
Framework for handling personal data: analysis of buying information by questionnaire

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Abstract: With the development of the latest telecommunication technologies and their pervading applications, the harvesting of personal information that we call 'big data' has recently exploded and is being dispersed throughout society. While companies make use of these data for marketing purposes and governments also discuss their application to social systems, individuals not only find them difficult to access, but also do not have any means of benefiting from their own data, even though they generate the data themselves. In this paper, we propose a framework that enables individuals to use their personal data and to receive a proper reward from companies that have access to it. In particular, we focus on buying information and how the results of a questionnaire survey on handling buying information that was conducted to investigate the resistance that users feel to allowing companies to use the data to obtain more rewards within this framework.

Keywords: personal data; life log; big data; buying information; self-control method; digital signage; telecommunication technologies; questionnaire survey; personalised service; POS systems.

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1 Introduction

Android phones and iPhones have recently become an integral part of our lives (Ministry of Internal Affairs and

Communications, 2012a). Irrespective of age or sex, most people own a smartphone and they use many kinds of applications that require the GPS sensors or communication functions that are included in the handsets. With the

development of information communication technologies and their pervasive applications, the gathering of personal data that is recorded automatically, such as buying information and action history, has exploded and is being dispersed throughout society.

The information that is collected includes personally attributed data such as address, birth, title and so on, along with personal history data such as buying information, action history, food history and so on.

Personal data that we call 'big data' is attractive not only for companies to use for marketing purposes and for providing a new personalised service, but also for governments. For instance, the Japanese government has offered a 5.3 billion yen subsidy in the last year (Ministry of Internal Affairs and Communications, 2012b). JIPDEC (Japan Information Processing Development Centre, 2012), which is a non-profit organisation that was established with the aim of enhancing the development of the economy and the wider community, offers many services for personal information protection and information security.

However, it takes a long time to build social systems and individuals have difficulties in accessing this data. They usually do not have any means of benefitting from their own records, even though they generate the data themselves.

In the present study, we aim to develop a framework for handling personal data to give the power of personal data back to individuals. Companies could also share the data freely across other companies, if the individual allows them to use it. Currently, most companies hold only a limited amount of personal data that is collected by each company. Therefore, we need a new framework in which the benefits to both individuals and companies can be balanced.

In this paper, in order to realise this framework, we focus on purchasing information that is obtained automatically using the point of sales (POS) system (Nakagawa et al., 2012) that was developed in our previous work. In this system, when the customer uses an IC card, the POS system sends the purchase information to the server and the customer can use the recorded data for application to household accounts. In particular, to propose a self-policing method for our own buying information, we discuss which is the best available method based on a questionnaire survey.

The structure of this paper is as follows. The next section shows the current situation regarding personal data. In Section 3, three problems that we recognise in the current situation are shown and a framework to solve them is suggested. In Section 4, the paper shows a structure that is able to handle personal data easily by focusing on purchasing information. In Section 5, we explain the questionnaire-based survey that was conducted to investigate the handling of purchasing information within this framework, especially the resistance that a user feels to allowing a company to use their information to obtain more rewards and also the results of the survey. In Section 6, the paper introduces the concept of a new digital signage system that displays personalised data based on the proposed framework.

2 Market trend and related works

These days, not only companies but also national governments are engaging in lively exchanges of opinions regarding 'handling of personal data' (Purtova, 2009). Moreover, there are many studies that deal with personal data and each country has national strategies and policies of its own (OECD, 2011). In this section, we introduce hot market trends and related works and discuss how they differ from our study.

2.1 World situation

The World Economic Forum reported on *Rethinking Personal Data: Strengthening Trust* in 2012 (World Economic Forum, 2012). They discussed how the potential value of personal data could be unlocked. But they only focus on the benefit to companies and organisations. Of course, they do care about the benefit to individuals, but this is not their first priority.

In the EU, the commission proposed the EU legal framework on the protection of personal data in 2012. They said "Everyone has the right to the protection of personal data". This is a very strong law and many countries within the EU are compelled to obey it. But in this case they focus on only benefits to the individual, so again, there is not a balance between the needs of business and of individuals.

In the UK, BIS (Department for Business, Innovation and Skills) opened new projects such as Midata (Department for Business, Innovation and Skills on GOV.UK., 2014) in April 2011. This is part of a wider consumer empowerment strategy. The aims of this project are;

- 1 to encourage more private-sector businesses to release personal data to consumers electronically
- 2 to make sure consumers can access their own data securely
- 3 to encourage businesses to develop applications (apps) that will help consumers make effective use of their own data.

Actually, many companies (e.g., Google, British Gas, Lloyds TSB and O2) are joining this project. It is very similar to our framework, but they only focus on how to access data which 'the company holds'. They do not mention how individuals 'could download their own data' and 'hold it by themselves'.

In the US, there has been some concern that government organisations (especially NSA) have asked IT companies to collect personal data without any personal permission. Therefore, the government released a report titled 'Consumer data privacy in a networked world' (Executive Office of the President, 2014). This stated that consumers have the right to exercise control over what personal data organisations can collect from them and how they use it. This is more focused on consumers than previous privacy frameworks. But the most important aspect is to find a balance between companies and the individual.

2.2 Market trends in business

In business, there are many companies in the world that use personal data. For instance, in the Japanese case, this includes Blukai, Tesco, Personal inc., Infochimps, Demdex and so on (JEITA, 2013; Ministry of Economy, Trade and Industry, 2012; OECD, 2012). These companies use personal data to provide many services that are intended to pass on benefits to the individual. For instance, in Japan, McDonalds and Zennishshoku give some discount tickets and information on basement merchandise to customers by using and analysing a customer's personal information. But unfortunately, the benefit for customers is not sufficient and there is also no reasonable way of giving our personal data to companies while keeping it under our control.

