Preliminary questionnaire-based study on using behaviour change to increase tourism to Toyama

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Abstract—Progress of information technology has enabled people to have more opportunities to diversify their interests and also led to an increase of tourists to various new locations. In this research, we study the possibility of using Persuasive Technology to increase the number of tourists with a focus on Toyama prefecture. We conducted a preliminary questionnaire for Japanese tourists, to explore their barriers for those who visit or would like to visit the area, the advantages of the location, and studied the possibilities of using behaviour change techniques derived from our initial analysis. Our focus was on Toyama prefecture, but we can extrapolate some suggestions to other regions as well. The analysis suggested that Toyama should appeal more to its often unknown attractive offerings, like hot springs and its unique features, while giving this information contextualized to users and routing the visitors to the destination based on the their home location. We also discuss with examples, the implications of using the persuasive system design (PSD) model, which has several system qualities we can take advantage of, such as primary task and dialogue support to create more persuasive features. Lastly, we present the limitations in our study.

Index Terms—Questionnaire study, Encourage tourism, Persuasive Technology, Information system

I. INTRODUCTION

In Japan, tourism is often encouraged to various domestic locations. For this, information technology has especially become a significant part in the decision making process when people need to decide where to go for their next visit [1]. Before the emergence of the internet based services, there were only a few options to gain good knowledge on where to go, how to get there and what to do, which resulted in most tourists just utilizing package tours provided by tourist agencies. In 2000's, this changed and now tourists have a much more easier access to several internet sites that describe and offer solutions to go to various sightseeing locations. Subsequently, the number of tourists who decide their destination from these websites is more than those using travel agencies, as more than 80% of tourists make use of the internet. It is clear that information technology has become an integral part of affecting the choices for tourist destinations.

These days, delivering greater 'regional spread' is also one challenge when encouraging tourism worldwide [2]. It is a result of most tourists completing their trips in only the most famous sightseeing areas such as London, Tokyo, or inside Japan, to Kanazawa, and they do not visit other cities or rural areas. These regional sightseeing spots cannot pull in enough tourists, which results in a limited economical effect. In addition, famous sightseeing spots become overcrowded, while other locations, even nearby, would be available but are not well-known. According to [2], the internet is one of the reasons that increases this kind of behaviour. Therefore, to tackle the challenges, we need to encourage tourists to visit lesser known, regional sightseeing areas which offer attractive spots, such as areas in Northern England, and Toyama in Japan.

In this study, we looked into the possibility of using Persuasive Technology to increase the number of tourists with a focus on Toyama prefecture, as it has seen a decrease in guests from 2015 onwards. For the objectives, we first conducted a preliminary questionnaire aimed at Japanese tourists in which we inquired reasons why they do or do not visit Toyama in general.

Many studies conduct these types of questionnaires where the goals is to decide business plans based on them and to encourage sightseeing in specific areas [3]–[6]. However, we cannot directly utilize the outcome of these questionnaires, since these situations vary from place to place, and as such as might not have relevant info related to Toyama specifically. Thus, for us the objective was to answer the following questions: (i) Why did the tourists select specifically Toyama as their sightseeing destination? (ii) What kind of Persuasive Technology and behaviour change techniques could encourage sightseeing in Toyama based on the results of the questionnaire?

II. LITERATURE REVIEW

A. Introduction and challenge of Toyama

Toyama prefecture is located in the Hokuriku region in central Japan. Figure 1 shows it in relation to the other surrounding areas of Kanazawa(Ishikawa), Gifu, Nagano, Niigata and the bordering sea. Toyama offers multiple sightseeing activities and locations such as Kurobe dam, Mt. Tateyama, and a world heritage village, as described in[1]. It is close to Kanazawa[2], also known for sightseeing and currently being more popular for tourists. Getting to Toyama can be done with two train routes as seen in the map, and from 2015 this

