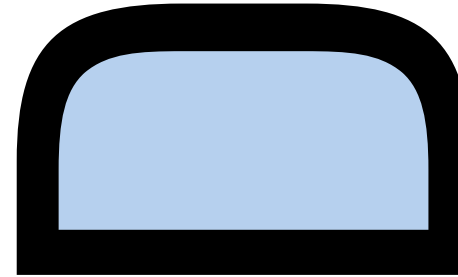


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➔ **Traceability System for Disclosure —  
A Case of Consumer Empowerment  
Strategy**

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### **Abstract**

*This paper argues the architecture of information-disclosure traceability systems, consisting of the information-disclosure system from the manufacturer to the consumer and the information-disclosure from supplier to manufacturer. Through this research, we could confirm the following things: Firstly, some items, e.g., allergens, genetic-control, could merit a supplier on the information-disclosure from supplier to manufacturer. Secondly, consumer evaluates information-disclosure, associating with consumer trust.*

## **1. Introduction**

This paper constitutes part of a research series aimed at resolving two issues facing information-disclosure-model traceability systems. Firstly, there is the issue of what design method should be adopted for information-disclosure originating with manufacturers and aimed at consumers. Secondly, there is the issue of designing information-disclosure models that start with suppliers and are aimed at manufacturers.

For the paper, a study of a traceability system at Ishii Foods Co., Ltd. (referred to hereafter as “Ishii Foods”) was conducted. This company is a processed foodstuffs manufacturer that is attempting to establish a competitive advantage via information-disclosure to consumers. The paper is composed of six sections. Sections 1 and 2 give some background to the heightening of social demand for traceability. These sections also give some consideration to information-disclosure theory.

Sections 3 and 4 report on research conducted to investigate whether any value has been created by the Ishii Foods traceability system. Specifically, Section 3 reports on research among suppliers, they being the source of much information disclosed to consumers. This section considers how suppliers evaluate the Ishii Foods information-disclosure practices. It also asks whether suppliers recognize any incentive towards contributing to the information-disclosure practices. Meanwhile, Section 4 reports on consumer awareness research that was conducted in order to find any indication of value created by information-disclosure converting into economic gain.

Section 5 reports on research regarding the “privacy”, a controversial issue in recent years that is a by-product of the steps taken to design systems that don’t undermine consumer trust. This section also offers some user evaluation of the Radio Frequency Iden-



tification (RFID) based admission ticketing system implemented at an event. It also focuses on some suggested research and positioning implications of RFID introduction into food industry traceability systems, an area in which two-dimensional data codes have been widely used. This focus, however, goes beyond foodstuffs and considers issues in terms of the introduction of such technology into consumer packaged goods.

Finally, Section 6 offers some conclusions.

## 2. The Theory of Traceability for Information Disclosure

Since the Japanese BSE outbreaks in of 2000 and subsequent revelations regarding deceptive labeling practices, there has been a strengthening of social needs regarding issues of food safety and food peace of mind. At the policy-making level within the Japanese Government as well, implementation of traceability has been promoted by “e-Japan Strategy II”, with improvements implemented through measures such as proposed legislation on beef traceability.

When considering food peace of mind and food safety, a distinction must be made between the two elements. “Peace of mind” is an issue of consumer psychology, while “Safety” is an issue of food hygiene. In business, these elements are divided into separate activities. Information-disclosure is used to secure consumer peace of mind. Meanwhile, Quality Control (QC) is used to guarantee food safety. The system that ties these divided business activities together is traceability. It is comprised of information-disclosure and quality control systems. Traceability identifies products and makes it possible to trace backwards and forwards

through food chain information as required. When a safety issue is recognized, if the production history information can be traced backwards, the company can quickly identify the production lot, investigate the cause of the problem and take any corrective action. If distribution information is clear, by tracing forwards just those products associated with the problem lot can quickly be recalled. The focus of this paper is information-disclosure. This is a subject not just limited to the foodstuffs. Rather the social trends that desire a social system incorporating safety and peace of mind are positioned within a wider context of ensuring better accountability and greater transparency. “Accountability” is a compound formed from “accounting” and “responsibility”. Originally it was understood to mean “liable to be called to financial account”. Accountability aims to win trust. Information-disclosure is a means by which to achieve better accountability.

