Creating open data sets on tourism information through citizen collaboration

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Abstract

As the concept of open innovation becomes more widespread, the resolution of societal issues through collaboration with various entities is also required with the promotion of open data in tourism. However, there are only a few local tourism associations that are currently collaborating with each other, and hardly any attempts have been made to turn the citizens' rich knowledge and information of tourism into open data sets. In this study, it was attempted to create open data sets using citizens' tourism information to promote tourist attractions. In this paper, the promotion of open data through citizen collaboration, including volunteer tour guides, and the creation of open data sets of tourism information provided by tourists will be discussed.

Keywords

open data, citizen collaboration, photograph, volunteer tour guide, tourism event

1. Introduction

In recent years, the open innovation that has received increased global attention is not only changing local governments and companies, and various entities such as citizens and users, but is also now being used to resolve societal issues [Japan Open Innovation Council, 2016]. In the promotion of open data, the Japanese government has also advocated 'Open Data 2.0 [Electronic Administrative Open Data Practitioners Meeting, 2016]', and began to shift from the use of disclosed conventional data to implementing initiatives by tapping on the open data to resolve societal issues through collaboration with diverse entities, further intensifying the need for open data. One of the areas to be strengthened is the upcoming Tokyo Olympic Games, where tourism challenges such as promoting Japanese tourism and Japanese culture to foreign travelers have been mentioned, and the promotion of open data in the tourism industry is receiving more emphasis.

In the promotion of open data in tourism, collaborative initiatives with entities other than local governments have been slowly increasing [Sapporo Open Data Joint Council, 2017]. However, many of those are collaborations with private businesses and research institutions, and there are simply few collaborations with citizens such as tourism associations familiar with the tourist attractions and local residents. Considering the enrichment of information that will promote local attractions, it is also important to turn the citizens' information of tourism into open data sets.

In this research, therefore, it was aimed to promote tourist attractions by promoting open data, and attempt to create open data sets of tourism information provided by citizens. In the attempt to create open data sets of tourism information provided by tourists and volunteer tour guides, the role of citizen collaboration in the promotion of open data will be discussed.

2. Current status of promotion of open data

2.1 Initiatives in promoting open data

Ever since the Open Data 2.0 was proposed in 2016, the Japanese government has begun to focus their efforts on using open data as opposed to the disclosed conventional data to resolve societal issues. The research group of this paper have also collaborated with various entities to promote open data published by the local governments in the Aichi and Nagano prefectures, and have been implementing practical initiatives to use open data to help resolve various regional challenges [Ogishima et al., 2016; Endo et al., 2016].

2.2 Promoting open data through citizen collaboration

Elements of citizen collaboration and public-private partnerships are important in promoting open data, and various efforts have been taken so far. Exemplary efforts include events such as Hackathons and mobile applications competitions, where tourism information is also one of the themes [Code for Shiga/Biwako, 2014]. However, a problem with these initiatives is that most of the time, many of these initiatives do not lead to administrative services and become short-term programs [Shoji, 2012].

On the other hand, citizens are also making efforts to provide information on their part. Citizens have provided photographs that were published in the local governments' open data sources, such as the '3776 Views of Mount Fuji [Shizuoka Prefecture, 2017]' in the Shizuoka prefecture and 'Kanazawa Photo Album' in the Yokohama city [Kanazawa Ward, City of Yokohama, 2015]. In addition, while LinkData [LinkData, 2017] is also used by the local governments as a free open data platform, it can be accessed by anyone as long as they register an account with the platform, and this has become one of the

tools that support the release of open data by citizens.

2.3 Position and objectives of this study

While the conventional promotion of open data through citizen collaboration has focused on holding events and providing data to local governments, there has not been much effort put into the release of citizen-based open data. Information that can be disclosed by the local governments is restricted to basic information that is impartial, authentic, or universal information from management problems, such as opening hours and location information of tourist attractions. Considering the attractive services that can be provided from open data, it is important to enrich its contents, and necessary to promote open data in future to turn citizens' (such as curators and civic organizations) information on historical and cultural knowledge into open data. In this study, it was aimed to contribute to the promotion of tourist attractions by promoting open data by conducting an experimental trial to create open data sets using citizens' tourism information.

