A Content Management System for Food Industry

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Abstract
There are many problems in Japanese agriculture. To overcome the dwindling and graying population of farmers, the authors have developed an information sharing system of food production, marketing, and consumption to promote its proper management for food industry, named food CMS. The system provides services appropriate to the types of users, farmers, customers, and distributors including retailing stores, brokers, and restaurants. Each user can reap benefits according to one’s role from participating in this system, not only the direct relationship-building between customers and producers which has long been difficult, but also freshness management of foods, efficiency and rationalization of ordering works in distributors, and expansion of sales opportunity. All kinds of food distribution information are stored in the integrated database, so the information can realize to adjust supply to demand. The system will contribute to save the impact on the environment because it can reduce the food loss by promoting production with just needed kinds and needed quantity when they are needed. This paper shows the effort the authors have addressed, especially the function design of food CMS.

Keywords: Farmers Information System, Agribusiness, Farming, Demand Forecasting

1 General Instructions

Recently, many farmers are experiencing a lot of problems. Farmers are rapidly aging because young people who get an agricultural job are decreasing in number. The average age of agricultural workers in Japan is over 66 years. The percentage of the population engaged in agriculture in Japan has been about 2% of the workforce since 2002, falling from 26.8% in 1960. The percentage of GDP (Gross Domestic Product) accounted for by agricultural production also dropped from 9% to less than 1% during the same period. The importance of agriculture to the Japanese economy has rapidly diminished in Japan with economic growth. Everyone understands the necessity of agricultural reform. The importance of agriculture and food supply issues takes time to improve the agriculture industry. But further structural reform necessitates radical reform of agricultural fields.

Over the years a number of laboratories have studied optimization of farm work using a sensor, camera and devices [1][2]. Researchers have recently proposed the development of hardware to support the farmers. But the literature is concerning system to help farmers by providing information. However, their hardware is expensive and limited. New business models for agricultural markets have needed using IT.

The authors have already developed a management function in Farmers’ Information System (FIS) to obtain skillful farmers’ knowledge [3]. The authors will have a great store of experience of farmers from collecting information using FIS to support and cultivate young producers, who would shoulder the task of upholding agriculture in the future. And, the farmer was able to encourage value creation of agricultural products using FIS by giving a customer the obsessiveness to each one of products, and additional information directly. From the operation experiment of single system, it was checked that it is effective in the support which builds the relation between consumers and farmers.

In this research, we pay attention to information sharing of the point of production which is a starting point of circulation, and the point of consumption which is the last points. We develop the information sharing system related to production, circulation, and consumption. We dig up the request from the consumer side for the improvement in manufacturing efficiency, and think that it is necessary to assign farm prod-
ucts exactly according to the feature. We think that they become possible by development of the information system based on the feature of SNS. The proposed system, named Food CMS, is developed with the previous efforts of FIS. A system offers a needed function according to a user’s role. By this system, it is possible to build relationships with the conventionally difficult customer and a producer, preserve freshness of food, improve the efficiency in sales order of distribution center’s buyer and expansion of sales opportunities. The user can get the profits according to each role.

2 Related Work

Previous agricultural research was aimed at computerization. Support of the traceability aiming at branding of agricultural products, optimization of the harvest which aimed at higher levels of productivity, make use of sensing technology and acquisition of the expert knowledge by an agricultural-work history. For example, the paper by takatsu et al. reported that there is introduction of ICT as a solution of agricultural successor problem. Additionally, the introduction of ICT contributes to know of the harvest time of agricultural products and prediction of yield amount and to improve of farmers income [4]. In order to put introduction of ICT to practical use, it is necessary to reduce the cost of providing a service. Therefore, the authors say that practical use of Cloud service is effective. In order to put introduction of ICT to practical use, it is necessary to reduce the cost of providing a service. Therefore, the authors say that practical use of Cloud service is effective. Similarly, Saito et al. also described the effectiveness of information system construction [5]. Saito et al. state that information of safety and security of food can contribute to branding of agricultural products. Then Mechanism of integrated management of distribution information is needed. So The authors start to develop Food CMS.