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[1]https://foreign.info-toyama.com/en/
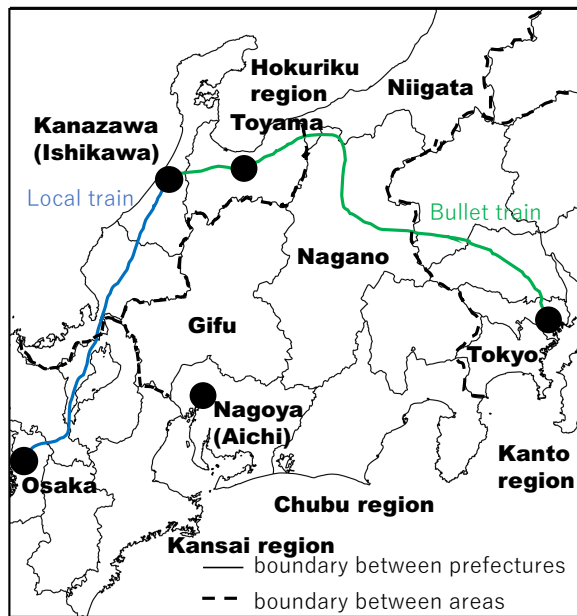[2]https://www.japan-guide.com/e/e2167.html
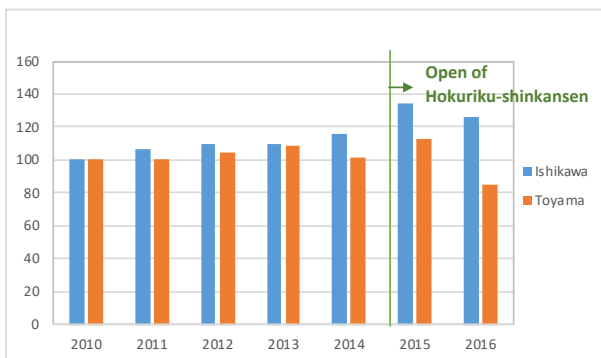
Fig. 1. Map of Hokuriku area

Fig. 2. Transition of hotel-staying guests

has also been possible with a bullet train that connects Tokyo (Kanto) to Kanazawa. Previously the trip took more than four hours and currently the fastest option takes only 2 hours and 10 minutes.

After the transition to this bullet train route, Ministry of Land, Infrastructure, Transport and Tourism, Japan[3]. Figure 2 released statistics on the effects of opening the line for the amount of hotel-staying guests. As noted, the number of hotel-staying guest in 2010 was normalized as 100 and from 2015, the guest numbers in Toyama and Ishikawa decreased, albeit in Ishikawa the overall effect was clearly less. Another report[4] studied reasons for the decline, and stated that the new route enables visitors to have day trips to Toyama, since they can get there faster and have more time on-location. Previously there was not enough time to do all the activities in a single

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[3]http://www.mlit.go.jp/kankocho/en/index.html
[4]http://www3.boj.or.jp/toyama/pdf/mes1706.pdf

day, so people tended to stay longer in Toyama.

The decrease in hotel guests is unfortunate side-effect of offering ease-of-access and affects the areas income for businesses and the overall economy as visitors staying longer would spend more money.

B. Encouraging tourism with Peruasive Technology

Travelling commonly consists of three stages: Pre-trip, during-trip, and post-trip. To support tourists decision making process in the pre-planning stage, various ICT tools are used to ease the process. Intelligent systems are used to support tourists' efforts to search for and decide on suitable destinations. While these systems can offer good value, as they help to collect and pre-process information according to users personal and situation needs, they are not currently used in a broader way to understand tourists social context for the visits [7]. Ubiquitous technologies also enable opportunities for creating, sharing and access of information online for the users on their vacations. While people access and interpret information in subjective ways, information technology is always affecting our behaviour with or without an intent to do so. As such, carefully planned persuasive applications can be used to change users behaviours and attitudes by utilizing software designs derived from the use of behaviour change support system (BCSS), persuasive system design (PSD) model, and persuasive technology (PT). In BCSS, presented by [8], the goal is to form, alter or reinforce users' compliance, behaviour or attitudes without using deception or coercing in an ethical way, and persuade or guide them to the desired outcome [8]. According to Oinas-Kukkonen [9] a persuasive system should offer ways for users to reach their goals, which a system also encourages systematically. Offering these goals to the user is also an essential way for persuasion.

