

Japan Earthquake: Wharton's Howard Kunreuther and Erwann Michel-Kerjan on Crisis Planning

Knowledge@Wharton: Both of you have studied low probability, high impact events. We've had several days of reading coverage of the earthquake. A lot is sure to unfold in the next few days and weeks. But what strikes you right away about the coverage?

Howard Kunreuther: There are two things that strike me right away. One is the magnitude and intensity of this event. It was the seventh-largest earthquake in recorded history. And it has an enormous impact on the country on many different levels. The second is how well prepared Japan was for this, in the sense that they had building codes and other things in place. And yet, even with that, because of the magnitude of the disaster and its interactions with other aspects like tsunamis and a nuclear power plant explosion, the devastation is enormous. The consequences are yet to come.

Erwann Michel-Kerjan: I utterly agree with that. If you had to put different countries on a scale from zero to 10, 10 being the most prepared, Japan may be at eight or nine. I would argue that the U.S. would be like six or seven [and] we are not even going to talk about Europe in some places.... What we're seeing now is really a perfect storm of a quake, floods and a nuclear [meltdown]. It's very, very overwhelming, and the death toll has continued to rise as time passes. It's just amazing.

Knowledge@Wharton: When you compare it, for example, to the earthquake in Haiti, one of the things that an amateur or anybody watching the news can see is the different construction of the buildings. They have very strong building codes in Japan. Does anyone have codes that match theirs?

Kunreuther: No. I think Japan, of any country, with respect to earthquakes, has the strongest codes, and for very good reason. They have had more earthquakes than any developed country in the world. They know the dangers, and they've experienced them over time.

Michel-Kerjan: The other country that compares to Japan, to some extent, is Chile. We had a major earthquake in Chile last year. It is not as rich as Japan, but the fact that Chile had had eight or nine earthquakes over the past 10 years made it one of the good students [among the countries prone to earthquakes], because you have to prepare for what could happen tomorrow morning.

Knowledge@Wharton: When you look at what we know so far, do you see any areas where the preparation, on a realistic scale, was not good enough?

Kunreuther: It's an interesting question about what "good enough" is. To some extent, it was good enough for almost any type of earthquake except the kind of earthquake that we had of this intensity. It raises a very interesting question that we have to raise as a global society: At what level do we put money into very, very low probability events? It is certainly the case that homes and other structures could have been built better. Part of it may have to do with the income level of the people and where [the earthquake] was located. But certainly the intensity makes it problematic as to [knowing] whether they could have done much better.

Michel-Kerjan: I agree with Howard on that one. It's too early to start blaming anyone here. We're still in crisis mode. Let's wait for a few days or weeks, and then we'll start seeing what could have been done better.

Knowledge@Wharton: Let's look at general questions that people have to deal with in planning for this kind of event. First is the low probability. How do you assess what a probability is of this, or even the more routine kinds of events? Do you go on past history?

Kunreuther: In the case of earthquakes, there's a fair amount of evidence with respect to how prone to them an area is. On the news today, in fact, there was talk about the fact that the San Andreas Fault [in California] may be a part of a square of earthquakes that could occur. Some seismologists have predicted that they may be more likely to have an earthquake given this [earthquake] than they otherwise would. Erwann and I do a lot of work in the analysis of risk so we wouldn't be in a position to say exactly what they would have been able to predict. But this one is "outside the box" of the normal prediction.

Michel-Kerjan: It's fair to say that it's hard to predict an earthquake. We know that it could happen. The question is when. The "when" could be a very long-time horizon. Fifty years or 100 years is a long time for seismology, not just for you and me as individuals, but also for earthquakes. The second point is that even though you come up with a probability, let's say one in 10,000, what does that mean? How do you translate that into action? It's very hard because the perception of the risk is even more important in that case than the number you arrive at in the end.

Knowledge@Wharton: We would assume that nothing we're doing is changing the risk of earthquakes, that it's embedded in tectonic plates and has nothing to do with us.