There is keen interest to safety and security of food and agricultural environment protection in Japanese society. There are a lot of technologies which is focus attention on this point. However, interest of many researchers are focused on limited area of society. So, Technology does not receive and spread easily in society in Japan. For example, Hayashi et al. has pointed out some problems which have one risk modification raise another issue, or trade-off between risk modification and primary advantage [6]. Nanseki et al. proposed the next generation food system which can supply food continuously by the same point of observation [7]. The problem consciousness shown by precedence study is the study background of total foods market information control package development.

3 Food CMS

3.1 Concept

Previously the authors have developed Farmers Information System (FIS), and FIS is new business models for agricultural markets have needed using IT[3]. The problem of food attracted attention since about 2000 in Japan. Consumers changed to become interested to food of secure and safe. Consumers began to ask for getting to know how and where agricultural products were made. Consumers came to get interested also in quantity of the agricultural chemicals of agricultural products and growing information of agricultural products. Because of this situation, the purpose of this FIS is “Change the domestic agriculture using IT”.

2. Stable supply of agricultural products.
3. Improvement in the value of agricultural products.

Under this perspective, the authors develop a new information system named Food CMS for urban markets to facilitate the transactions. Food CMS is CMS having a marketing function and SNS, and is the system which specialized in agricultural product marketing. Traditional, as a circulation package of goods, it is EC Cube,and as a SNS package, it is OpenPNE are developed and these most are exhibited by the open source. However, it has both feature and there is no package for exclusive use which specialized in food circulation further. In the case of agricultural products, there is an element of raising products, and especially the traceability of the growth process is searched for. Therefore, it differs from an industrial commodity or daily necessaries. And, because agricultural products are living things, preservation and management are difficult for them. Then, consumers’ voice is sent to Farmers, farmers make it possible to produce agricultural products according to consumers’ request
only a suitable quantity for suitable time. In order to satisfy the demands of above request, the feature of SNS is very effective. For the background of having resulted in authors’ idea. There is already a report which expected cooperation of a restaurant and an agricultural-products direct sales store [8]. There is a report which described the shared necessity of the consumption trend of farm products, production information, and physical distribution information [9]. It is thought that an important issue is cooperation with the producer of a direct sales store or a restaurant group especially.

3.2 Function of Demand Forecasting

Food CMS consists of two services, a front end and a back end. In the front end, it has a user interface of Web page form, and the back end has an interface of the setting screen of CMS, and a function of SNS. All the users of a system are provided with the function of a front end and a back end. The class structure shown in Figure 2. This is a front end of Farmers and is an example at the time of applying a default skin as it was and utilizing. And, Satake et. al did sharing of a consumption trend, production information, and physical distribution information. And wasteful reduction which avoids abandonment of products Improvement in the freshness
of the products to ship Value, such as production / processing information, is raised [9]. The view of these Satake et.al agrees with authors’ awareness of the issues. Not only as for bidirectional information dissemination simply but the taste according to consumers’ attribute becomes clear through the accumulation of a buying history, the feature of SNS is added to the e-commerce function for dealings is expected. Matching of producer seeds and consumer needs is attained as the result.

3.3 Details of Front and Back Service

The general public who is that user is not registered can also browse the front end of the system. Browse the system authority is not granted in all the pages of a system, but Browse the system authority is set up for a portion of a page. The design layout of a front end can be performed for user itself. It is the form which uploads a CSS file. The design of two or more patterns is prepared by the default.

The Food CMS would include pictures of the actual farmers and their farms, information on growing practices and methods will also be included, along with the information on what type of chemicals or fertilizers were used in growing the products, or what type of preservatives were added to the products, if ever there was any. The objective of the system is to provide consumers information that cannot be known by simply looking at the products. This information can be considered as a value added to the products, thereby resulting to better acceptance of the products and better market prices. Figure 3 and Figure 4 has useful information which posted message and photos from farmers, consumers, seller and sommelier of vegetables. Uses of the system don’t need active use, but need for only sending an e-mail with a photo attached. So this system is easy to use.