2.3 Related works

There are many related works that focus on personal data.

For instance, there are some developed systems that are able to store personal data such as movies and pictures automatically (Mann, 1998; Aizawa et al., 2004; Kim et al., 2008) and a mobile e-invoice system (Chang et al., 2014) can manage the consumer's buying information on a website. Consumers manage their point-collection card, their buying information and automatically match the uniform-invoice prize winning numbers. It has become much easier to collect personal data automatically than before and we can also manage and enjoy collecting it much more easily than before.

In addition, there are some systems that enable the individual to manage their own personal data. Personal information management agent (PIMA) has enhanced both human-computer interactions and application integration for PIM on mobile devices (Zhou et al., 2012). There is greater perceived usefulness, ease-of-use and efficiency when using PIM on mobile devices. the Memoria-Mea framework (Francesco et al., 2013) aims to develop a PIM for managing multimedia content by supporting the user in searching, browsing and visualising 'multimedia memories'. This system is based on personalised information indexing and classification techniques centred around a rich semantic model. This project could combine semantic technologies and interactive visualisation techniques for PMI. It is more efficient and hence more useful to us. The system known as open PDS by MIT allows individuals to collect, store and give finely-controlled access to their own data while protecting their privacy (Montjoye, 2012). It provides a secured space. Therefore, individuals can manage and control the flow of data much more safely than before. PD3M is a new approach to D3M that is designed to empower the individual to make informed choices (Duggan, 2014). Based on personal data, we can easily make decisions; we can live more easily and be more useful.

With these systems such as PIMA, the Memoria-Mea framework, open PDS and PD3M; individuals are able to use or manage their own data much more easily and safely than before.

They recognise and discuss consumers' rights to ownership of their personal data and the importance of an individual-oriented information privacy model (Hoffman et al., 1999; Wang et al., 2012). However, these works only discuss the collection of information, such as which device to use or how to manage it. They do not refer to the need to obtain reward or how to balance the benefits for both individuals and companies.

In this paper, we aim to suggest a framework for handling personal data to give the power of personal data back to individuals with rewards on each investment. And also, at the same time, the company can disseminate it freely and across companies if the individual allows them to use it. We need a new framework that can balance the benefits to both individuals and companies.

3 Problems and solutions

In this section, we discuss three problems that we are able to recognise in the current collection of personal data and suggest a framework to solve them.

3.1 Problems

There are three problems to solve under the current situation:

- we do not figure all of our own personal data out and also there is no reasonable way of controlling it
- there is no reasonable way of giving our personal data to companies under our control and we are also not able to receive a proper reward from companies
- the companies can hold only limited personal data that is collected by each company.

For many years, companies have used personal data as 'customer data' to better understand individual consumers and have used it for marketing without any permission from each individual. However, individuals not only have difficulties in accessing the information, but also do not have any means of benefitting from their own records, even though they generate them. In fact, according to previous research (Nakagawa et al., 2012), many people are eager to understand and handle their personal data by themselves.

On the other hand, the companies can hold only limited personal data that is collected by each company. In Japan, if they can identify an individual from the data, it is forbidden by law to share personal data among companies. However, companies want to know the whole of the data for marketing purposes. Therefore, sometimes they edit it to avoid identifying an individual and then sell or buy it, although this is offensive to some individuals. In fact, we can see this on the headline news throughout Japan.

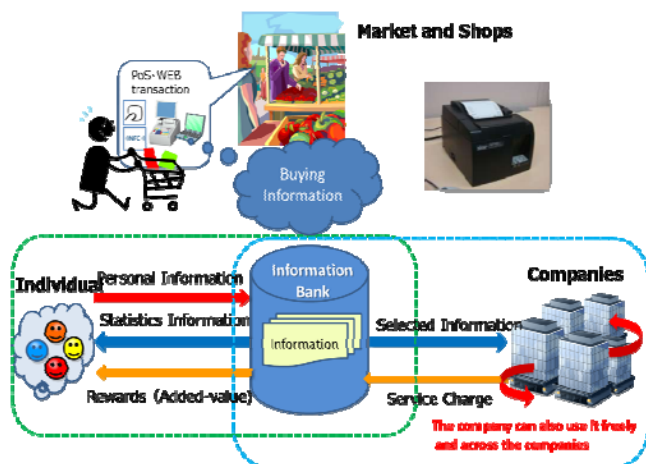
Therefore, we aim to suggest a framework for the handling of personal data to give the power of personal data back to individuals (Kanasugi et al., 2009). Also, at the same time, the company can use it freely and across companies if the individual allows them to use it. We need a

new framework that can balance the benefits to both individuals and companies.

3.2 Solutions

To solve these three problems, we suggest the framework as below for handling personal data to give the power of personal data back to individuals. And also, at the same time, the company can use it freely and across companies if the individual allows them to do it.

Figure 1 Overview of proposed framework (see online version for colours)



In this framework, individuals can hold their own personal data in an Information Bank and they are able to manage and access it whenever they want to. The Information Bank is a secured space and individuals cannot change their own data by themselves, so personal data can be saved more securely. Also, individuals can receive new services, such as household account applications, that can manage how they spend their money and so on. At the same time, the company can also use it freely and across companies if the individual allows it.

This is a new framework that can balance the benefits to both individuals and companies.

4 How to handle personal data

In this section, we discuss a structure that is able to handle personal data easily by focusing on purchasing information.