2.4 Research field and previous studies

The Cultural Path ('Bunka no Michi') located in the Higashi ward of Nagoya city has been chosen as the field of study for this study. The Cultural Path is an area where modern historical buildings are preserved, and dotted with tourist attractions such as Nagoya castle and Tokugawa gardens. The research team of this paper has previously worked together with the Higashi ward of Nagoya city to promote open data on tourism event information conducted along the Cultural Path [Ogishima et al., 2016; Urata et al., 2016]. The data was released in cooperation with local governments, and have helped to boost the participation rate of tourists in tourism events by developing an event guide application based on the data. However, a proof of concept has demonstrated that the historical and cultural explanations on tourist attractions from the open data of the local government alone were insufficient, and that the appeal and allure of tourist attractions were clearly not fully conveyed to the participating tourists. It was therefore speculated that it is possible to further convey the appeal and allure of tourist attractions by creating and making use of open data sets on information held by tourism associations operating along the

Cultural Path as well as that of tourists.

3. Creation of open data sets in tourism from citizens
3.1 Proposing creation of open data sets

To boost the activities of local tourism by promoting open data, it is necessary to create more open data sets on information that tourists need. Such information may not be necessarily held by local governments, but by local citizens or private companies. Yet, it is not realistic for local governments to gather such information and turn it to open data sets when their workload is considered.

Therefore, this study suggests a proposal to release local citizens' information as open data. The development of local tourist attractions requires the construction of a system to readily accept tourists (such as foreign tourists) to Japan together with various regional entities [Japan Tourism Agency, 2017]. It can be said that it is important to promote open data on local tourism information through collaboration with local citizens, since collaborations between local entities such as industry, government, academia and private sector, and the creation of open data sets on citizens' information are required (2). In this study, open data sets on the local tourism information of the area surrounding the Cultural Path were created that were not released as open data by the local government due to various circumstances such as impartiality and accuracy issues as well as information that they did not possess to begin with. In addition, it was also attempted to boost local tourism activities by utilizing open data at the official websites on 'Arukou! Guide' and 'Arukou! On the Cultural Path [Higashi-net, 2016]' to promote the appeal and allure of the area (Figure 1).

3.2 Creating open data sets based on citizens' information
3.2.1 Target: Tourism information

The Cultural Path Volunteer Guide Association in Higashi ward conducts tours and historical research on the Cultural Path area for tourists every day, and maintains a website where they disseminate much valuable historical and cultural information on the area (Figure 2). Such information is unique to the volunteer guides working in tourism, and it is believed that it is useful to convey the appeal and allure of tourist attractions. It was therefore decided to create open data sets on the 'informa-

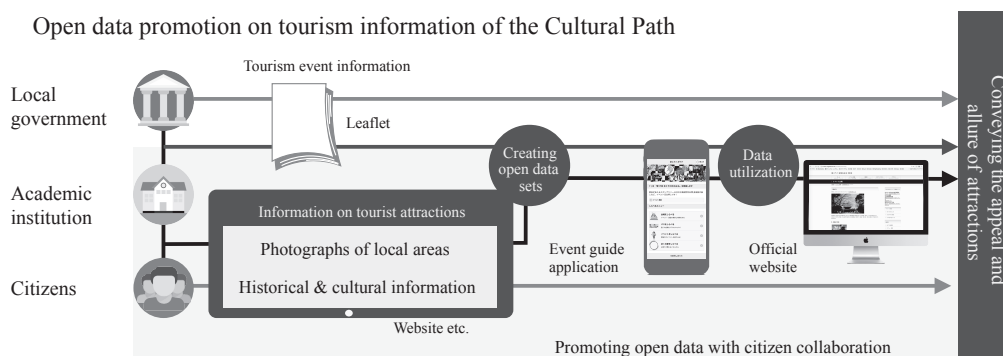Open data promotion on tourism information of the Cultural Path

Figure 1: Promoting open data on tourism information through citizen collaboration

Figure 2: The Cultural Path Volunteer Guide Association in Higashi ward website

tion on attractions' and 'flower photographs' in the area based on the information that the volunteer guides have uploaded onto the website.

