The Precautionary Principle in Risk Analysis

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The Principle and Procedure

Who hasn't heard the old and mostly out-dated proverbs: *"Better safe than sorry", "An ounce of prevention is better than a pound of cure", "Penny-wise and pound-foolish", "A stitch in time saves nine", "Look before you leap"*, etc.?

At least in the risk analysis domain they still thrive as the 'Precautionary Principle', which, simply stated (Ref. 1) is: *"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically."*

Simple and wise as it sounds, arguments may be raised against indiscriminate application of the principle. For instance, the safeguards imposed sometimes create losses of smaller magnitude to much larger numbers of people, or with much longer-term adverse effects.

Examples of this last problem are: Restrictions on genetically modified crops may deny affordable food to starving millions. Banning nuclear power will lead to continued dependence on dwindling fossil fuel reserves, and in due course, to energy starvation and (of course!) oil wars.

Fortunately, most of the controversies have been sorted out by now. Here, the author takes the basic approach, summarised by the first four statements in the following check-list. As one way to settle doubt or controversy, he focuses on just one more criterion, namely a check on any 'new risks' from the control, listed as check item 5 in the list.

Application Example: Cell phone use at petrol stations

Consider the widely adopted practice of car or van drivers and passengers turning cell phones off at petrol stations. (In fact, they are banned near grain-elevators also in USA.)

1. Feasibility: Petrol – even its gas – is highly flammable, and a spark can conceivably torch it. – Yes.
2. Severity: Very high. When a petrol station goes on fire, the conflagration will be a fireball of mini-nuclear proportions, enough to destroy the township around. – Yes.
3. Probability: Almost nil. There no conclusive evidence about cell phones setting off petrol fires. Further, neither serious investigators nor popular media (such as Discovery Channel's 'MythBusters') could recreate the mishap! (Ref. 2.) – Yes.
4. Control: Customers simply have to turn off the cell phone for the few minutes they are in the petrol station. Easy, simple, inexpensive, no big deal. – Yes.
5. New risk: The inconvenience to the customers is very minimal. There is also no identifiable fresh hazard or other loss to others outside the station. – Yes.

All five responses are 'Yes'. So, impose the control, never mind that it may happen only once in a million, or a billion times!

But who were the real culprits?

What about the hundreds of petrol station fires reported from around the world?

Forensic investigation (Ref. 2) has traced most of these fires to static electricity, from the driver or passenger sliding across the car seat, then stepping out and touching the petrol nozzle, igniting the petrol by the discharge spark.

No fun or offence intended, but it just happens (statistically) that a majority of the seat-sliders were women with their tighter synthetic fabric dresses which built up static electricity more efficiently than the looser suits men wore. The women were also found to be more prone to entering and leaving the car while the petrol was filling the tank!

The solution to this seat sliding problem lies in the hands (and other parts of the anatomy) of the drivers and passengers more than with the risk analysts! Many safeguards are recommended to take care of static electricity at petrol stations (Ref. 2), including static electricity discharge panels for their customers' use.

Author has highlighted this as one of the 'Risk Management in Practice' examples in his book (Ref. 3).

Readers may take it up as a challenge to propose other examples of possible application of the precautionary principle from their workplace, home, office, sightseeing, etc.

The Four-Step Precautionary Principle ... Plus ... a Fifth Step		
1	Feasibility	The mishap is possible, credible, conceivable, 'can happen'.
2	Severity	If and when it happens, the consequences can be catastrophic and/ or can affect the environment and/or a large number of people.
3	Probability	Its probability is very small and/or not fully (scientifically) documented.
4	Control	A simple and highly cost-effective safeguard can be proposed.
5	New risk	Any adverse consequences (costs) of application of the control would be much less than the benefits derived from the control.

If the response is 'Yes' to all the five postulates, then it is wise to apply the control firmly.

The precautionary principle is invoked only in cases where the normal risk assessment methodology for fairly well known likelihood and severity of hazards does not apply, as for instance when we know something can go very wrong, but we do not know when it will, what the chances are, or when there is no clear cause and effect relationship.

References

1. *Myers, Nancy, "The Precautionary Principle Puts Values First", Bulletin of Science, Technology, & Society, Vol. 22, No. 3, Sage Publications, June 2002, p. 210-219.*
2. *____. Static Fires at Retail Petrol Stations, Australian Transport Safety Bureau (ATSB), Australian Government, ISBN 1 921092 08, 19pp, 4 June 2005. Download from author's link: http://www.profkrishna.com/ProfK-Assets/StaticFires(AU).pdf*
3. *Krishnamurthy, N., "Introduction to Risk Management", 88p, ISBN: 978-981-05-7924-1, 2007.*