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**THE FUKUSHIMA NUCLEAR DISASTER; HOW EFFECTIVE IS THE "POLLUTER PAYS PRINCIPLE" IN LIABILITY SETTLEMENT AND COMPENSATION?**


## ABSTRACT

*Recognizing the need to attach a cost to a negative externality, the "Polluter PAYS principle" (PPP) has been progressing over time from an economics concept to a normative principle in environmental law. It entails the person responsible for environmental damage to incur a full cost. This paper therefore sets out to scrutinize if this principle was effective in the Fukushima Nuclear Disaster. The legislation in place for the PPP and liability compensation of Nuclear Damage at both international and Japan levels were reviewed. So many questions arise about the Japanese legislation in this context rendering it unclear and so is the international law. Moreover the biggest consumers of Nuclear Power have failed to ratify to the international regimes pertaining to compensation for Nuclear Damage international. This paper concludes that the PPP was not effective in the Fukushima Nuclear Disaster and suggests the need to review both the international and Japanese regimes in this context.*


**WORD COUNT: 3694**

**PRESENTED TO: Dr. Sergie Vinogradov**

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## LIST OF ABBREVIATION

| | |
|---|---|
| Convention on Supplementary Compensation | CSC |
| International Atomic Energy Agency | IAEA |
| Japanese Yen | JPY |
| Polluter Act Principle | PAP |
| polluter-pays principle | PPP |
| Organisation for Economic Co-operation and Development | OECD |
| Tokyo Electric Power Company | TEPCO |

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## 1.0 INTRODUCTION

The global primary energy supply is expected to expand by 75%in 2050 due the gradual increase in the population however producing this energy to meet the demand requires production at least cost while protecting the environment.[1]

Nuclear power is one of the energies countries have considered to include in their electricity generation mix due to its reliability as low carbon electricity at stable prices hence exhibiting the strength for climate change mitigation and energy security.[2]

Japan is no different from the rest of the world; it has advocated for nuclear energy since 1973 and in fact envisaged a 60% share of nuclear power in its primary energy by 2100 from 10%in 2008[3].Further nuclear acted as a form energy security since Japan is not resource self- sufficient and imports about 84%of its energy requirement as well as a weapon for climate change mitigation.[4]

However, this idea of increasing Nuclear Energy came to review by the Japanese government subsequently after the Fukushima Nuclear disaster that happened on the 11th day of March 2011.The disaster has been referred to as the world's worst case of pollution that has ever happed due to negligible errors:[5] At the same time the International Atomic Energy Agency (IAEA) classified it under category seven (7) same as the 1986 Chernobyl reactor explosion that was classified as the major accident before.[6]

The Japanese government also confirmed the on-going radioactive releases as well as water and waste management challenges following the disaster and expressed the need for immediate intervention; since it is most likely to take 40 years to stabilise the

1 International Atomic Energy Agency (IAEA), 2013 'Linking Nuclear Power and Environment safe, secure, sustainable power fact sheet' (2016). [online] Available at: https://www.iaea.org/sites/default/files/np0613.pdf [Last accessed 10 May 2016].
2 Ibid.
3 World Nuclear Association. (2016). Nuclear Power in Japan | Japanese Nuclear Energy - World Nuclear Association. [online] Available at: http://www.world-nuclear.org/information-library/country-profiles/countries-g-n/japan-nuclear-power.aspx [Accessed 10 May 2016].
4 Ibid
5 Yoshida, F., 2013. The Fukushima Nuclear Disaster: One of the World's Worst Cases of Pollution.

6 Rating under the International Nuclear Event Scale. See BBC News. (2016). Japan: Nuclear crisis raised to Chernobyl level - BBC News. [online] Available at: http://www.bbc.co.uk/news/world-asia-pacific-13045341 [Accessed 10 May 2016].

site[7]. Moreover no concrete laws are in existence to handle radioactive contamination as an environmental issue.[8]

Nonetheless, polluter-pays principle (PPP) has been recognised at international forums and used to restore the environment. PPP is defined as "an international guideline for environmental policy requiring that any that the person or firm who damages the environment must bear the cost of such damage."[9]Given that damages related to the environment manifest as negative externalities, the liability leads to the internalization of full social cost by the responsible party hence achieving an optimal level.[10]

Although PPP poses as a good approach to environmental management, it may not work in case of costly environmental damages that include other social costs especially when dealing with nuclear accidents as was evidenced in the Fukushima disaster which has had both international and national implications never seen before; hence the need for government or other countries' intervention.[11]