For companies taking up information-disclosure in order to create trust, the idea of “Consumer Empowerment” is extremely important. Information is a source of power. In the past, the balance of power lay with companies at the expense of consumers. Due to the penetration of the Internet, however, consumers have become more able to access information. This has resulted in the existing balance of power collapsing, forcing businesses to seek new relationship forms with consumers. Companies are actively disclosing information that vouches for quality assurance, information including ingredient data and temperature management. This represents an effort by companies to eliminate the asymmetric informational imbalance that has existed between them and consumers. Such developments are one approach for building trust relationships with consumers. This strategy has been called the “Consumer Empowerment Strategy.” (Kokuryo et al, 2003)

Within the concept of accountability, there are elements such as “responsibility for explanation” and “responsibility for results



of one's actions." The application of the concept of accountability has also been expanded to encompass environmental and social responsibility. In order to fulfill their responsibilities, companies now bear the building and operating costs of infrastructure such as customer support and factory emission systems. Similarly, the question of how to cover the cost of traceability has become an issue for companies.

It is possible to theorize that reductions in business costs and increases in value may cover the traceability costs expended to enable information-disclosure.

Let us first consider reductions in business costs. Business activities are a chain of values, and any inputs into the chain are products from suppliers. In order to reduce costs, cooperation optimization with suppliers is necessary (Porter, 1985). If the information disclosed to manufacturers represents an increased cost for suppliers, this increase may be reflected in the unit price at which inputs are sold to the manufacturer. Two issues are thus presented to the manufacturer. Firstly how do they make "information-disclosure" into an incentive in the eyes of suppliers? Furthermore, how do they design an information-sharing system that does not lead to an increase in supplier costs?

Let us next consider an increase in value. "Value" is an amount that consumers will willingly pay in return for the products representing the output of business activity. In order to increase value, a strategy is required to increase consumer evaluations of information-disclosure.

In Sections 3 and 4, the case of Ishii Foods will be used as an example to highlight problems confronting manufacturers. Section 3 reports on research among the suppliers who cooperate with Ishii Foods vis-à-vis information-disclosure. Section 4 comprises an interim report on consumer research.

### 3. Supplier Evaluation of Information Disclosure

In the case of a manufacturer adopting a "Consumer empowerment strategy", and configuring and operating their traceability systems for information disclosure, the suppliers providing base ingredients to the operation are newly required to disclose to the manufacturer information regarding base ingredient quality in each delivery lot. In this section, the above-mentioned influence of corporate activities impacting suppliers will be examined from the product cost and product appeal perspectives. The influence of "Consumer Empowerment Strategies" on the manufacturer-supplier relationship vis-à-vis the value chain will also be examined.

#### 3.1 Data Sampling

The survey targeted a company adopting a consumer empowerment strategy, Ishii Foods (<http://www.ishiifood.co.jp/>), and its suppliers. In addition to being famous for its "Ishii Meatballs," this company also manufactures a range of processed meat products including meatballs and hamburgers. Within the foodstuffs industry, it is a medium-sized operation with sales of approximately JPY12.5 billion (first quarter, FY2003). From 1997, in order to try to differentiate itself from competitors, it established a policy of using no additives whatsoever at the manufacturing stage. It also promotes this additive-free preparation. In 2000, the company introduced a traceability system using two-dimensional data codes. In 2001, it opened an information-disclosure website entitled "Open Ishii". This site allows consumers to find information on topics such as product ingredients and potential allergens.

The survey was conducted among seventeen companies who supply the base ingredients to Ishii Food's meatball production



division (the chilled meat company unit). Valid responses were received from thirteen companies (a valid response rate of 75%).

**3.2 Information Disclosure Performance from Suppliers to the Manufacturer**

The survey on information-disclosure performance from suppliers to the manufacturer was conducted on a battery of eleven items. These items can be broadly classified into two groups: The first group is information whose disclosure is mandatory under law. This is information dealing with additives, the usage purpose of such additives and sell-by dates. The second grouping of ten items is information not requiring disclosure by law. Rather it is disclosed voluntarily by the companies concerned. What consumer empowerment strategies are interested in is this latter grouping. Namely, information disclosed voluntarily by the companies.

