

Management System for Regional Electronic Coupon

Hiroki Satoh¹, Toshiomi Moriki¹, Yuuichi Kurosawa¹, Tasuku Soga¹,
Miho Kobayashi¹ and Norihisa Komoda²

¹Research & Development Group, Hitachi, Ltd., 1-280, Higashi-koigakubo Kokubunji, Tokyo 185-8601, Japan

²Code Solutions, Co.,Ltd., Daidoseimei south building 9th floor, 1-2-11 Edobori Nishi-ku, Osaka 550-0022, Japan

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Abstract: We propose a regional electronic coupon management system. This system is for events where many local shopping streets in Japan offer special menus and rediscover the local shopping streets and their appeal. It has a web application for customers that incorporates a mechanism that allows customers and store clerks to interact with each other, and a function for event organizers that can visualize the success of the event every hour. The proposal system was used in actual events and was well received.

1 INTRODUCTION

In Japan, regional revitalization events are increasing. Japan has a declining birth rate and an aging society, and the local youth population is decreasing and the vitality of the region is declining (Muramatsu, 2011). A decline in regional vitality leads to a decline in the regional economy. As a solution to this problem, local currency introduction studies and regional revitalization events are being carried out (Kido, 2005) (Onitsuka, 2018).

In Japan, electronic money is spreading. In Japan, smartphones have become widespread, and anyone can easily use electronic money. In recent years, the government has been aiming to spread electronic money, and has implemented measures to reduce the consumption tax from 10% to 5% when making payments with electronic money.

In this research, we propose an electronic money utilization system for regional revitalization events. Provide new value by incorporating electronic money into local revitalization events. The target regional revitalization event is an eating and walking event in a local shopping district called “Town Bar”. Conventionally, a special menu based on the number of paper coupons has been provided using paper coupons. This will be changed to an electronic coupon to provide customers and stores with automated payments and event organizers to see the entire event.

2 OUTLINE OF REGIONAL ELECTRONIC COUPON

2.1 Regional Revitalization Event “Town Bar”

There is an event called “Town Bar” as part of preventing the decline of the local economy. Figure 1 shows a conceptual diagram of a “Town Bar”.

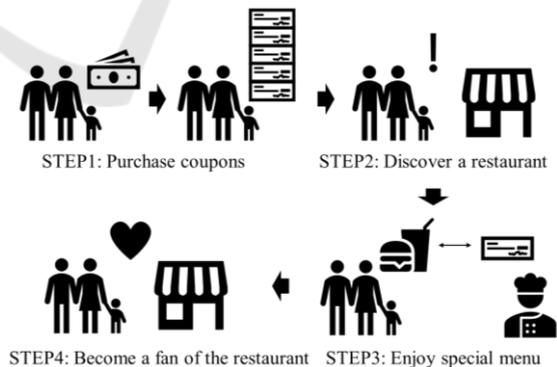


Figure 1: Conceptual diagram of a “Town Bar”.

The local residents who have purchased the coupons are aiming to rediscover the local attractions by eating and walking around the restaurants in the target shopping street. In the conventional “Town Bar”, first the event organizer sells paper coupons to

a customer, and the customer pays the paper coupon to a store.

When customers pay with paper coupons, a special menu is offered at a great price. The aim is for customers to enjoy the great menu and continue to be a fan of the store and keep coming to the store.

2.2 Validation and Implementation Issues of Regional Electronic Coupons

We examined the validity of electronic coupons to solve the problem of event management using paper coupons. Next, we clarified the issues of implementing electronic coupons.

In the event operation using paper coupons, there are problems that it is necessary to manually count the number of paper coupons and it is difficult to grasp the state of the event. Conventionally, stores had to bring paper coupons received from customers to the event organizer after the event, count the number of coupons, check sales, and exchange money with the organizer. Sometimes it was discovered that coupons had been lost and counting them was a heavy burden. Also, the event organizer could not check only the sales results, and could not monitor customer behavior and hourly sales.

The regional electronic coupon is effective in solving this problem. The regional electronic coupon digitizes the payment method like digital currency. Instead of physically paying with paper coupons, you pay with electronic coupons on your smartphone. Because it is digitized, it is possible to record who paid whom and when. Therefore, sales can be calculated automatically, and event status can be monitored from sales data. The burden on the store is reduced, and the event organizer can grasp the state of the event in detail.