PSD guidelines by Oinas-Kukkonen et al. offer four main categories of system qualities: 1. Primary task support, 2. Dialogue support, 3. System credibility and 4. Social support, each including seven sub-principles for reference.

The first category is used in supporting the user's primary tasks with reducing amount of information, tunneling the user to their goals, tailoring the information to group needs, personalizing it for specific user needs, helping the user monitor their performance, offer simulations so the user sees the cause and effect of their behaviour change, and finally, proving means to help rehearse a behaviour change in some ways.

In the second category, the aim is to provide some form of feedback to the user from the system. While some of these principles are related to human-computer interaction (HCI), in the model they are used to support user reaching their goals. The feedback forms are presented are praise, rewarding the user, offering reminders, suggesting behaviours, being similar to the user by imitating them, having an overall likeable look and feel to encourage use and finally, trying to be in a social role for the user.

Third category is to suggest ways on how to create credible system, so that user's trust the system more, and through

this credibility better persuasion is possible to achieve. The principles presented are about having information that is truthful and unbiased, having expertise behind the software, on first initial user contact the system should have a competent look and feel, if possible the people behind the system can be highlighted to create trust, it should refer to authoritative figures to enhance persuasion and to respected third parties, and finally to offer information that can be verified.

The last category suggest how social support can be achieved and how it will affect the users behaviour by leveraging social interactions and natural influence between people. A user can learn if they can look at what others are doing, they can compare their behaviour to get motivated to reach a goal, normative influence can change user's behaviour when they interact with other towards a goal, or if a users sees others doing the same thing they are doing, cooperating with others motivate change in users from their basic instinct to do it, or when people have a natural tendency to compete against each other, and finally offering recognition to a user that is shared to others can affect users or groups motivation to adopt target behaviour.

Regarding behaviour change, and looking at it from tourism perspective, molding socially responsible behaviours is called a slow change, and targeting on-site actions through affecting tourists in their decision-making process is called a fast change, in behavioral design. As examples of these would be to design slow change by making users aware of their visits to a sightseeing spots ecosystem and trigger some form of responsibility. Fast change, would be an immediate feedback experience by using context-aware systems combined with e.g. gameplay or social networks. In other words, persuading tourist to visit particular attractions and locations by instantly rewarding their performance, for example with discount coupons, badges and virtual or real points [10]. In this particular example mobile phones would be a key factor for behaviour change, as a study by Wang et al. [11] state that mobile phones already affect how people experience various trips and make use of contextual information of the user, for instance Google Maps[5] offering location-based suggestions. Persuasive technology has been previously used in changing users behaviour into healthier life style habits [12] which suggests other behaviours suitable for tourism purposes can be tried and tested.

III. RESEARCH METHODS

A. Research Policy

In our study, we aim to develop a persuasive technique to increase tourism to Toyama with the following policy. First of all, we focus on studying the technique that encourages tourists to plan the trip to Toyama in the pre-planning stage and visit there, since we think the pre-planning stage is the most expecting for persuasion to increase the number of tourists to visit Toyama. As discussed in Section II-A, our final goal is increasing the number of hotel-staying guests. To increase
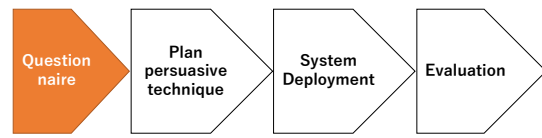
[5]https://www.google.com/maps
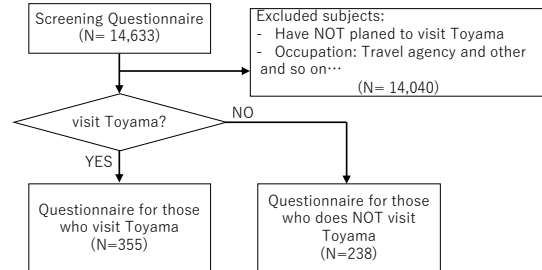

Fig. 3. Research flow

Fig. 4. Questionnaire flow

the number of hotel-staying guests, first we need to encourage tourists to visit.

