

Keita Nishimura
kn915@nyu.edu
Full Description of the Project
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QR Code for Risk Communication Regarding Fukushima Disaster

I. Introduction

This paper will propose a system to convey the food radiation data to consumers shopping at retail stores by using QR code. First, the marketing difficulties of agricultural crops caused by Fukushima Daiichi Nuclear Disaster will be discussed as the problem to be addressed. After the review of existing policies for addressing the problem, the approach and scheme of the system using QR code will be introduced. Lastly, the paper will conclude with the story of how this project has evolved.

II. Problem

1. Marketing Difficulty of Agricultural Crops

Fukushima Daiichi Nuclear Disaster occurred on March 2011 caused large economic damage on Japanese farmers. Large amount of radioactive substance spread over broad area in eastern Japan contaminated the crops and the soil. Since many consumers declined to buy crops from eastern Japan, the farmers in the area faced major marketing difficulties and lost a lot of money.

The government decided that the economic damage caused by the disaster should be compensated by Tokyo Electric Power Company (TEPCO), the operator of Fukushima Daiichi Nuclear Power Plant. The Ministry of Education, Culture, Sports, Science and Technology (MEXT), which oversees nuclear energy, formed the

Examination Board for Nuclear Damage Compensation consisting of jurists and radioactive scientists to make the guideline for compensation. The guideline identifies that there are at least some kind of damage that deserves compensation in 20 out of 47 Japanese prefectures.¹ This shows the geographic spread of the damage.

Although it is difficult to calculate the monetary impact of the damage on farmers, one way is to see the amount of compensation paid to them. Based on the information collected from prefecture governments, the Ministry of Agriculture, Forestry and Fisheries (MAFF) calculated that such an amount of money has added up to ¥355 billion by April 2013.² This is a significant amount of money given the fact that Fukushima prefecture's annual agricultural production before the disaster was ¥233 billion.³ The real amount of loss would be actually even larger because prefectures do not have complete information and there are farmers who just put up with their damage.

The impact of economic damage can be serious in individual cases. A dried tealeaf producer who regularly sold the products to a medical company got the deal stopped, making a loss of ¥30 million. An organic rice grower in Tohoku, who usually get ¥10,000 for a bag of 30kg, had to sell it for ¥5,500.⁴

¹ Examination Board for Nuclear Damage Compensation, *The third Supplementation to the Interim Guideline for Judging the Range of Nuclear Damage Caused by Fukushima Daiichi and Daini Nuclear Power Plant Accident*, 2013, pp. 5-6. Retrieved from http://www.mext.go.jp/component/a_menu/science/detail/__icsFiles/afieldfile/2013/02/12/1329116_7.pdf

² Ministry of Agriculture, Forestry and Fisheries (MAFF), *White Paper on Food, Agriculture, and Rural Area of 2012*, 2013, p. 51.

³ MAFF, *Statistics of Agricultural Income in 2010*, 2010, 3. Retrieved from <http://www.e-stat.go.jp/SG1/estat/Xlsdl.do?sinfid=000013163000>

⁴ Examination Board for Nuclear Damage Compensation, Retrieved from http://www.mext.go.jp/b_menu/shingi/chousa/kaihatu/016/attach/__icsFiles/afieldfile/2013/03/11/1329042_001_1.pdf

2. What Has Been Done

The government pursues food safety by the standard limits, radionuclide tests, and shipping regulations. The Ministry of Health, Labour, and Welfare (MHLW) set the standard limits of food radiation at mostly 100 becquerels per kg (Bq/kg).⁵ The sample tests on food are continued in many prefectures, and when the food exceeding the standard limit is found in certain area, the area gets prohibited to ship the same kind of food until they go through certain number of tests without exceeding the limit.⁶

The government has been also working on risk communication about food radiation. MAFF and MHLW publicize all the data of radionuclide tests results on their websites. They hold town meetings and symposiums to explain about standard limits and tests. Also, MAFF supports promotion of food produced in the area affected by the disaster.⁷

Although the marketing difficulties have been alleviated to some extent along with these efforts, some consumers still have hesitation in buying food produced in eastern Japan, especially Fukushima. According to the consumer survey conducted by the Consumer Affairs Agency (CAA) in February 2013, 50.9% of respondents answered that even when the food radiation is below the standard limit, they still want the level to be as low as possible. At the same time, less than 30% of respondents knew the key