However, there were three issues to implement the regional electronic coupon. The first point is to consider how to introduce digital devices without installing them in stores. Most of the stores participating in "Town Bar" are private stores, and it is difficult to bear the additional cost of introducing the regional electronic coupon. The second point is the creation of a new settlement method that has the characteristics of "Town Bar". Existing digital payment methods cannot be used because digital terminals for payment cannot be installed in stores. Therefore, a new settlement method is needed. The third point is to provide a means to grasp the entire event and details. It is impossible for event organizers who are not data analysis experts to output payment

data to an electronic file and analyze it with spreadsheet software.

2.3 Proposal of Regional Electronic Coupon Management System

We propose a regional electronic coupon management system to solve the regional electronic coupon implementation issues shown in Section 2.2. Table 1 shows the functions that require the proposed system to solve the problems in Section 2.2.

Table 1: Functional requirements of regional electronic coupon management system.

System Requirements	Description
Payment with a single smartphone	The ability to make payments using only the smartphones owned by customers.
Interaction between customers and stores	The system has a function that allows customers and stores to interact with each other during settlement.
Event management and analysis	The ability to manage and analyze the status of the entire event.

The ability to complete payments with a single smartphone solves the problem of implementing regional electronic coupons without installing new digital devices in stores. Implementing this function, regional electronic coupons can be introduced without placing an economic burden on local stores.

The settlement function with interaction between the customer and the store solves the problem of creating a new payment method with the characteristics of "Town Bar". The settlement function with interaction between customers and stores solves the problem of creating a new settlement method that has the characteristics of a "Town bar". By realizing this function, it is possible to introduce a local electronic coupon that is different from the existing settlement method, while taking advantage of the significance of "Town Bar" whose main purpose is to rediscover the local area.

The function to visually check the entire event and individual details solves the problem of providing a means to grasp the status of the event. Adding this function, the event organizer can analyze the situation of the entire event, use it for the next event, and advertise the success of the event.

3 SYSTEM CONFIGURATION

3.1 System Overview

Figure 2 shows an overview of the proposed regional electronic coupon management system. The customer pays cash to the event organizer and receives an electronic coupon. This electronic coupon can only be used at local stores participating in the “Town Bar” event and it is classified as a regional gift certificate or regional coupon (Kurita, 2012).

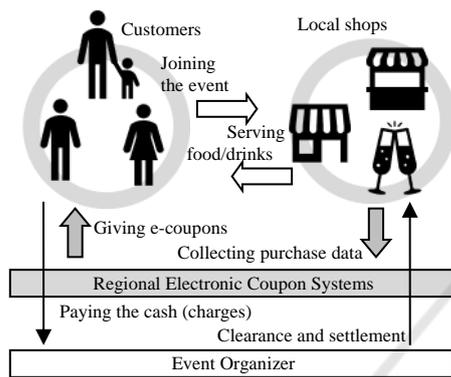


Figure 2: Regional electronic coupon management system overview.

The proposed system consists of a website for mobile devices, and customers can use their smartphone and e-mail address on the same day without downloading the application if they have an e-mail address. Also, the event organizer can grasp the usage status of the participant's “Town Bar” event at any time via the electronic coupon system. Table 2 shows a list of data acquired by the electronic coupon management system.

Table 2: List of the regional electric coupon management system acquisition data.

Name	Data description
E-mail address	“Town Bar” customer’s email-address (which used as user-ID)
Charges	Times of electric coupon charges
Information of food/ drink menus	Coupons used for food/ drink orders - Times of food/drink orders - Number of shops visited - Number of coupons used each order
Comments	Word-of-mouth information by visitors. They can leave a comment each time the coupon used and show thanks to the shop owners and advertisements to other users.

3.2 Functional Features

This system is roughly composed of three types of functions. The first is a function for providing fun to the user. The second is a function for managing cash transfer between customers and stores for stores and event organizers. The third is a function for analyzing the movement of a customer, the exchange status between a customer and a store, the information of money transfer between the customer and the store and displaying the result for the event organizer.

Functions for providing fun to the user include an "information providing function", a "comment posting function", and an "exchange settlement function". The "information provision function" is a function for providing information from the store to the customer with menus and recommendations, so that the customer can easily come to the store. The "comment posting function" is a function that allows customers to post impressions of shops and events, which can be viewed by event participants and all stores. The "interchange settlement function" is a function that completes settlement by the customer and the clerk simultaneously pressing and holding the screen of the smartphone at the time of settlement and aims to promote conversation and exchange. This function is described in section 3.4.