4.1 Structure

In our previous study, to solve the first problem we studied a system that could obtain personal data with special focus on purchasing information (Nakagawa et al., 2012). We made a prototype of a household account application to obtain buying information automatically from POS systems by using a network and we evaluated its marketability and effectiveness. In the household account application, we do not see raw data; we can see well-edited data to help it to be understood more easily.

In this paper, to attempt the realisation of this framework and to solve the second problem, we studied a system structure whereby companies are able to use personal data that individuals have selected under their own control.

To build this structure, there are two points to consider:

- individuals can select which data they will provide and which companies will be able to use it
- individuals who control their data and allow companies to use it can receive more rewards than others who do not want to participate in this framework.

With these two points in mind, we discussed how to handle buying information.

4.2 Considerations about buying information

Where and when did you buy? What kinds of things did you buy? This information is so-called 'buying information' and we can see these on our receipts. There is much information on receipts in Japan, as below: the product that you bought, the company who made it, the place where you bought it, the time when you bought it, the calories in the meal that you ate at the restaurant and so on. There is a great deal of personal information.

To be able to select data without any resistance and to allow its use to obtain more rewards within this framework, we conducted a research survey on how to handle buying information. We especially wanted to know:

- Is there any difference by individual?
- What kind of buying information does the individual want to be kept secret?

5 The questionnaire survey on handling buying information

In this section, we explain the details of the questionnaire survey on handling buying information that was conducted to investigate the resistance to using it for obtaining more rewards within this framework.

5.1 Overview

As we have already said, we conducted a research survey. Table 1 shows the overview of this questionnaire survey.

5.2 Questionnaire

In the questionnaire, we asked individuals whether they may be prepared to give their buying information to different types of companies under different circumstances.

Under case 1, there is no possibility to identify individuals. Under case 2, there are a few possibilities to identify individuals. Under case 3, there are several possibilities to identify individuals.

Table 1 Overview of the questionnaire survey

Survey technique	On the website and in print
Format of questions	Both closed-ended and open-ended questions.
Number of responses	131 people
Survey population	<ul style="list-style-type: none"> • Students and teachers at Graduate School of System Design and Management, Keio University on the website • Personal friends on Facebook and in print • I asked voluntary body and kindergarten mothers
Statistics of the survey	<ul style="list-style-type: none"> • Male 51%, female 49% • Married 61%, unmarried 39% • 20's 24%, 30's 37%, 40's 18%, 50's 6%, 60's 8%, over 60's 5%
Attribute data	<ul style="list-style-type: none"> • How many children do you have? • None 19%, one person 19%, two people 41%, three people 19%, four people 2% • Where do you buy daily goods? • Supermarket 54%, convenience store 33%, shopping mall 1%, department store 6%, other 5%

Table 2 Part of the questionnaire in this survey

Category		Case1			Case2			Case3		
		<i>There is no possibility to identify individuals</i>			<i>There are a few possibilities to identify individuals</i>			<i>There are several possibilities to identify individuals</i>		
		<i>To major Co.</i>	<i>To small private shop</i>	<i>To advertising Co.</i>	<i>To major Co.</i>	<i>To small private shop</i>	<i>To advertising Co.</i>	<i>To major Co.</i>	<i>To small private shop</i>	<i>To advertising Co.</i>
Food costs	Only trade name	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + date info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + place info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
Insurance costs	Only trade name	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + date info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + place info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
Book costs	Only trade name	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + date info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
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Tax	Only trade name	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + date info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not
	Trade name + place info	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not	Open/not

Concerning the buying information, we grouped it into categories such as food costs, luxury goods costs, entertainment costs, daily necessities, expendable supplies costs, book costs, medical expenses, expense accounts, educational expenses, work-related expenses, insurance costs, tax, costs of utilities, communications expenses. In

addition, it includes sales and calories in the food. There are 15 categories in total, as shown in Table 2.

As for the products in each category, we asked respondents to make judgments whether they would allow buying information that consists of product name, or product name and date information, or product name and place information to be revealed to different companies. In

this case, the companies were classified into major companies such as Wal-Mart Stores and Carrefour S.A., small private shops in which the users know each other and advertising companies like Omnicom Group and WPP plc.

6 Result and discussion

In this section, we show the results of the questionnaire survey on handling buying information and the results of a statistical test.

We were able to obtain results as follows:

Figure 2 shows the differences in the results for each expense category under different cases. As we have already said, we asked individuals whether they might give their buying information to the different types of companies under different circumstances. Each case is as follows; under case 1, there is no possibility to identify individuals. Under case 2, there are a few possibilities to identify individuals. Under case 3, there are several possibilities to identify individuals.

For instance, under case 1, on categories of food costs, luxury goods costs, daily necessities, calories in food that you ate, book costs, entertainment costs and expense accounts, more than 80% people do not mind revealing their buying information to a company. On the other hand, in the categories of insurance fees, medical expenses and tax fees, around 50% of people tended to avoid opening up the information to a company. Individuals are extremely reluctant to be open in these cases.

This means that people tend to think that the categories that include insurance fees, medical expenses and tax fees

are much more sensitive and reveal more important personal information than categories involving food and calories. If there is some accidental circumstance by which the users might be identified, they do not really want to reveal it and nor do they want anyone else to know it.

Figure 3 shows the differences in the results for each company-type under case 1. In the categories for insurance fees, medical expenses and tax fees, people tend to avoid revealing their personal data to small private shops more than they do to advertising companies.