⁵ Ministry of Health, Labour, and Welfare (MHLW), *New Standard limits for Radionuclides Radionuclides in Foods*. Retrieved from http://www.mhlw.go.jp/english/topics/2011eq/dl/new_standard.pdf

⁶ Nuclear Emergency Response Headquarters, *The Principle for the Radionuclide Test Plan and the Activation and Removal of Shipping Regulations*, 2013. Retrieved from <http://www.mhlw.go.jp/stf/houdou/2r9852000002xqoq-att/2r9852000002xqxx.pdf>

⁷ Consumer Affairs Agency (CAA), *The Policy for Promoting the Consumer Understanding of Food and Radiation*, 2013. Retrieved from <http://www.caa.go.jp/adjustments/pdf/130426honbun1.pdf>

facts such as that the standard limits are set at the level where people can stay safe eating such food all their life. In addition, only 12% answered that they get information from governmental websites. Other respondents answered that they get information from TV/radio (47.6%) and newspaper/magazine (32.5%). 36.3% answered that they do not especially get any information on food radiation.⁸ These survey results suggest that the government needs further effective ways of risk communication.

III. Solution

1. Approach

A way of risk communication this paper is proposing is to do it at supermarkets using QR code. It is, of course, necessary to publicize the test data on websites, but the survey shows that only limited people take their time to see them. CAA has been holding about 100 town meetings and symposiums in 2013, and publicized data shows that each event attracted 80 to 180 people.⁹ Although this is a valuable result, the whole number of attendants is still a very small portion of Japanese working age population: roughly 80 million.¹⁰

The place where the most of consumers visit is, of course, retail stores. The majority of consumers go to supermarkets for buying food. If there is a way to inform citizens of food radiation data at retail stores, a great number of consumers including those who would not proactively search for such information will get access to the data.

⁸ CAA, *The Survey on Consumers' Recognition of Food Radiation*, March 2013. Retrieved from http://www.caa.go.jp/safety/pdf/130311kouhyou_1.pdf

⁹ CAA, *On the Risk Communication of Food and Radiation*. Retrieved from http://www.caa.go.jp/jisin/r_index.html#M2504

¹⁰ Statistics Bureau, *Population and Households of Japan 2010*, p. 23. Retrieved from <http://www.stat.go.jp/english/data/kokusei/2010/poj/pdf/2010ch02.pdf>

The technology that makes such a thing happen is QR code. There are already some actions that use QR code to inform consumers about the food at retail stores. One example is a system called Toresaburo, which must have come from the word “traceability.” This system allows consumers to access the database of how the crop was produced by reading QR code on the package with their cellphone.¹¹ Also, Honjo Bunseki Center, which conducts radionuclide tests for farmers, provides the stickers of QR code linked to their test reports so that farmers can stick them to their products.¹²

2. Scheme

MAFF can actually create such system using the data of test results they already publicize in Excel format. What MAFF needs to do is:

- i. Extract every combination of municipality and crop from the Excel sheet, and make a webpage showing the recent test results for each combination: one page for one combination. Also, each page should randomly show a short passage of various basic facts about the standard limits and governmental nuclide tests.
- ii. Make every page accessible from the existing MAFF webpage by choosing prefecture, municipality, and crop.
- iii. Generate QR codes assigned to every URL of every page, and show them on each page so that anyone can print them. Also, put a note that writes “You can see the results of radionuclide tests in XX city, YY prefecture by reading this QR code. It links to the website of Ministry of Agriculture, Forestry and Fisheries.” so that it can be printed with the QR code.

¹¹ Noah, *The Product Outline of Toresaburo*. Retrieved from <http://toresaburo.net/products/index.html>

¹² Honjo Bunseki Center, *QR Code Stickers for Free*. Retrieved from <http://honjo-bunseki.jp/campaign/index3.html>

- iv. Make a pamphlet that requests retailers for posting QR codes on their shelves in the selling area when they get the QR codes with crops from farmers. Make it printable from the pages that show QR codes.

