Proposals and implementation of tourism resource stimulation using public and private sector data:

The case of Suzaka city zoo

Atsuko Kanematsu (Graduate School of Informatics, Nagoya University, kanematsu@i.nagoya-u.ac.jp)
Mamoru Endo (Graduate School of Informatics, Nagoya University, endo@i.nagoya-u.ac.jp)
Mayu Urata (Graduate School of Informatics, Nagoya University, mayu@i.nagoya-u.ac.jp)
Takami Yasuda (Graduate School of Informatics, Nagoya University, yasuda@i.nagoya-u.ac.jp)

Abstract

With municipalities working on local informatization, interest in the use of information and communication technologies in the field of tourism is growing. This research project aims to heighten Suzaka City Zoo's appeal as a touristic site in coordination with municipal informatization measures and open data efforts. We also discuss how its undertakings heighten the appeal of the municipality as a whole and can lead to further development of the area.

Keywords

open data, beacon, monozukuri, suzaka city zoo, tourism resource

1. Introduction

In Japan, tourism is seen as a major policy pillar due to the Tourism-based Country Promotion Basic Act (*Kankō rikkoku suishin kihon hō*) that began to be implemented by the Japan Tourism Agency in 2007. This act states that it is the responsibility of regional public organizations to formulate and carry out measures that make use of area characteristics, as well as to try to engage in regional coordination and cooperation. The Tourism-based Country Promotion Plan (*Kankō rikkoku suishin kihon keikaku*) discusses the promotion of "new tourism," one of the measures currently being carried out by the Japan Tourism Agency.

"New tourism" refers to a new form of travel that makes use of aspects unique to areas that had not been seen as tourism resources in the past and incorporates experiential and interactive elements. Japan Tourism Agencies hope that it will lead to local revitalization because it can easily make use of an area's characteristics.

With the Ministry of Internal Affairs and Communications carrying out local informatization measures, municipalities are formulating their own local informatization plans. They are considering how to actively use information and communication technology (ICT). In the tourism sphere, diverse efforts to attract tourists from Japan and abroad come to mind, such as free Wi-Fi, developing websites and applications for sharing information regarding areas' appealing aspects, and so on. Novel tourism-related efforts that involve the use of open data are also increasing.

This research project's objective was to heighten Suzaka City Zoo's (Nagano Prefecture) appeal as a touristic site in coordination with municipal informatization measures. We hope that the area will develop even further through the spread of similar efforts to other facilities that can then cooperate with each other, thereby stimulating tourism resources in the municipality as a whole and advancing regional coordination.

2. Local informatization and tourism in municipalities

2.1 Past undertakings at Suzaka City Zoo

Suzaka City Zoo is a municipal zoo that opened on October 1st, 1962 in Suzaka City, Nagano Prefecture. It is one of the city's 100 famous cherry blossom tourism spots and is located inside Garyu Park, one of Japan's 100 famous pine tree spots. The zoo features approximately 250 animals of fifty different species. Approximately 150,000 people visit every year, equivalent to around 3 times of the city's population. In addition to people from the city, many visitors come from neighboring areas in Nagano Prefecture. The zoo holds interesting and creative events and features hand-made information displays so that visitors can deepen their interest in living things through its animals. The zoo tries to close the distance between people and its animals using six information sharing channels: its website, blog, Facebook, Twitter, Instagram, and Line. The zoo chooses the content and the frequency of update of the information provided on each channel in accordance with the channel's characteristics and the kind of people who receive information from it.

On Line, the zoo has gone even further, and sells stamps on the Line Store: "Suzaka City Zoo's Friends" (*Suzaka-shi dōbutsuen no nakama tachi*) and "Suzaka City Zoo's Friends 2." The stamps are based on drawings by its zookeepers, which are publicly released as open data under a CC BY license.

2.2 Related research

Various local informatization and tourism-related proposals and trials, as well as the development of technologies, can be found in the academic world. First, we will describe undertakings carried out by our research group within municipalities.

Our research group has actively worked with over 30 municipalities on local informatization and open data efforts. Major efforts include constructing communities in Komagane City, Nagano Prefecture comprised of municipal employees and university-affiliated individuals by making use of a social networking service (SNS) [Endo et al., 2015], as well as participatory,

beacon, and monozukuri-based undertakings in Suzaka City, Nagano Prefecture [Endo et al., 2016; 2017; Hattori et al., 2016; Kanematsu et al., 2016; Pinero et al., 2017; Uchida et al., 2016].

Our group has also developed an application and proposed and created a data set that aims to turn municipal tourism event information into open data in Higashi Ward, Nagoya City (Aichi Prefecture) [Ogishima et al., 2016; Urata et al., 2017].