The functions for managing the transfer of money between the customer and the store include a “QR (Quick Response) code settlement function”, a “finance settlement data management function”, and a “money transfer display function”. The “QR code settlement function” is a function that completes the payment by reading the special menu provided by the customer with the QR code, eliminating the need for the store to prepare a digital device. The “financial settlement data management function” saves the payments made with the smartphone in the server database. “Money transfer display function” is a function that displays who used the coupon when and where it is, displays your own coupon usage history for customers, and displays all coupon usage history for event organizers can do.

The event information analysis function includes a “customer analysis function”, a “coupon usage analysis function”, and an “analysis result display function”. The “customer analysis function” is a function that can display the number of times a digital coupon has been purchased and the number of times a digital coupon has been used for each customer and compare them. The "coupon usage analysis function" is a function for displaying and comparing the digital coupon usage history for each customer, each store, and each time. The “analysis result display function”

is a function for displaying an event analysis result on a map. You can see how the event has changed over time.

3.3 Functional Configuration

Figure 3 shows a functional configuration diagram of the proposed system. The proposed system consists of a server and a client-type IT system using a smartphone as a client. It is provided as a web application to a smartphone used by a customer to perform screen operations and input / output data. The server runs in the cloud and performs input / output of the database and display of data analysis results. The functions executed on the smartphone are "information providing function", "comment posting function", "exchange settlement function", "QR code settlement function", and "money transfer display function". The functions to be executed on the server are "finance settlement data management function", "money transfer display function", "customer analysis function", "coupon usage analysis function", and "analysis result display function".

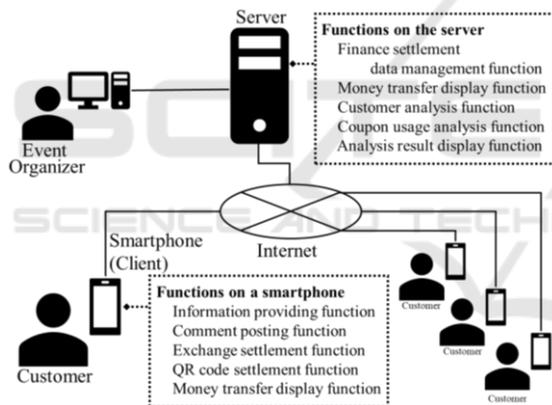


Figure 3: Functional configuration diagram.

3.4 User Experience Design

The conventional electronic money payment user interface is designed to quickly complete payment in terms of processing efficiency. On the other hand, the main purpose of “Town Bar” is to revitalize the area through interaction between customers and stores, so it is important to promote interaction between customers and clerks. Therefore, we propose a user interface that incorporates the joint work of the user and the clerk at the time of settlement and induce natural communication happening between the customer and the clerk.

Figures 4 and 5 show the proposed user interface. As a collaborative effort to induce conversation

between the customer and the clerk, we propose an interaction in which the user and the clerk simultaneously "press and hold" the screen of one smartphone. The screen design is such that a bar is displayed on the screen and a “long press” advances the bar, and payment is completed when the bar advances to the full bar. This screen design aims to provide a starting point for conversation in the time that two people hold down the button. In order to make the payment operation with one smartphone easier to understand, the screen design is designed so that the customer who pays the electronic coupon using the smartphone is on the front side and the clerk receiving the coupon is on the opposite side.

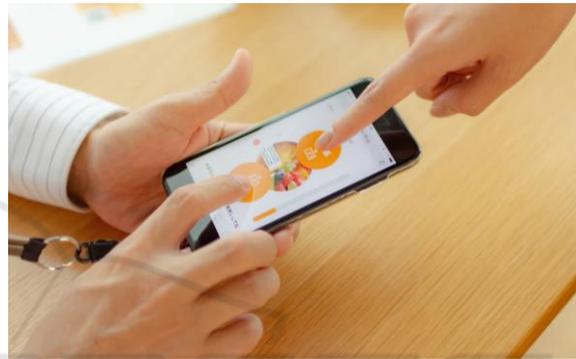


Figure 4: Touch user interface.



Figure 5: Payment user interface.

4 INTERFACE FOR MANEGEMENT AND ANALYSIS

4.1 Management Analysis Interface

The management analysis interface is used by the organizer to grasp the state of the event and to analyze

the event result. Using the management analysis interface, it is possible to visually confirm customer behavior, store sales, and the degree of interaction. The management analysis interface can dynamically display changes over time. With this screen, you can analyze the movement of customers for each time zone and which time zone was prosperous, and based on the analysis results, you can operate the next event more smoothly.