This paper therefore seeks to assess how effective the Polluter Pay Principle was in the Fukushima disaster in Japan. It looks at how the compensation procedures relate to the PPP.A qualitative approach was used. Also scholarly publications, Government Websites and other stakeholders' websites were reviewed and visited respectively. The rest of the paper is organised as follows; chapter 2 Overview of Japan's Nuclear Industry including the Fukushima accident; chapter 3 the Polluter Pay Principle; the liability regime in compensation for nuclear damage and its application in Japan Fukushima case; chapter 4 is the conclusion and chapter 5 is the bibliography section .

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[7] Sweeney, D. (2016). Fukushima five years on, and the lessons we failed to learn | Dave Sweeney. [online]the Guardian. Available at: http://www.theguardian.com/commentisfree/2016/mar/11/fukushima-five-years-on-and-the-lessons-we-failed-to-learn [Accessed 11 May 2016]

8Supra note 5 Pg1

9 Luppi, B., Parisi, F. and Rajagopalan, S., 2009. Environmental Protection for Developing Countries: The Polluter-Does-Not-Pay Principle. International Review of Law and Economics, Forthcoming, pp.09-08.

10 Ibid

[11] Lembrechts, J., Slaper, H., Pearce, D.W. and Howarth, A., 2001. Technical Report on Nuclear Accidents and other Major Accidents in Europe: an integrated economic and environmental assessment.

## 2.0 OVER VIEW OF JAPAN'S NUCLEAR INDUSTRY

This chapter looks at Japan's nuclear industry and the Fukushima accident.

### 2.1 Japan's Energy situation and the Nuclear Industry

Japan highly depend on imports for almost all of its energy requirement however since the 1973 oil shock efforts have been geared to control energy consumption using various saving efforts. At the same time constant efforts have been made to promote the utilization of alternative fuels to oil.[12]

Among the alternative fuels is nuclear energy. Japan's nuclear research programme started right away in 1954 utilizing a budget of ¥230 million followed by an Atomic Energy Basic law that was passed in 1955. Its first commercial reactor to produce electricity was imported from the United Kingdom in July 1966 however in cooperation with the USA it started building its own reactors in the 1970s: At the moment, 42 reactors are operable and 24 of them are seeking for approval to restart[13]after the phase out of all nuclear reactors for safety reasons after the Fukushima accident.[14]

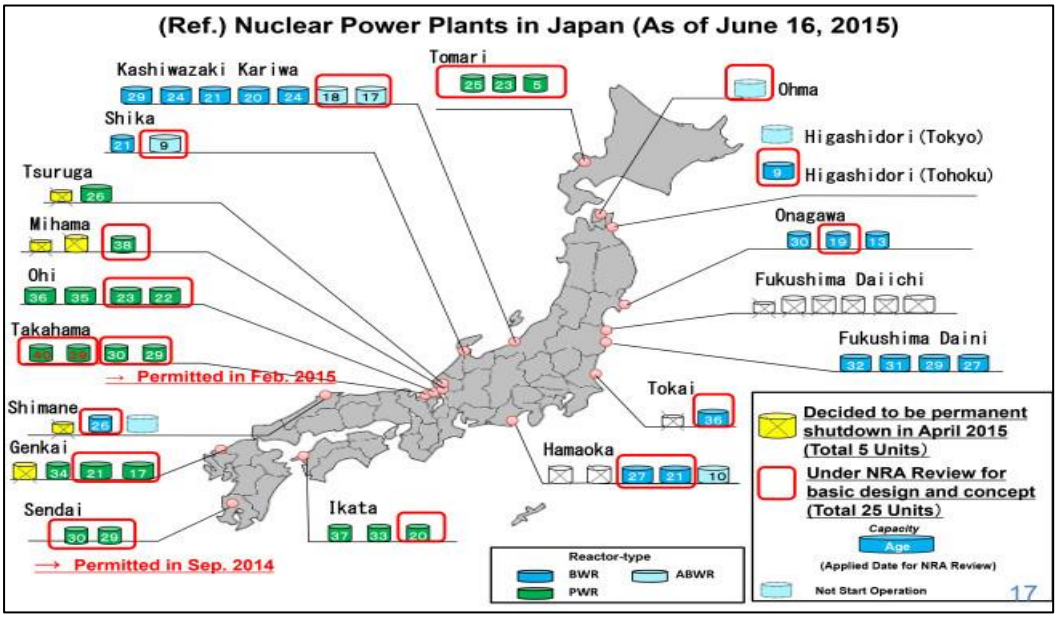
Before the Fukushima disaster, nuclear energy accounted for 30% of the Japan's total electricity production and was expected to increase to 41% by 2017, and 50% by 2030 respectively.[15]The figure below shows the status of operation of the nuclear power plants

