

Evaluating the effects of actions taken to attract visitors to sightseeing areas

— An Open Service Field behavior survey technology —

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[Translation from *Synthesiology*, Vol.5, No.3, p.179-189 (2012)]

Every year, actions are taken to attract more visitors to sightseeing areas, yet the effects of these actions are rarely evaluated. Basic data for assessing effects can be obtained by measuring the change in visitation patterns upon the introduction of actions. We did not have the technology, however, to track the migration behavior quantitatively and successively with reasonable cost. To address this problem, we developed an Open Service Field Point of Service (OSF-POS) method that is practical and cost-effective. A case study of this method for the Kinosaki spa resort (Hyogo Prefecture, Japan), highlighting collaboration with local authorities, business circles, and engineering experts, is reported in this paper.

Keywords : Open Service Field, pedestrian research, questionnaire survey, POS

1 Purpose of this study - Optimum design loop for service quality improvement:

The service industry accounts for 70 % of Japan's gross domestic product (GDP). Therefore, it is important to improve productivity in this industry to revitalize Japan. To accomplish this objective, it is necessary to introduce an optimum design loop to enhance service quality based on actual data, replacing the traditional method of attempting to improve service quality based on hunches and experience.^[1] In general, sightseeing areas conduct promotional events every year in an effort to attract more tourists. However, objective data are rarely collected to assess the impact of scheduled events on tourism. Promotional events and investments are selected based on hunches and experience, making it difficult to focus on more effective events and cancel events for which the impact is uncertain. This may lead to an increase in the number of events and is a major concern for the parties involved.

In this case, it is necessary to create an optimum design loop in order to invest more resources in highly effective events, and the loop must be maintained on a long-term basis.

Sightseeing areas are designed to provide people with particular tastes and experiences.^{[2][3]} Therefore, fluctuations in the number of people and their movements in these areas are taken into account. However, pedestrian surveys^[4] conducted in the past showed that there are difficulties in creating the loop on a broader scale on a mid- to long-term basis (primarily due to high costs). It is also difficult to investigate each event.

Hence, in April 2009, in a typical spa resort area in Kinosaki, we started a project aimed at the practical realization of implementing technology to continuously and quantitatively observe tourists' activities.

In this study, a general theory of an objective sightseeing area or "open service field" is defined. The reasons for the difficulties encountered in conducting the survey on the open service field are then explained. Next, we present our approach to providing incentives in our research system in order to avoid the known difficulties. We then explain the open service field point of service (POS), which we developed ourselves.^{[5]-[7]} Finally, we consider the interaction of local concerned parties and engineering experts, which played an important role in the practical realization trial.

2 Pedestrian survey on the sightseeing area

2.1 Definition of "open service field"

We generalize and specify sightseeing areas based on the following conditions:

1. Many small-sized service providers exist competitively in adjacent areas. They have equal footing; no master-servant relationship exists among service providers.
2. The service field has no fixed entrance or exit; thus, customers may enter and exit from anywhere. Service providers are not aware of customers' entering and exiting.

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Original manuscript received February 9, 2012, Revisions received May 7, 2012, Accepted May 9, 2012

The area possessing the above characteristics is called an “open service field.”

Examples of open service fields possessing the above characteristics include shopping streets, shopping malls, local sightseeing areas, and so on. A service complex operated by a single body, however, is not considered an open service field. Most prominent theme parks are not open service fields.

2.2 Surveys in open service fields

Investigations are not always conducted to determine the effectiveness of promotional events in attracting more customers to sightseeing areas.

Many service providers operate independently in an open service field. No downward communication is possible; therefore, the consent of each business operator is essential.

The following structural factors contribute to the reasons why local business operators are reluctant to conduct surveys in a positive manner.

(a) There is a lack of interest and concern, as well as difficulties in evaluating the appropriateness of the required cost.

Local business operators are agreeable to the project, which may lead to a direct increase in customers and sales. However, survey work is not directly connected to boosting sales. An increase in business is dependent on each promotional step, while surveys only measure the results of each step. The objective of this project is to increase effective measures, while non-effective measures will be discontinued so that more effective investments can be made in the future. Though we have spent considerable time explaining the significance of this project to local concerned parties, their reaction was quite weak, as this project is not directly linked to sales. It is also difficult to evaluate whether the required cost is appropriate when compared to the increase in sales.

(b) Difficulty of equal burden sharing

Though the project is found to be beneficial to the entire area and the cost is reasonable, it is not easy to agree on equal burden sharing. Due to the competition present in the open service field, economic disparity exists among business operators and equality is not commonly understood. Small business operators believe that large business operators should take on a considerable portion of the burden, while large business operators believe this idea is not fair or equal.

(c) General concern regarding the use of data

Analysis is required to use the obtained data, and it is generally considered that this analysis requires special knowledge and skills. This leads to the argument that

additional costs must be incurred to solicit the help of a specialist.

Because the use of obtained data is not necessarily clear at times, a specialist may hesitate to undertake the analysis, while the cost is significant for local sightseeing areas.

(d) Psychological anxiety when introducing a new methodology

New technologies and new ideas are not always welcome. Many business and hotel owners with considerable experience are not prepared to learn a new concept such as service engineering. Only a few people will aggressively accept a new idea that is different from the existing one. It is, in a way, understandable that successful shopkeepers are conservative.