Other groups have performed diverse research making use of technology, such as the development of a wide-area tourism support system in Iwate Prefecture that uses open data [ueda et al., 2017] and research on turning the movement history of tourists into linked open data [Kozaki et al., 2018].

3. Local informatization in Nagano Prefecture's Suzaka City

3.1 The current state of open data efforts

In April 2014, Suzaka City became the first municipality in Nagano Prefecture to declare that it would promote open data. This was prompted by its participation in International Open Data Day (IODD). IODD is an open data event that is promoted by Open Knowledge International (at the time, the Open Knowledge Foundation) and held yearly on the same day around the world. Advocacy by the resident group, Group for Considering Suzaka City's Informatization (*Suzaka-shi no jōhōka o kangaeru ka*i), led the city to participate by holding International Open Data Day 2014 in Suzaka. Based on information released on the city's website, an idea-thon to consider what could be used as open data in the future, as well as a city stroll event, were held, and people also discussed the creation of a time table application. After the event, on April 1st, 2014, Suzaka City established an Open Data Promotion Committee, and on May 1st, they launched an open data website.

In the four years since then, Suzaka City has actively worked to promote open data by, for example, participating in IODD yearly and engaging in industry-academia-government-citizen cooperation. The city is currently at the top in CityData.jp's overall open data ranking.

3.2 Characteristics of Suzaka City's open data efforts

Suzaka City's open data efforts have four major characteristics.

First, residents propose them. As was shown by IODD 2014 in Suzaka, which led the city to promote open data, residents take the lead in discussing local issues, creating necessary data, and offering proposals based on this data to the government. Citizens do not only look to the government to solve local problems. This method finds undertakings that make it possible for solutions to arise out of residents' initiatives.

Second, Suzaka City's employees also create applications. City employees receive requests from residents, and not only release data after discussions, but also develop applications showing how the open data can be used. For example, Suzaka City has released, as open data information, Asiatic black bear sightings, and city employees have developed a related application, "Bear Sighting Information" (*Kuma mokugeki jōhō*). Currently, 17 applications developed by city employees have been released.

Third, Suzaka City incorporates the Internet of Things (IoT) into its open data efforts. Terminals called "beacons" have been placed in 128 places in the city, including city-related facilities, privately-owned stores, and so on. The city has released the IDs and location information of these beacons as open data.

The applications, "Suzaka and Takayama Health Walking" (*Suzaka, Takayama kenkō wōkingu*), for promoting residents' health, and "Suzaka City Zoo Treasure Hunt" (*Suzaka-shi dōbutsu en takara sagashi*), for enjoying the Suzaka City Zoo, were developed using this data.

The city has also held microcomputer children's programming classes and developed a "Suzaka Slow Jog" (*Suzaka suro jogu kun*) walking device to promote residents' health. In the case of the former, text layout information is released as open data, and in the case of the latter, the device's source code has been released as well.

The fourth characteristic of Suzaka City's promotion of open data is its incorporation of monozukuri. In the 2015 financial year, using a 3D printer, STL files of drawings by event participants were released as open data under the CC BY license. This data can be used by anyone under the Creative Commons license on the 3D open data website "Open Stamp Library" (*Ōpun sutanpu raiburari*). Furthermore, for IODD 2016 in Suzaka, figures were used made from the publicly released animal data.

Since the 2016 financial year, a laser cutter has also been used. At IODD 2017 in Suzaka, acrylic parts created with a laser cutter were used to make a diorama of Suzaka. At the Suzaka City Zoo, novelty goods were created based on zookeepers' own drawings, which are available as open data.

4. Using open data to encourage tourism at Suzaka City Zoo

4.1 Proposing stimulation of tourism resources using open data

We believe that the following three elements are important for connecting the advancement and use of open data with the stimulation of tourism resources at the Suzaka City Zoo.

- Application Development and Use
  Visitor use of a smartphone application developed by Suzaka City Zoo for an even more enriching time when touring the zoo.
- Reducing the Burden of Data Updates on City Employees
  Application information is expected to be perpetually new, and for budgetary and other reasons, it is difficult to contract this work out. Therefore, there is a need for adjustments to be made so that zoo employees can update this information as part of their regular duties.
- Efforts to Increase the Number of Visitors
  For the zoo's operational situation to sustainably improve, there is a need to increase the number of visitors. To do so, efforts need to be made so that people think of the zoo in their daily lives, viewing it as something familiar to them.

In our research project, we considered that enacting the above in coordination with the municipality's local informati-

Figure 1: Quiz rally

zation measures was important to help encourage tourism in Suzaka. We will describe how they were carried out in the following section.