Table 3 shows the type of the management analytics interface. Figures 6 shows a screen design of the store sales analysis interface. Figure 7 shows the screen design of the sales and marketing analysis interface. Due to the small number of data elements retrieved, both interfaces cannot yet display all data elements. The August 2020 event will capture more data elements and make all the features of the interface available. Currently, the user data analytics interface allows you to see how people and stores are changing sales as events change.

Table 3: Types of management analysis interface.

Type	Description
Store sales analysis	Displays sales and customer attribute information for each store.
Sales and marketing analysis	Displays the number of visitors, attributes, and store sales rankings for the entire event.
User Data Analysis	Displays the movement of each user or all users on the map.

4.2 User Data Analysis Viewer

Figures 8 and 9 show screens for analyzing and displaying user data. The screen displays the date and customer behavior information for each shop on the left side. There is a map on the right, which shows the shops participating in the event, user comments, payments and electronic coupon purchases. On the lower side is time information of the selected date and indicates at what time the customer paid with the electronic coupon or purchased the electronic coupon. The screen displays changes dynamically as the time changes. As a result, it is possible to grasp on the map where the customer is paying, purchasing coupons, and sending comments. In the example shown in Figure 6, it is displayed that after 15:00, an electronic coupon has been purchased and a plurality of electronic coupons have been paid at the shop at the bottom of the screen.

When the same user is paying at a different store during different hours, the system determines that the user has moved and displays the movement on the screen. In the example of Figure 7, a customer pays with an electronic coupon at the upper store and then pays with an electronic coupon at the lower store, so a small circle is displayed on the screen. This small circle moves dynamically from the top store to the bottom store. The method of displaying this movement is simple because it is not GPS information. However, by displaying this, you can immediately confirm that the user is using multiple shops.

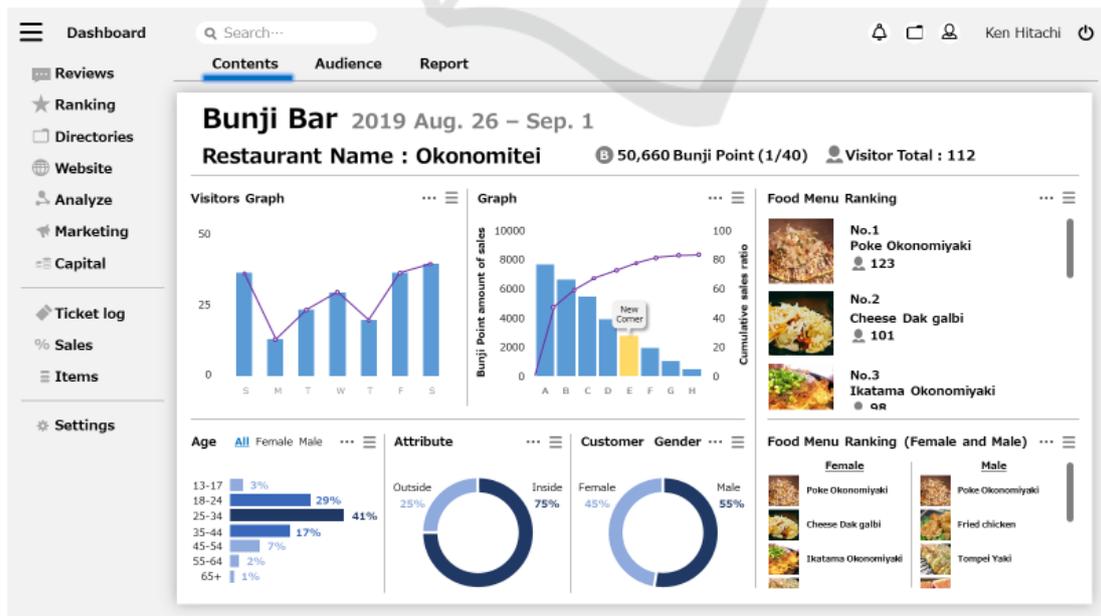


Figure 6: Store sales analysis interface screen.