In forming a consensus, the principle is one man, one vote. Therefore, this means that it is difficult to obtain a majority to introduce a new idea where people are conservative.

3 A proposal of the survey system with incentives

The purpose of the project was to introduce a tourist behavior survey system in sightseeing areas that can be maintained on a mid- to long-term basis. However, it was foreseen that this system might not readily be accepted. Hence, some incentives are required to persuade business operators to accept this survey system. Any actions that lead to customer satisfaction can be incentives, although specific measures differ according to the service areas.

Ogawa^[8] indicates that two solutions are required in order to create innovation: need design and technology design. Need design is a solution for finding out users' problems and translating them into function elements. Technology design is a solution for creating a combination of element technology that includes production technology. In need design, the services that will lead to customer satisfaction have to be determined. Hence, it is apparent that this will be best conducted by business operators in the field rather than by IT researchers working in Tokyo.

Still, it is difficult to achieve our objective by simply understanding what has been requested in the field. Therefore, we had to build a system to function as a survey technology and to introduce structures designed to please customers.

Therefore, we have focused our attention on a POS (point of sales) system. At retail shops, POS is used to determine when, where, and what customers bought. In the service field, however, this system is not recognized as a survey system but instead is considered a tool to efficiently handle day-to-day business.^(Note 1) Leading from this, we have defined POS

as point of service to determine where, when and what kind of service customers can receive and as a survey technology used to learn the movements of tourists in a sightseeing area. For this purpose, we developed cloud service to establish services at POS (point of service), which are required in sightseeing areas, as well as a small terminal to access such services. This terminal is called an OSF-POS (Open Service Field Point of Service^(Note 2)) (Fig. 1). In addition, we asked hotels and shops about the kind of services they wanted within this POS system in sightseeing areas.

3.1 Turning up unaware needs design

While explaining the physical functions of printers, displays, audio playback, non-contact IC card readers, and so forth, as well as the outline of software-oriented functions (such as creating member cards) of OSF-POS, we did a hearing investigation with local entities concerned about the kind of services they wanted to provide to customers.

Credit cards accepted under town management

The first request was to accept credit cards under town management. At Kinosaki Spa Resort, a “buy and sell on credit” culture has taken root. Tourists in yukata (summer kimono) can enjoy shopping and dining on credit. Such payment is settled when customers check out of the hotel.^(Note 3) The person who presented this idea had plans to expand this service even to small purchases such as ice cream and juice so that more tourists can enjoy the credit service.

Computerization of out-spa tickets

In addition to the request for credit payments, many local entities asked for computerization of out-spa tickets. At Kinosaki Spa Resort, the out-spa tour^(Note 4) is a major attraction, and almost all hotel guests receive such tickets from the hotel and then tour the town (Fig. 2).

Conventional out-spa tickets are printed on paper, and tourists are required to have a ticket for each spa. There are



Fig. 1 OSF-POS

several problems with these paper tickets. Hotels and inns and the Toyooka City Office, which administers the out-spa tour, experienced several disadvantages^(Note 5). Moreover, there were disadvantages for the tourists as well.

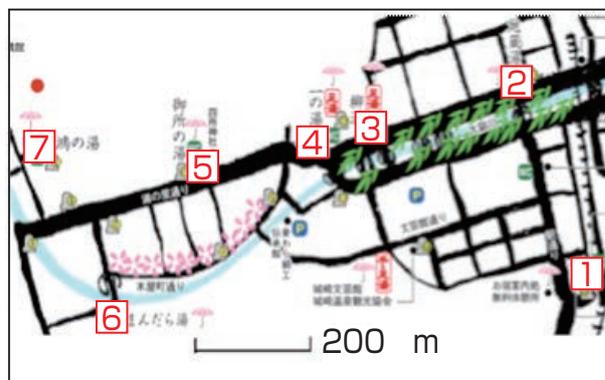
The tickets are available at the hotels’ front desks. Hotel guests may take as many tickets as they want. However, some guests only take a few tickets, thinking that that will be enough. When guests run out of tickets, they are sometimes denied entrance to the out-spa, resulting in disappointment and dissatisfaction. Some imprudent guests take many tickets and sell them on the Internet. To avoid these problems, it became necessary for tourists to provide identification. This was accomplished by having hotel guests wear a yukata (summer kimono) with the hotel logo emblazoned on it. However, this restricted use of spas by hotel guests causes inconvenience to hotel guests, as they are not able to wear the yukata after they check out of the hotel.

Based upon the abovementioned requests, computerization of the out-spa ticket was requested.

Proposal for other applications

We had several meetings with local entities to hear their requests for applications even after the demonstration experiment started, and some hotels started issuing tickets on a trial basis. Among the requests was an application for sightseeing guidance. At Kinosaki Spa Resort, there are Kinosaki guides who are voluntary local guides. However, this system was not very popular because it requires advance booking. Moreover, the system was not able to accommodate the increase in the number of foreign tourists. The service was then expanded to provide sightseeing information by authenticating the out-spa ticket via the OSF-POS system.