[12] Supra note 3 Pg.1

[14]Batty, D. (2012). Japan shuts down last working nuclear reactor. [online] the Guardian. Available at: http://www.theguardian.com/world/2012/may/05/japan-shuts-down-last-nuclear-reactor [Accessed 11 May 2016].

[15] Supra note 3 Pg.1

**Figure 1: Status of Nuclear power plants in Japan**




In 2015, the Japanese government carried out a study and announced a range of 20% to 22% nuclear generation in their total electricity generation by 2030 despite public opposition[16] In fact two power plants of Sendai 1 and 2 restarted their operations in August and October 2015 respectively.

## 2.2 The Fukushima accident and impacts

On the 11th day of March 2011, the Fukushima Daiichi nuclear power facility under the operation of by Tokyo Electric Power Company(TEPCO) was severely damaged due to a 9.0 magnitude earthquake and a tsunami that hit the Northern coast of Honshu Island.[17]Forty seven minutes after the earthquake, the waves from the ocean of height 13.1m hit the plant even though it was designed to contain waves up to 5.7m.[18]

Eleven reactors that were operational in the region at that time shut down automatically when the earthquake hit hence proving that they were robust

[16] Sueyoshi, T. and Goto, M. (2015). Japanese fuel mix strategy after disaster of Fukushima Daiichi nuclear power plant: Lessons from international comparison among industrial nations measured by DEA environmental assessment in time horizon. Energy Economics, 52, pp.87-103.
17 Dauer, L., Zanzonico, P., Tuttle, R., Quinn, D. and Strauss, H. (2011). The Japanese Tsunami and Resulting Nuclear Emergency at the Fukushima Daiichi Power Facility: Technical, Radiologic, and Response Perspectives. Journal of Nuclear Medicine, 52(9), pp.1423-1432.
18 Lankarani, K. B. "From Hiroshima to Fukushima." Iranian Red Crescent Medical Journal 2011, no. 8, Aug (2011): 528-529.

seismically but vulnerable to the Tsunami.[19]Further due to the absence of a cooling system, the core of units 1, 2 and 3 were overheated and seriously melted down in the first three days of the disaster; while the hydrogen [20]explosions affected the non - operating unit 4 due to gas back flow from unit 3.[21]

This structural damage led to the evacuation of people with in 20kms from the surrounding areas due to the radioactivity release hence creating a long term impact on the environment and human health[22].In fact it has been reported that levels of iodine-131 and caesium-137 have gone up both with in regions nearby but also in other countries and continents.[23]

In addition other environmental issues such as soil and marine environment contamination have become evident. Marine and groundwater contamination was due to the backflows and intended discharge of waste water into the Pacific Ocean. In fact this disaster recorded the highest radioactive discharge in the sea in the world.[24]

Surprisingly the true cost of this disaster has not yet been conclusive up to date though the government estimated over $57bn in compensation[25] while the actual clean-up is estimated to take 30 to 40 years at a cost $14bn on fuel removal excluding the actual decommission.[26]

This is not the first nuclear accident in the history of Japan. There was the 1981 Tsrunga incidence; Tokaimuru Nuclear accident of 1997 and 1998 and the 1999 Shika Nuclear power plant incidence among others.

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19 World-Nuclear Association,(2016). Fukushima Accident - World Nuclear Association. [online] Available at: http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/fukushima-accident.aspx [Accessed 11 May 2016].
20 Hydrogen was generated due to the this high-temperature
21 Supra note 19
22 Supra note 17
23 Supra note16
24 Rosen, A., 2012. Effects of the Fukushima nuclear meltdowns on environment and health. Dusseldorf: University Clinic Dusseldorf.