1. Offer tourists in the pre-trip planning stage easy access to information about Toyama. 2. While helping, look into using PSD as a tool to nudge them to choose Toayma 3. During the trip, use the same system to (PSD) nudge tourists to sightseeing spots that people might not know about, with rewards, recognition, etc principles 4. Post-trip, offer social sharing (PSD) so that others planning their trips can see Toyama from users who have been there. (This also means that anything good or bad about Toyama will be posted online, and acts as feedback to improve services which leads to more tourism from the improvements later on. Also good feedback leads to more tourists.)

Figure 3 illustrates the steps in our research. In "Questionnaire", we conducted a survey to extract various reasons why Japanese tourists visit Toyama. In "Plan persuasive technique", we develop technique(s) to encourage tourists to visit Toyama using Persuasive Technology approaches. in "System deployment", we develop a system that involves taking advantage of the techniques developed in the previous stage. Lastly, we evaluate these persuasive techniques in "Evaluation". In this paper, we focus mainly on "Questionnaire" and partially delve into "Persuasive technique" parts of the research flow.

B. Design of the questionnaire

1) Questionnaire flow: The questionnaire consisted of two parts where figure 4 shows its overall flow. First, in a screening questionnaire, the subject answered whether they have planned and would go, or have not planned to visit Toyama, and have planned to but not visited yet. Other parts included surveying user demographic questions.

Based on the answers, we divided the subjects into three groups; visited, planned to, not-visited. The subjects who would actually visited Toayama proceed to part: "Questionnaire for those who have visit Toyama". The subjects who have thought about visiting Toyama, but had not actually

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TABLE I
SCREENING QUESTIONNAIRE CONTENTS (SQ)

SQ#	Question
1–3	What is your gender, age profession?
4	Choose one that describes your job title.
5	How often do you go on a domestic sightseeing trip?
6	How many times have you done sightseeing to Toyama?
7	Have you considered Toyama for sightseeing? candidate between August 2017 and September 2018?
8	Who recommended Toyama as a sightseeing location to you?
9	Did you do trips on August 2018 – present, incl. Toyama
10	Tell us times you visited Toyama in Aug.2017 – present.
11	Please tell us the times you did sightseeing trips other than Toyama prefecture between August 2017 and the present.

TABLE II
QUESTIONS FOR THOSE WHO HAVE VISITED TOYAMA

#	Question
Q1	Based on SQ 10, please tell us why Toyama prefecture was a candidate in your X tourist trip?
Q2	Do you think the reasons in #Q1, were unique to Toyama?
Q3	If you considered Toyama prefecture for sightseeing, were there unique reasons to visit? List as many as possible.
Q4	Based on SQ10, did you stay in Toyama during your trip?
Q5	Based on SQ10, tell us all the prefectures you stayed in?
Q6	Based on SQ10, tell us why you didn't stay in Toyama?
Q7	Based on SQ10, please tell us all the sightseeing spots you visited in Toyama and in the neighbouring prefectures.
Q8	Based on SQ10, how many people participated on incl. you?
Q9	Based on answer to SQ10, tell us who you travelled with?
Q10	Based on SQ10, When choosing a prefecture to visit, select all the ways you used to make the decision from the list
Q11	If possible, tell us your household annual income?