In addition to the above, there were requests to create Kinosaki member cards, applications for a rental-cycle system, and so on.^(Note 6)



1.Satonoyu 3.Yanagiyu 5.Goshonoyu 7.Kounoyu
2.Jizouyu 4.Ichinoyu 6.Mandarayu

Fig. 2 Kinosaki Spa Resort and locations of out-spa

3.2 Technology design for cost reduction

In the open service field, technology is required for cost reduction. To install technology designs presented in the open service field in the future, we prepared a structure for cost reduction in the OSF-POS system.

Reduction of ID distribution costs

Providing IDs to customers is essential for upgrading service and providing better-quality service. This makes it possible to collect and analyze detailed individual movements. The total number of IDs used on a given day shows the total number of guests for the day. The movement data of each ID shows whether the guest is a repeat visitor or not, making it possible to provide special incentives to repeaters. It is also possible to know, by paper stamp note, whether the guest is a repeater or not. However, the ID system can provide a technically advanced point system. For example, distribution state of points are instantly identified, and the market value of the points are correctly determined. Providing points to IDs helps to control the possession of points. The transfer of points to other persons can be limited. Points may be given to others as a gift in order to create more prospective customers. As this system clarifies customers' movements, a new system in which shops support each other can be introduced, such as "X is presented to customers who visited Y shop."

ID distribution is beneficial to customers. Customers are entitled to receive incentives as frequent visitors, and it is unnecessary to carry a bunch of coupons and tickets; by bundling all the rights in a membership card, the customer is able to exercise his or her rights by simply showing the membership ID card. In the event the card is lost, it is easy to reissue it because the necessary information is controlled by the ID. Furthermore, services for particular individuals are available anonymously, as the customer is not required to disclose personal information to service providers. For instance, by bundling credit card numbers with random ID numbers at hotels, customers can enjoy shopping in the area without the need to disclose their credit card numbers or real names. If an unreliable shop does exist in the area, the customer's personal information will not be disclosed.

Thus, providing an ID is a forceful means to maintain good service infrastructure. Therefore, shopping malls and department stores can provide membership cards and simultaneously make an investment to maintain customers.

However, most tourists visit sightseeing areas infrequently; many may come only once a year. In this case, the provision of a plastic card would increase operational costs and would not be economically realistic.

Hence the OSF-POS system utilizes customers' existing numbers as their ID. For example, the production number of FeliCa may be used as an ID number. FeliCa is a non-contact

IC card device that is used as a mobile phone with a credit function, public transport ticket IC card, and so forth. More than 70 % of mobile phones have a credit function in Japan.^[11] According to research conducted in August 2010, 98.6 % of the population are holders of electronic money in the Tokyo Metropolitan area, while this figure is more than 60 % in the Kinki, Sapporo, Fukuoka, and Tokai regions.^[12] It will be quite helpful to reduce the cost of ID issuance if the production number of FeliCa is used as an ID.

For customers who do not have mobile phones, the OSF-POS system has a ticketing function. When the customer receives the first service in a sightseeing area, his or her customer ID is printed on the ticket. Such ID shall be electronically readable (by barcode or a similar function). The required cost for this service is quite low, encompassing such expenses as consumable paper and the like.

Reduction of software development costs

As a large variety of services exists in OSF, it is not practical to develop software individually. Hence, we propose to divide various services in OSF into ascertained claim-type services and updating claim-type services.^{[6][7]} By organizing applications and relegating them to one of the above services, the required software module is specified, leading to more efficient software development.

(a) Ascertained claim-type service

This service is designed to provide a service after a customer's ID has been identified as valid. This type of service is used in facilities such as cinemas and museums, where the service is provided after a large number of customers congregate. An OSF-POS system is installed at the entrance.

(b) Updating claim-type service

This is a service in which information is updated every time the customer receives the service. For example, electronic money requires an information update every time the customer's right changes (such as a change in the deposit balance). In the event that ID media is not writable, a change of rights must be reported to the server every time.^(Note 7)

These two types of services require different response times. The ascertained claim-type service requires a quick response, as many tourists come simultaneously. It is too time consuming to communicate with a server after the customer has shown his or her ID. Therefore, for application (a), data on the server is cached in the terminal for a quick response. As for application (b), customers stay longer in front of the terminal. Therefore, the customer may accept being kept waiting while his/her ID is being checked with the server each time his/her ID is presented. For example, let us suppose a customer stays at a cash register longer than ten

seconds when shopping. Payment by credit card still requires that the customer wait several seconds, which is within an acceptable time frame. If this is applied for (b), such logic can be implemented on the server. This will minimize the logic required by the OSF-POS system, reducing the required cost of the hardware as well as the maintenance costs for different kinds of terminals (if any).

Reduction of consensus-building costs

Many people have different ideas for service improvements in the area. Many creative ideas are presented through individual hearings. However, these ideas are seldom proposed at large meetings in the area. One of the reasons is that there is a burden of consensus-building costs. Although the idea is presented, it is not an easy task to obtain consensus in the area. Therefore, people become hesitant to propose ideas, resulting in their relinquishing the idea.

The OSF-POS system, then, has a function of partial operation. When a shopkeeper wants to introduce a booking service by utilizing the provided ID, this can be implemented at his or her shop only, not placing any undue influence on the existing service. This does not require a consensus. If somebody else wants to introduce the same service, it can easily be accomplished. This kind of framework is necessary for IT in area development.

