

Reflection, the Public, and the Modern Machine: An Investigation of the Fukushima Disaster in Relation to the Concepts of Truth and Morality

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Abstract

In March 2011, Japan suffered a massive earthquake. The resultant tsunami hit the Fukushima Daiichi nuclear reactor and it was later revealed that the reactor was actually in a state of meltdown. While it is still unclear how many people will be affected, both mentally and physically, by the radio-active fallout, the extent to which our lives are subject to the unimaginable risks of scientific technology has become patently clear. This paper strives to clarify the risks of scientific technology in relation to instrumental reason, critical thinking, plurality, and subsequently, the significance of the public realm in contemporary world affairs, with a specific focus on the Fukushima incident. In so doing, I shall introduce arguments regarding scientific technology by such thinkers as Arendt, Heidegger, and Horkheimer as well as the Kyoto School philosophers. This paper also focuses on the issue of morality in order to address the notion of the lack of critical thinking and the disappearance of the public.

Introduction

In March 2011, Japan suffered a massive earthquake. The resultant tsunami hit the Fukushima Daiichi nuclear reactor and it was later revealed that the reactor was actually in a state of meltdown as the electricity required for cooling the reactors was no longer operational. The incident has not yet been resolved as the site conditions are still unstable. In fact, the full extent of the damage cannot be assessed at this stage as investigations are still on-going, but it is anticipated that the damage will be far greater than suggested in the reports published after the initial large-scale investigations into the Fukushima nuclear accident (ICAF, 2012; The Independent Investigation Commission on the Fukushima Nuclear Accident, 2012; RJIF, 2012;

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TEPCO, 2012; JASTJ, 2012). While it is still unclear how many people will be affected, both mentally and physically, by the radio-active fallout, the extent to which our lives are subject to the ‘uncertain’ risks of scientific technology has become patently clear.

Three of the four reports emanating from the investigations state that the disastrous consequences are largely attributable to human error. They are unanimous in their claim that the nuclear accident and the subsequent dispersion of radioactive substances, causing widespread suffering amongst those living in the area, were man-made and, at least partially, caused by a lack of proper thought.

Historically, numerous philosophers and political thinkers have drawn attention to the risks of modern science and technology and many of them have attributed the risks to a lack of critical thinking and the overwhelming ascendancy of instrumental reason (Arendt, 1971; Heidegger, 1977; Nishida, 1952). If the lack of critical thinking is the main cause of the perceived risks related to the Fukushima tragedy, we are obliged to ask what we really mean by ‘thinking’ in contemporary life. We need to ask, ‘What does “thinking” actually consist of?’ and ‘How could it prevent man-made disasters from occurring?’

This paper strives to clarify the risks of scientific technology in relation to instrumental reason, critical thinking, plurality, and subsequently, the significance of the concept of the public in the contemporary world, with specific focus on the Fukushima incident. My main aim here is to draw a cautionary tale from the devastating nuclear accident that suggests that scientific knowledge and technology without critical reflection are not only meaningless but also, more importantly, dangerous. In so doing, I shall introduce arguments regarding scientific technology by such thinkers and philosophers as Arendt, Heidegger, and Horkheimer as well as the Kyoto School philosophers, including Nishida Kitaro and Tosaka Jun. This paper also focuses on the issue of morality in order to address the notion of a lack of critical thinking and the disappearance of the public realm. To clarify these points, it starts with a brief explanation of science and thinking. Using Arendt’s concept of thinking, I shall argue that the unquestioned adaptation of reason as a mere instrument for technological development actually inhibits the function of critical reflection. Second, I shall concentrate on the issue of the disappearance of the public realm in the modern world as a result of a lack of critical reflection. I shall argue that the evaporation of this realm is intimately intertwined with the emergence of the contemporary machine of technological development and human progress, which in fact destroys human lives, as in the case of the Fukushima disaster. Third, I shall conduct a detailed examination of the investigation reports on the Fukushima accident. A careful reading of the reports reveals that the accident occurred because of the reckless adoption of the technological machine of the nuclear complex, which is characterized by a lack of critical thinking and moral reflection. Next, I shall pay specific attention to some counter arguments to the ascendancy of instrumentality. Here I shall introduce Tosaka Jun’s theory of literature and morality, and attempt to elucidate the importance of a possible collaboration

between social science and the humanities that could help ameliorate the disastrous consequences of the ascendancy of instrumental reason. This will be followed by some concluding remarks.