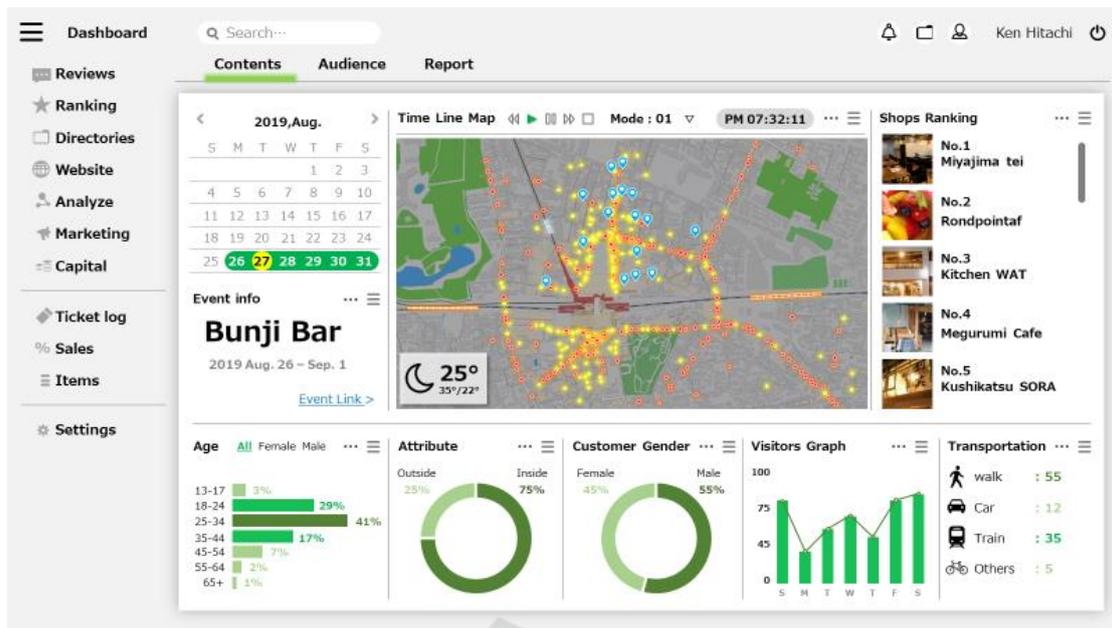


Figure 7: Sales and marketing analysis interface screen.

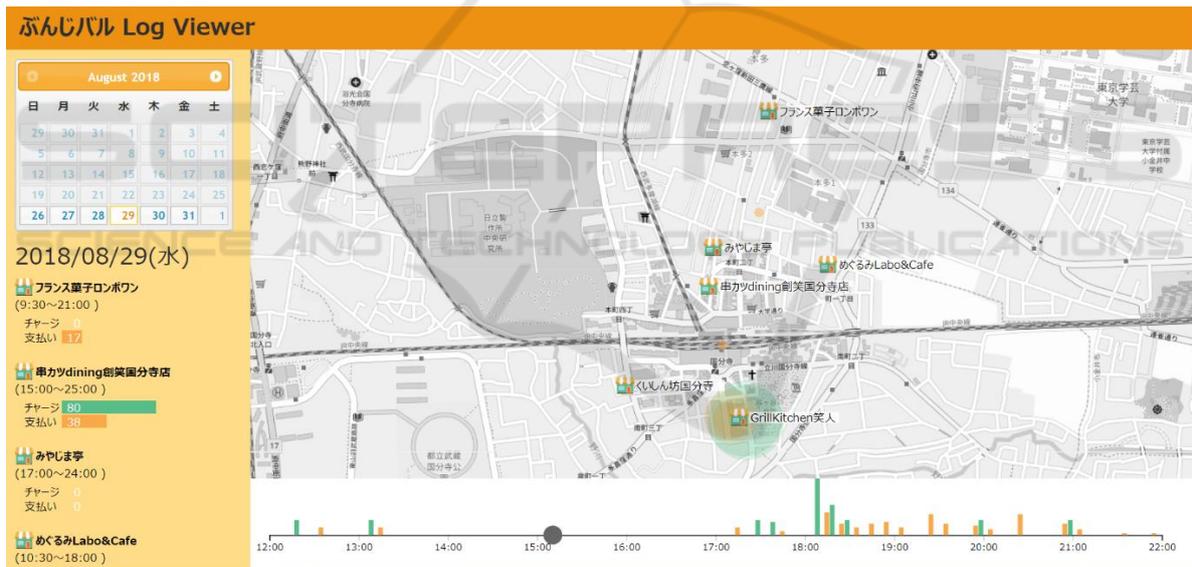


Figure 8: Example of user data analysis viewer screen.

