precautionary principle in environmental science," *Environ. Health Perspect.*, vol. 109, no. 9, pp. 871–876, 2001, doi: 10.1289/ehp.01109871.
[23]. B. H., R. M.R., V.-J. P., P. N., and R. S., "Map-making and myth-making in Broad Street: The London cholera epidemic, 1854," *Lancet*, vol. 355, no. 9223, pp. 64–68, 2000, [Online]. Available: http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed5&NEWS=N&AN=2000225948.
[24]. D. Gee and M. Greenberg, *Asbestos: From "magic" to malevolent mineral*, no. 22. 2013.
[25]. M. Martuzzi and J. a Tickner, "The precautionary principle : protecting public health , the environment and the future of our children.," *World Heal. Organ.*, p. 220, 2004, [Online]. Available: http://www.euro.who.int/__data/assets/pdf_file/0003/91173/E83079.pdf.

[26]. A. Alemanno, “The precautionary principle,” *Handb. EEA Law*, pp. 839–851, 2015, doi: 10.1007/978-3-319-24343-6_38.
[27]. J. Cameron and J. Abouchar, “The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment,” *Boston College Int. Comp. Law Rev.*, vol. 14, no. 1, pp. 1–27, 1991, [Online]. Available: http://lawdigitalcommons.bc.edu/iclr%0Ahttp://lawdigitalcommons.bc.edu/iclr/vol14/iss1/2.
[28]. X. Wang, “Ecological wisdom as a guide for implementing the precautionary principle,” *Socio-Ecological Pract. Res.*, vol. 1, no. 1, pp. 25–32, 2019, doi: 10.1007/s42532-018-00003-1.
[29]. European Commission, “The precautionary principle: decision-making under uncertainty,” *Sci. Environ. Policy*, vol. September, no. 18, pp. 1–24, 2017, doi: 10.2779/709033.
[30]. P. Sandin, “The Precautionary Principle: From Theory to Practice,” Royal Institute of Technology Stockholm, 2002.
[31]. A. M. Peterson, “Journal of Medical Ethics,” *Med. J. Aust.*, vol. 2, no. 8, pp. 294–294, 1975, doi: 10.5694/j.1326-5377.1975.tb105826.x.
[32]. E. Davis, “Towards a typology for systemic financial instability,” *Econ. Financ. Work. Pap. Brunel Univ.*, no. 2, pp. 1–23, 2003, [Online]. Available: http://bura.brunel.ac.uk/handle/2438/916.
[33]. S. Claessens and M. A. Kose, “Financial Crises: Explanations, Types, and Implications,” 2013.
[34]. B. Eichengreen and R. Portes, “The Anatomy of Financial Crises,” Massachusetts, 2126, 1987.
[35]. C. M. Reinhart and K. S. Rogoff, *This Time Is Different, Eight Centuries of Financial Folly*. New Jersey: Princeton University Press, 2011.