Using Twitter as a Source for Travel Warnings: the Role of Information Source and Target Audience

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Abstract

Business travelers are oftentimes equipped with technology informing them about local dangers. As these corporate travel risk applications increase personal safety during travels, they are also expensive and hardly available to the average traveler. Online platform Twitter, known for extensive contribution by nonaffiliated users, has also been recognized by international foreign offices as an outlet for travel warnings and guidance. This new channel of information allows for the creation of applications that bring current and high quality travel risk information to the mainstream. Our explorative research aims at investigating the role of the information source and target audience of such an application. The results of our analysis show no substantial evidence that user-generated travel risk information would be per se unsuitable as an information source. Further, our analysis revealed that frequent travelers as well as non-frequent Twitter users might be of special interest as a target group for the application.

1 Introduction

Natural disasters, political instability, terrorism, diseases and crime pose severe threads to travelling individuals – particularly in unfamiliar environments [30]. Natural hazards are life-endangering and can cause immense harm to unprepared travelers [4]. Political instability and unrest is a major reason for travel warnings and advice not to travel in foreign countries [33]. Terrorism and its consequences pose a steady threat to the safety of international travelers [13]. Tourists are particularly vulnerable to crime, present in most urban areas [10]. Summing up, there is a variety of reasons why travel risk information like travel warnings and guidance of high quality are important. First and foremost, tourists are prone to be under informed about imminent dangers when travelling, as they usually do not have regular access to suitable information outlets and oftentimes do not speak the local language. In case of an emergency, travelers usually do not have sufficient knowledge about local emergency infrastructure preventing them to react appropriately in critical situations. Travel risk applications can provide travel risk information when and where it is necessary and can further help to take appropriate

precautions before travelling and prevent dangerous situations in advance by indicating generally risky travel destinations.

There are already information systems in place distributing high-quality travel risk information. Corporations pay extensive amounts of money to assist their employees during travels and keep them safe from potential threat on the basis of these sources (see e.g. [1], [11]). This happens for two reasons. First, big corporations have a higher travel budget and can afford this kind of service more easily than individuals. And second, corporate workers might be assigned to travel to countries with a higher risk-profile than the usual tourist. Typically, the travel risk information feeds incorporated in such corporate programs are assembled, processed and distributed by specialized agencies in return for a significant service fee. This shows that travel risk information is not just highly valuable for the safe being of travelers, but also comes with a substantial price.

With the advent of social networks, micro-blogging and news platforms like Twitter, information generally propagates more freely than before. Not just the amount and frequency of broadcasted information has increased, but also the diversity of directly available information sources has immensely grown [20]. Lately, Twitter has been recognized by multiple foreign offices and other official sources as an outlet for travel warnings and guidance. The quality and amount of available travel risk information from these sources on Twitter is substantial and enables for the creation of information systems that bring high-quality travel risk information to the average traveler who do not travel under the safeguarding umbrella of a corporation.

The core design artifacts [17] of our research are a travel risk web portal and a mobile application that integrate travel risk related tweets and provides an information system comparable to a corporate travel risk program to consumer markets. As of today, the system obtains Twitter feeds from several foreign offices, in order to provide high quality and up to date travel risk information. Tweets, which contain a reference to a country are automatically recognized and presented to the user grouped by country.

Twitter has even more potential for providing travel risk information. At a later stage of development, we want to integrate Tweets which were not generated by official sources, but by unaffiliated users of the platform. Despite the fact that it requires more effort to filter for travel risk relevant content and appropriately integrate it into the information system, this kind of information source holds great potential for broadening the information base and providing more detailed first-hand information [3]. However, it is unclear how user-generated travel risk information is perceived by the users of the system and how that perception affects their intention to use the system. Perceived information quality is known to be a key driver of system acceptance [26]. We assume that this is also the case in the context of a travel risk information system. Therefore, the first dimension along which we study the perception of the provided information and the resulting consequences for the intention to use the system, is the information source.

The second dimension we want to investigate is the target audience of the application. While there is large potential for companies to strategically position themselves in the travel context by offering such an application, it is unclear which target audience can be reached. We identified two major factors which might influence the acceptance of the solution. First, existing research suggests that general perception of travel warnings might strongly vary with travel frequency of the user [29]. More frequent travelers might rely more on their own experiences and are less affected by travel risk information. Second, prior evidence indicates that Twitter experience of a user might strongly affect

the perception of any information that is presented as a tweet [31]. Users with low twitter affinity probably value travel risk information lower than users with high twitter affinity.