Science, reason, and thinking

Hannah Arendt, a prominent political thinker of the twentieth century, severely criticized the lack of thinking that results from relying exclusively on instrumental reason, and contended that it was the main cause of the emergence of totalitarianism (Arendt, 1958). Nishida Kitaro, a well-known Japanese philosopher, also wrote after the Kanto Earthquake in 1923 that the practice of critical thinking had disappeared in contemporary society and this resulted in the disastrous consequences of the earthquake (Nishida, 1952: 129). In this sense, they both agreed that the disasters were largely man-made.

Any investigation of the relationship between scientific technology and the contemporary world should probably commence with a close scrutiny or analysis of the term 'reason' as a human trait. 'Reason' as usually used in scientific investigation is purely instrumental; thus, it comes very close to the Kantian notion of intellect. According to Heidegger, the prominent philosopher and proponent of existentialism, science investigates the relations of cause and effect. It strives to reveal the causal relationships, mechanisms, and logic lying behind the manifestation of its research objects. The ancient Greek philosophers, Aristotle in particular, distinguished between four types of causality: material (*cause materialism*: what something is made of); formal (*cause formalis*: what it is to become); purpose (*cause finalis*: the end for which something is done); and efficient (*cause efficiens*: that which brings about the final effect). Reflecting Aristotle's articulation of causation, Heidegger contends that contemporary science only focuses on the efficient cause and rarely concentrates on the others. What is important here is that scientists disregard the importance of the purpose and meaning of the change, or the other causes and 'cause efficiens, only one of the four causes, sets the standard for all causality' (Heidegger, 1977: 7).

Concentrating on the *cause efficiens* in fact means that we, those who are living in the contemporary age of the domination of science, have got used to employing only instrumental reason. Consequently, we have lost our capacity to consider the purpose and meaning of the consequence, often called critical reflection, which supposedly provides the moral foundation for every aspect of human behaviour. The loss of capacity for critical reflection of course denotes that we are unable to call into question the purpose of the change, thus asking whether the means actually contributes to achieving the pre-set goals, whether the means is justifiable in relation to the purpose, and whether the purpose itself is morally acceptable or not. Max Horkheimer, a harsh critic of modern technological society, contends that scientific investigations based on instrumental reason put aside the moral question because they disregard the purpose. The scientific task, set without considering the moral question in this way, can appear to be set 'arbitrarily' and thus becomes 'ideological' (Horkheimer, 1989: 56). In this sense,

it comes close to what Cox calls ‘problem-solving theory’ in international relations (Cox, 1981).

Hannah Arendt also took up the issue of reason in her work *The Life of the Mind*, published posthumously, which addresses the question of thinking and evil-doing. Examining Adolf Eichmann’s trial in Jerusalem in 1961, she comes up with the notion that evil is not something monstrous or demonic, but simply ‘banal’ (Arendt, 1977). In fact, what she saw in Eichmann was simply a total lack of thinking. As a result, Arendt felt obliged to address the question of thinking and evil-doing; ‘Might the problem of good and evil, our faculty for telling right from wrong, be connected with our faculty of thought?’ (Arendt, 1971: 5) Thus, she had to address the following question:

Could the activity of thinking as such, the habit of examining whatever happens to come to pass or to attract attention, regardless of results and specific content, could this activity be among the conditions that make men abstain from evil-doing or even actually ‘condition’ them against it? (The very word ‘conscience’, at any rate, points in this direction insofar as it means, ‘to know with and by myself’, a kind of knowledge that is actualized in every thinking process) (Arendt, 1971: 5).

‘To know with and by myself’ is, to Arendt, the core process of critical reflection. But what is this critical reflection? In that context, Martin Heidegger’s definition of reflection is indicative: he states that reflection means: ‘the courage to make the truth of our own presuppositions and the realm of our own goals into the things that deserve to be called in question’ (Heidegger, 1977: 116).

This can be done within oneself when we acknowledge the plurality of the self. Arendt argues:

Nothing perhaps indicates more strongly that man exists essentially in the plural than that his solitude actualizes his merely being conscious of himself, which we probably share with the higher animals, into a duality during the thinking activity. It is this duality of myself with myself that makes thinking a *true activity*, in which I am both the one who asks and the one who answers. (Arendt, 1971: 185)

In this sense, plurality within an individual is an essential condition for critical reflection, and consequently for making moral judgements. It is not just to ask oneself whether the goal was achieved in the way it was planned and whether the means hired to achieve the goal was consistent with the purpose of the action, but moreover one is obliged to ask in the reflective thinking process whether the purpose of one’s action itself is justifiable. Thus, it inevitably involves a moral judgment as well as technical issues.