This means that people do not mind giving their buying information to those companies that do not identify individuals. If shops are not 'close' to the customer, people do not mind revealing their personal information.

Therefore, there are some expense categories and companies that individuals feel reluctant to open up to and there are other expense categories and companies that people feel more comfortable in revealing information to. We could say that there are differences among each category and company.

Figure 4 shows the results for differences of gender. For instance, more females than males tend to avoid revealing their personal data, which includes not only sensitive data like medical care costs, insurance and educational fees, but also food costs, to small private shops. We did a test of population rate by gender. Table 3 shows the results of the test for population rate. In particular, under case 2 and case 3, there are many significant differences on the 5% significance level. In many categories we could recognise differences between genders on the 5% significance level, i.e., there are differences between males and females.

Figure 2 Differences by categories and cases

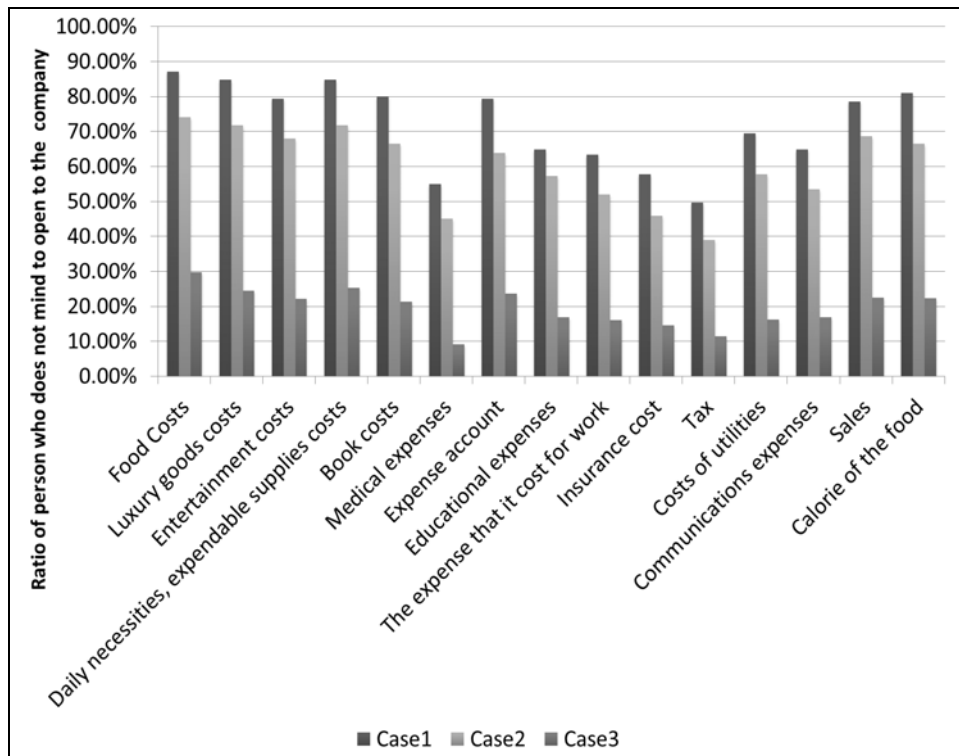