In this study, we specifically want to investigate the interplay of information source and target audience on an explorative basis, as we expect interesting insights that can guide future artifact development. More specifically, we want to focus on the following research questions:

RQ1: What is the impact of information source and travel frequency on system acceptance?

RQ2: What is the impact of information source and Twitter usage on system acceptance?

The reminder of this paper is structured as follows. In the next chapter the theoretical background of our research is outlined. We describe our research design and data collection in section three. The results of our research are presented and analyzed in chapter four. Finally, we discuss our findings in section five.

2 Theoretical Background

Our two research questions are both framed in the context of information source and target audience. Therefore, we want to build upon perceived information quality as a key construct to explain system acceptance. In order to operationalize system acceptance in the context of our work we conducted an intense literature review (keywords “perceived information quality”, “system acceptance”) on the basis of six scholarly databases (Science Direct, Proquest, EBSCOhost, ACM, Wiley Inter Science, SpringerLink), as they cover the most relevant IS journals, books, as well as conference proceedings.

The identified literature can be categorized into three domains, i.e. tourism, risk management and information systems. All three domains identify trust and risk as essential concepts which play a vital part in the interplay between perceived information quality and intention to use (cf. for example [29], [12] and [23]). In their seminal work, Nicolaou and McKnight [26] ultimately bring these fundamental concepts together in one consistent research model. Hence, we take their work as a foundation for our work.

After examining various PIQ (perceived information quality) -related definitions, Nicolaou and McKnight define PIQ to represent cognitive beliefs about the favorable or unfavorable characteristics of the currency, accuracy, completeness, relevance, and reliability of the information [26]. This definition comprehensively adopts different aspects of PIQ in the literature.

Building upon the trusting beliefs component of the trust concept typology of McKnight and Chervany, trusting beliefs (TRU) means one believes the other party has beneficial characteristics, and implies favorable perceptions about the other party, i.e. the party is honest (i.e., has integrity and keeps commitments), benevolent (i.e., responsive to the partner’s interests, not just its own), and competent (i.e., has the ability to do what the partner needs done) [24].

Nicolaou and McKnight define perceived risk (RSK) as the degree to which one believes uncertainty exists about whether desirable outcomes will occur. This definition includes part of Sitkin and Pablo’s broader perceived risk concept, capturing outcome uncertainty, outcome divergence likelihood, and extent of undesirable outcomes [32].

Intention to use (ITU) stems from the theory of reasoned action (TRA) literature [14], as exemplified by TAM (Technology Acceptance Model) research (e.g. [8]).

3 Research Design and Data Collection

We conducted a combined online questionnaire and experimental simulation with German-speaking participants from the university's environment (n=87). Participants were acquired via a mailing list and asked to imagine soon to be traveling to the fictive country "travel country" for the first time. With the following scenario, which was presented to participants, we aimed to provide a possibly realistic and substantial motivation for the participants' travel intent: *"In two weeks, the wedding of your best friend will take place in 'travel country'. You are your best friend's witness at the marriage. On the next page you will be presented with Twitter messages about 'travel country'. Please take a look at the page and answer the upcoming questions."* We incorporated a fictive country, so participants would not be biased by previous travel experience [34]. To add more realism to the scenario and provide a somewhat sharper picture of "travel country", participants were informed that their flight to "travel country" would take about 12 hours including waiting and transfer time.

The applied experimental design was a 1 x 2 between subject arrangement. Participants were randomly assigned to either one of the two groups, in which we manipulated the information source of the presented Twitter messages. One group of participants ("official") was presented with tweets from foreign offices (USA, UK, Canada, Switzerland, and Germany), the other group ("unofficial") with tweets from fictive individual Twitter users. Notably, the content of Twitter messages in both groups was identical, i.e. we exchanged author name and avatar only. All presented information originates from actual tweets twittered by foreign offices about Columbia. Exemplary tweets for both groups are shown in figure 1.