Obviously, Arendt’s argument of plurality in individuals is a radical extension of her argument of the ‘public’, which she develops in her *Human Condition*. For her, plurality in a group is an essential precondition for human existence, which guarantees ‘action and speech’ (Arendt, 1958: 175). Dialogue between individuals within a group only takes place in the realm she calls the ‘public’, and plurality in the public is ‘specifically the

condition – not only the *conditio sine qua non*, but the *conditio per quam* – of all political life’ (Arendt, 1958: 7).

The Investigation Committee on the Accident at the Fukushima Nuclear Power Stations (ICAF) report on the Fukushima accident in fact touches upon the problem of the ‘purpose’ and plainly states that the nuclear engineers or administrators never ensured whether they agreed on the purpose of the nuclear energy policies among themselves in public, let alone morally assessed it. The chairperson of the ICAF deprecatingly states in the epilogue of the report that ‘nuclear scientists or engineers did not have, or even attempted to have, any consensus whatsoever on the primary purpose of the organizations they belonged to or what they had been granted by society in relation to the nuclear energy policies’ (ICAF, 2012: 446). Here, although it is generally regarded that there are some differences between scientists and engineers, which I will briefly touch upon later, they do not show much difference when it comes to the issue of the ‘means and purposes’ of nuclear energy policies. The chairperson clearly sees one of the most important elements of the nuclear accident in the fact that the scientists and engineers were concerned more with instrumentality and the technical issues, *causes efficiens*, of nuclear energy promotion than the purpose, *causes finalis*, thereof. In other words, their efforts were exclusively devoted to maintain the formality of the nuclear complex, but never aimed at contributing to the wellbeing of people living in that area or those using the electricity in the broader society.

What is the purpose of the nuclear policies then? The Atomic Energy Basic Act states:

The purpose of this Act is to secure energy resources in the future and achieve the progress of science and technology and the promotion of industries by encouraging research, development and utilization of nuclear energy and thereby contributing to the improvement of the welfare of human society and of the national living standard. (Article 1)

Here, the ultimate goal of the nuclear power policies was to contribute ‘to the improvement of the welfare of human society’ and the ‘national living standard’. However, it is obvious that this purpose was not really the purpose and is regarded as mere abstract principles, which have no concrete meaning to engineers or administrators. What they were more concerned with as the purpose of their endless efforts is stated before the principle, that is, ‘the progress of science and technology’ and the ‘promotion of industries’.

The ‘progress of science and technology’ and the ‘promotion of industries’ are obviously the means to achieve the ideals, such as the improvement of the welfare of human society and of the national living standard. It is evident here that the means are converted into the ends. This is because instrumental reason is always for a certain end, and the end will be effortlessly transformed into means to achieve something else. This forms an endless ‘chain whose every end can serve again as a means in some other context’ (Arendt, 1958: 153–4). If we trace the chain backwards, it is possible to say that instrumental reason is incapable of setting the end and means itself becomes the end.

In other words, there is no end as such, but only means in the eyes of instrumental reason.

In this context, Arendt's distinction between 'means' and 'ends' is suggestive. Arendt argues that the distinction between means and ends or utility and meaning can be explained linguistically by differentiating between 'in order to' and 'for the sake of'. The ends and meaning here denote principle with meaningfulness that 'can no longer be conceived of as something needed in order to have something else'. It therefore 'defies questions about its own use'. On the contrary, means is always an action carried out 'in order to' achieve something, and this is the principle of utilitarianism (Arendt, 1958: 154). However, those with instrumentality cannot distinguish the means from the ends, simply because they are 'incapable of understanding meaning' (Arendt, 1958: 154–5). They need a further end to the present end, which turns into the means to achieve the former. This paradoxical chain of means and ends leads to an argument that they would not recognize a purpose as an end if there were no further purpose. It is possible to say therefore that 'improvement of the welfare of human society and of the national living standard' did not appeal to the scientists and engineers, or administrators, of the nuclear complex and thus were not recognized by them simply because they were too abstract and any concrete benefits could not be clearly defined. Or, simply put, there is no end of the end.

The ICAF report repeatedly states that the total lack of attention to the principle of nuclear power policies contributing to the improvement of the welfare of human society was one of the most impelling reasons for the accident (ICAF, 2012: 583–4). It severely criticises the nuclear administration and the attitude of TEPCO for devoting themselves only to the promotion of nuclear energy industries and not paying sufficient attention to the safety and health of individuals. It is evident here that this was directly related to their instrumentality and the lack of reflective thinking among administrators and engineers. However, this is not the end of the story.