In a Figure 6, a back end is shown. It is provided only for the user by whom the user registration is done. This figure is a management screen of Farmers. Screen composition is common to all the users. However, the composition of a left-hand side menu and its number change with a user’s rolls. A system construction function is mainly offered. For example, a CMS function, EC function, a SNS function, and the statistics analysis feature of a history are offered. Other addition functions, for example, a planning-of-production function, are additionally offered according to a user’s roll. Three rolls
are prepared for the user. They are a producer, a distributor, and consumers. The user can serve as two or more rolls. The class shown in the figure is realized (see Figure 5 and 7).

4 Result and Effect of the Introduction

The authors were introduced to urban farmer’s market in Hyogo in Japan the developed system. In this section shows effect of introduced. This time, the raw data such as sales cannot be displayed in this paper by contract.

First, the authors report the results of analysis of the system about the visitor. Figure 6 shows the percentage of visitors and new visitors of the system. Visitors are done by using a cookie to identify a browser on a particular computer as a single visitor. The most accurate visitor-tracking systems generally employ cookies to maintain tallies of distinct visitors. There are two types of visitors. New visitors are the first time a browser accesses the system. The system records the visitor as new. This is done by checking to see if the urchin utm cookie for our domain exists on the browser. If it does not, the visit is con-

<table>
<thead>
<tr>
<th>Title of Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign in</td>
</tr>
<tr>
<td>Cart</td>
</tr>
<tr>
<td>Safety and Security of Food (catch-phrase)</td>
</tr>
<tr>
<td>Varieties of Fresh Fruits and Vegetables</td>
</tr>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Campaign</td>
</tr>
<tr>
<td>Recommendation</td>
</tr>
</tbody>
</table>

Figure 3. Website of a Direct-sales Place

<table>
<thead>
<tr>
<th>Title of Farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Next (The start of harvest)</td>
</tr>
<tr>
<td>Next (Tomato are beginning to change color)</td>
</tr>
<tr>
<td>Introduction (vegetables grown in a greenhouse)</td>
</tr>
<tr>
<td>News (Growth situation of vegetables)</td>
</tr>
<tr>
<td>Information (Information of vegetable)</td>
</tr>
<tr>
<td>Information (Recipe of vegetable soup)</td>
</tr>
</tbody>
</table>

Figure 4. Information transmission utilizing IT

Figure 5. Internal Design of Front-End
Figure 6. SNS function of back-end services

Figure 7. Internal Design of Back-End

sidered a first-time visit. Returning visitors is the system records a visitor as returning when the urchin utm cookie for our domain exists on the browser accessing the system. The authors got the data of the number of visitor to a system immediately after introduction of a FIS system. In this period, SEO and listing advertising measures have not done. New visitors accounted for approximately 60% in spite of not doing the advertising. These results show that FIS was viewed online by customers who wants to know safety and security of food. And, number of returning visitors have been gradually increasing from the introduction stage. The increase of returning visitors is considered that the user was interested in the information on a site. FIS believed that shares great amounts of information between farmer and customers. Other page lets you see where visits originate. Location is derived from mapping IP addresses to geographic locations. High percentage of Hyogo Prefecture can be predicted. Because, shop of the experiment, in the Hyogo Prefecture. However, visitors have about 17% of visitors from Tokyo(over 500 kilometers away). The shop is acquired the user outside the prefecture by introduction of the system. Users from outside of the prefecture are
browsed information of the system and are felt safety and security of agricultural food. Thus, the shop has increased the demand for mail order from Tokyo. Sales of the shop has become a 140% year-on-year due to these factors. The authors resolve the agricultural problem through the system in this way. But, some agricultural crops don’t have the opportunity to harvest only once a year. So to show the further effect that require more time than three years.