(a) **(b)**

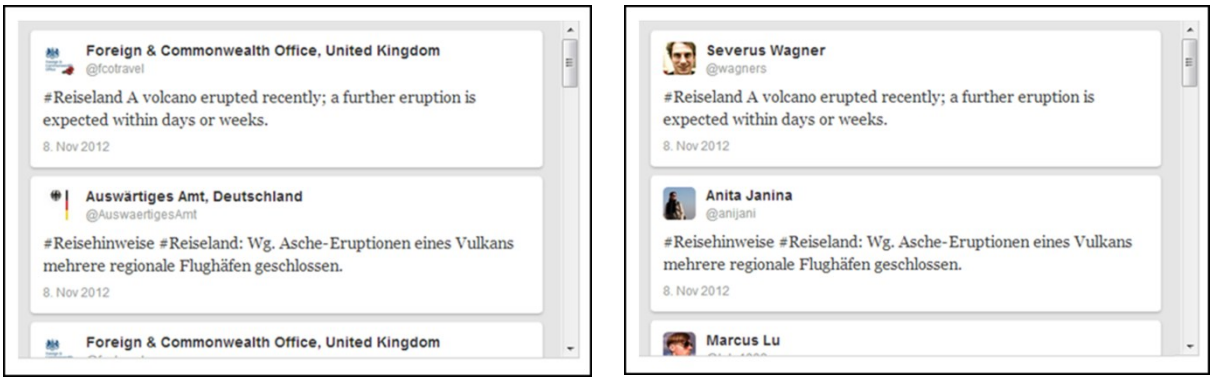

Figure 1: Display of twitter messages for the two experimental groups: official information source (a) and unofficial information source (b)

A subsequent item-based questionnaire allowed us to measure participants' perceived information quality (PIQ), perceived risk (RSK), trusting beliefs (TRU) and intention to use the system (INT) in both experimental groups. Furthermore, participants were asked how often they travel long distance (1, rarely – 6, often) and how often they use Twitter (1, rarely – 6, often). The scale assessing PIQ was adapted from Nicolaou and McKnight [26] to the context at hand while preserving the underlying theoretical considerations of the scale (different information quality dimensions). TRU, RSK and ITU also stem from Nicolaou and McKnight [26]. Again, the scales were adapted with the intend to maintain the underlying rationales. Only the original TRU scale cannot be tuned well to the nature of our work. Our experimental setup is limited in that it does not allow assessing the benevolence of the

solution provider. Hence, TRU only reflects honesty and competence as major aspects of trust. Summing up, Table 1 shows the item measures underlying our work with corresponding descriptive information.

Table 1: Construct and item measures

Item	*1-7 Scale (Strongly disagree… Strongly agree)*	*Mean*	*Standard deviation*
Perceived information quality (PIQ)			
PIQ 1	Information is current enough	5.22	1.41
PIQ 2	Information is accurate enough	3.84	1.52
PIQ 3	Information is relevant enough	4.70	1.51
PIQ 4	Sufficient amount of information available	3.28	1.40
PIQ 5	Information has appropriate level of detail	3.06	1.64
PIQ 6	Information can be relied upon	4.08	1.68
Trusting Beliefs (TRU)			
TRU 1	Website is sincere	4.52	1.46
TRU 2	Website competent	4.11	1.63
Risk (RSK)			
RSK 1	Risk of making wrong decision (very low … very high)	3.90	1.47
RSK 2	Website use (potential for loss… potential for gain)	4.75	1.12
Intention to use (ITU)			
ITU 1	Would use again	4.55	1.58
ITU 2	I would recommend use	4.60	1.71

19% of the participants were between 18 and 24 years old, 65% were between 25 and 34 years old, 2% were between 35 and 54 years old and 2% were older than 55. 12% of the participants did not report their age. Of all participants, 57% were female, 30% were male and 13% did not report their gender.

4 Analysis and Results

Our research is of explorative nature. Therefore, we do not aim to validate the constructs on the basis of a comprehensive research model but run an item-based analysis. To analyze our results we conducted two two-way analyses of variance (Anova). One first Anova was conducted to analyze the impact on information source and travel frequency on intention to use the system (first research question). The second Anova was conducted to analyze the impact of information source and users' twitter usage frequency on intentions to use the system (second research question). The analyses are presented in the following two sections.

4.1 The impact of information source and travel frequency

Information source (official/ unofficial) might influence the perception of the presented travel risk information, but that effect might differ across groups of frequent and non-frequent travelers. A two-way Anova tested the perceived information quality, trusting beliefs, perceived risk and intention to use of travel warnings either being presented as originating from official or unofficial sources among respondents who classified themselves as frequent or non-frequent travelers. Anova test results are

presented in Table 2. The means of all items are illustrated in Figure 2. In the following, all significant effects are described.