	All of product line	Part of product line	None	Not answered
Additives	13	0	0	0
Purpose of using additive	13	0	0	0
Warranty period	13	0	0	0
Allergy-causing ingredients	11	1	0	1
Ingredient	11	2	0	0
Process	10	3	0	0
Genetically-controlled ingredients	10	1	1	1
Additive manufacturer	9	2	1	1
Ingredient manufacturing place	8	5	0	0
Recipe	6	5	1	1
Ingredient manufacturer	4	6	3	0

*Table1: Current Situation of Information Disclosure*

For the three items requiring mandatory disclosure, all suppliers complied with the obligation. On the other hand, few suppliers disclosed all information on recipes and ingredient manufacturers

(their information disclosure performance was low). It was also interesting that the disclosure performance was high on “Allergy-causing ingredients.” This item is one on which consumers have shown growing demands for information-disclosure.

**3.3 Measurement of Disclosure Benefit for Suppliers**

From this Section onwards, consideration will be given to whether or not voluntary information disclosure on the part of suppliers is actually beneficial to the suppliers. Currently, linkages are seen between information-disclosure from suppliers to manufacturers, and information-disclosure desired by consumers from the manufacturer. Indeed, such linkages seem to imply the following: Firstly, information needs to be disclosed due to social responsibility. Secondly, information disclosure itself needs to be mandatory.

However, it can be said that these implications are based on the single assumption that information-disclosure carries no benefit for the suppliers. However, models showing that information-disclosure actively brings benefit have long existed. These show that disclosure of social information, such as environmental activities and local participation, does have a positive effect on corporate profits. To cite U.S. research, when the relationship between corporate disclosure and profitability was studied using the annual reports of Fortune 500 companies over ten years (1964 to 1974), the results showed that companies with high disclosure returned much higher profits than companies with low disclosure (Abbot and Mosen, 1979).

So, by demonstrating clearly that information-disclosure from supplier to manufacturer is beneficial to the supplier, can we build a model for information-disclosure as a tool for suppliers to differentiate their own products? Using this as a background, the authors arrived at the following hypothesis: “Regarding voluntary disclosure, the supplier benefits from disclosure to the manufacturer”.



**3.4 Correlation Between Disclosure Performance and Benefits**

Two axes were tested for expressing the benefits of information-disclosure. One was “Positive when the supplier promotes the product”. The other was “Negative when the supplier promotes the product”. For this test, the benefit to the supplier of disclosing all base ingredient information to the manufacturer (a total of six items) was researched. The breakdown of six items was as follows: 1. Those items with high disclosure performance (mandatory items), namely “Additives” and “Purpose of using additives”. 2. Items such as “Genetically controlled products” and “Allergy causing ingredients” that have a growing consumer disclosure demand. 3. Items such as “Recipes” and “Ingredient manufacturers” who exhibit low levels of disclosure performance.

**3.5 Result (1): Influence on Product Promotion**

	Affecting Product Promotion					
	Positive	A little positive	Even	A little negative	Negative	Not answered
Additive	6	3	2	2	0	0
Additive Purpose	5	1	3	0	2	2
Genetic	6	1	2	1	0	0
Allergy	5	2	3	0	0	1
Recipe	2	0	4	0	0	0
Ingredient manufacturer	2	0	2	0	0	0

Table 2

For items with high disclosure performance and items with growing consumer disclosure demand, many suppliers reported a “Positive” influence on product appeal. On the other hand, for items with poor disclosure performance, many suppliers reported an “Even” influence on product appeal.

**3.6 Result (2): Influence on Product Cost**

	Affecting Product Cost					
	Negative	A little negative	Even	A little positive	Positive	Not answered
Additive	0	3	4	1	4	1
Additive Purpose	2	4	0	2	3	2
Genetic	0	2	2	2	3	1
Allergy	0	3	2	2	3	1
Recipe	0	1	2	1	2	0
Ingredient manufacturer	0	1	0	1	2	0

Table 3

Regarding items with high disclosure performance (mandatory items), supplier responses concerning the influence of disclosure on product costs were divided between a “Negative” segment and a “Positive” segment. On the other hand, for items with growing disclosure demand from consumers, responses indicating a “Positive” influence on product costs were noted. Regarding items with poor disclosure performance, a similar response indicating “Positive” influence on product costs was seen.