3.2.2 Steps in creating open data sets

Cooperation from the Cultural Path volunteer guides were requested to release the open data on 'information on attractions' and 'flower photographs' on their website. After they understood the significance of promoting open data, a public page on open data on their volunteer guide website was created, and then respectively the contents of the 'information on attractions' and 'flower photographs' as open data of the volunteer guides was released.

3.2.3 Publishing the open data

Upon getting the approval from the Cultural Path Volunteer Guide Association in Higashi ward, the information was released as open data of the Volunteer Guide Association in Higashi ward under a CC-BY license on the website. For 'information on attractions', the data of all 20 attractions was released in the form of a CSV file, of which the contents were described by {attraction name}, {outline}, and {photograph} (Figure 3). For 'flower photographs', the flower venues and flower names on the public page were keyed into, and a total

Figure 3: Open data on 'information of attractions' (CSV file)

Figure 4: Open data on 'flower photographs'

of 145 photos in JPEG format that were taken from 2013 to August 2016 were uploaded (Figure 4). The copyrights and personal information regarding these open data were taken into account, and only information that would not cause problems even when converted into open data was made available.

3.3 Creating open data sets based on tourist-provided information

3.3.1 Target: Tourism information

It has been demonstrated that photographs taken by tourists are useful to promote the appeal and allure of tourist attractions. In recent years, visual communication such as SNS using photographs (e.g., Instagram and Snapchat) have been becoming popular, and the superiority of photographs in information transmission has been recognized. In promoting open data, photographs have also attracted attention due to ease of conversion into open data. In particular, photos taken by the local citizens of the '3776 Views of Mount Fuji' in the Shizuoka prefecture and 'Kanazawa Photo Album' in the Yokohama city introduced in paragraph 2.2, have been released to the public as the local government's open data. Due to the abovementioned reasons (such as the superiority, ease, and degree of attention of the information transmission of photographs), it was decided to use the 'photographs' taken by tourists participating in the 'Arukou! On the Cultural Path' event as tourists' information in this study.

3.3.2 Steps in creating open data sets

The cooperation of tourists participating in the 16th 'Arukou! On the Cultural Path' annual event was sought, and open data sets on the photographs taken by the tourists during their participation of the event were created (Figure 5). As for the steps in creating the open data sets, the participants were asked to fill in a pledge agreeing to the creation of open data sets after they finished the event, and send their photographs (including the title and location it was approximately taken) that can be released as open data via e-mail. Upon obtaining permission from the Nagoya city on the photographs sent by the participants, the research team of this study and the civic organization, 'HigashiNet', checked all photographs and only those that

Flow in releasing open data

(1) Take photographs (2) Send via email (3) Conduct check (4) Release to public

Pledge

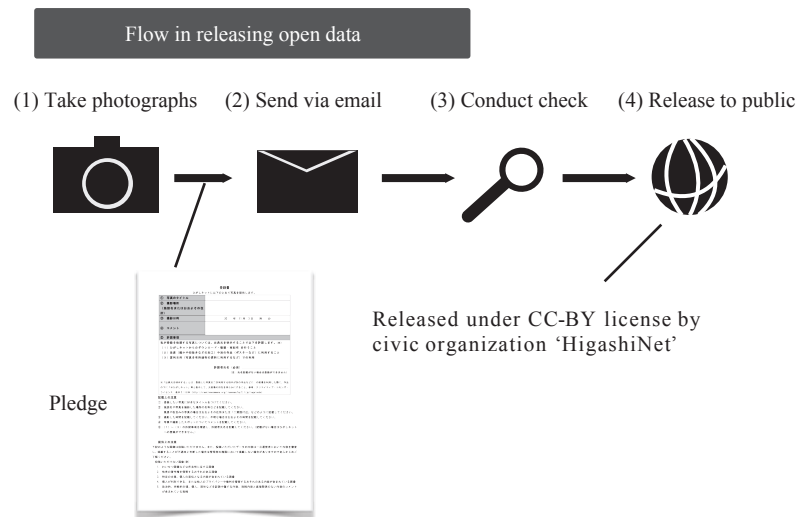Released under CC-BY license by civic organization 'HigashiNet'

Figure 5: Release of open data on photographs taken by tourists

did not infringe on copyright or disclose any personal information were released. In this study, the data was released as open data of HigashiNet, and not as open data of the Higashi ward. Considering the problem of disclosure period due to issues of administrative jurisdiction and commercial circumstances in the Cultural Path area, as well as the administrative paperwork and problem of data maintenance, it was concluded that the information should be released as open data of civic organization, and not as that of Higashi ward.