4.2 The development and use of Suzaka City Zoo Treasure Hunt

The Suzaka City Zoo has released the beacon-based application, Suzaka City Zoo Treasure Hunt. This application is one example of the city incorporating the IoT into its open data promotion efforts. The application was jointly developed by our research group, Suzaka City Zoo, and the Suzaka City Policy Promotion Division (*Suzaka-shi seisaku suishin ka*). Twenty-nine of the city's 128 beacons were placed in the zoo for this application. The application features a so-named quiz rally and an illustrated animal book. In addition to beacon technology, it also uses photographs that have been publicly released as open data by Suzaka City Zoo.

4.2.1 The structure of the application

• Quiz Rally

At beacon spots (animal enclosures), users' smartphones receive quiz questions from the beacon. They tap the "Search for Treasure!" button to display the question, then press the icon displaying what they think is the correct answer. Two possible answers are displayed. After touching one of them, a message indicating whether the user is correct appears. If the user's answer is correct, they are led to the next "treasure spot," that is, the animal enclosure to which they should go next. If the user's answer is incorrect, then it is not displayed, and they need to search for the treasure spot using the application's treasure map (Figure 1).

The questions that appear in the quiz rally were created by Suzaka City Zoo zookeepers and released as open data under the CC BY license at LinkData.org. This application allows zookeepers to guide visitors to animal enclosures that they want visitors to see. For example, during the Spring Animal Festival held on the 17th and 18th of March in 2018, an "elec-

tion" to choose the face of the animal that would represent the zoo for the 2018 financial year was held. The quiz rally questions in Suzaka City Zoo Treasure Hunt were changed to ones related to animals appearing in the election. By guiding users to the enclosures of these animals, it became more likely that users would take an interest in them.

• Illustrated Animal Book

The application's illustrated animal book features photographs and explanations regarding animals in the zoo (Figure 2). The photographs used were released as open data under the CCBY license by the Suzaka City Zoo. The explanations were written by the zookeepers. They include not only general information on the animal (its species, etc.), but also specific information on the individual animal (such as its name and characteristics). By finding out about the animals that are nearby, it is hoped that application users can, with a feeling of affinity, read about each animal and consider

Figure 2: Illustrated animal book

things they were previously unaware of when at the zoo.

The illustrated animal book can be used outside of the zoo, and another one of its goals is to encourage users to visit the zoo again by having them open and enjoy the application in their daily lives.

4.2.2 Application management

While application information is expected to stay new and be highly useful for users, updating application data can be a burden if doing so is complicated. Therefore, an effort was made to reduce the burden of updating the application by using the open data support platform LinkData.org.

The data update steps are as follows.

- Access LinkData.org and download an uploaded Excel data file containing location information and quiz rally questions (Figure 3).
- Open the downloaded file and enter the new data.
- Access the LinkData.org page again and upload the file. The application data is thereby updated.

Figure 3: SUZAKA_ZOO_treasureApp

Updating the application becomes easy using the LinkData.org system. This makes it possible for museum zookeepers to directly update the data amidst their regular duties and not have to contract this work out. The application has been updated for each event (a total of five times).

4.3 Promoting open data and using a laser cutter for monozukuri

The Suzaka City Zoo has been working with our research team since 2016 on the development of novelty goods using a laser cutter. The developed novelty goods are given to visitors who use Suzaka City Zoo Treasure Hunt. The goods use the original drawings that the zoo has publicly released as open data. At the zoo's October 2017 Autumn Zoo Festival, a participatory open data workshop was held for visitors, a part of the city's work to incorporate monozukuri into its open data

efforts.

4.3.1 Novelty goods development and use

Novelty goods have been developed five times: first at the Halloween Zoo 2016 event, and then at the Spring Zoo Festival 2017, Autumn Zoo Festival 2017, Halloween Zoo 2017, and Spring Zoo Festival 2018. Continually developing novelty goods will lead to the acquisition of new visitors and repeat visitors seeking to receive such goods.

Novelty goods are developed using the following steps:

- Make an original drawing for open data.
- Digitalize the design by taking a photograph of it (drawn on paper) with a smartphone or tablet.
- Use Illustrator to create laser cutter data based on the digital data.
- Create the novelty goods using a laser cutter.
- Package a piece of paper with the novelty goods that bears information regarding open data and the Creative Commons License.

At the time of Halloween Zoo 2016 and Spring Zoo Festival 2017, Suzaka City did not have a laser cutter, and work was divided up. The zoo was in charge of making the drawing open data and digitalized, as well as packaging the novelty goods with the aforementioned piece of paper. Our research group did the work that required software or a machine.

In September 2017, the Suzaka City Technology and Information Center (*Suzaka shi gijutsu jōhō sentā*), with backing from the Nagano Prefecture Locality-based Revitalization Support Fund (Nagano ken chiiki hatsu genki zukuri shienkin), purchased a laser cutter, enabling zookeepers to perform all of the steps (Figure 4). From the Autumn Zoo Festival 2017 onwards, zookeepers did all of the novelty goods work based on their own ideas.