3.3 The bridge between need design and technology design

The work required to apply need design to technology design was done primarily by researchers. Trial production and use were repeated many times by researchers and local people concerned until the time when the final interface was fixed. The details of the concrete case are reviewed in subchapter 5.2. Figure 3 shows the scene of credit shopping with the OSF-POS system.

4 Presentation of examples (data application)

After the introduction of the OSF-POS system, the information obtained was made available to everyone, such



Fig. 3 Shopping at OSF-POS

as the number of entries to out-spas, congestion, and the amount of proceeds in the whole area. An example of data application is presented below.

4.1 Configuration analysis of the visitors

People departing from the same hotel and touring the same area around the same time will be considered as the same group of people. According to the data analysis conducted in December 2011, it is known that single tourists account for 3,561 (12 %) of all tourists; the number of people in two adult groups (including couples) is 11,424 (40 %); adult couple groups is 8,284 (29 %); three to five adult groups (men and women mixed) is 6,155 (21 %); and three to five people groups (adults and children mixed) is 3,262 (11 %).

In order to investigate the adequacy of this estimation method, we conducted a questionnaire survey from December 16 to 19. The survey was conducted at all exits of all out-spas (total: 7) by providing questionnaires to visitors. The number of provided questionnaires was 2,444, whereas the number of returned questionnaires was 1,619 (66 %).

For a group that was estimated as a family with a child (or children), the estimate accuracy (accuracy rate) was 92 %. Thus, we concluded that the data analysis of the OSF-POS system provides us with the estimation of the group configuration with practical accuracy.

The question is whether the ratio of 11 % for families is reasonable or not. According to a document,^[13] the ratio of family travelers for a domestic sightseeing tour is 51.4 %. This is the largest figure compared to other compositions (Data from Travel Current 2009 by Japan Travel Bureau). A family does not always include children, and families with children tend to avoid leaving the hotel, so 11 % is probably too low. Up to then, Kinosaki Spa Resort displayed only two types of advertising posters. One shows a young couple, and the other shows a mature couple. A new poster of a family with children has also been created for this year, based on the data.

4.2 Analysis of stay and route

Out-spa occupancy data obtained by the OSF-POS system is directly used. A luggage store checks the ratio of men and women in the neighboring out-spa and displays the bags for men or women use accordingly.

The OSF-POS system installed at the entrance can only record the time of entry. Regardless, an accumulation of the time of entry makes it possible to assume the duration of stay at each place. Figure 4 (left) is a graph showing the number of people who moved from Satonoyu to another out-spa, as well as the time spent traveling from the entry to Satonoyu to the entry of another spa. Figure 4 (right) shows similar data of movements from Jizoyu to other out-spas. Thus, a similar graph can be made for each location. This graph shows

that most of the tourists from Satonoyu traveled to Jizoyu. The time spent traveling from Jizoyu to Satonoyu was 49 minutes, whereas it was 76 minutes from Satonoyu to Jizoyu, which is 55 % longer. It is considered that tourists stay 55 % longer at Satonoyu.

Through the analysis of these data, it will be possible to construct a congestion forecast.

4.3 Off-time analysis

For the vitalization of the area, it is desirable to attract more tourists at lunchtime.

Figure 5 shows the number of entries to the out-spa from 7 a.m. to 11 p.m. (accumulated total for December 2010). There are a certain number of entries to the out-spa before breakfast, but there are none after 10 a.m. Because most of the tourists check out of their hotels at 10 a.m., promotional measures should be taken to keep them in the area until lunchtime. Now the discussion has started to provide out-spa tickets to hotel guests that are only valid once between 10 a.m. and 2 p.m.

4.4 Event Evaluation

Figure 6 shows data from August 2011. The upper graph shows the total number of overnight guests, while the lower graph shows the total sales amount of the town. The number of overnight guests from August 13–16 was the highest, as this period is a Bon public holiday in Japan. The sales amount, however, is not that high compared to the number of overnight guests. The highest sales amount was recorded on August 26, 2011. However, the number of overnight guests is not very high on that day. Fireworks were displayed on fair-weather weekdays in August, but this did not significantly contribute to sales. On the other hand, Toronagashi was performed on August 26, 2011. Toronagashi is the traditional observance of lighting floating lanterns in the river to send off the spirits of ancestors. People enjoy walking slowly to watch the lanterns float down the river. The cost required to observe this event is lower than the cost of fireworks. Therefore, Toronagashi is considered to be an event that contributes to an increase in sales more so than the fireworks display.

5 Consideration

After a one-year trial operation, Kinosaki Spa Resort decided to continue operating the constructed system. As of January 2012, computer terminals have been installed and operated at all hotels and inns (87), all out-spas (7) and 35 shops and sightseeing spots.

So far, our explanations regarding this project have primarily been presented from an engineering standpoint. However, we believe that users have contributed a lot to the implementation of this project. Therefore, in this chapter, cross-interaction and the division of the roles between users and the engineering side are considered.