The universal truth and the public realm

The lack of critical reflection because of the absence of plurality in each individual and the excessive inclination towards instrumentality is clearly part of the cause of the accident. However, there is another factor that is closely related to critical reflection within an individual: the disappearance of the public realm. The public realm is, according to Arendt, also based upon the idea of plurality, not in each individual but in society. In this sense, the existence of the political dialogue among scientists and engineers in the industry and the practice of critical reflection within an individual are different sides of the same coin, both of which are established on the basis of plurality. The essential element of critical reflection is, thus, the existence of plurality, whether it exists within an individual or among individuals.

However, critical reflection is different from the notion of the public realm in terms of human activities, or in Arendt's words *vita activa*. While the former can be conducted within an individual, the latter needs others with whom to communicate. To Arendt,

the function of the latter is vital in relation to the human condition. This is because it involves ‘action and speech’ because Arendt does not think that a life without action and speech deserves to be called a life as ‘it is no longer lived among men’ (Arendt, 1958: 175–6). This encapsulates the essence of Arendt’s argument on the basic human condition, that is, to live ‘among men’, which is similar to the Japanese word for human beings, *ningen*, which literally means inter-human.

Because she was deeply concerned with the plurality of human beings in the public realm, Arendt was a harsh critic of science and technology. In her *Human Condition*, she argues that science’s relentless pursuit of the transcending and universal truth is a dangerous business. Contrary to widely accepted conventional wisdom, Arendt contends that it is misleading to assume that science and technology have nothing to do with politics; on the contrary, they dwell at the very core of politics.

The situation created by science is of great political significance. Whenever the relevance of speech is at stake matters become political by definition, for speech is what makes man political (Arendt, 1958: 3).

Arendt regards speech and dialogue as naturally generated by the plurality of individuals as the most essential condition of human existence. This plurality is the origin of the public realm, and, according to Arendt, the public cannot be materialized in any sense without human plurality. In this context, she maintains that the problem of science is mainly caused by science’s robust assumption that there is a universal truth, which transcends the human existence. The truth in this context cannot be doubted, nor is it debatable in any sense, simply because it is the truth. Discussions or dialogue in the public realm regarding the ‘truth’ are simply superfluous once scientists have discovered the universal truth. Thus the truth, by definition, is assumed to exist exogenously to society.

However, this assumption appears to be inaccurate and far from convincing when we look at existentialist philosophy. Nishida Kitaro for example, contends that there is ‘pure experience’ before it is divided by language into subject and object (Nishida, 1947). It is literally incommunicable experience because it is impossible for anyone, by definition, to present this pure form of experience to others as it presumably exists before the subject–object division and thus before language. Nishida assumes that pure experience is the only way to grasp reality. Once it is narrated, it is easily captured and distorted by the power of language. In this sense, ‘scientific truth cannot be called the perfect truth’ when it is spoken (Nishida, 1947: 37). Imamura transforms ‘pure experience’ into the existence of reality in general and argues that we should distinguish ‘pure’ existence (the genuine truth) from ‘language’ existence (the narrated fact); the ‘pure’ reality, in other words the truth, only exists before it is spoken (Imamura, 2008: 73). However, many scientists robustly maintain the prevailing belief, with their persistent faith in instrumental rationality, that they hold the transcending universal truth on the basis of scientific investigation. They also hang on to the assumption of the transparency of language and believe that it conveys the truth without distorting it.

The scientists' unwillingness to interact socially with others and their unmitigated reliance on instrumental reason often results in the dispersion or disappearance of the public realm. Taking the example of scientists who developed atomic bombs and nuclear weapons, Arendt insists that the reason why she considers the scientists' judgement to be misleading does not lie in the scientists' naivety in believing that their scientific development would be used exclusively for peaceful purposes and never be abused, but in the fact that scientific practice to discover the universal truth actually deprives society of the opportunities for dialogue. Arendt maintains:

The reason why it may be wise to distrust the political judgement of scientists *qua* scientists is not primarily their lack of 'character' – that they did not refuse to develop atomic weapons – or their naïveté – that they did not understand that once these weapons were developed they would be the last to be consulted about their use – but precisely the fact that they move in a world where speech has lost its power (Arendt, 1958: 4).

This is a typical example of Arendt's perception of science. For her, life without action and speech is 'literally dead to the world' (Arendt, 1958: 176). In this way, she sees scientists as no longer existing among human beings and having disappeared from the public realm.