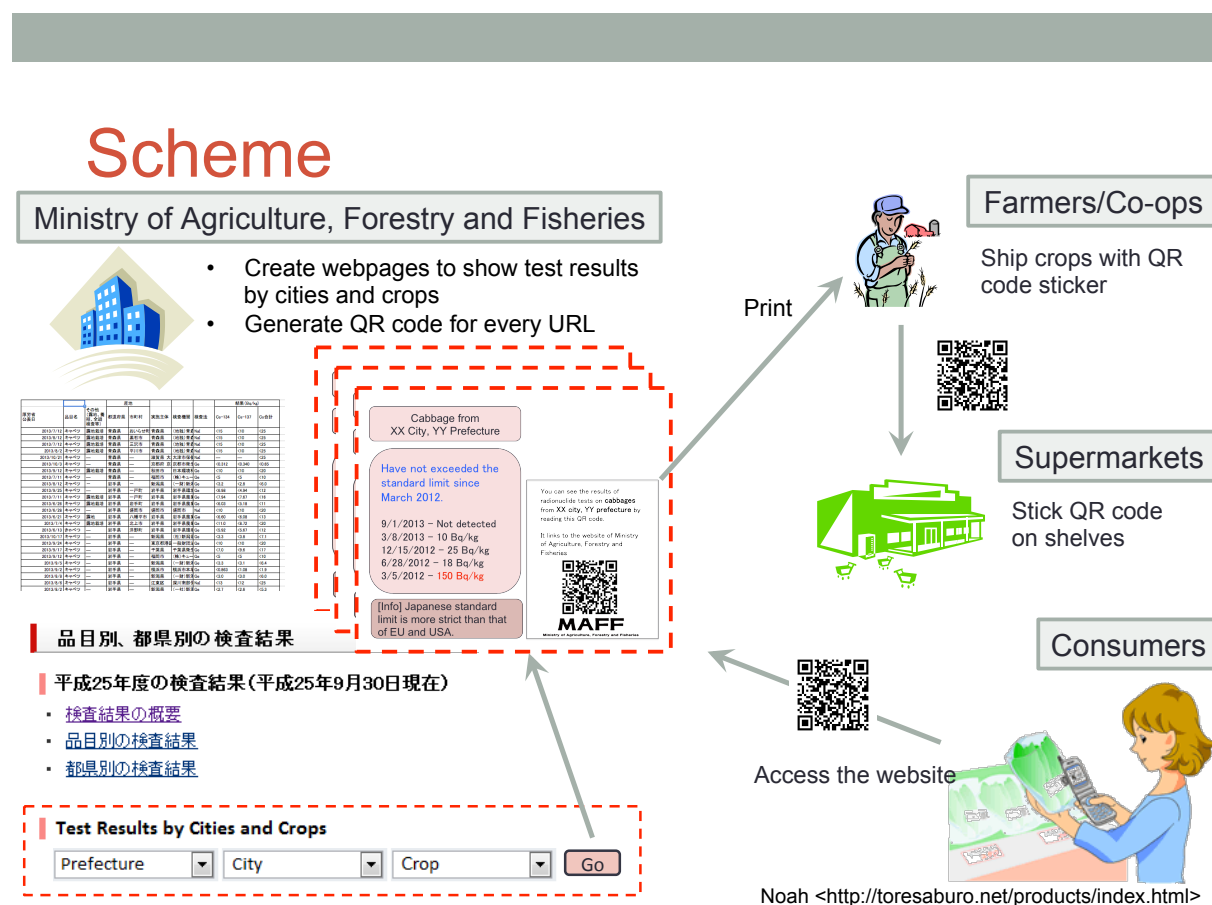
Farmers or agricultural co-ops suffering from marketing difficulties can use this system for showing consumers that their products have been passing the radionuclide tests. They can print QR codes and the pamphlet from the webpage showing their municipality and crop and put them into boxes when they pack the products for shipping. Farmers and co-ops should print the QR codes on label stickers so it is easier for retailers to post them on their shelves.

After the boxes of crops go through wholesalers and reach to retailers, retailers will find the QR code label and the pamphlet in the box. Although sticking the label on their shelves creates extra work and it is difficult to force retailers to do that, there are reasons that retailers might want to cooperate. There are retailers that try to alleviate consumer anxiety by posting the results of their voluntary radionuclide tests. It shows that there are needs of retailers to inform their customers of food radiation, but of course not every retailer has capacity to do so. Providing a way to post the information of governmental tests would respond to such needs to certain extent.