5.1 Division of the roles and adherence of the knowledge of innovation

When a number of individuals have conducted the joint project, each role is defined according to each individual's knowledge. Regarding this, Ogawa's discussion [adherence of knowledge] is interesting.^[8] The adherence of knowledge is a concept that represents the mobility (transfer to other areas) of locally learned and acquired knowledge (know-how, recognition of problem points). When such knowledge is easily transferrable and practically usable in other areas, its adherence is low. Meanwhile, the out-spa ticket issue at Kinosaki Spa Resort is not easily applied to other areas; thus, this adherence is very high. Knowledge of how to make use of IT technology prevails, thanks to the popularization of PCs and the Internet; and this adherence is relatively low. Such a case, innovation is explained to take place in the neighborhood of the knowledge of high adherence. The result of this project, which has been completed in Kinosaki, fits in with Ogawa's discussion.

In addition to the concept of "adherence," Ogawa^[8] indicates other concepts of "needs push" and "technology pull." Needs push means that users conduct needs design, and technology pull implies that users conduct technology design. He points out that the tendency for technology pull grows when the adherence of technology information is low.

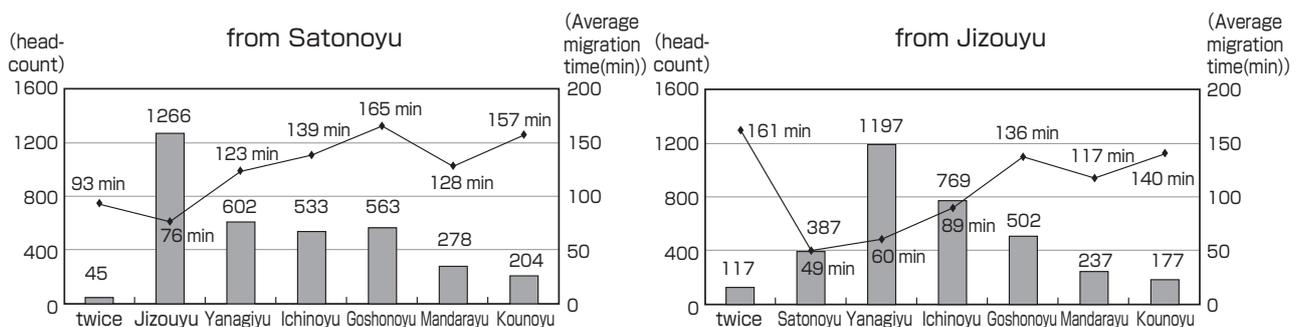


Fig.4 Movement from Satonoyu (left), Movement from Jizoyu (right)

The technology design of this project was generally entrusted to engineers (no technology pull happened). The proposed needs design would be implemented in various ways. Non-engineers could specify the implementation method by finding similar examples. However, it is necessary to understand the difficulty involved in each technology to find the best solution for cost reduction. This is very dependent on the engineers' skills and capability. Therefore, this is considered to be high adherence.

5.2 Coordination of a contact point between users and engineers

To install needs design in a technology design framework, coordination is required. The contact point between needs push and technology pull from the user side and technology development from the engineering side has made a considerable impact on both technology design and needs design.

As previously mentioned, trial productions and operations were reciprocally repeated by both users and engineering experts to achieve a better interface (usability on-site). This was repeated until the final configuration was installed. In cases where users are able to describe the needs push completely (to write down completely with specifications), this represents a needs push as well as a technology pull. When users have no idea about relevant technology design, the user's need has to be realized in trial production and operation. Joint work is required to duplicate the same scenario to discover the problem, if any, and review solutions for improvement. Mutual interaction between users and engineers has made an impact on needs design and technology design. The following is a specific example.

Operational interface at hotels

At the initial stage, computerization of out-spa tickets was requested by concerned local entities; however, no request was made for an interface. We then expected that additional information, such as age-demographic data and so on would be input when issuing out-spa tickets at hotels. Data entry is important for the data analysis, and we considered that this

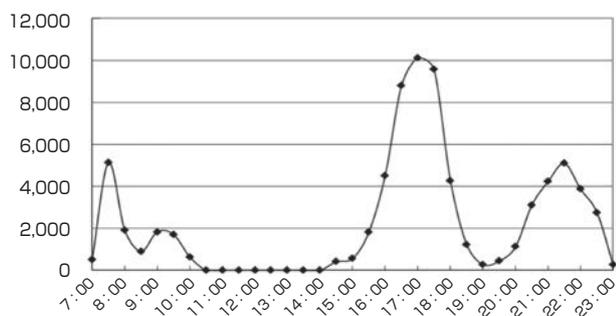


Fig. 5 Number of visitors to out-spa between 7:00–23:00 (accumulated total of December 2010)

would be feasible at Kinokuniya hotels since such data entry is ordinarily performed at convenience stores by young and old people alike.

However, no data entry interface was adopted for additional information. For instance, we created the system so that the out-spa ticket could be issued by reading the ticket barcode from a list of commands. We also designed the system so that the customer's non-contact IC card, such as a mobile phone, is entitled to an out-spa ticket by simply touching the OSF-POS system at hotels. In the event that guests stay over more than two nights, the number of overnights is entered by barcode. A child's ticket is issued by reading the [child ticket barcode] first.

Due to the importance of the research function, we have tried to keep the data collection capability in the trial interface as much as possible, while simultaneously making efforts to simplify the operation. However, local people who were concerned asked us every time to make the operations much simpler. Many elderly people work as hotel clerks, and they experience anxiety when learning a new technology, such as the ticketing process at hotels.