25 Phys.org. (2015). TEPCO's Fukushima compensation cost to reach over $57 bn. [online] Available at: http://phys.org/news/2015-07-tepco-fukushima-compensation-bn.html [Accessed 11 May 2016].
26 McCurry, J. (2016). Five years on, clean-up of Fukushima's reactors remains a distant goal. [online] the Guardian. Available at: http://www.theguardian.com/environment/2016/mar/11/fukushima-daiichi-nuclear-reactors-decommission-cleanup-japan-tsunami-meltdown [Accessed 11 May 2016].

## 3.0 THE POLLUTER 'PAYS' PRINCIPLE (PPP)

### 3.1 Concept of the PPP

The Polluter Pays Principle is an economics concept that has come to be a normative principle in environmental law.[27]Before incorporating in domestic and international laws, the concept was to a certain degree applied in the 1886 case of Rylands V Fletcher although the concept of foreseeability of harm was not incorporated in judgement.[28]

The 1960 Paris Convention on Nuclear Third Party Liability marked the emphasis of this principle by buttressing Ryland's case and providing for strict liability instead of general tort law which is based on fault or negligence: It entails adequate compensation for damages caused by nuclear damage.[29]Further, this principle was first adopted in 1972 as an economic principle for allocating costs of pollution control by member countries of the Organisation for Economic Co-operation and Development (OECD).[30]

In the context above the polluter bears the 'costs of pollution, prevention and control measures.'[31]Moreover the legal interpretation of PPP holds that '*states and local governments are jointly and severally liable for environmental damage caused by parties, either private or public, allowing the public regulatory agencies to act in "sub-rogation" against industrial polluters.'*: Therefore the internalisation of the costs for a negative externality aids in influencing behaviour and thereby reducing pollution either through technological change or other means.[32]

For the effectiveness of the principle, the polluter shouldn't be given any assistance in form of subsidies; below charges for public services; tax allowances to mention but a few.[33] Further, although the principle was previously applied in the domestic context

27 Khan, M.R., 2015. Polluter-Pays-Principle: The Cardinal Instrument for Addressing Climate Change. Laws, 4(3), pp.638-65

28 Under the rule in Rylands v. Fletcher, a person who allows a dangerous element on their land which, if it escapes and damages a neighbour, is liable on a strict liability basis: Rylands v. Fletcher, 1868. [online] Available at: https://www.lexisnexis.com/uk/legal/search/ [Accessed 16 May 2016].

29 Oecd-nea.org. (2014). Nuclear Energy Agency - Paris Convention on Nuclear Third Party Liability. [online] Available at: https://www.oecd-nea.org/law/paris-convention.html [Accessed 12 May 2016].

30 OECD,(1992) The Polluter-Pays Principle: OECD Analyses and Recommendations. Paris

31 Ibid

32 Supra note 27

33 Supra note 30

due to the absence of common global problem, it is not the situation today though it is effective in that context.[34]

This principle has also gradually been demonstrated in declarations and treaties i.e. The Stockholm declaration;[35]1992 Rio declaration;[36]1963 Vienna Nuclear Liability Convention;[37] 1992 Helsinki convention of protection of marine environment of the Baltic Sea;[38] ; among others.

### 3.2 Japan's legislation on PPP

Although Japan is silent about the environment in its primary law; the constitution, the government is committed to abide by environmental treaties and other bilateral and international agreements as well as developing domestic policies[39].Surprisingly Japan has been party to many environment related agreements such as the Law of the sea, the biodiversity treaty among others but it has never ratified to any.[40]

Regarding the PPP, the fundamental legal perception of environmental policy is sparse in Japan however the PPP and Polluter Act Principle (PAP) form part of the basis[41]. The two principles are drawn from the Basic Environment Law[42] though no specific duty is directly imposed on pollution but rather the specific duties are in individual laws which include implementation duties and duty to bear the cost such as the 1968 Air pollution control act, water pollution act among others.[43]

In divergence, it is hard to differentiate between the PPP and the PAP. Under the PPP the polluter bears the pollution prevention cost for preserving the environment while

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[34] Supra note 9 Pg. 2
[35] See principle 21
[36] See principle 16
[37] See Article II-VII
[38] See Article 3.4
[39]Ministry of Environment of Japan [online] Available at:https//www.env.go.jp/en/policy/plan/basic/
40Cia.gov.(2014).The World Fact book. [online] Available at: https://www.cia.gov/library/publications/the-world-factbook/fields/2033.html [Accessed 12 May 2016].
41 Moore, L. and Freehill, H. (2012). Environmental risks for major projects. Thomson Reuters.