Figure 3 Differences by company

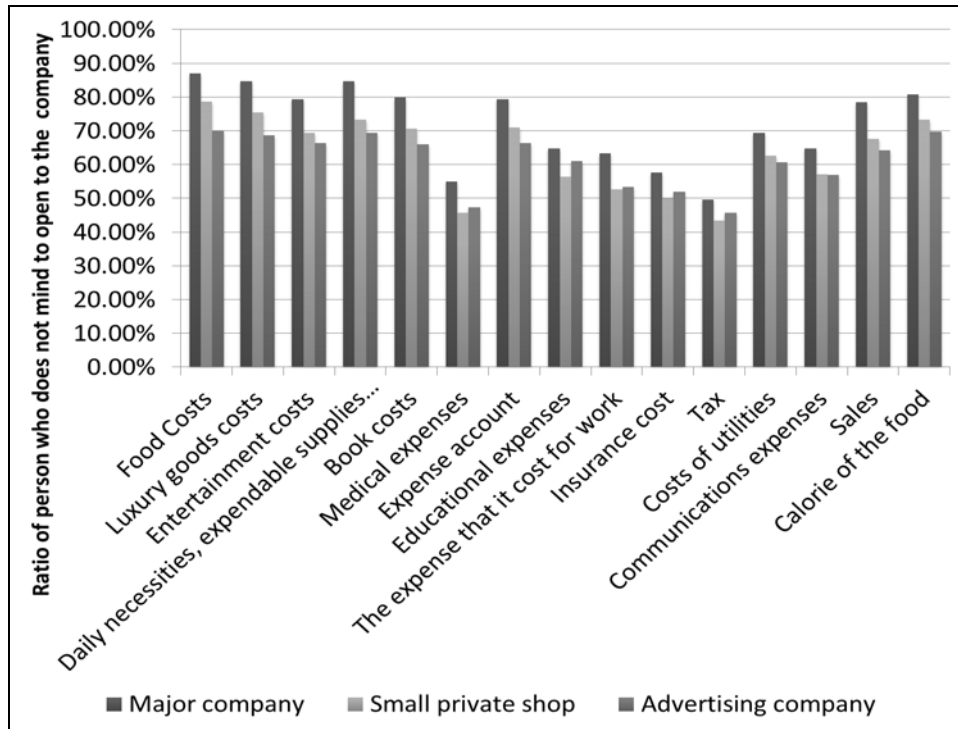


Figure 4 Differences between males and females

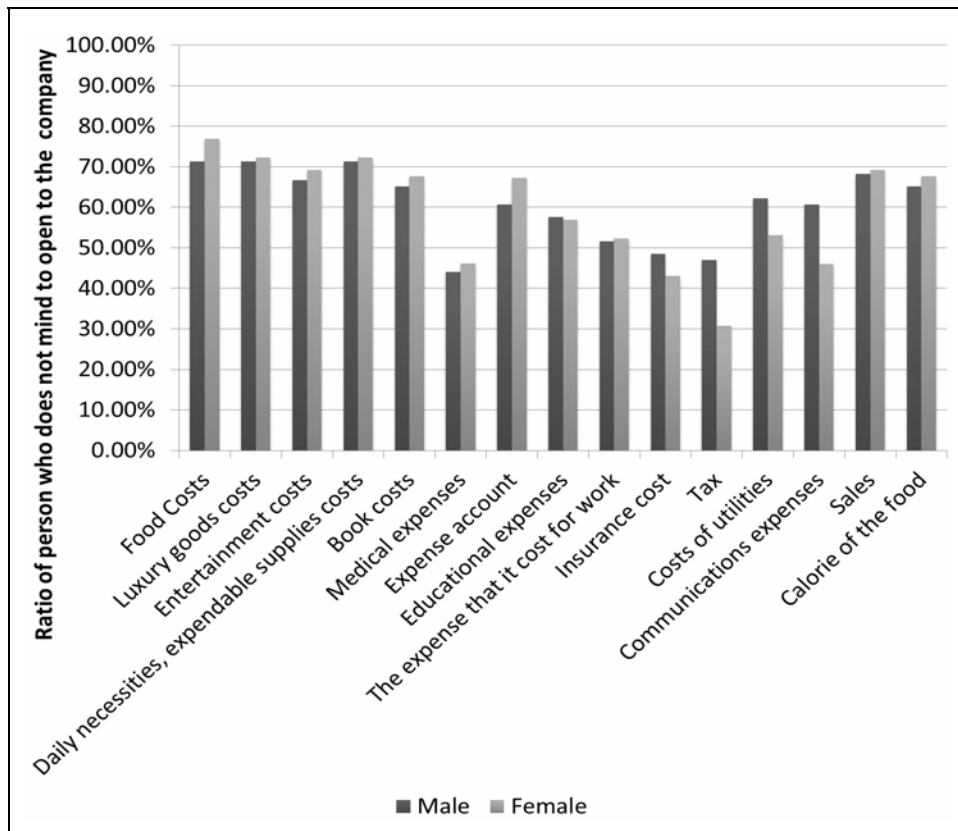


Table 3 Part of ‘differences by gender’

Category	Open to	Data	P value
Food costs	To small private shop	Trade name + date info	0.044674545
Luxury goods costs	To small private shop	Trade name + date info	0.006769544
Luxury goods costs	To small private shop	Trade name + place info	0.043682106
Book costs	To small private shop	Trade name + date info	0.017927104
Educational expenses	To small private shop	Trade name + date info	0.023837879
Educational expenses	To small private shop	Trade name + place info	0.036653319
Tax	To major company	Only trade name	0.048165709
Tax	To small private shop	Only trade name	0.030942146
Tax	To small private shop	Trade name + date info	0.026511838
Tax	To small private shop	Trade name + place info	0.024158581

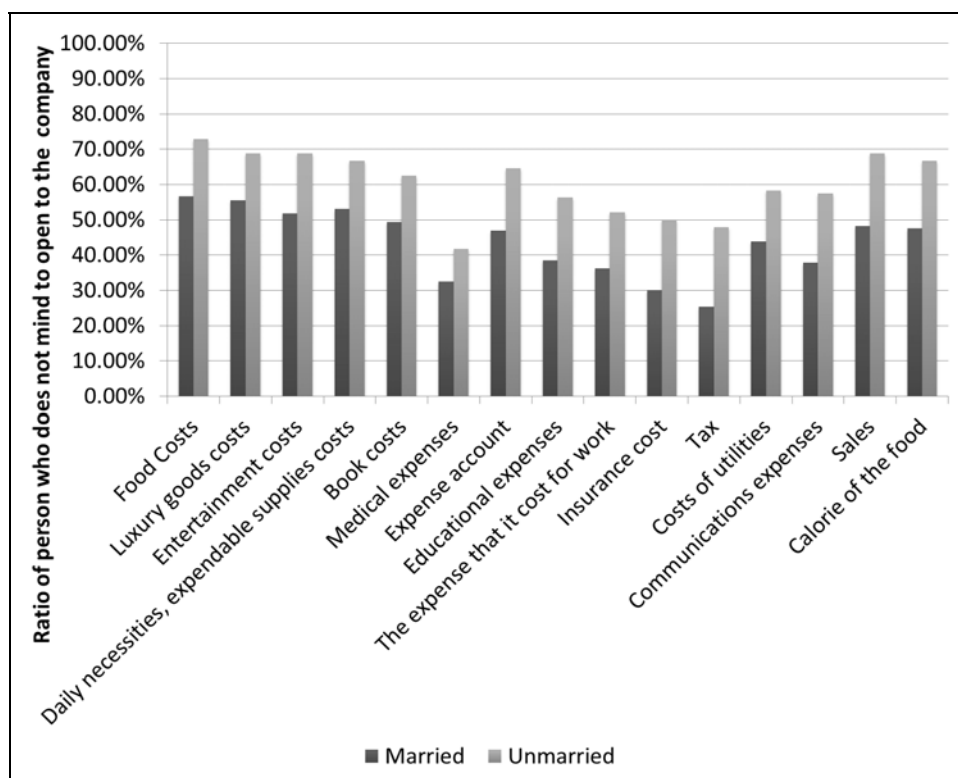
Figure 5 Differences by civil status

Figure 5 shows the differences between married and unmarried people for case 2. For instance, more than 47% of unmarried people feel free to open their Tax information to small private shops. However, there are only about 25% of married people who are happy to do the same.