Though the proposed needs design was indefinite at first, this became concrete in the course of matching technology design and needs design.

Needs design of out-spa tickets

The OSF-POS system has a function to utilize mobile phones with credit functions or non-contact IC cards as IDs. However, the penetration rate of the above is not 100 %. Therefore, a method to print a barcode on a receipt must be adopted as well. A question then arose as to whether the printed out-spa ticket alone would function well enough.

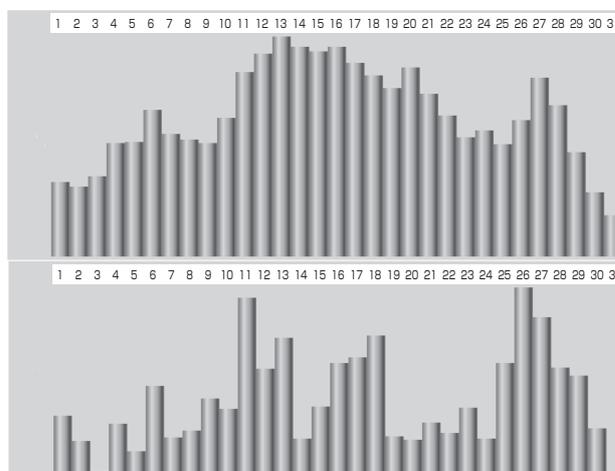


Fig. 6 Number of overnight guests by day (upper) and amount of sales by day (lower) in August 2011

However, both the non-contact IC card and the printed receipt were to be used together for the following two reasons.

First, the promotional message “a mobile phone is used as an out-spa ticket” was considered to be a very appealing new technology. A mobile phone is one of the most familiar IT technologies. Making use of such a technology at a spa resort is welcomed as a cutting-edge approach that has never been attempted by other resorts. Moreover, this approach is expected to be highly popular with the tourists. While enjoying an out-spa tour wearing a yukata, tourists try to minimize their belongings as much as possible. However, mobile phones are known to be an exception. “A mobile phone is used as an out-spa ticket” is a good point that should appeal to tourists.

Another reason the two are to be used together is that it may help prevent the unauthorized use of a ticket. At the time, Kinokuniya was planning to issue a one-day pass to be used for unlimited entries to out-spas on the purchased day. However, their hesitance was caused by their concern that one ticket might be abused by several people. It is expected that tickets will not be abused if tourists’ mobile phones are used as the out-spa ticket.

Therefore, the application of FeliCa was positively incorporated into the needs design, though the cost was comparatively higher than the barcode-only system, which points to the fact that some part of technology pull was effectuated by users.

Out-spa ticket with a credit function

Credit service increases the burden on hotels. They are obliged to explain the system to hotel guests and settle the bill at checkout time. There is no merit to hotels at this point; credit service is offered to the area as a whole. Therefore, it is at the hotel’s discretion to issue or not issue the out-spa ticket with a credit function.

In order to save time and work for the hotels, it was arranged so that out-spa tickets came equipped with a credit function by simply entering the room number. The room number is essential to settle the hotel bill. Therefore, engineers considered that this would be the final form, as it is not possible to reduce the operational work any further.

After the introduction of the OSF-POS system, many hotels prepared printed out-spa tickets before their guests arrived in order to avoid congestion at check-in time. However, hotels were obliged to discard the prepared tickets and reissue them if the guests requested a credit function. This is because the out-spa ticket with a credit function requires inscribing the room number before the ticket can be issued.

With this fact in mind, engineers have added a function

whereby the credit function can be added to an already-issued ticket by entering the room number. This function has been well accepted and has become a major trend in Kinokuniya. Hotel clerks had a difficult time imagining that the new function could be added on to an already-prepared ticket later. In addition, hotels that issue out-spa tickets with a credit function are cooperating with the efforts of the area. Therefore, it is believed that those hotels were able to endure some inconveniences. This shows that engineers are sometimes expected to extract the needs.

Pass code

It was required that pass-codes be provided (from 1–3 digits), as guests may lose their out-spa ticket with the barcode; hence, a pass-code is given when issuing the ticket. Allowing guests to choose their own pass-code was not implemented in order to avoid congestion at the front desk. Throughout the trial, some guests contacted the hotel to ask for a forgotten pass-code, and hotels were obliged to respond which was troublesome at the time.

In response to this, a specific number of pass-codes was allocated to each hotel and was made available to all guests for that day (the same pass-code number for all guests) in addition to the abovementioned system. This system in which all hotel guests were to use the same number for the day seemed very risky. (No engineers would likely recommend this system). However, many hotels used their specific number in a practical way, which can be considered part of the technology pull.

As the reason for the OSF-POS system being introduced in a considerably short period of time, frequent dialogue or interchange between users and engineers were particularly noted. The users’ requirements were taken into consideration, and technological improvements were implemented (and sometimes new functions were added) and returned to the site. These reciprocal actions were conducted in approximately two weeks in each case. This interaction created new knowledge of a more user-friendly system and contributed a lot to making needs design much more attractive to the local entities involved.

5.3 Supporting users’ awareness

The most difficult challenge was answering the question of who would conduct the analysis of the collected data. One option was to employ a consultant; however, this option was not affordable for many sightseeing areas. The ideal option was to build a structure in which the local people involved could freely exchange ideas.