TABLE III
QUESTIONS FOR THOSE WHO HAD NOT VISITED TOYAMA

#	Question
Q1	Based on SQ11, why Toyama was considered on your X trip?
Q2	Were the reasons in #Q1, unique to Toyama?
Q3	If you considered Toyama, were there unique reasons? List all.
Q4	Based on SQ11, tell us why you did not visit Toyama?
Q5	Based on SQ11, tell us the prefectures you visited?
Q6	Based on SQ11, how many people participated on incl. you?
Q7	If you had a companion on your trip, who did you travel with?
Q8	When choosing a prefecture to visit, please select all of the ways you used to make the decision from the list
Q9	If possible, please tell us your household annual income?

visited before proceed to part: "Questionnaire for those who have NOT visited Toyama". Others who did not plan to visit Toayama ended the questionnaire at this point, as they would not give us any clue for the reason why tourists select Toyama as their sightseeing destination.

2) Questionnaire for screening participants: Table I shows the questions for the screening questionnaire. The objective of this questionnaire was to exclude unsuitable subjects such as those who have not planned to visit Toyama, business and travelling home trips, as well as collecting demographic information.

Subjects who answered "YES" to having actually visited Toyama" proceeded to tailored questions for them as seen in Table II . Subjects who answered "NO" to having visited Toyama" proceeded to tailored questions as seen in Table III.

3) Questions for those who have visited Toyama: Table II shows the questions in this part and it consists of four sections. We asked the participants to use the most recent trip as basis for their answers if they had multiple to choose from. The objective was to extract the following reasons:

- why the subject had planned to go on a trip to Toyama?
- why the subject had stayed or NOT stayed in Toyama?

In the first section, the subject answered reasons why they had decided to go on a trip to Toyama, and what were the advantages of Toyama as sightseeing destination compared to other locations.

In the second section, the subject answered whether they had stayed in a hotel during their stay in Toyama. For subjects who had not stayed in Toyama, we asked them which prefectures they had stayed in and reasons why they did not choose Toyama.

The last section, consisted of the questions to collect demographic information such as income, information source for the trip and accompanying people.

4) Questions for those who have NOT visited Toyama: Table III shows the questions and the objective was to extract reasons why subjects had NOT gone to Toyama, even though they had planned to go.

C. Data collection

We conducted a web-based questionnaire between 22.09.2018 – 29.09.2018 for users registered to Rakuten Insight[6]. In addition, we also distributed it to subjects that were between the ages of 18 to 69 and lived in either Kanto, Chibu or Kansai regions. They were asked to answer the questionnaire via email or by pushing notifications through the Rakuten App. Users participating earned Rakuten super points, which they could use as money in Rakuten services, and in an Electric Commerce website.

IV. RESULT

A. Statistics on demographic items

14,633 subjects (64,8% male, 35.2% female) answered the screening questionnaire. Among those 14,040 subjects who did no plan to visit or had other conditions described in Section III-B2, were excluded. The screening resulted in 594 subjects where the average age of subjects was 43.51 ranging from 19 to 60. Overall, 355 subjects answered "have visited", and 238 subjects answered "have not visited" parts.

B. Ratio of hotel-staying guests

We analyzed how many subjects stayed in Toyama and Q4–Q6 from Table II showed that 70% of tourists who visited Toyama also stayed there, and corroborated the statistics that the number of hotel guests has decreased. This indicates that encouraging visits might result in an increase of hotel-staying guests, since the ratio is still showing to be rather high.

TABLE IV
REASONS WHY THE SUBJECT HAS VISITED TOYAMA

Season	Winter			Summer		
Total	Kanto	Chubu	Kansai	Kanto	Chubu	Kansai
F:19%	F:24.1%	**N:30.4%**	F:20.7%	F:17.5%	F:19.7%	F:21.6%
N:7.8%	**H:10.3%**	F:21.7%	**N:13.8%**	K:10.3%	V:9.4%	**C:10.4%**
K:7.6%	**C:10.3%**	E:8.7%	K:10.3%	**N:7.2%**	**N:7.9%**	K:7.2%
V:7.5%	V:10.3%	**C:4.3%**	**H:6.9%**	T:7.2%	K:7.9%	**N:6.4%**
T:6.8%	T:6.9%	V:4.3%	V:6.9%	V:6.2%	T:6.3%	**H:6.4%**