Table 4 shows the results of the test of population rate by civil status. In particular, for case 2 and case 3, there are many significant differences at the 5% significance level. In many categories we could recognise differences between civil statuses on the 5% significance level. There are differences between married and unmarried people.

This implies that people become more conservative when they get married (they maybe thinking more about risk when they have a family).

Therefore, there are differences between married and unmarried people.

Figure 6 shows the differences by age. For instance, those in their 20s and 30s tend to reveal their personal data without stress, but those in their 40s, 50s and 60s tend to avoid revealing it.

Table 5 shows the result of the χ^2 -test by age. In particular, there are significant differences for case 3 on the 5% significance level. In the categories for food costs, luxury goods costs, entertainment costs, medical expenses and expense accounts we could recognise differences among the different age categories on the 5% significance level.

Table 4 Part of ‘differences by civil status’

Category	Open to	Data	P value
Food costs	To small private shop	Trade name + date info	0.027240551
Food costs	To small private shop	Trade name + place info	0.013425188
Expense account	To small private shop	Trade name + date info	0.035866731
Luxury goods costs	To small private shop	Trade name + date info	0.013425188
Entertainment costs	To small private shop	Trade name + date info	0.044095502
Expense account	To small private shop	Trade name + date info	0.035866731
Educational expenses	To small private shop	Trade name + place info	0.018887314
Insurance cost	To small private shop	Trade name + date info	0.02402458
Insurance cost	To small private shop	Trade name + place info	0.015895168
Tax	To small private shop	Trade name + date info	0.012503024
Tax	To small private shop	Trade name + place info	0.015180683

Figure 6 Differences by age

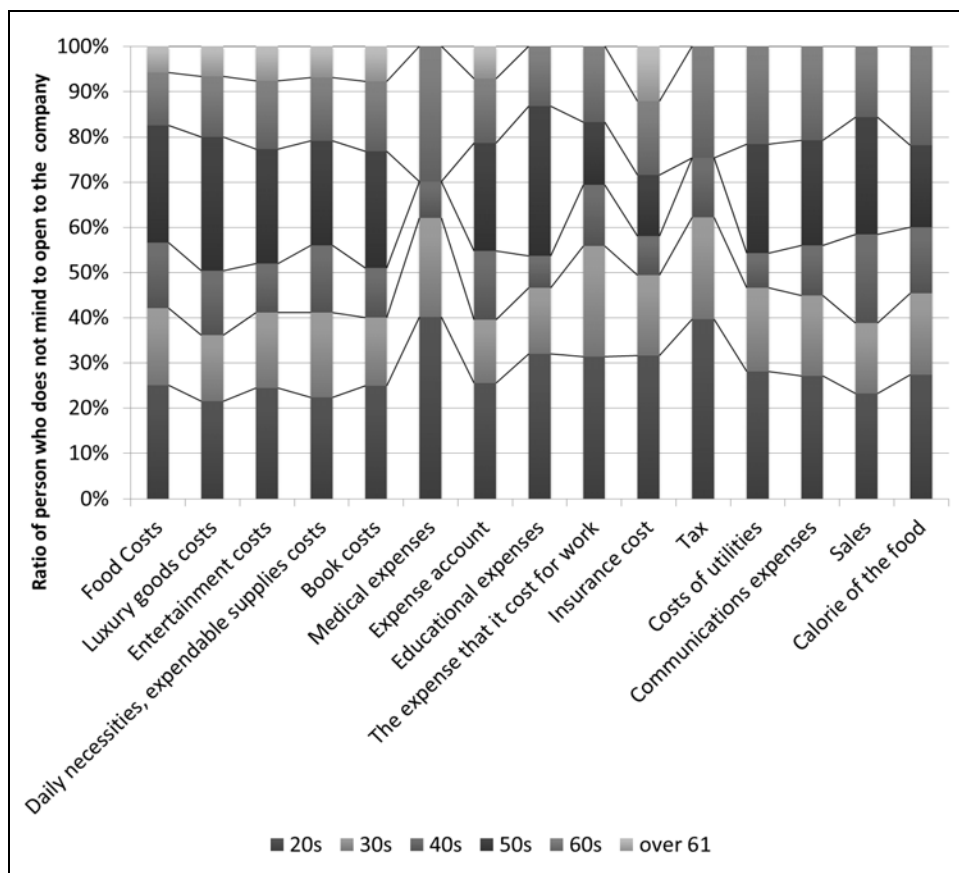


Table 5 Differences by age

Category	Data	P value
Food costs	Trade name + date info	0.039202103
Food costs	Trade name + place info	0.039202103
Luxury goods costs	Only trade name	0.049350662
Entertainment costs	Trade name + date info	0.033878086
Entertainment costs	Trade name + place info	0.033878086
Medical expenses	Only trade name	0.045000355
Medical expenses	Trade name + date info	0.045000355
Medical expenses	Trade name + place info	0.045000355
Expense account	Trade name + date info	0.033878086
Expense account	Trade name + place info	0.035942235

Therefore, there are differences by age.

We also asked open-ended questions. We obtained results as follows.