If the main problem of science is the evaporation of the public, does technology have the same problem? In the case of technology, the story seems to be even more complicated. It is because the term scientific technology implies the application of scientific knowledge in society. As technicians and engineers exist in the world of social and material forces, so too does their technology. In this sense, technology is ceaselessly social and political from the outset.

Tosaka Jun, another Kyoto School philosopher, argues that technology becomes possible only when it is applied in society to produce goods (Tosaka, 1966a). Without getting involved in the material production processes, 'the knowledge of physics or chemistry remains as mere scientific knowledge' (Tosaka, 1966a: 241). Tosaka insists that technology is ideological and the widespread misunderstanding that technology exists outside of social structures is itself ideological. This is because scientific technology often results in a confirmation of the prevailing political and economic order and therefore, whether intentionally or unintentionally, delivers the benefits to the dominant class in society. Tosaka maintains that this happens because the technicians and engineers usually belong to the dominant bourgeois class and their perceptions often take for granted the prevailing socio-economic and historic order into which they were thrown (Tosaka, 1966a: 269).

Technology together with scientific truth, the production process, the apparatus of wealth generation, and, of course, administrators and engineers, constitute a 'nature-like' machine (Arendt, 1958: Chapter 3). This machine exclusively aims at achieving 'startling increases in efficiency', but has no clear end. It has its own mode of reproduction and lasts forever, as there is no end. Arendt compares it to nature because neither of them has any discernible beginnings or ends, but only the continuity of its

functioning. Of course, Arendt contends that the machine has already replaced nature in the modern age and our lives are controlled and dominated by it. Arendt states:

The continuous process pursuant to the channelling of nature's never-ending processes into the human world, though it may very well destroy the world *qua* world as human artifice, will as reliably and limitlessly provide man-kind with the necessities of life as nature herself did before men erected their artificial homes on earth and set up a barrier between nature and themselves (Arendt, 1958: 176).

Once human beings are involved with this reckless machine of wealth production, no one seems able to escape, even though they are deprived of the opportunity of thinking or interacting with others in the public. In other words, there is no plurality in this wealth-producing nature-like machine while everyone is destined to get involved in it. This is a peculiar problem of modernity, and, in a very real sense, the Fukushima disaster was caused by this uncontrollable machine.

The nuclear village and the modern machine

There is no clearer example of the deprivation of human life by the reckless machine of wealth production through scientific technology than in the case of the Fukushima incident. It is often said that Japan's nuclear power energy policies have been mainly promoted by what has been referred to as the 'nuclear village' (*genshiryoku mura*), consisting of the scientists, technical experts, government politicians, and administrators, which constitute a complex cartel strikingly similar to Arendt's depiction of the modern machine. In the Fukushima case, the main organizations forming the machine include the Cabinet; the Nuclear and Industry Safety Agency, which was later reorganized into the Nuclear Regulation Agency of the Ministry of the Environment in 2012; Japan Atomic Energy Commission; and the Tokyo Electric Power Company (TEPCO). Among those bodies, the majority of scientists and engineers are in TEPCO (RJIF, 2012: 251), but the company itself is by no means controlled by scientists or engineers. Instead, administrators have long been controlling TEPCO, and, in fact, no scientists or engineers have been appointed as the president of the company in its history.

This nuclear machine often works as a fortress of nuclear energy production to protect the established organizations and companies. For example, the RJIF report states that laws and regulations set by the agencies often function monopolistically to prevent other electric power companies from entering the nuclear power generation market, so that TEPCO did not invest its resources to compete with them (RJIF, 2012: 7).

The monopolistic character of the nuclear village has presumably resulted in the disappearance of the public realm in which democratic dialogue is supposed to take place. Strikingly, some government officials and TEPCO nuclear engineers, individually interviewed by the investigating committees, testified after the incident that they were 'aware that there was a lack of safety measures in the nuclear policies of Japan, but

that one person's demand for countermeasures would not have made much difference' (RJIF, 2012). It is indeed shocking that they were aware of the deficiency of the system long before the accident. Thus, by and large, there was critical reflection in some individual cases, but those involved were never able to express it in public because there was no such thing as a public domain in the village.

One may well ask, what is the mechanism behind the silence of the engineers and administrators? One of the possible answers resides in the peculiarity of Japanese cultural politics. For example, Maruyama Masao, a prominent political scientist in post-war Japan, argues that there has been a subtle, but long-lasting balance between Western 'institutions' and indigenous 'spirit' on the basis of which Japanese modernity has been established and maintained since its inception. The 'pattern' of Japanese perceptions of organizations and individuals, namely, the 'fetishism' to modern institutions by bureaucrats and the adherence of the ordinary people to nature has been interestingly internalized and embedded in the individual without him/her becoming aware of the inherent contradiction between the two. This is because, according to Maruyama, these two extreme perceptions of society appear to be very different and seem to be completely dissimilar and unrelated (Maruyama, 1961: 52–3).