For people to be able to exchange a variety of ideas, they would need more opportunities to review data. Therefore, we presented push-style data, where we sent a graph to shopkeepers and so forth, showing the number of guests as

well as the total sales amount in Kinosaki. In addition, a system was constructed to discuss items on the mailing list.

The event evaluation mentioned in subchapter 4.4 was pointed out by a hotel owner on the mailing list.

He commented, “My hotel had eleven credit payments yesterday, amounting to 21,625 Japanese yen. Eleven credit payments were the largest ever. Credit payments in the area were also the largest. Though the number of guests at Bon time (religious ceremony celebrated in summer) was larger, there were more credit payments at the time of Toronagashi. This data suggest that many people enjoyed walking at Toronagashi” (extracted from an e-mail received from a hotel owner on August 26).

It is presumed that this owner first noticed the large number of credit payments by guests of his hotel and then noticed that the entire area had the same experience. It then reminded him of the effect the event had on credit payments.

In order to encourage the people involved to remain aware, it is meaningful to review data daily. The impression that “something is different today” will instantly fade away. Therefore, minor changes will not be noticed if reviewing the data is troublesome.

In order to accelerate the awareness of people concerned, one measure is to reduce the cost for checking data like that used in this project in data push style. Another option is to arrange the data so that shop and hotel owners want to check them (for instance, a graph showing the sales amount of the hotels and shops in the same business).

Apart from the measure to increase the opportunity to review data, it is important to arrange data in a way that will encourage awareness. Local business operators are clearly aware of what occurred on that day; however, they sometimes do not pay attention to changes that occur over the mid- and long-term. Therefore, it is effective to present a graph on a monthly or annual basis. At 7-Eleven stores, POS data is provided on a graphic terminal so that the shop owner may make use of this data.^[8] Differing from 7-Eleven, data from the entire area does not have a direct impact on each hotel and shop. However, providing chronological changes of the area on a graphic mode will help people understand signs of real changes.

5.4 Local project implementation structure

Presence of the key person

Though local people at Kinosaki had no prior opportunities to work with engineers on a joint project, we could conduct demonstration experiments, which led to continued operation. This owes much to the presence of the key persons who have actively cooperated with us. Key persons in this

sense refer to those persons who have strongly influenced the decisions made in the area. In Kinosaki, fortunately, several key persons recognized the value of this project, talked about the needs in a constructive manner, tried to understand the technology, and took on the practical work of consensus building. Since consensus building is a time- and cost-consuming task in the open service field, the presence of key persons is essential for joint project implementation.

Increase in the number of people involved

The presence of a key person does not necessarily mean that consensus building will be easy in the area. It is important that the key person receives broad support. Hence, meetings were frequently held for local coordination. Here, we would like to point out the significance of the interactions mentioned in subchapter 5.2, in which users generated ideas that were put into operation. The repetition of the above work in a short period of time contributed much to users being able to recognize that their ideas were reflected upon and incorporated into the system. Recognition widely spread that not only people who had offered ideas but other people were taking initiatives to create projects as well. This has led to the commitment (involvement) of many people.

Another factor contributed to a large commitment (involvement) of the people. People were bestowed with the task of naming the system. The unique name “Yumepa,” which is the “Kinosaki spa-tour pass,” spread quickly and became popular. Scientific causal connection is not clear at this stage; however, it is presumed that bestowing naming rights evokes recognition of their initiatives.

Creating an administrative organization

Creating the structure to implement the project on a long-term basis was one of the major points of controversy. The project requires the consensus of the entire area. However, in Kinosaki, there were industry-classified associations only, and no adequate organization was found for the discussion of the OSF-POS system. The out-spa ticket issue was in the hands of the property ward assembly. The credit payment issue was in the hands of the commerce and industry association. The operational initiative of the project was separated. Then, Kinosaki set up a decision-making body consisting of representatives from all of the industry-classified associations in the area. This new organization functions as the center of discussions of business that affects the entire area, as well as as a responsible body for the continued operation of the OSF-POS system. It is essential to define the body responsible for guaranteed operation in the future.

6 Conclusion

In order to introduce the optimum design loop for service quality improvements in sightseeing areas, it is necessary

to conduct continuous surveys on consumers' behavior on a mid- and long-term basis. In this study, we have indicated that the proposed survey system, which includes incentives, has a beneficial effect. We have also considered the importance of collaborative activities between the local people involved and the engineers.

When the practical survey system was introduced, the main concern of the local entities involved was whether the utilization of data would be possible by local people only. This concern was solved by providing data frequently and in a friendly manner. The project demonstrated that beneficial ideas are generated by local hotel owners and shopkeepers.

For the promotion to be effective in attracting tourists, it is required that we give due consideration to next year's plans by stating a hypothesis. The decisions involved in the planning process may be affected by the presence or non-presence of subsidies or human relations. Therefore, operations in the future shall be carefully observed.

Acknowledgement

This study was conducted with the support of a project [a promotion to create a new market by integrating IT and service (service technology research and development project)] by The Ministry of Economy, Trade and Industry in 2010.

Notes

Note 1) Although a cash register and POS system are basically different (the purpose of a POS system is to analyze data), they are often used as synonyms.