F:food, **N:no specific reason**, K:Kurobe dam
V:nature viewing, **C:visited by chance**, T:Mt. Tateyama
E:event, **H:had not visited Toyama before**

TABLE V
REASONS WHY THE SUBJECTS HAVE NOT VISITED TOYAMA

Ranking	Reason	Ratio
1	Scheduling problems	24%
2	Changed to another destination	24%
3	Poor access to Toyama	16%
4	No specific reason	11%
5	Budget limitations	7%

C. The reasons why tourists go on trip to Toyama

We have analyzed the differences between the regions in Japan and the reasons why subjects visit Toyama specifically with Q1–Q3. Table IV shows the ratio of subjects on the visit reasons. We have compiled the answers based on two seasons (Winter–October to March and Summer–April to September) and regions (Kanto, Chubu and Kansai). Throughout the year, about 20% of subjects visited Toyama for "Food(F)". In the summer season, Kurobe dam(K) is second or third most common reason. However, throughout the year, especially in winter time, second or third largest number of subjects answered that they visited Toyama with no specific reason(N), visited by chance (C), or because they had not visited Toyama before (H). For tourists in the Chubu area, several answered to have been to Toyama to join special events(E). These answers suggests that some persuasive techniques could be used and are later discussed in Section V.

D. Reasons why tourists do NOT go on trips to Toyama

We have analyzed the answers in Q1–Q4 in Table III to extract reasons why subjects did not visit Toyama. Table V shows the reasons and their ratio. Most reasons such as "Scheduling problems", "Changed to another destination", and "No specific reason" are trivial. However, with "Poor access to Toyama", the subjects had not visited Toyama because accessing the location was difficult. The more detailed analysis shows that about 20%, the second largest number, from Kansai region answered they had not visited Toyama for this specific reason. In fact, in order to access Toyama by train, tourists need to change trains at Kanazawa, which might make them reluctant to have an additional step when they can just stay in Kanazawa instead.

V. IMPLICATIONS TOWARD PERSUASIVE TECHNIQUE

In this section we look into how we can address the problems of Toyama and the questionnaire results in relation

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[6]https://member.insight.rakuten.co.jp/

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to persuasive technology use and present them with implementation examples.

We chose to use persuasive system design, because it offers guidelines on how to change people's behaviour and attitudes, and it has suitable features that we can clearly use in the case of Toyama. In the pre-planning, during-trip and post-trip stages we can use several of the principles from the PSD model to affect how tourist would search information about Toayama, why they should choose it as a travel destination. In the post-trip stage, tourists who visited can affect others attitudes towards Toyama if we make use of some of the social support methods from PSD such as the sharing principle.

A. Persuasion context

We analysed Toyama's situation using the model presented in II and its "Intent - Event - Strategy". As the intent, the persuader is Toyama and us as the system developer, and the type of change we are looking to achieve is attitude towards Toyama and behaviour change of the user towards the location itself and its attractions. The event, are the use-context situations, where the current one is of Toyama having problems with tourists reluctant to visit for example because of poor access and nearby locations being more popular. The strategy, is to find ways to reach the previous two step by looking at what needs to be done; straight use of direct and/or indirect routes for the user, and these can be reminders or awards for the user as an example.

B. System qualities

As mentioned earlier, the PSD model has design support as four system qualities: 1. Primary task support, 2.Dialogue support, 3. System credibility support and 4. Social support. For tourism encouragement to Toyama, they have a good set of principles for our persuasive approaches. We present them with some examples and suggestions.