42 See Article 8 and Article 37
43 Supra note 41

in the PAP, the polluter must perform the acts necessary to preserve the environment.[44]

Further, it worth noting that Japan has been previously hit hard by other pollution disasters such as 1950-1960 Minimata disease as a result of organic mercury poisoning; Ltai-itai disease in the 1950s and 1960s Yokkaichi air pollution connected to emissions from power plants. The causes of this previous pollution were well understood and probably the consequences easily overcome however the Fukushima disaster has been very complex and it has led to the questioning of the PPP[45]. Moreover the PPP was last applied on a large scale in Japan in the 1970s.[46]

In this case TEPCO was responsible for the accident as it will be explained in details in the below sections however due to large compensations government had to intervene questioning if this principle really works in large scale accidents.[47]

### 3.3 Liability and compensation of Nuclear Damages

Despite the social and economic benefits of Nuclear power, it is important to note, that the Nuclear Industry has challenges among which potential nuclear accidents. These accidents are too extensive and catastrophic to be handled by a single company and not even an insurance company can have the funds to compensate. Moreover the damages involved are not always limited to geographical boundaries as demonstrated in the 1986 Chernobyl Nuclear Disaster.

Acknowledging the consequences of the accidents including likely trans-boundary effects, a common legal framework has been established since 1960 on Third Party Liability. It is applicable to all participants in the nuclear industry and it forms as a basis for their National law.[48]

In that regard two major international regimes on compensation have been put in place for Nuclear Damage by OECD and IAEA respectively. The OECD developed the 1960 Paris Convention of Third Party Liability in the field on Nuclear Energy

[44] Ibid.
[45] Supra note 5 Pg.1
[46] Linas, D., 2014. Radioactive Contamination of Fukushima's Forests: Application of the Polluter Pays Principle. *社会科学ジャーナル= The Journal of Social Science*, (77), pp.79-99.
[47] Ibid.

[48] Thomas, A. and Heffron, R.J., 2012. Third Party Nuclear Liability: The Case of a Supplier in the United Kingdom.

while the IAEA came up with the 1963 Vienna Convention on Civil Liability for Nuclear Damage both referred to as the primary treaties. However the Chernobyl accident led to the revision of these treaties and the initiation of the Joint Protocols like the 2004 Brussels Supplementary Convention. Also the 1997 Convention on Supplementary Compensation (CSC) for Nuclear Damage was adopted by IAEA parties.[49]

All these treaties have the same principles which include "strict liability of the operator; channelization of liability to the operator; the Operator's limitation of liability in time; compulsory financial security; jurisdiction and applicable law and non-discrimination of the victims."[50]

However Japan has not ratified to any of these international treaties apart from 1997 CSC which it ratified to early 2005.[51] Despite that, the equal significant aspect is that Japan has put in place a legal framework integrating nuclear third party liability. This includes Act on Compensation for Nuclear Damage; Order for execution of the act on compensation for nuclear damage; Act on Indemnity Agreement for compensation of nuclear damage.[52]The Act on Compensation for Nuclear Damage forms the key liability rule and financial requirements.

The principles are somehow in line with the international law and they include those in paragraph five (5) in addition to unlimited liability and government intervention where the damage exceeds the financial security.[53]

Specifically, the operator is liable and no need to prove a fault[54]hence TEPCO took up both responsibility and liability for the accident; therefore it initiated a consultation

[49] Liu, J. and Faure, M. (2014). Compensation for nuclear damage: a comparison among the international regime, Japan and China. *International Environmental Agreements: Politics, Law and Economics*, 16(2), pp.165-187.
[50] Supra note 48
[51] World-Nuclear.Association. (2016). *Civil Liability for Nuclear Damage | Nuclear Insurance - World Nuclear Association*. [online] Available at: http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/liability-for-nuclear-damage.aspx [Accessed 13 May 2016].
[52] Nomura, T., Matsuura, S., Takahashi, Y., Takenaka, C., Hokugo, T., Kamada, T. and Kamai, H., 2012. Japan's compensation system for nuclear damage-As related to the TEPCO Fukushima Daiichi nuclear accidents.
[53] Vásquez-Maignan, X., 2011. Fukushima: liability and compensation. *NEA News*, *29*(2), p.9.
[54] See Section 3 of the 1961 Compensation Act of Japan

process to determine the total damage and indeed the compensation was in line with the domestic law.[55]

Much as the liability is on TEPCO by law, the same law when interpreted implies that if the contractor (like plant designer or builder) is party to the risk then the operator can also recover some risks in other words recourse against the third party.[56]

Also JPY 120 billion or even less is required as financial security for nuclear damage and followed by an indemnity agreement for compensation of nuclear damage. It takes the form of liability insurance.[57]Japan Automatic Energy Insurance Pool provides the liability insurance policy.