Table 6 Reward that respondent wants to receive (part)

<i>What do you want to get back as a reward?</i>
I do not care about any reward. Even nothing back to me.
Never open my personal data. Even if they give huge rewards.
Cash (1,000 yen, 2,000 yen, 50,000 yen, 10,000 yen and so on)
Discounts
Coupon or points (In Japan, there are many kinds of points cards)
Exchange for 'air miles'.
Many services (applications for house hold accounting and to reduce the time and effort spent on accounting.)
Attractive information (discounts, recommendations and so on)
Not necessary.

Table 6 shows part of the answers for 'What kind of reward do you want to get back when you reveal your personal data to a company?'

There are many different kinds of answers. Though some respondents want to receive many rewards such as cash, services and attractive information, others do not want to receive any rewards, even if they reveal their data to a company. It seems that the opinions of people have recently become different to those expressed in previous research (Nakagawa et al., 2012).

7 Ideas for applications in the future

In this section, based on the results of the questionnaire, we discuss the development of a new digital signage system based on this framework for handling personal data. Digital signage is an electronic display that shows information, advertisements, maps and so on. These days we can easily access them at stations, airports, department stores, hospitals and so on.

Usually, digital signage displays information to us one-sidedly, or else people have to search to obtain useful information. To get useful information from them can take a little bit longer and sometimes it is difficult to obtain at all. Sometimes we cannot find what we are looking for and therefore miss out on things we wish to know.

Our idea is to place digital signage systems at shopping centres or tourist information centres that can present personalised information to those users who allow the use of their own personal data and are prepared to reveal it to the advertising company by using a collaborative filtering method based on the personal data.

Figure 7 shows that around 60% of people do not mind revealing their personal data to an advertising company, except in the categories of medical expenses and taxes. Based on this result, we made a template that an individual can use on a digital signage system.

Figure 7 Ratio of persons who do not mind revealing data to an advertising company

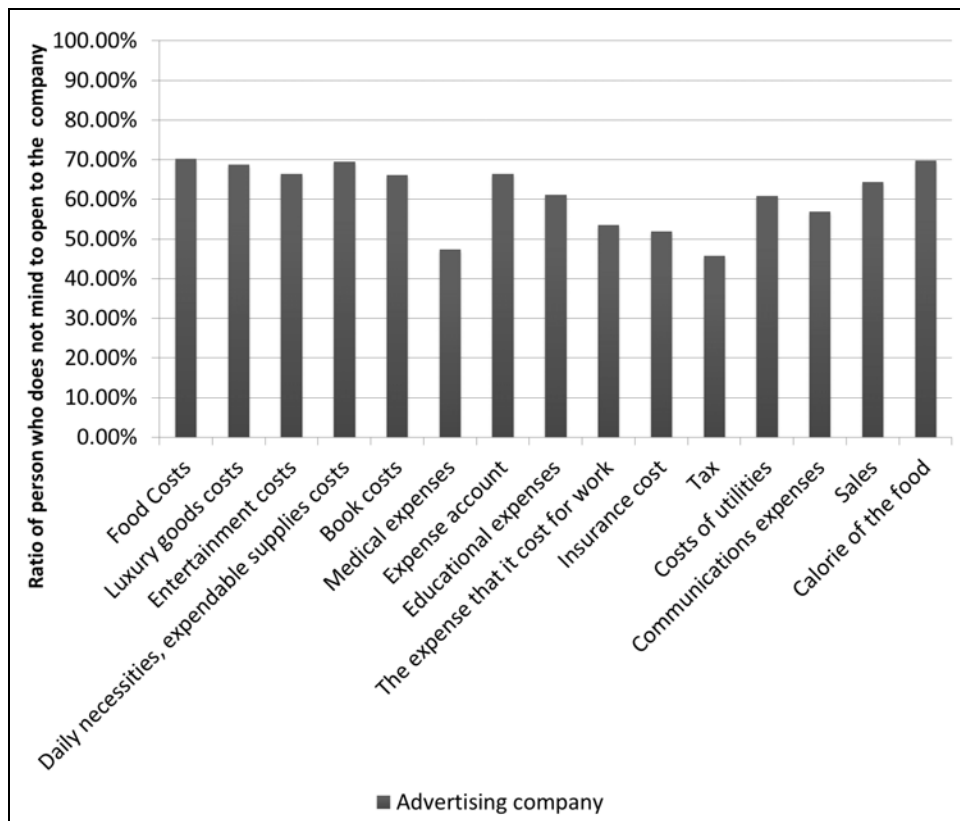
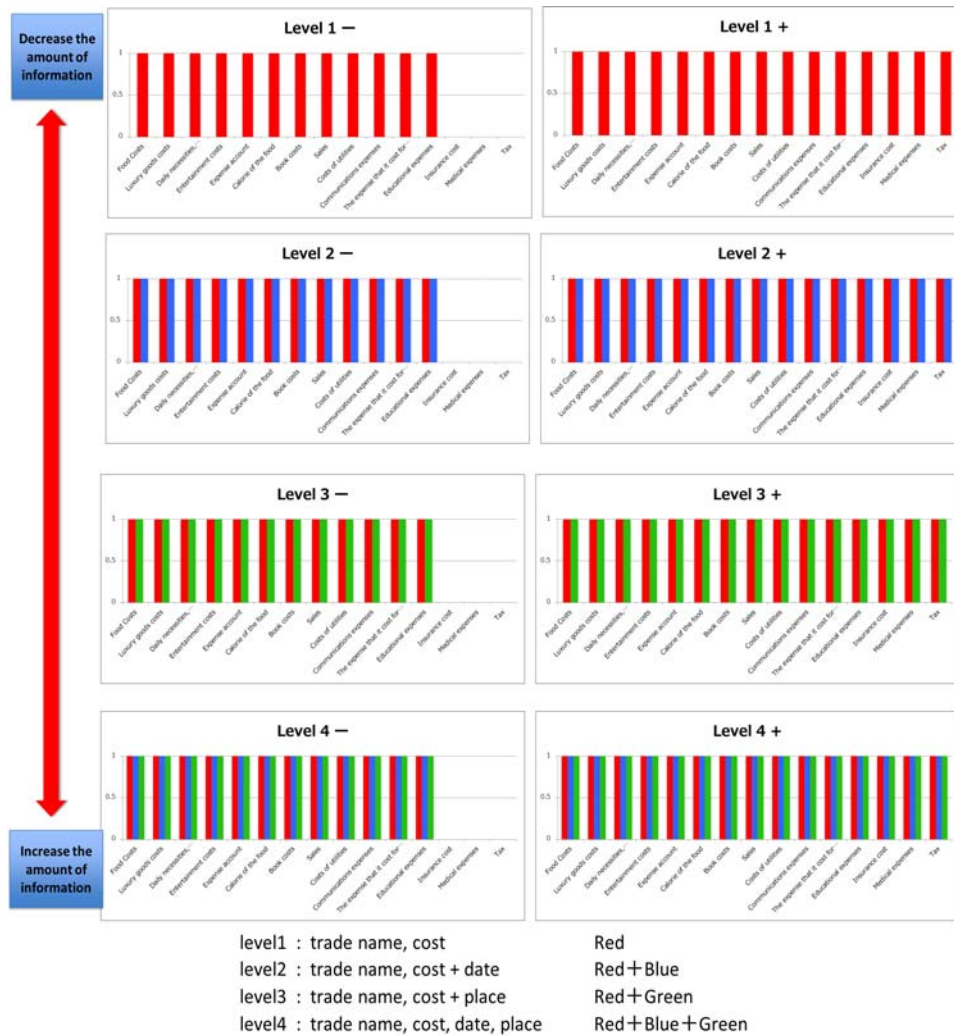