Kunreuther: It's like climate change.

Knowledge@Wharton: They talk about 100-year floods, and this sort of thing that seems to come more often. How do you adjust for these kinds of events when the pace and history may be more volatile?

Kunreuther: There was a period, maybe 20 or 30 years ago, when earthquake prediction was on the agenda. There was a fair amount of money given by the National Science Foundation and other research institutions for work in this area.

There's a feeling that they're less likely to be able to [make predictions] today. The best they can do in certain areas like Turkey is to have studies that, because of the earthquake in 1999, are able to predict that another earthquake will occur within 20 or 30 years. Whether seismologists are still as confident about that now as they were, say, eight or 10 years ago, is an interesting question. But it's very, very rare that they'd be able to do that. As Erwann was saying, the notion of when it's going to happen and where it will happen is really something that has been puzzling and a challenge for the scientific profession.

Michel-Kerjan: On top of that, they're happening more often and there are a few other things happening. One is that we gained another billion people on planet earth over the past 10 years. In the next 10 years, there will be another billion. You're talking seven to eight billion people on planet earth.

And because the media coverage is much better now, you can receive live video of what's happening in Japan 24/7. You see more of [the disaster] in your living room, so you feel the emotion much more.

A last point is that more people are living in high-risk areas. The state of Florida is a good example. Its population increased something like 600% over the past 60 years. Some of the work Howard and I have done for the book, *At War With the Weather*, looks at these issues very carefully. Even before talking about climate change, we look at how many people are living in high-risk areas. Are they protected enough? They are not. The economy and social consequences may be very high.

Knowledge@Wharton: All over the world, people tend to live in coastal areas. The most densely populated areas are found where there's water and transportation. That gets to the next question, which is about cost. There's obviously human cost, but there's financial cost as well in these events and that is a moving target. How can anyone trying to balance risk and cost assess the cost?

Kunreuther: This is one of the real challenges in this area. There's a direct cost, and that's obviously what we're hearing about now: Lives lost. In terms [information about] how many people have been lost, and the damage to buildings, has been changing hourly. But there's a large cost associated with business interruption and a lot of the interdependencies. Take Toyota. They're trying to figure out what's going to happen to them in Japan itself and they didn't even have a lot of damage to their factory because they were far from the earthquake. But they rely on suppliers. There's a whole supply chain problem. And we still don't know how serious [the damage to] transportation and infrastructure is, which can cause real challenges. We have to really look at these things from a very long-term perspective. We can't just say right now the cost is going to be X. It's going to be a matter of time before we fully understand it and its indirect costs.

Michel-Kerjan: Maybe they are low probability, but how prepared are we if something like that happened tomorrow? If I'm a Google today, I'm looking at whether an earthquake could happen in the Silicon Valley tomorrow, and asking myself, "Are we ready for that? Do we have insurance? Do we have financial protection?" The earthquake in Japan may be one of the most costly earthquakes since the California earthquake in Northridge in 1994. You're really talking about a major event here.

Kunreuther: There's one other point and it's one that we still don't have a very good handle on, which is the possibility of radiation. The cost could be enormous if there were a core meltdown or if things happened to not only this area, but also a much wider area. A question came up in my risk class today when we were talking briefly about this, as to what's going to happen to nuclear power as a result of this.

There's the whole perception of how safe nuclear power is, even though the Japanese have done everything in many ways to make these plants quite safe. Compared to Chernobyl, it's a lot safer. Even so, the perception of nuclear power may change as a result of this disaster.

Knowledge@Wharton: One thing that seems clear is that nuclear power has been clawing its way back to respectability. Even environmentalists are saying, "Maybe it's better than some of the fossil fuel alternatives." I guess all these calculations are up in the air now.