![Image]

Table 1: Compared to Other Similar Service

<table>
<thead>
<tr>
<th>Service</th>
<th>B to B Commerce</th>
<th>B to C Commerce</th>
<th>Social Functions</th>
<th>Analysis Functions</th>
<th>Added Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telefarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Game and local contribution</td>
</tr>
<tr>
<td>Radishbo-ya</td>
<td></td>
<td>⭫</td>
<td></td>
<td></td>
<td>Safety and security</td>
</tr>
<tr>
<td>Agrisaurus (Farmscape)</td>
<td>⭫</td>
<td></td>
<td>Knowledge sharing</td>
<td></td>
<td>Local production for local consumption</td>
</tr>
<tr>
<td>Farmers WEB</td>
<td>⭫</td>
<td></td>
<td></td>
<td></td>
<td>Local production for local consumption</td>
</tr>
<tr>
<td>Farmigo</td>
<td></td>
<td>⭫</td>
<td></td>
<td></td>
<td>Incentive for customers</td>
</tr>
<tr>
<td>Good eggs</td>
<td>⭫</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food CMS</td>
<td>⭫</td>
<td>⭫</td>
<td>⭫</td>
<td>⭫</td>
<td></td>
</tr>
</tbody>
</table>

Figure 8. Compared to Other Similar Service

5 Discussion

Both sides, consumers and farmers, require certain information from markets about agricultural products. For example, this system are used by two different types of user. One is the type who is the actively write and utilize the function of food CMS. For example, it is agricultural producers. They will be posting information disclosure of production schedule and growth records of products and providing safety and security of food. Another type is read-only user. For example, it is hotels and restaurants. They will not be actively posting. But, the photo posted on system can show restaurant’s customers information. In fact, Consumers may make requests about the exact information of agricultural products or their safety, while farmers may want to boast with their products. FIS can assist in the negotiation among both parties. If the farmers do not adjust their farming schedule to fit the demand of consumers, they automatically loose that sales opportunity. It is then very important that the farmers take into consideration what the consumers really want. The authors will avoid that their products are sold at a very low price. Farmers should focus on producing products that has actual consumer demand. FIS can adjust their farming schedule in a way that by the time they grow the product, their product is actually sought upon by consumers.

Because of these efforts, the authors provided infinite opportunities that farmers disclose, and created a value-creation opportunity for safety of agricultural crops. For example, the system disclose information which spray crops with pesticides, record growth of agricultural crops and serving idea. The system feeds back the result of basic function and have a functional evolution at farmer’s request. The authors summarized development results as a Content Management System(CMS) package of the integrative information sharing system which the persons involved in food production, circulation, and consumption can use and aim at public presentation by an open source.

This system and similar service have been already in operation. The contribution to local supply and local consumption or farm management, e-commerce, the information-sharing function of a producer and consumers, etc. are implemented. A Figure 8 shows what summarized those functions. A Telefarm and a Radishbo-ya are services of Japan. Others are U.S. service. A Telefarm does remote cultivation of the organically grown vegetable on the Internet using a personal computer at home, a personal digital assistant, a game terminal, etc. The Telefarm aims at activation of a rural area, and a contribution in the safe side of food. The Radishbo-ya sells organic matter and low-pesticide vegetables, additive-free food, etc. Because it is a major company, there are much number of articles and information and the reliability of information is high. Farmscape is service supported so that ordinary persons can also enjoy a kitchen garden freely. If it applies for service, the planter which cultivates vegetables will arrive and Farmers will come for help regularly. “urban-type of agriculture” is a keyword and is introduced into Los Angeles at 300 or more places. Agrisaurus has some feature that registers vegetables, inform you to watering schedule, up to the timing of harvest. Agrisaurus is a tool which can manage various things. In Japan, “Cropnet”, “vegetable garden Navi”, etc. which are SNS for a kitchen garden attract attention. Food CMS is service of a free participatory type. It is thought that technical solution is needed in the field of the reliability of information.
6 Conclusion

In this research, the problem about the present agriculture was shown. Farmers information system for carrying out a remedy to three problems was proposed. Solution was proposed to those problems and the support system was developed. The authors developed a simple prototype of FIS, the database of the proposed system will be examined to further cooperate with the stabilization of agricultural management and the support for stable supply of agricultural products. The structure that connects farmers, consumers, and a store was built using FIS. The major merit cooperating with agricultural field is to ensure traceability of foods for customers, and it lead to improve the service quality. And there will be new knowledge with the data collected by FIS.

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