Figure 8 Template for individuals (see online version for colours)



In this case, the template shown in Figure 8 is used, so that the user can select the categories of buying information that are revealed to the advertising company. In Figure 8, the vertical scale indicates the level (on a zero-to-one scale) at which the individual does not mind revealing their information to various companies. (e.g., if the individual does not mind at all, the rate is 1. If they do not want to reveal anything, the rate is 0.) There are eight levels on this scale; level 1-, level 1+, level 2-, level 2+, level 3-, level 3+, level 4- and level 4+. Each level is as follows;

- On level 1-, the individual will share all categories except medical expenses, insurance costs and tax. Only the trade name and cost can be provided to a company that wants to use it.
- On level 1+, the individual will reveal all categories. Only the trade name and cost can be provided to a company that wants to use it.

Thus, people can obtain personalised information and services from a digital signage system placed in a public space.

- On level 2-, the individual will share all categories except medical expenses, insurance costs and tax. The trade name, cost and date information can be provided to a company that wants to use it.
- On level 2+, the individual will reveal all categories. The trade name, cost and date information can be provided to a company that wants to use this information.
- On level 3-, the individual will share all categories except medical expenses, insurance costs and tax. The trade name, cost and place information can be provided to a company that wants to use it.
- On level 3+, the individual will share all categories. The trade name, cost and place information can be provided to a company that wants to use it.
- On level 4-, the individual will reveal all categories except medical expenses, insurance costs and tax. The trade name, cost, date information and place information can be provided to a company that wants to use it.

- On level 4+, the individual will reveal all categories. The trade name, cost, date information and place information can be provided to company that wants to use it. Going to higher levels, an individual will provide more and more detailed personal data.

The default is level 1-. If an individual wants to receive much more useful information and services from shops and companies, they can choose different levels. If the individual obtains more information, it means that they should be prepared to reveal much more personal data to companies.

In our concept, those companies that want to deliver more useful information to individuals are able to give more personalised information such as order-made services by using their personal data under their control. If an individual authorised the use of their personal data and would be prepared to share it, this would be much easier to achieve.

In 2020, the Olympic Games will be held in Tokyo. Many tourists will visit the city to watch many different sports and hopefully will enjoy their stay. If the tourists can use this system, they will be able to obtain useful personalised information, even if this is their first stay in Tokyo. It will help their stay in Tokyo to be more joyful.

Moreover, we could provide many services based not only on purchase information, but also health information to make our lives healthier and to control our health.

8 Conclusions

In this paper, to solve the problems that there is currently no reasonable way of giving our personal data to a company under our own control, that we are not able to receive proper rewards from companies and that companies can hold only limited personal data that is collected by each company, we have suggested a system structure by which companies are able to use personal data that individuals have selected to reveal under their own control.

To build this structure, we had to consider two points:

- 1 individuals can select which data will be provided and which companies will be able to use it
- 2 individuals who allow companies to use their personal data under their own control can receive enhanced rewards compared with others who do not want to participate in this framework.

To be able to select appropriate data and companies that can be authorised to use it without any resistance to obtaining more rewards within this framework, we conducted a research survey on how to handle buying information.

We got much useful information from the research survey and from the results of tests;

The results show significant differences for each expense category, in terms of case, gender, civil status, age and the company. Also, there are different opinions about the value of personal information.

Therefore, to build this structure to give rewards back to individuals without any stress, it is very important to accept each individual's requests.

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