Michel-Kerjan: It's more than that. People are seriously contemplating the alternatives now. A really good example is here in Pennsylvania and Three Mile Island in 1979. Nothing really happened there in terms of millions of victims. It was pretty benign. But the perception about the nuclear industry changed forever, at least in this country. And that was more than 30 years ago. Coming from France, with companies like Areva selling nuclear power to China, Brazil and others, I've been on the "front." It's a booming business, and there's no question that they are thinking about the future of their business model.

Knowledge@Wharton: I don't know if this is a little too far out of your bailiwick, but the plants in Japan are quite old -- 30 or 40 years old, I believe.... Do you know whether the current technology is much safer than the 40-year-old technology?

Michel-Kerjan: It's true for nuclear, it's true for everything. The technology is getting better and better. That said, given the magnitude of this earthquake, I'm not sure that a new nuclear reactor would do much better than the one that was built 10 years ago, maybe 30 years ago, as is the case in Japan. The quality of the construction will be better, but you're talking about a devastating event here....

Kunreuther: One comment made over the last couple of days is that the plants in Japan are far better designed than Chernobyl, and that there is really a hope. As we're speaking now, they're trying what someone in the news called "a Hail Mary effort," using football analogy, to have salt water in the plants try to prevent the core meltdown. But they also indicated that the design of the plant might still be able to contain a great deal of the radiation, whereas Chernobyl was not able to. In that context, this is definitely a safer plant. Now, whether they could have done much better is really something that, as Erwann said, may well be [known later]. It will be interesting to hear what experts say about designing another plant able to deal with earthquake-prone areas.

The other comment I want to make ... [is that] apparently this plant is on an earthquake fault. There is a question whether it was recognized what could happen because of the earthquake fault. My guess is there must have been. On the other hand, there is discussion now as to whether they put the plant in the right place.

Knowledge@Wharton: It's one thing to say, "We do sort of know the frequency of earthquakes and we can calculate the odds." But in this case, one of the things that seems to have gone wrong is that the diesel generators that served as backup were installed at a level below what would be flooded if the sea walls were breached. Of course, that seems like an obvious error now. But when you're doing a risk assessment, how much do you have to worry about apparently minor details that could just be overlooked, but that could have devastating effects?

Kunreuther: You worry about it all the time. Any risk assessor makes a comment that they do the best they can with the knowledge they have. The best example in the case of an earthquake was Kobe, because it received an enormous amount of damage in the earthquake in the 1990s. It wasn't that the buildings weren't well designed; they just didn't know until after the earthquake that they couldn't withstand that particular type of shock. They were unaware. Exactly the same thing happened in California with respect to Northridge. There were new designs they thought were very safe, and they weren't.

Michel-Kerjan: One point I would like to make on nuclear if I may is that it's not just Japan. The entire international community is looking at what's happening, especially the International Atomic Energy Agency, which is the international body looking at these issues. It happens that the current director-general is Japanese, a Mr. Yukiya Amano. That will help a lot in terms of the interaction between the Japanese authorities and the international community. That's a positive note on the international approach.

Knowledge@Wharton: Let's say this event is a big wakeup call for people needing to do better risk assessments and thinking about low probability, high impact events. Let's suppose you're the CEO of a major corporation and realized, "My firm has really not been doing this." Where do you start?

Michel-Kerjan: First of all, I don't think that it's a wakeup call. We have had many wakeup calls over the past few days and years. It's like it keeps arriving every three months now. There was an earthquake in New Zealand a few weeks ago, major flooding in Australia [earlier this year] and earthquakes in Haiti and Chile [last year]. It keeps coming. If you're a CEO, I hope you have already started thinking about this issue. What we have seen so far is that more boards of directors are putting these issues on the agenda than they used to just three, four or five years ago. We see that radical change.

How we start? That's what we're doing at the Wharton Risk Center. We've been doing that for 28 years now.... There are ways you can handle these issues and do it properly.

Knowledge@Wharton: But does a CEO have to go outside and find experts who know how to do this, or is it something that can be built inside the company?

Michel-Kerjan: Typically, it's both. You're still driving what you want to do. You have limited resources you want to allocate to these issues. But you need expertise from outside to help you do that and we know how to do it. The question is, are you ready to start?