**3.7 Result (3): Influence on Product Promotion and Product Costs**

For information disclosure related to the growing consumer demand items of “Genetically controlled product” and “Allergy causing ingredient” a response indicating a “Positive” influence on both product appeal and product costs was seen. In other words, for these two items it can be said that the hypothesis regarding “the supplier benefiting from disclosure to the manufacturer of items included in the voluntary disclosure category” was upheld.



## 4. Consumer Evaluation of Information Disclosure

For the manufacturer, one of the issues when establishing and operating a traceability system for information-disclosure is supplier cooperation. These entities represent an input source for the information disclosed. This subject was addressed in Section 3. Another issue of research is the output side of the equation. Namely, those consumers who use information-disclosure services. With the cooperation of Ishii Foods, consumer research was conducted from the end of July through August, 2004. This section highlights the results of this research. Subjects covered included consumer evaluations of manufacturer information-disclosure, their awareness and use of the information disclosure website, their acceptance of higher prices for information items, and consumer checking products at time of purchase or for product safety confirmation.

### 4.1 Research Outline

The research objective was to clarify the following:

- Consumers' evaluations of information-disclosure and the permissible price premium they would pay for products with information-disclosure.
- Information items for processed foods that dictate purchase habits and peace of mind.
- The level of awareness and level of use of Ishii Food's information-disclosure website.

Questionnaires were sent by post to 1,000 people randomly selected from Ishii Food's Member Club (200,000 members). Of the responses received during the fieldwork period (July 30 to

August 13, 2004), 591 valid responses were tabulated. The results were as follows:

### 4.2 Source of Peace of mind

First of all, on a 5-point monadic scale in terms peace of mind vis-à-vis general food products, consumers were asked about what types of things, if implemented, would be effective. The results were as follows: The highest combined positive evaluation ("Offers peace of mind" and "Somewhat offers peace of mind") of 74% was recorded by "Examination or certification by a consumer body or NPO". This response highlighted the involvement of third-party organizations. In second place at 71%, was "Products for which the food product manufacturer has disclosed information". This was followed in third place by "The existence of laws". At 61%, however, this response cannot be said to instill absolute peace of mind among consumers. Put in another way, it might be an indication of consumer psychology being uncertain that laws would be complied with by various parties.

Positive responses towards "Products sold by large supermarket chains" remained low at 25%, with the "Cannot say either way" response for this item recording 63%. Rather, more people found peace of mind in well-known manufacturers (40%), and manufacturer brands tended to be stronger than distributor brands. Peace of mind ascribed to "Products sold by co-ops" (47%) was higher than for supermarkets and at the same level as manufacturers. It was also on a par with "Introduced in a TV program or newspaper article" (47%). "Word of mouth" was 55% and consumers felt this offered more peace of mind than manufacturers.

### 4.3 Information Disclosure Evaluation and Price Premiums

Eighty-three percent (83%) of people valued the introduction of information-disclosure. Furthermore, their peace of mind towards



companies who released information were high at 72%. However, when it came to the level of faith placed in the information released by companies, in addition to the 40% of consumers who gave positive responses, nearly 50% responded “Cannot say either way”. This indicated some the uncertainty regarding information sent out by companies.

Of the people who said they would like to buy products from companies that release information (60%), 40% actually purchased such products often. In contrast, all negative responses were low at approximately 10%. On the level of price premium permissible for products that disclosed information, approximately 60% of consumers responded that they would pay between 5% to 10% more for such products. In contrast, some 26% showed no intention to pay any premium.

Caution must be taken against raising prices based purely on information-disclosure. However, on store shelves if products disclosing information and products not doing so are placed side by side, if consumers were able to choose, they would possibly select the product of the company disclosing information if pricing were the same or slightly higher.