3.3.3 Publishing the open data

Within the server controlled by HigashiNet, an open data website using WordPress, which is one type of CMS (Content Management System) was constructed, and the open data on photographs taken by tourists was released as open data of HigashiNet (Figure 6). 64 photos by tourists were received, but only 40 of them in JPEG format were released as open data with CC-BY license after the check conducted by Nagoya city.

Figure 6: Published open data site

On the download page, the released photographs were uploaded with the title, location information, and comments from the photographers.

4. Utilization of open data

This study made use of the open data released in disseminating tourism information of the Cultural Path. Further, in the aim to boost the appeal and allure of local tourist attractions, open data in the official website of 'Arukou! On the Cultural Path' event and the event guide application 'Arukou! Guide!' that have been used to disseminate information so far, were utilized as well as the flower map of the Cultural Path that was created (Figure 7).

- Utilization of official event website
  Only basic information on the attractions and information printed on the leaflet about the events to be held on the day of 'Arukou! On the Cultural Path' (such as name of attraction, opening hours, address, telephone numbers) were written on the event venue pages of the existing official website. It was therefore decided to use the open data on photographs and information on attractions to improve the photographs of tourist attractions. The contents were also enriched by posting introductory information on the tourist attractions.
- Utilization of event guide app
  This study made open data on photographs in the event guide application. In the venue list under the 'search venue function' of the application, photographs of the tourist attractions provided by the ward office were posted, but there were also other tourist attractions that had no photographs listed in the event guide application. It was decided to use the open data on the photographs taken by tourists in the event guide application so that these tourist attractions can now be displayed with the appropriate photographs.
- Utilization of flower maps
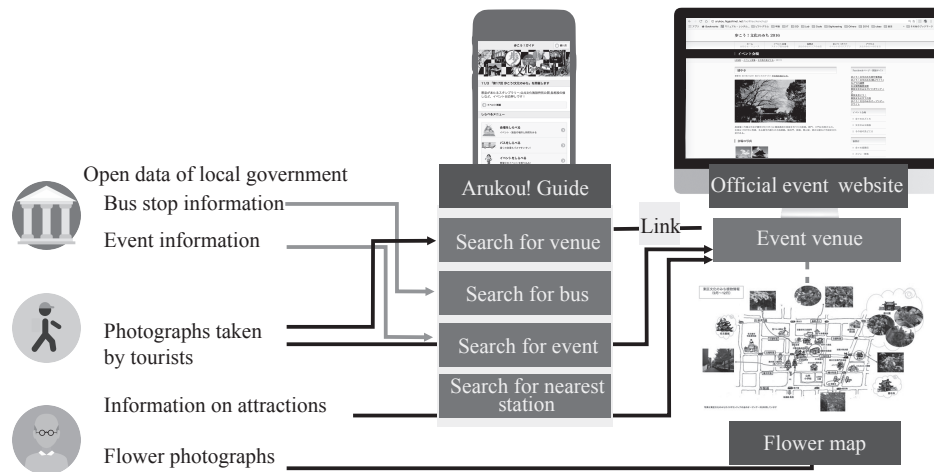 In the Cultural Path area, there are many floral attractions

Figure 7: Utilization of open data

that start to bloom from the beginning of February, including a street lined with Ohkanzakura (a type of cherry blossom) trees. The volunteer guides have also been disseminating information about the blooming periods on the website on a regular basis for seven years since the website was launched, and has been highly appraised by the tourists who browsed the website. Based on this information, this study created the Cultural Path flower map by utilizing open data on flower photographs for the period from fall to winter, which is the best time to attend the 'Arukou! On the Cultural Path' event.