Table 2: Anova results for information source and travel frequency

	Information source			*Travel frequency*			*Interaction*		
	df	*F*	*Prob > F*	*df*	*F*	*Prob > F*	*df*	*F*	*Prob > F*
PIQ 1	1	0.000	0.969	1	4.470	**0.037**	1	0.140	0.710
PIQ 2	1	0.020	0.892	1	3.560	0.063	1	1.010	0.318
PIQ 3	1	0.020	0.885	1	1.790	0.184	1	0.290	0.594
PIQ 4	1	3.550	0.063	1	4.610	**0.035**	1	0.370	0.547
PIQ 5	1	0.550	0.459	1	12.120	**0.001**	1	4.540	**0.036**
PIQ 6	1	6.340	**0.014**	1	0.040	0.837	1	0.060	0.801
TRU 1	1	2.590	0.111	1	0.170	0.685	1	1.430	0.236
TRU 2	1	0.830	0.365	1	0.780	0.381	1	0.370	0.547
RSK 1	1	1.830	0.180	1	1.620	0.207	1	0.030	0.856
RSK 2	1	0.030	0.870	1	0.210	0.650	1	1.090	0.300
ITU 1	1	1.600	0.210	1	0.240	0.625	1	0.670	0.416
ITU 2	1	0.670	0.416	1	2.760	0.100	1	0.210	0.646

There was a significant main effect of travel frequency on the perception of the currency of the presented information (PIQ 1), $F(1,83) = 4.47$, $p < .05$. Specifically, frequent travelers perceived the information to be more current than non-frequent travelers.

Furthermore, there was a significant main effect of travel frequency on the perception of the sufficiency of the amount of available information (PIQ 4), $F(1,83) = 4.61$, $p < .05$. Specifically, frequent travelers perceived the amount of available information to be more sufficient than non-frequent travelers.

In addition, there was a significant main effect of travel frequency on the perception of the appropriate level of information detail (PIQ 5), $F(1,81) = 12.12$, $p < .01$. Frequent travelers perceived the level of detail to be more appropriate than non-frequent travelers. However, there was also a significant interaction effect between travel frequency of the participants and the information source of the presented travel risk information (PIQ 5), $F(1,81) = 4.54$, $p < .05$. Taking the means as a basis (cf. Figure 2), this indicates that the perceived level of detail of the information was quite similar for frequent and non-frequent travelers if they were presented travel risk information from an unofficial information source, however it was significantly different if they were confronted with the same information from an official information source.

Finally, there was a significant main effect of information source on the perception of the reliability of information (PIQ 6), $F(1,82) = 6.34$, $p < .05$. Specifically, information originating from an official information source was perceived as being more reliable.