In Japan's situation issues of PPP start arising right from the definition of the word damage in the Act.

### 3.4 Effectiveness of the PPP in the Fukushima disaster compensation

Under the nuclear regime, there is a debate between liability Vs responsibility. The act on compensation for nuclear damage states that "*Where nuclear damage is caused as a result of reactor operation etc. during such operation, the nuclear operator who is engaged in the reactor operation etc. on this occasion shall be liable for the damage, except in the case where the damage is caused by a grave natural disaster of an exceptional character or by an insurrection."*[58]

The Fukushima disaster having been caused by a tsunami and an earthquake would indeed qualify under this section. It can be argued that, Japan being aware of its seismic vulnerability evidenced with previous earthquakes in the region should have taken precautions in that regard interpreting the clause not to be obvious for the Fukushima situation.[59]Moreover Japan had been warned by international bodies about

[55] Supra note 53 Pg.9
[56] See Section 4 of the 1961 Compensation Act of Japan
[57] See Section 7 of the 1961 Compensation Act of Japan
[58] See Section 3 of the 1961 Compensation Act of Japan
[59] Supra note 49 Pg.9

a possible earthquake in that particular plant.[60]Also the plant designer, General Electric was warned against the design weaknesses having placed the backup generators in areas prone to floods.[61]

None the less for the PPP to be effective, the polluter must face the entire cost of the damage however the Japanese Government and other electricity operators contributed to the cause since the insurance excluded issues like natural disaster.

A dispute reconciliation committee was put in place to handle nuclear damage compensation. Broad guidelines were formulated in that regard however no exact reference was made to the environmental damages.[62]

Also an Institution to take responsibility of the funds herein referred to as Nuclear Damage Compensation Facilitation was created on top of the JPY 120 billion paid by TEPCO through the Indemnity Agreement with government.[63] The pool system of operators is in parallel to that of the USA and as of 2016 government's bonds were worth JPY 5 trillion expectant to be repaid by in 10-13 year by TEPCO.[64]

[60] Gábor, K. (n.d.). *The Nuclear Liability Issue after Fukushima – The Role of International Law in Liability Theory*. [online] Available at: http://www.burges-salmon.com/INLA_2012/10148.pdf [Accessed 15 May 2016].
[61] Supra Note 49 Pg.9
[62] Ibid.
[63] Ibid.
[64] World-Nuclear Association. (2016). *Civil Liability for Nuclear Damage | Nuclear Insurance - World Nuclear Association*. [online] Available at: http://www.world-nuclear.org/information-library/safety-and-security/safety-of-plants/liability-for-nuclear-damage.aspx [Accessed 15 May 2016].

## 4.0 CONCLUSION

This paper aimed at assessing the effectiveness of the PPP in the Fukushima Disaster. Initially TEPCO accepted the liability in respect of the law to the extent of instituting a consultancy for damages. It underestimated the magnitude of the disaster and indeed needed government intervention.

Assessing the effectiveness of the PPP in this case is even more complex due to the introduction of the Indemnity Agreement which requires in this case TEPCO to repay all support rendered to it in the future. However, putting aside the law; one would argue that before TEPCO repays, government could be liable on the grounds of not guiding or monitoring TEPCO's nuclear operations before the accident.

Moreover, all the loopholes start with the Japanese legislation on the compensation for nuclear damage. Giving room for government support when damages are not explicitly defined weakens the PPP the more since the owners of the plants don't incur all the costs. Moreover the direct legislations on the PPP are not also straight forward. Scholars have referred to this sort of arrangement as the PPP transiting to Government Pay Regime evidenced also in other countries. [65]Basing on the principle of full cost by the polluter, the PPP is not effective in the Fukushima case.

The implication is that Japan should revisit its legislation related to PPPs and nuclear liability and at the same time consider ratifying to the nuclear damage liability conventions given its nuclear usage position.

While at the International level reflection should be made on the implementation of PPPs that entail large scale accidents. Also it is time to review the international Conventions on Nuclear Third Party Liability.

[65] Supra note 9 Pg.2

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