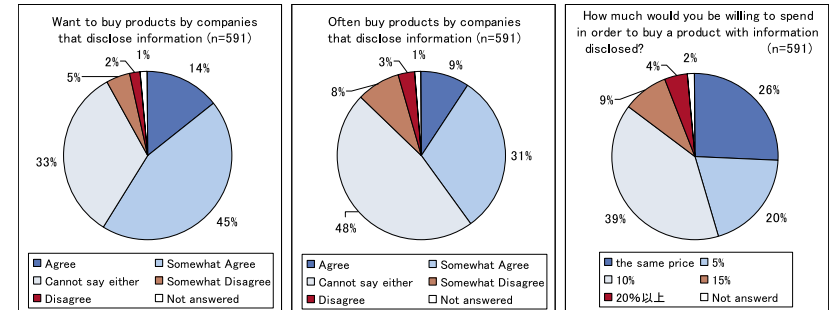


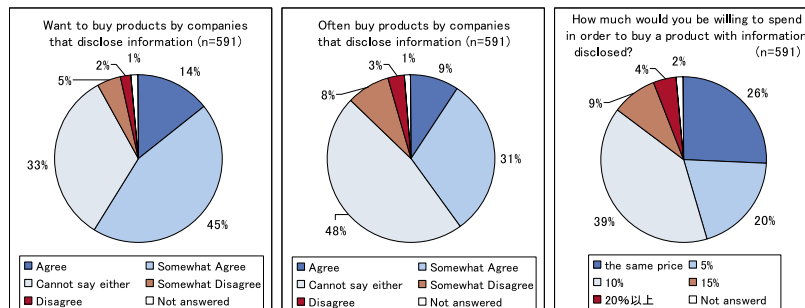
Fig. 1

#### 4.4 Items Assessing Safety

The top three responses regarding the most important information when purchasing were “The sell-by-date” (75%), “The base ingredients” (73%) and “The additives” (70%). In parentheses is the percentage of the total respondent base who selected these items in either first, second or third place. The percentage who selected “Allergens” in one of the top three places was only 5%. With the exception of “Price” (3%), “Allergens” recorded the lowest response rate in terms of being checked as an indicator of safety. The effect of price signaling, i.e., high price equates to high safety, was not evident.

#### 4.5 Awareness and Usage Levels of Ishii Food’s “Open Ishii” Information Disclosure Website

Twenty-eight percent (28% or 166 people) of respondents were aware of the information-disclosure website. Of these some 32% (52 people) had used the site. Out of these 53 people, 50 had used it via their PC, while 2 had used it via their mobile phone. It is possible that the reason for low usage via mobile devices was non-awareness of this new service (only commenced in







December 2003). Based on member awareness and usage levels, it can be assumed that general consumer awareness and usage levels are yet to progress either. Of members who showed awareness, 13% had told someone about the service. However, because few expectations can be held regarding the effectiveness of information spread by word of mouth, some thought should be given to PR activities.

#### 4.6 Motivations for/and Advantages of Using the “Open Ishii” Information Website

Less than 27% of people were motivated to use “Open Ishii” to find out specific information such as production of base ingredients or allergens. More than 80% were curious to “know what the site was like”.

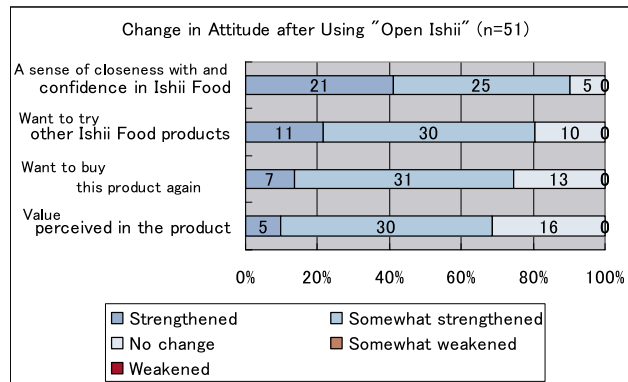


Fig. 2

When respondents were asked about any change in attitudes as a result of using the site, over 70% indicated a positive change in attitude towards both Ishii Foods and its products. These who felt a sense of closeness and confidence in the company also showed

some intention towards becoming repeat purchasers. After using “Open Ishii”, the number of people reporting a negative change in attitude was zero. Although the sample size (n=51) was small meaning that some questions remain regarding its validity, there seemed a strong probability that information-disclosure sites contributed to increases in customer loyalty.

## 5. Respecting Privacy of Consumer Perspectives

Although in Japan there has been no surfacing of an opposition movement (e.g. consumer groups) with respect to RFID, in terms of using RFID in applications that provide the points of contact with consumers, it appears that many companies are concerned about privacy issues and they are becoming especially cautious.

In order to design a valid application, it is first necessary to identify those information items that consumers recognize as private, along with their concerns and their expectations. To achieve this, the authors distributed RFID-based IC chip passport admission passes to people entering “Networld+Interop 2004 Tokyo”, one of the biggest information technology events in Japan (attended by more than 140,000 people). A survey on privacy consciousness of these people was conducted. Out of approximately 1,200 response samples received over the course of the event, 997 valid samples were tabulated and the following results obtained.