Figure 4: Zookeepers designing a novelty goods

4.3.2 Participatory open data workshop

At the Autumn Zoo Festival 2017, a workshop for visitors entitled "Pumpkin Face Drawing" was held. This workshop was a joint project of our research group, the Suzaka City Zoo,

Figure 5: The workshop

Suzaka City's Policy Promotion Division, and the Suzaka City Technology and Information Center. Visitors drew faces on an outline of a pumpkin that had been drawn by a zookeeper; visitor drawings were then released as open data under the CCBY license (Figure 5).

Advance notice was given that the drawings from the workshop would be used at the Halloween Zoo event held in the same month. The aim was to have participants feel closer to the museum due to their involvement in part of this event, as well as to have them return to see the faces they drew. In the three days that the event was held (October 7th to 9th, 2017), a total of 240 participants drew 468 faces. 221 of them were used as decorations at the Halloween Zoo 2017 event held during the same month (Figure 6). Our research group was in charge of creating the data, and the zookeepers did the laser cutting work.

Figure 6: Decorations made from visitors' drawings

4.3.3 Constructing an open data drawing website

The zookeepers' drawings used for novelty goods and the pumpkin faces drawn by workshop participants were released under the CCBY license as open data on a website (Figure 7).

Data was provided in two formats: jpg and ai. The ai format is for use in *monozukuri* work involving, for example, laser cutters. We hope that by using the data from drawings that they like, people will feel closer to the Suzaka City Zoo as well as an affinity for the zoo's animals, thereby leading to more repeat visits.

Figure 7: Open data drawing website

5. Discussion

This research project proposed and implemented necessary elements for linking open data efforts at Suzaka City Zoo to the stimulation of tourism resources. The development of a beacon-based application, monozukuri novelty goods, and so on was done in coordination with the municipality's open data measures. Doing this shows it is possible to carry out such efforts sustainably without placing a burden on zoo operations or employees' regular duties. Looking at application users and workshop participants, we believe that these efforts are one effective way to stimulate interest in the Suzaka City Zoo and its animals, as well as to heighten the zoo's appeal.

Here, based on the results of our research, we will discuss how to further heighten the Suzaka City Zoo's appeal and connect it to the advancement of municipal tourism.

- Coordination with Municipal Measures
  Application and novelty goods development and the participatory open data workshop were carried out in coordination with Suzaka City's open data efforts. The Suzaka City Zoo's efforts and the results of these efforts can also be seen as an accomplishment in Suzaka City's work to advance open data. It is important that the zoo's efforts continue to be carried out in coordination with the municipality's measures in order to produce a synergetic effect.
- Advancing and Using Open Data
  Uploading data released by the Suzaka City Zoo under the CCBY license to LinkData.org and using it prevented the work of updating the Suzaka City Zoo Treasure Hunt application from placing an excessive burden on zoo employees amidst their daily duties. Updates were thereby able to be continually carried out. Furthermore, the photographs and

drawings used for the animal illustrated book and novelty goods were released as open data under the CCBY license, enabling anyone to use them. While continuing to advance open data in the city, the appeal of the zoo should be heightened by actively using and proposing, to visitors and others, ways to take advantage of this data, particularly that which is easy to use (photographs, drawings).

• Ways to Inspire Suzaka City Zoo Enthusiasts

During application and novelty goods development, efforts were made to have Suzaka City Zoo visitors feel closer to the museum by, for example, having them encounter the zoo in their daily lives. Some visitors started collecting the novelty goods presented after completing the quiz rally and therefore return to the zoo multiple times. Efforts should be made so that not only the number of new visitors but also the number of repeat visitors increases.

Stimulating tourism resources at the Suzaka City Zoo also helps promote Suzaka City tourism. We can expect that connections established by spreading such efforts to other facilities while continually trying to cooperate with the municipality would lead to the overall development of Suzaka City.

6. Conclusion

This research project, aiming to increase the appeal of the Suzaka City Zoo by coordinating with municipal local informatization efforts and open data promotion measures, proposed and implemented undertakings that made use of beacons and a laser cutter. The results of each of these undertakings proved that their methods are sustainable ones that do not place a major burden on zoo operations and employees. Furthermore, we believe that efforts carried out in coordination with municipal measures are effective not only for heightening the appeal of the Suzaka City Zoo, but also for municipal local informatization and the stimulation of tourism resources.

Other areas and local governments promote tourism by tapping into their unique local resources. By aligning such efforts with local municipalities' policies and further collaboration, it is even more possible to tie local resources and tourism promotion in the area.

While increasing the number of facilities engaging in similar sustainable efforts based on this research project's undertakings and accomplishments, we intend to continue to engage in research that can contribute to the advancement of tourism in the municipality as a whole, as well as wide-area cooperation-based development.

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