4.3 Usage Scenario

The management and analysis function of the proposed electronic coupon system is used when the event organizer analyzes the improvement and effect of the event, and when the event organizer promotes the success of the event to event participants and supporters.

When analyzing the improvement and effect of the event, the payment by the customer, the comment

of the customer, the movement of the customer are displayed every hour. By confirming the payment, you can see which store the customer visited. By checking the comments, you can confirm whether the interaction between the customer and the store was thriving. By confirming the movement, it is possible to anticipate the movement of a person at a future event, and to consider the response.

When promoting the success of an event, payouts, distinctive comments and movements are clearly



Figure 9: Screen example showing movement of people.

displayed. Unlike analysis, it shows what has been done in an easy-to-understand manner. Multiple payment information is displayed at once, the number of comments is carefully selected, the movement of people is highlighted, the content of the event is clearly displayed, and the success is impressed.

5 APPLICATIONS

The proposed regional electronic coupon system was introduced on a trial basis at “Bunjibar”, a “Town Bar” event held in Kokubunji, Tokyo, Japan. “Bunjibar” has been held in the shopping district around Kokubunji Station in Tokyo since 2013, and it is the ninth time in 2019. The proposed system was piloted in 2018 and 2019. Table 4 shows an overview of “Bunjibar” in 2018, and Table 5 shows an overview of “Bunjibar” in 2019.

The proposed system was first tested in 2018. There were six stores that accept electronic coupons, but stores that accept electronic coupons ranked first and second in sales. In 2019, participation in electronic coupons increased to 22 stores in 2019, and stores supporting electronic coupons again ranked first and second in sales.

We surveyed comments from customers, store staff, and event organizers to see if the proposed system met the functional requirements described in Section 2.3.

The comment from the viewpoint of payment with a single smartphone is as follows. "It was nice and simple that the process was completed with just my

smartphone." "We could easily respond to digitization simply by attaching a QR code to the menu we were using so far." "We have reduced the trouble of counting paper coupons, which has shortened the cashing process from three days to one day."

The comments from the viewpoint of interaction between the customer and the store are as follows. "It's fun to work with the store staff, and it's interesting to see others paying on their smartphones." "I felt that there would be no mechanical settlement when there was some kind of embarrassment on the paying side and the receiving side."

The comment from the viewpoint of event management and analysis are as follows. "It's great to get an overview of the event." "It was useful to clarify how customers use coupons depending on the date and time." "I understand who uses coupons at multiple stores on the same day and who uses coupons at different stores on another day. I would like to consider creating different benefits for those customers." "I want you to show it in conjunction with the weather and temperature. I would like to change the menu offered on weekdays and holidays and offer a special menu when participating in multiple shops." "I want to know the customers who came to the store after the event. I would like customers to use local electronic coupons and use them in various ways."

Based on the survey results, we conclude that the proposed system contributes to the management and operation of regional electronic coupons.

Table 4: Summary of event, “Bunjibar” in 2018.

Name	Description
Event period	During 26 th Aug to 1 st Sep., 2018
Place	Around Kokubunji Station, Tokyo
Format of food/drink coupons	Paper-based or electronic coupons provided. (400 JPY x 7 / set)
Num. of shops	42 shops. (6 shops: e-coupon ready)
Number of visitors	Approx. 450 visitors (42: e-coupon users)
Types of shops	Bar and Izakaya: 18 shops (43%) Restaurant: 12 shops (29%) Café and coffee: 6 shops (14%) Others: 6 shops (14%)

Table 5: Summary of event, “Bunjibar” in 2019.

Name	Description
Event period	During 25 th to 31 st Aug., 2019
Place	Around Kokubunji Station, Tokyo
Format of food/drink coupons	Paper-based or electronic coupons provided. (400 JPY x 7 / set)
Num. of shops	49 shops. (22 shops: e-coupon ready)
Number of visitors	Approx. 512 visitors (52: e-coupon users)
Types of shops	Bar and Izakaya: 22 shops (45%) Restaurant: 16 shops (33%) Café and coffee: 6 shops (12%) Others: 5 shops (10%)

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6 CONCLUSIONS

We proposed a regional electronic coupon management system. The proposed system incorporates a mechanism that allows local shopping malls held in Japan to provide special menus, rediscover local shopping streets and their appeal, and allow customers and shop clerks to interact with each other. The proposal system was used in actual events and was well received.

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