1) Primary task support: A user trying to find information and planning to go to Toyama as well as when they are on location, needs task support. In Q4 (Reasons not to visit Toyama) in Table III and from Q2 in Table II, we derived that in general the offered information needs to be reduced to essentials such as the food information of Toyama. In addition, we need to tailor it to a group while personalising it for single users e.g. Chubu tourists needing special tickets ads as they are interested in special events mostly. When tourists are interacting for example on a web page especially in the Pre-planning stage, they can be tunneled towards their goal, and to visit Toayama. This is very initial persuasion can happen. For people who did not go to Toyama, this would be nudging them towards zoning tickets that save money, to overcome poor transportation option. The same web page can entice new attractions by persuasion if more information is knows about the users, their location and other shared information.

2) Dialogue support: Praise, virtual rewards, reminders and tailored suggestions are good principles for a persuasive alerts from a system, and can make users more open to persuasion. These are all good ways to be used in Toyama's case. A stamp

rally to gather and share stamps within Toayma might be one one of these examples.

3) System credibility: An application should also have system credibility features as it creates confidence towards the system. In the case Toyama, we could not find any clue for System credibility. However, in general, these features would highlight the professionalism in Toyama content offered towards the user in an IT system. It makes e.g. a tourism web site feel more competent and might create a greater level of quality related to Toyama as a visiting spot.

4) Social support: The most interesting system quality principles are through social support, as it provided seven clear points that have connectivity to the features of encouraging tourism to Toyama. In the case Toyama, we could not find any clue for System credibility. However, as the general discussion, many users share their experiences and pictures, videos, stories, ratings and word-of-mouth are effective ways of boosting up for example restaurant, services, movies and other events. The principles suggest that social interaction between the tourists could provide more chances of persuasion from competitiveness, peer pressure, common goals or from just following what others have done. An application for encouraging Toyama could implement e.g. some games between friends, offer comparison of or competing with walked distances to sightseeing spots as a common goal-driven event, or getting recognition as a form of virtual rewards by the winner. This could be spotting animals, doing fastest laps around a mountain, or others. Tourist's location sharing with these principles would be essential in Toyama as it would enable better contextual use.

VI. DISCUSSION AND LIMITATIONS

In addition to the target of encouraging tourism to Toyama, it might be good to connect persuasion to features that would offer other clear benefits to the tourists. These can be personal needs, hopes and goals, or interests such as weight loss, exercising, personal improvement. Targeting these for positive effects when using a system, would most likely affect how effectively persuasion for encouraging tourism would work. A limitation in our paper is that because of the preliminary nature of the questionnaire, the initial set of question were not detailed enough to give all of the important details to our problem set in Toyama. The more detailed analysis such as the tourists' profile would breed more findings, which is our future study. In addition, the questionnaire focus was on Japanese only as it was easier to get answers through the Rakuten Insight system used by many Japanese travelling domestically. In the future we would like to perform a more thorough for reasons to the decline in tourism, and to expand the set of answers to include foreign tourists as well as they might offer more insight into the decline of tourists, or have a different set of problems to the Japanese tourists. We would like to also look if Hokuriku region has problems with overtourism[7] and if persuasive technology could be implemented to solve it's

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[7]http://www.travelandtourworld.com/news/article/wtm-london-2017-to-tackle-overtourism/

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problems. Last, based on the data we got from the results and the analysis we will prepare persuasive techniques for tourism encouragement and present the detailed results later on.

VII. CONCLUSION

In this paper, we presented a questionnaire to find clues to encourage tourism in Toyama. Specifically, we focus on finding the following items: (i) Why did the tourists select specifically Toyama as their sightseeing destination? (ii) What kind of Persuasive Technology and behaviour change techniques could encourage sightseeing in Toyama based on the results of the questionnaire? For (i), the tourists visit Toyama for food and Kurombe dam in summer. Tourists in Chubu area visited Toyama to join special events. For (ii), Primary task support is expecting technique. Especially, tailoring and tunneling website to provide zoning ticket or event information would be expecting technique. However, we could not come up with the technique for Dialogue support, System credibility, and Social support. Based on the findings from questionnaire, we plan to add persuasive techniques to encourage tourism in Toyama. Also, we hope that these survey results will be valuable to tourism organizations and businesses in designing marketing strategies.

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