If the QR codes are posted on the shelves of retailers, consumers would see them. The consumers who does not firmly distrust the government but still feel anxious about buying crops produced in Fukushima or the prefectures around it could be interested in reading the QR code. When they read it, they would see the test results showing that the crop does not recently have the radiation level exceeding the standard limit. They would also see the short note explaining about the standard limit and tests. Such

information could affect the consumers who have rather obscure understanding of those governmental measures.

Here is an imaginary case: a mother interested in protecting the health of her child comes to a supermarket to buy a melon and finds that all the melons they have are from Ibaraki, a prefecture next to Fukushima. She could be interested in the QR code and make her decision based on the impression she gets from the webpage and desire to please her child with a melon. I believe it is possible that the information on the webpage could nudge her to buy the melon.



This system will enable the government to convey a part of the information they have been providing through websites and town meetings at a different place: retail stores. This is a valuable channel of communication in itself, and also it might change

the behavior of consumers as discussed above. The output of this system will be the informed consumers with increased access to governmental information making decisions based on scientific data. As an outcome, the system will reduce the marketing difficulties caused by the limited awareness about governmental measures.

3. Implementation

The initial resources needed to implement this system are the labor to create the webpages with QR codes. This requires some expertise for efficiently extracting the data from Excel and showing it on webpages as well as for randomly showing the facts of the standard limits and test. In order to avoid technical confusion, it would make sense to contract with consultants to make sure it works. Pamphlets can be created and posted in the course of ordinary business without major special effort.

Since such a system is something new to MAFF, it makes sense to test its effect with a pilot project first. The pilot project will need some farmers and the retailers who will lay in and sell their products in the course of pilot project. MAFF will need to create only the webpages for the municipalities and crops of participating farmers at this point. The system should be scaled up and publicly promoted if the pilot project finds that the system is manageable without too much burden on farmers and retailers and facilitates the sales of crops.

When scaling up, the system should be promoted so that farmers and retailers know about this system. MAFF has a network of distributing administrative notices through the co-ops and industry organizations it oversees, so the first step will be to request those organizations for knowing and cooperating by sending out a notice. Also,

since it is uncommon that the government uses a tool like this, it is worth trying to get the project broadcasted by the media such as TV and newspapers.

IV. Conclusion

This project originally emerged from the concern with the compensation for the damage caused by the marketing difficulties, seeking for more effective ways to collect the evidence necessary for making the compensation guidelines explained in this paper. Although the concern was based on my first-hand experience, it seemed not easy to defend the necessity of project given the fact that a new version of comprehensive guideline was created in 2013. I could argue that such a system can be used for other incidents in future, but I found it difficult to make it sound compelling to invest on a system for the incidents that nobody would know when and in what form they would emerge.

With such a feeling in mind, I had a chance to speak with Mr. Azby Brown who has been volunteering for Safecast, which has been mapping radiation levels in Japan after the disaster.¹³ Although we did not go deeply into the compensation issue, the conversation with him about radiation monitoring was inspiring. He pointed out the government's communication failures such as publicizing the data partially or without clear narrative, which has been raising public distrust despite its effort to collect and deliver correct information. It made me turn to the possibility of addressing on-going marketing difficulties itself by changing the way government communicate radiation data.

¹³ Safecast, *About Safecast*. <http://blog.safecast.org/about/>

I shared MAFF's webpage disclosing the radionuclide test data in class, and found that there is a room for improvement in terms of data visualization. As I started to think about improving the design of the webpage, I found CAA's survey data reporting that only 12% of consumers see governmental websites for radiation data. This data made me think that I should come up with the way the government can really convey its data to consumers, and the idea of using QR codes at supermarkets came to my mind. The conversation with Ms. Naoko Mori in GS1 Japan, the institution that works for international standardization of product codes, made me convinced that this system is technologically feasible and will not cost so much money.¹⁴

Although this system would not determine consumers' decisions nor address the consumers convinced that they cannot trust the government, it would at least increase the access to the government's data. That is a valuable step in broadening the number of people the government can reach out in risk communication. I hope that the QR code will connect consumers, producers, and the government in order to alleviate the impact of Fukushima disaster.

¹⁴ GS1 Japan, *History of GS1 Japan*. Retrieved from <http://www.gs1jp.org/reference/overview.html>