5. Proof of concept

5.1 Outline of experiment

A proof of concept on the 17th 'Arukou! On the Cultural Path' annual event held on November 3, 2016 was conducted. There was a total of 17 subjects that included students in their 20s and general event participants, of which 8 of them were the first-time visitors to the Cultural Path area. After gathering the subjects at the Akatsuka Shinmeisha (a shrine) in the east of the Cultural Path area, and explaining to them the flower map and how to use the event guide application, the subjects participated in the event for about 4.5 hours as they toured the Cultural Path area. After they had finished participating in the event, they were met at the Akatsuka Shinmeisha again and asked them to fill in the evaluation form.

5.2 Results

In this study, the usefulness of contents that made use of open data on citizens' information to convey the appeal and allure of local tourism to the subjects was validated.

Figure 8 shows the subjects' evaluation (split into 'all participants' and 'first-time visitors') on open data on information on attractions. Subjects were asked to evaluate the question of 'Are you now more interested in the Cultural Path from the information on attractions and other points of interest?' on a five-level scale (5: 'Very true' to 1: 'Not true at all').
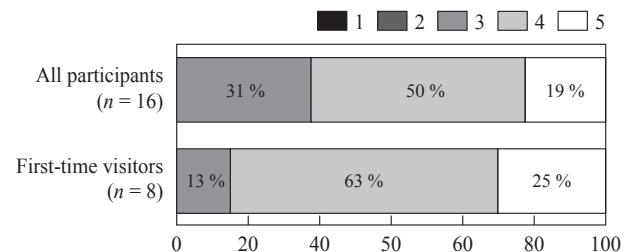

Figure 8: Evaluation on the utilization of open data

Note: 1 subject did not answer.

In addition, Figure 9 shows the subjects' evaluation on open data on flower photographs. Subjects were asked to evaluate the question of 'Do you think the flower map is useful for sightseeing walks?' on a five-level scale (5: 'Very true' to 1: 'Not true at all').
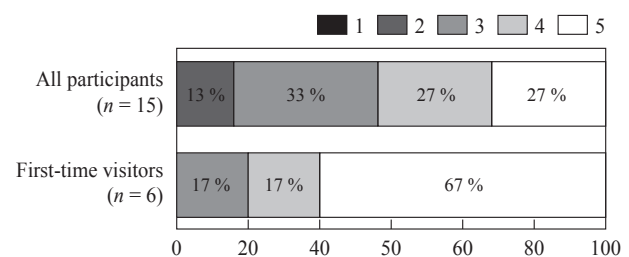
Figure 9: Evaluation on utilization of open data on flower photographs

Note: 2 subjects did not answer.

Table 1 shows the subjects' evaluation on the open data on the photographs taken by tourists. Subjects were asked to evaluate the question of 'What did you find useful?' regarding the 'search venue function' of the mobile application by checking any of the four responses and writing their comments in the 'Others' section (multiple responses allowed).

Table 1: Evaluation on the utility of the 'search venue' function

Reasons	Evaluation ($n = 17$)
Possible to list down all the names and photographs of attractions	41 %
Basic information of attractions available	35 %
Route to attraction venues available	35 %
Possible to search for attraction venues	12 %
Others	0 %

5.3 Discussion of experiment results

It was possible to obtain evaluation on the respective contents that made use of open data released by the citizens. The results showed that introductory information on attractions and flower map could boost the interest of tourists in tourist attractions, especially for first-time visitors who found these contents highly useful. Participants commented that 'This is useful to people who want to see the flowers in person after looking at the (flower) map' and 'It was interesting to see how attractive the route that was dotted with various tourist attractions. This method may be used for other applications other than flowers'. On the other hand, there were also comments such as 'It would be good if the application doesn't just show us the introductory information on the attractions, but that we also have a volunteer guide to walk us through the area with explanations' and 'Since it would be difficult for first-time visitors to estimate the time needed to tour the area, it would be great if the application can suggest routes for us'. To further convey the allure and appeal of local tourism, it can be said that it is necessary to not only create open data sets, but to also link the data more closely to the mobile application and the activities of the volunteer guides.