Similarly, a Japanese thought specialist Najita Tetsuro of Chicago University states that Japan has a long history of the importation of knowledge and technology by arranging for them to fit in with Japanese culture, which is a combination often referred to as *wakon yosai* (Japanese soul and western knowledge) (Najita, 1989). Najita argues that there has been a particular perception of knowledge and technology in Japan from the beginning of its modernization process:

What we are capable of knowing from whatever source outside ourselves may indeed be true and valid, but the real margin of plenitude is in our indigenous culture. The quest for Western science and technology in the mid-nineteenth century was grounded in this sense of cultural certitude (Najita, 1989: 9).

If Najita is right, then there has been almost no tradition of 'thinking', in the Arendtean sense, that Japanese 'culture' is supposedly founded on the basis of the 'senses' and 'feelings' of people, as Maruyama argues. The 'senses' and 'feelings' was supposed to be inherent in Japanese culture and the assumed monoculture cannot and does not accommodate the difference, which results in the disappearance of the plurality among individuals, namely, the public realm. In fact, the evaporation of the public became the foundation of the *anzen shinwa* (safety myth) of the nuclear power management. The disappearance of the public functioned in such a bizarre manner that administrators and engineers started simply believing that nuclear power plants have no risk (RJIF, 2012: 247). The RJIF report asserts vigorously that:

All the concerned individuals adopted a particular attitude that they would not make any remarks which may trouble the organizations on the question of the 'Safety Myth' (*anzen shinwa*). There are some who interpret it as the peculiar characteristic of Japanese society. However, if 'reading the atmosphere' (*kuki wo yomu*) is inevitable in Japanese society, such a society is not capable of safely

managing nuclear energy, which requires high risk and complex technology (RJIF, 2012: 7).

What was at stake in the case of Fukushima disaster was the existence of the nuclear machine as a result of a lack of critical reflection and the absence of the public. It became clear that the evaporation of a public space for dialogue and critical discussion, in the case of Japan's nuclear village, actually produced tremendous risks in the process of materializing the most advanced technical knowledge and scientific technology.

Then, how could we make sure that we have critical reflection and the public in contemporary life, which seems to be virtually dominated by instrumental reason? One of the key concepts would lie in the concept of human beings, which is totally absent in the discourse of the nuclear village.

Tosaka Jun's theory of technology and morality

If the causes of the Fukushima disaster reside in the modern machine, based on the lack of reflective thinking and the disappearance of the public realm, the problem is by no means limited to the Fukushima accident. It is about technology and politics in the age of modernity in general. In order to draw lessons from the Fukushima accident, Tosaka Jun's theory of science is probably the most insightful and indicative theory on which to concentrate. This is because Tosaka investigated Japanese culture and politics before World War II and examined the separation of technology from philosophical engagement. It is also because he was very much aware of the importance of human beings, not only for the principle of human dignity, but also for practical engagement in politics.

Tosaka was very much concerned with the practice of reflection and technology from the very beginning of his philosophical enterprise and his analysis of scientific technology is historical. He acknowledges history in the dialectic attitude and argues that science, whether natural or social, is a historical product. This not only means that science is always exposed to social and material forces, but also that science itself is also a social force.

For Tosaka, the analysis of technology consists of three different dimensions: the dimension of technology per se, the ideological subjective dimension, and the dimension of the technician (Tosaka, 1966a: 234). The first objective or dimension of analysis, which corresponds to the physical technology, does not appear to Tosaka to be as important as the last two. He explains the reason why he pays more attention to the second and the third dimensions than to the first dimension. According to Tosaka, technology per se becomes an imperative only when it is connected to material society. Take for example a big business. Machines do not produce anything by themselves. Thus, machinery is not in any way technology in itself. Machines need operators, business organizations, and transportation methods to function as machines. Thus, technology is an organic combination of machinery and concomitant elements of the production process (Tosaka, 1966a: 239).

As technology is always organizational and in need of socio-economic interactions with other organizational bodies, he contends that technology should be analysed in a wider context, that is, history (Tosaka, 1966a: 241–3). For instance, whether a certain set of scientific knowledge deserves to be called technology totally depends on the state of social development. If economic or social forces do not find the scientific knowledge useful in relation to social development and progress, the knowledge remains mere knowledge and will never be developed into technology. In this way, technology is profoundly influenced by history.