Note 2) POS, as indicated in this study, refers to an ordinary POS (point of Sales) system. OSF-POS is the name of the proposed system, and here POS means Point of Service.

Note 3) Although this service was very popular, all restaurants did not always accept credit payments. The reason for this is that collecting money early in the morning or late at night places a heavy burden on them. Besides those restaurants, only a few souvenir shops accepted credit payments.

Note 4) In contrast to hotel spas, a public spa is called an out-spa. There are seven out-spas in Kinoshiki.^[10]

Note 5) Hotels were required to visit the town office periodically and were obliged to stamp the hotel name on the back of the tickets. Hotels sometimes experienced a shortage of tickets because some guests took many tickets at one go. Hotels also experience cleaning difficulties because some guests left the unused tickets in the sleeve of the yukata. In

order to know the number of out-spa guests, the town office had to count the number of recollected tickets manually. Since this work is very time consuming, it was always three months behind. Nevertheless, details of the behaviors and activities of the guests could not be determined.

Note 6) These ideas were not yet implemented as of January 2012, mainly because of the shortage of human resources.

Note 7) In documents,^{[6][7]} adding to the ascertained claim-type service and the updating claim-type service, a stamp-type service for the guests who do not have IDs is also described. For example, sightseeing information (audio-visual information based on the guests' requests) is a stamp-type service. However, this type of service does not contribute to the accumulation of data. Hence, the service is to be divided into two types, as described in this study.

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Discussions with Reviewers

1 Research paper in general

Question and Comment (Yasunori Baba, Research Center for Advanced Science and Technology, The University of Tokyo)

In this area, there is an important preceding study conducted by Susumu Ogawa presented in the book, "Emergence Logic of Innovation - surpassing manufacture-oriented research system" - Chikura Shobo (2000). I highly recommend reading through this book to upgrade the analysis as well as to gain a better understanding of the phenomena. This will make this paper more reader friendly.

Answer (Yoshinobu Yamamoto)

Since your recommendation, I have read the book. I feel that the concept presented in this book is quite important and useful. Before I read the book, I did not adopt the viewpoint of technology transfer or innovation. I strongly feel that further consideration from a new point of view will be possible by employing Ogawa's concept of adherence of information. In order to make the modification as indicated, I have conducted a drastic review because minor changes and modifications were not enough.

2 Productivity of service

Question and Comment (Yasunori Baba)

This paper says that the introduction of the OSF-POS system that was developed by the author produced the improvements to service productivity and argues that this improvement contributed to the prevalence and continuous operation of the relevant system in the area. It is desirable to proceed with the analysis having

a clear concept of service productivity. From the viewpoint of who benefits from productivity improvement, it is also desirable to conduct an analysis and give it due consideration, though not quantitative, on the following: (1) What impact was observed in tourists' movements (such as the number of tourists and the amount of consumption) when tourists were the beneficiaries? (2) With the introduction of the OSF-POS system, what impact was observed by local business operators of a different nature?

Answer (Yoshinobu Yamamoto)

The primary significance of service productivity improvement in this study is to conduct investment decisions on a mid- and long-term basis based on an objective assessment of the measures used to attract more tourists. I have tried to make this point clear in this paper.

3 System improvements by local business operators

Comment (Yasunori Baba)

In order for the introduced system to operate on a continuous basis, a key factor is to construct a social infrastructure wherein system improvement can be accomplished through the initiative of the local business community. Since this is very important, it is advisable to cut back other parts in an appropriate manner and enforce this point specifically. A proposition or suggestion for the future is expected such as the possibility of using technological support to exploit the potential of local business people's ideas, or any unexpected functions to be added.

Answer (Yoshinobu Yamamoto)

I have reviewed subchapter 5.3, including the title. Overall, rearrangements were made. In order to support awareness, I have indicated (1) to review data frequently and (2) to provide data in an awareness-raising style. For reviewing data frequently, I indicated that data should be provided by e-mail and other communication outlets, as well as data should be interesting data that people want to see on a daily basis.

4 Meaning of POS

Comment (Koh Naito, Service Engineering Research Center, AIST)

POS is used as the abbreviation of both [point of service] and [point of sales]. POS is, in general, recognized as the abbreviation of the latter. Therefore, the former should be standardized by [OSF-POS]; otherwise, another abbreviation must be adopted. Since comprehending the service process, such as pedestrian movements, is a typical feature of this paper, I ask that you duly consider applying [Process] instead of [Point] for P in OSF-POS. Meanwhile, POS is not recognized as a survey system and does not represent the actual conditions. The reality is that this system is not used to a satisfactory extent as a survey system.

Answer (Yoshinobu Yamamoto)

Your suggestion to change Point to Process is greatly appreciated. I understand that by doing so, the word may include the meaning of service process. However, the word "POS" was initially introduced as an acronym for the Point of Sales system. Hence, it is somehow not the case that two completely different things coincidentally share the same acronym. Therefore, I believe further explanation will be required to delve deeper into its meaning. I have then standardized in this paper that POS is used as an acronym for Point of Sales, while Point of Service is represented as POS (Point of Service) or OSF-POS, as a name of the developed system. For further explanation, Note 2 was added.

In order to make it clearer, [is not recognized as a survey system] was modified to [This system is recognized, by sales people, not as a survey system but as a tool for the smooth operation of the daily sales task].