In addition, comparing the results of this year to that of the previous year showed the superiority of photographs taken by tourists since users can now list and have an overview of all the photographs, and thereby allowing enhancement of the application's guide function. Participants also commented that 'It was great that we could tell how the event was like from these photographs'; it was therefore possible to create a more intuitive mobile application for users not just via words, but with photographs too.

5.4 Evaluation by citizens

In this study, citizens who worked on releasing the open data about the conversion of open data on citizens' information were interviewed.

The volunteer guides commented that 'Since the digitization of tour guide activities is going to become more important in future, the wide range of applications from open data sets is extremely good' and 'Using it in flower map is fantastic. It made me want to work on creating a new type of guide that combines seasonal flowers and temples'. The promotion of open data in this study was also a useful initiative for the activities of the

volunteer guides. On the photographs taken by the tourists, they also opined that 'As it is impossible to tour all the attractions usually, we are very happy to have such photographs'; thus, it is believed that this has helped to support their usual tour guide activities.

While the tourists commented that 'I am happy that various people saw my photographs' and 'I would like to share good photographs that I took', on the other hand, they also honestly revealed that 'I would not think of submitting my photographs if I was not asked' and 'Telling me that my photographs may be used in the open data may not exactly be a strong incentive'. It can therefore be said that the incentive that was attached behind the creation of open data sets on photographs is important for the tourists. However, there were many favorable comments towards the use of photographs in open data sets, such as 'I will be happy if the photographs of my favorite tourist attraction can attract other people' and 'I am happy if the photographs I took are used because it feels like I am being recognized for it'.

Further, this study also talked to the staff in the Higashi ward about the photographs taken by the tourists, who commented that 'Permission is required for everything reflected in photographs used in open data: places, people, exhibits, etc. It is difficult to work on it as the local government's open data' and 'If the local government decides to release this open data, various procedures such as creating rules needs to be in place and this will take us time to implement it'. Considering the nature of the local government where they look at impartiality, publicness, and accuracy, it is believed that it will also be effective to release such information as open data released by citizens, instead of by the local government in this precedent case.

On the other hand, the government staff of the Higashi ward approved of the usefulness of the charm of the photographs taken by the tourists, and launched a 'Cultural Path Online Photo Gallery' as the official website for the 17th 'Arukou! On the Cultural Path' annual event. Although the online photo gallery is not an open data of the photographs, they collected the photographs of the event taken by the participants with the aim of using it for publicity and other purposes.

6. Conclusion

This study proposed and implemented practical initiatives to release tourism information on local resources that local governments are not able to release as open data by citizens. The citizens in the 'Volunteer Guide Association in Higashi ward' who run the tourism, and the participating tourists of the 'Arukou! On the Cultural Path' event, respectively created open data sets based on the attractive local tourism information they have, to which we came up with a proposal on how to use this information and through a proof of concept was developed, clearly demonstrating the usefulness of tourism information held by the citizens.

From the proof of concept and evaluation by citizens, it can be said that it is desirable not only to disseminate information

online, but also to collaborate with local tourism, such as the volunteer tour guides. In addition to disseminating information on tourist attractions, it is believed that it is possible to more effectively convey the appeal and allure of tourist attractions by using open data services in regular tourism activities. In addition, it can be said that the attempt to resolve the challenges of local tourism through such practical efforts has led to the promotion of open data.

On the other hand, the reasons and the incentive to work on the open data of the citizens' information has become more important. It can therefore be said that it is necessary to actively link the promotion of open data to other projects, such as creating privileges (e.g., premium coupons) for the community, and activating the use of open data. There is also the problem of the accuracy of information. In this initiative, there was a discrepancy between the contents of the photograph and its title in the open data on the photographs taken by tourists. It will be necessary to discuss who and how to carry out checks in the future, not just on copyright and personal information, but also on such errors. To improve the work efficiency of local governments and the resolution of regional issues through the promotion of open data of citizens' information, it is necessary to construct a system to support the efforts of the entire region (such as local governments and private business operators) to promote the open data on local information by local governments and citizens.

Furthermore, the promotion of open data on photographs taken by tourists has led to the local government coming up with a new initiative. From the tourism viewpoint, this practical approach to tackle local issues can be expected to lead to better administrative services. From this point of view, this study believed that promoting open data on citizens' information can help in developing tourist attractions.

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