Just as scientists and engineers are historical products, Tosaka himself was, of course, also a product of history. In the 1930s, when he successively published his works, Japan was exclusively characterized by an economic downturn and the emergence of a militarist government, following the overwhelming prevalence of capitalism and consumerism. For Tosaka, science and technology were critically important elements constituting this historical epoch. The crucial issue in science and technology for him was not only the fact that scientists and engineers confirm the perceptions of the dominant bourgeois society, but also the fact that their narratives were ostensibly based on the alleged ‘truth’, and this had tremendous power of persuasion over ordinary citizens, because it looks less ideological than social science (Tosaka, 1966a: 271).

Tosaka contends that the ideological function of scientists and engineers is embedded in the production of the objective ‘truth’. This truth is solely formulated and produced by science on the basis of instrumental reason. As instrumental reason, as noted above, focuses exclusively on the *cause efficiens*, it does not contain any impetus for critical self-reflection. This clearly stems from the fact that not sufficient attention is paid to the *cause finalis*, the purpose of the change, and, consequently, scientists, using instrumental reason, never raise the self-critical question of the purpose of their investigation. The justification of the investigation is inevitably left to the question of ‘morality’.

Similar to the concept of ‘truth’, which presumably resides outside of human activity, morality is traditionally supposed to be exogenous to human reason. Conventional wisdom usually assumes that human reason does not have the capacity to develop morals or morality on its own, and, thus, morality needs to be given to them externally, usually by religion, or as David Hume argues, by passion (Audi, 2007: 238). In the case of Japan, morality has presumably also been provided by religion, cultural heritage, and local convention, and obviously then the foundation of morality is assumed to be outside of, or beyond, human reason. However, Tosaka argues that the benefit of the term morality resides in the ruler’s intention to maintain the prevailing social norms. In other words, morality is a product of social and historical forces that maintain the prevailing political and economic order. As the powerful and dominant always intend to institutionalize morality in society as far as it benefits them, morality is frequently deified and universalized (Tosaka, 1966b: 252). In this sense, the deified and universalized morality is a result of power structures based on instrumental reason. Then what is moral in Tosaka’s understanding of the term? He states it is a ‘living

consciousness', which is far from exogenous to human activities (Tosaka, 1966b: 217). He argues that morality is not a separate area from other areas of life, such as politics, law, and the economy. It is not an external coercion. It is not and should not be something fixed either. It is rather 'an attitude for searching, or the purpose of searching' (Tosaka, 1966b: 223). Tosaka was suspicious of any forms of morality that were formulated collectively. As socially formulated morality is often imposed on individuals, it is inevitably biased by social and historical forces and only represents the power relations in the society (Tosaka, 1966b: 259).

For Tosaka, the purist form of morality exists only in individuals. Yet, the concept of 'individual' (*kojin*) itself is the product of social forces. Instead, he uses 'self' (*jibun*) in order to refer to his unique concept of individuals. He states that the concept of 'individual' is an abstract and universalized form of the particular. However, this particularity is a generalized particularity (Tosaka, 1966b: 260), thus, it only exists on an abstract level in contrast to universality. As a result, 'individual' does not hold the peculiarity that exists based on experiences inherent in a person and that becomes exchangeable with other individuals, like a labourer, for instance. On the other hand, the 'self' is assumed to be a concept that cannot be replaced with other selves. This peculiarity guarantees plurality among selves, thereby guaranteeing the public in the Arendtean sense.

In the case of the Fukushima accident, some technicians and bureaucrats in the nuclear village were more 'individuals' than 'selves', in Tosaka's sense. They failed to reflect the potential problems of the nuclear village upon themselves. Even if they became aware of the issues, they were unsuccessful in realizing that presenting their reflection was a moral act. This can be found even in the reports on the accident. An independent association of journalists (the Japanese Association of Science & Technology Journalists: JASTJ) published a critical examination of the four reports in 2012, which contends that none of the four reports explicitly tackled the issue of morality (JASTJ, 2012: Chapter 13). Obviously, the lack of morality was one of the main causes of the incident in the first place, but it is surprising to see that the issue of morality is not touched upon by any of the official investigation teams. This means that the issue of morality is still regarded as exogenous to the Fukushima accident and was never taken seriously, despite the number of books that have been published on the plight of those who suffered. The lack of morality and thus the absence of reflective thinking, also explains the recent LDP government's hasty move to re-commission nuclear power plants.