Kunreuther: If I could pose one challenge to all CEOs, and one that we have been thinking a great deal about at the Risk Center in terms of our own research and interaction with corporations, is how corporations can think long term. How can they design not only strategies for dealing with [immediate] risks, but also strategies for the long term? There is a tendency to forget, and a tendency for feeling that we're okay after a period of time. I'm not saying that corporations forget completely. But the real challenge is that there is a need to have things in place that give the firm stability.

Knowledge@Wharton: I imagine there's an issue of incentives as well. If you look at the financial crisis of a few years ago, one of the things that surprised many people was why people running these big, fancy firms were taking risks that could destroy these firms. One of the answers is that many of them were able to make so much money so quickly by gambling so big that the future didn't matter that much. It seems to me that there's always a tension between immediate results and long-term planning, especially when it comes to spending money. What you see as the major obstacles to better disaster planning in corporations and government?

Kunreuther: You hit the nail on the head. It's the challenge of giving short-term incentives in order to convince firms that they should do long-term planning. You need both. If you think that you can do it just with a long-term plan, without incentives, it's not going to work

for the reasons you pointed out. We have to work toward giving something back the next year, but at the same time, recognizing it's a multi-year process.

Michel-Kerjan: Going back to your question about the financial crisis. If your salary or bonus was given to you not after a year but after five years, depending on how your portfolio of clients have been behaving over five years, I'm pretty sure you will have made very different decisions, rather than trying to gain the system, as we've seen happen.

It's the same thing for earthquakes, the same thing for floods and hurricanes. Can you extend the time horizon? If we do so, you can make it a win-win situation for many people.

Kunreuther: Let me pose a little experiment that people can think about. If you told an individual that there's a one in 100 chance of an earthquake or a flood occurring next year and they can take protection, our guess is, from previous experiments, is that you would not get that many takers.

They say, "One in 100 is below my threshold level of concern. I'm not going to worry." But if you tell a person there's a greater than one in five of having at least one, if not more, earthquake or flood in the next 25 years, they may think differently. But those two probabilities are absolutely identical. All we've done, as Erwann was suggesting, is stretch the time horizon. Here, you're just stretching a time horizon to give the same figure, but putting it in a different dimension. One in five is large enough for people to want to think a little bit about. One in 100 is too small.

Knowledge@Wharton: When we think in terms of disasters, our minds immediately go to those who are most immediately affected, people in businesses in those areas. Here we are, in Pennsylvania, half a world away, yet this could affect us in some ways. There are certainly immediate effects on trade that could have an impact us. I've seen some speculation that Japanese consumers may tighten up as a general reaction to the stress and buy fewer products. Many people and companies that aren't in the immediate impact area are affected somehow. How does a businessperson who's trying to look at the ripple effects from halfway around the world start evaluating that?

Kunreuther: I ask the same question you were posing earlier in terms of what the impact is going to be on me, on my corporation. That's question number one. Then, what does it mean to have an earthquake in Japan? Where do we rely on sources of supply? Is our business going to be affected?

There are a series of questions in our interdependent, interconnected world, which any business would ask. That's what's happening today. Around the world, everyone is asking a question along those lines. The second point, and the obvious one, is our compassion, our feeling that we are all in this together, of having to somehow help for reasons that are not just economic, but social. We know the concern that everyone has about Japan today.

Knowledge@Wharton: When you look at the interactions and how interconnected the world is today, I assume that planning for a catastrophe isn't something you order up and put on the shelf to act on some day. You have to review it constantly as conditions changed.

Michel-Kerjan: That's a fair point. But it's more than that because we are living on a small planet now. For me to prepare means that I need to prepare internally and make sure my employees are ready, but also externally with my suppliers and regulatory systems outside of my country, so that the "dashboard" really [encompasses] planet earth. That's a radical change. That's the flip side of globalization. Risks are becoming much more global. You need to be prepared on a very global scale.