- On one hand, users valued the convenience of not having to wait in line to enter the event or present their business card at display booths. On the other hand, they were uneasy about their own information being handled by a company without



their knowledge. Specifically they did not like the idea of not knowing when information would be scanned.

- Such unease had less to do with the RFID technology itself and more to do with major concerns regarding pre-existing corporate information management practices. For example, the misappropriation of personal data for purposes other than the original purpose, and information leaks due to poor security.
- Users had high expectations for RFID in terms of the information it could offer customers. This was the next-most popular response after its ability to make inventory control and goods distribution more efficient.
- More than 50% of people considered information on business cards; company names, addresses and telephone numbers to be private. For means through which the individual can be reached directly, over 70% felt that e-mail addresses were also private. The privacy awareness for mobile phone numbers was over 80%.
- Thirty percent (30%) considered serial numbers on disposable cards as private, while nearly 80% of people considered serial numbers on reusable cards as private.
- From the “open answer box”, unease was voiced about such things as not having prior notification, not knowing the objective for a cards’ use, and not being able to check if cards were being scanned normally or erroneously.

At this event, we converted the Privacy Guidelines of Japanese Government, and the EPC Global Privacy Guidelines, into some realized forms. For example, large notification boards were put up near gate-type RFID Readers and at various other areas at the event. Nevertheless, in a comment field, several persons wrote that explanations had been insufficient or that they couldn’t recognize any notifications.

Based on the results, the following points were noted regarding the design of systems that constitute the point of contact with the consumer. Firstly, it is necessary to find more effective means to notice objective of information usage. Furthermore, ways need to be found that appeal to peoples perceptions vis-à-vis their desire to know scan status via lights, sounds or other stimuli.

This survey investigated user evaluation of the RFID admission ticket system at the event. As such, it has limited scope for making generalizations.

It focused on some suggested research and positioning implications of RFID introduction into food industry traceability systems, an area in which two-dimensional data codes have been widely used. The focus, however, went beyond foodstuffs and considered the issues in terms of the introduction of such technology into consumer packaged goods. It considered how to design a system constituting the interface/contact point with the consumer if introducing RFID.

## 6. Conclusions

There are two main questions concerning information-disclosure traceability systems. The first is the design of a method of information-disclosure from the manufacturer to the consumer, and the second is the design of a model of information-disclosure from the manufacturer to the suppliers (assemblers).

From this research, it was confirmed that the benefit recognized by suppliers of disclosing information to the manufacturer differed depending on the item being disclosed. For information consumers are demanding be disclosed, such as allergens or genetic-control information, suppliers tend to regard the disclosure benefit as



high and the damage of disclosure as low. On the other hand, with different levels of perceived benefit for different disclosure items, the disclosure of all information relating to ingredients, depending solely on voluntary disclosure from the supplier to the manufacturer, was shown to be difficult. A fresh incentive design is necessary in this respect.

Consumer evaluations of information-disclosure were high. This can be said to be linked to customer trust. However, at present actual consumer needs for checking disclosed information are not high. It would seem that information-disclosure systems are actually used for more for novelty value and to try them out. For companies, it seems necessary to pinpoint the information needs of consumers to prevent over-investment in systems. Information-disclosure is a new social undertaking and in the future, it will be necessary to study in greater depth how to disclose the desired information.

In the question of what kind of system to design, in order to ensure the right of consumers to control their personal information, privacy considerations must not be omitted. An important factor is related to implementation from the viewpoint of the consumer, and this equals fulfilling the responsibility to explain and the responsibility for results, i.e., accountability. In addition, ensuring the security of information, not only in the RFID system forming the interface with consumers, but also in the database system forming its infrastructure, user trust must be assured.

This research reports the results of a survey of suppliers of a given food products manufacturer, a survey of consumers, and a survey of privacy awareness of users of RFID admission passes at an event, and as research into information disclosure- model traceability systems it has limited scope for making generalizations. Based on this research, it is intended in the future to follow up with a survey on a different company within the same industry,

a survey on a different industry, and a survey on awareness of privacy issues at an actual commodity distribution site.



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