According to Tosaka, the most salient form of the expression of self does not reside in social science, but in literature. He states that the 'individual is a social scientific concept while the self is a literary representation' (Tosaka, 1966b: 265). This is the only foundation for sound morality. A social issue affects individuals uniformly. However, the reception is different, thus the social issue becomes a 'personal' issue on the self. In other words, a social issue will be 'humanized' through the self (Tosaka, 1966b: 266). The particularity becomes truly particular only through reflection upon the self. Thus,

Tosaka contends that morality is formulated on the basis of ‘personal truth’ (Tosaka, 1966b: 268), and this personalized truth only takes place through reflecting the social forces and political structure upon itself. Thus, the ‘self’ is a mirror (Tosaka, 1966b).

According to Tosaka, the representation of this personalized truth, which is often apparent in literature, is one of the most important moral acts. Literature is able to perform this function because literary expressions are able to distinguish the ‘self’ from ‘individual’ with its ‘non-existential functions such as representation, fantasy, exaggeration’ (Tosaka, 1966b: 265). Of course, Tosaka does not see such ‘non-existential functions’ negatively. They are rather the purist representations of one’s ‘sense and sensations’ (Tosaka, 1966b: 266).

Interestingly, Arendt also developed a similar argument for literature. She regards art as the direct representation of ‘thinking’. This is because works of art do not embrace any ‘exchange value’, which represents a standard of value judgment in modern society. They are ‘unique’, and ‘defy equalization through a common denominator such as money’ (Arendt, 1958: 167). In artistic endeavour, the ‘most human and least worldly’ is poetry. This is because Arendt believes that a poem’s ‘end product remains closest to the thought that inspired it’ (Arendt, 1958: 169). Although Arendt differs from Tosaka in the sense that she regards poetry as a direct representation of ‘thinking’ instead of the ‘senses’ as Tosaka argues, her intention to broaden the scope of our inquiry to embrace contemporary society for moral reflection by focusing on art remains the same.

In fact, numerous books and journals have been published after the Fukushima accident on the lives of the locals. They collect the words and voices of the people who are suffering from the accident and provide a very strong social force against the LDP government, which is hastily propelling the resumption of the nuclear power plant like an unstoppable, reckless machine. It is our task now to expand the public realm regarding the resumption of nuclear electric power generation so that it includes the local voices of Fukushima. Probably the first step is to transcend the boundaries of social science and the humanities so that the voices of the ‘self’ are clearly heard and expand the scope of our investigation to include the representation of art.

Concluding remarks

As we have seen, scientific technology has a peculiar tendency to concentrate exclusively on instrumentality and thus lacks the moment for critical reflection and the public. This seems sufficient to explain the cause of the Fukushima disaster. It also explains the reason why some engineers and administrators remained silent before the accident, despite their clear awareness of the problems inherent in the nuclear power policies. Tosaka’s argument of morality indicates the possible collaboration of science and the humanities for the sake of moral reflection. Taking seriously the stories of those who suffered is a tremendously important gesture in understanding contemporary world affairs. The fact is that innumerable notes and memoirs have been published by those who suffered as a result of this man-made disaster, which give us the opportunity to reflect the meanings of our contemporary lives.

The question remains how we shall maintain the public realm in which different perceptions and perspectives are represented and understood by a variety of participants. Our view of contemporary world affairs seems to be limited by the presumption of the truth principle of social science. This ‘truth’ is strictly limited to being objective and verifiable. This often ends in neglecting personal stories and narratives in understanding the world. The public realm or domain is not something exogenous to our investigation. Rather, our investigation constitutes the public. Therefore, it seems to be our duty to widen the scope of our research as much as possible for the sake of a more accurate comprehension of the on-going tragedy as well as of the human dignity of those suffering.

On 7 September 2013, the International Olympic Committee voted for Tokyo to host the 2020 Olympic Games at Buenos Aires. The *New York Times* reported that at the presentation before the voting session Prime Minister Abe Shozo gave an ‘emphatic assurance of safety regarding the country’s 2011 nuclear disaster and continuing concerns about radioactivity’ (*New York Times*, 7 September 2013). The same night in Japan, a well-known poet living in Fukushima wrote in reflecting the feelings of those who are suffering:

Looking at the slowly approaching autumn sky I thought I heard someone say
 ‘Fukushima is 250 km away; the radiated water cannot affect Tokyo’
 The clouds try to block it out by moving hastily
 Mishearing in September is cruel (Wago, 2013).

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