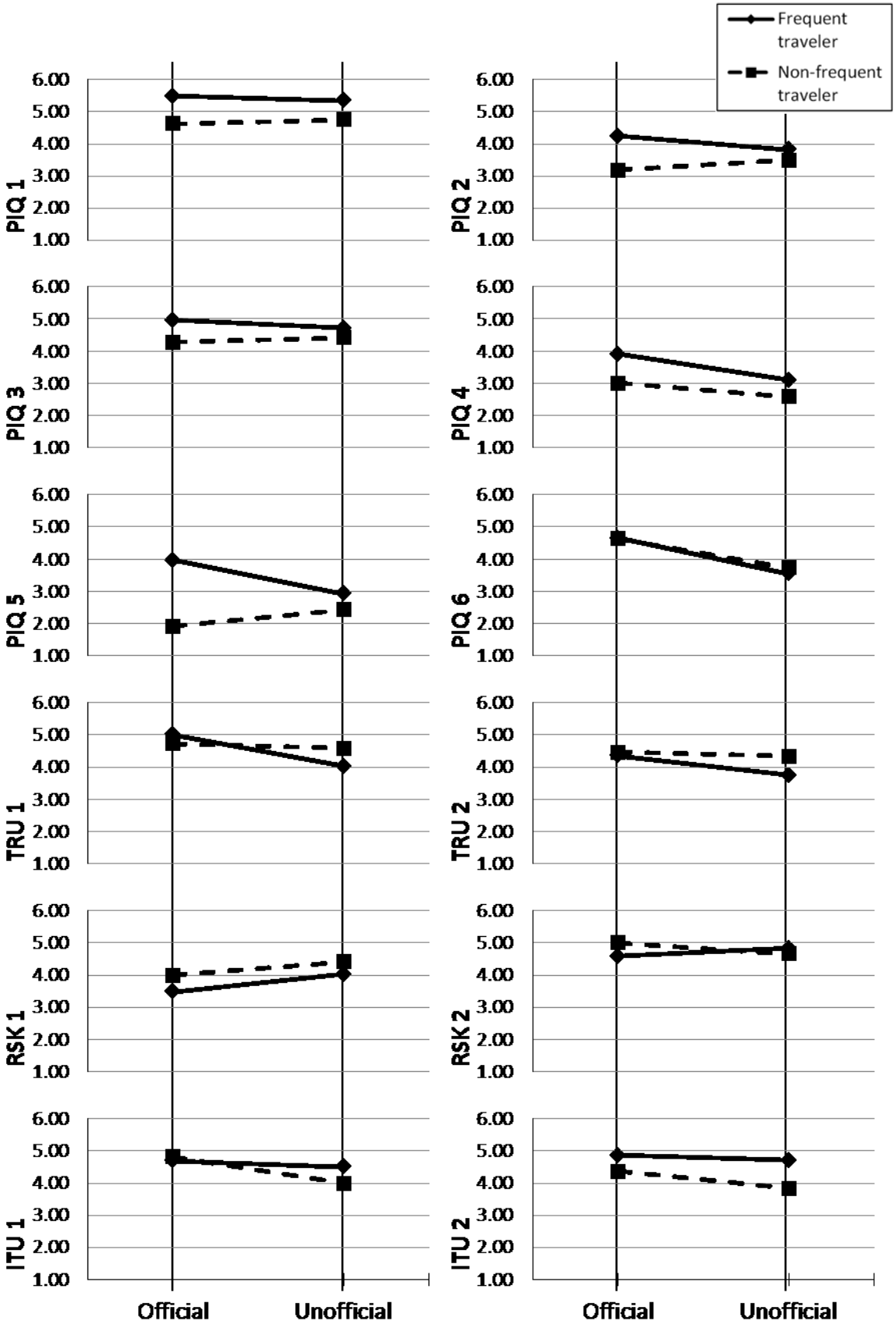

Figure 2: Means for two way Anova (information source and travel frequency)

4.2 The impact of information source and Twitter usage

As we have shown, information source might influence the perception of the presented travel risk information. However, that effect might differ across groups of frequent and non-frequent Twitter users. A two-way Anova tested the perceived information quality, trusting beliefs, perceived risk and intention to use of travel warnings either being presented as originating from official or unofficial (unknown Twitter users) sources among respondents who classified themselves as frequent or non-frequent Twitter users. Anova test results are presented in Table 3. The means of the corresponding analysis are illustrated in figure 3. In the following, all significant effects are described.

Table 3: Anova results for information source and Twitter usage

	Information source			*Twitter usage*			*Interaction*		
	df	*F*	*Prob > F*	*df*	*F*	*Prob > F*	*df*	*F*	*Prob > F*
PIQ 1	1	0.010	0.906	1	14.740	**0.000**	1	0.640	0.426
PIQ 2	1	0.200	0.653	1	0.070	0.797	1	0.340	0.563
PIQ 3	1	0.290	0.589	1	0.140	0.709	1	0.680	0.411
PIQ 4	1	3.910	0.051	1	0.220	0.644	1	1.060	0.307
PIQ 5	1	1.980	0.164	1	2.050	0.156	1	0.070	0.785
PIQ 6	1	9.210	**0.003**	1	0.830	0.365	1	0.740	0.394
TRU 1	1	4.430	**0.038**	1	2.890	0.093	1	0.090	0.761
TRU 2	1	2.570	0.113	1	0.310	0.582	1	2.180	0.144
RSK 1	1	2.040	0.157	1	0.190	0.660	1	0.510	0.477
RSK 2	1	0.400	0.531	1	3.650	0.059	1	0.020	0.898
ITU 1	1	0.620	0.433	1	4.750	**0.032**	1	0.180	0.669
ITU 2	1	0.050	0.824	1	3.160	0.079	1	0.520	0.472

There was a significant main effect of the Twitter usage on the perception of the currency of the presented information (PIQ 1), $F(1,83) = 14.74$, $p < .01$. Specifically, non-frequent twitter users perceived the information to be more current than frequent Twitter users.

There was a significant main effect of the information source on the perception of the reliability of information (PIQ 6), $F(1,82) = 9.21$, $p < .01$. Specifically, information originating from an official information source was perceived as being more reliable.

There was a significant main effect of the information source of the participants on the perception of the integrity of the system (TRU 1), $F(1,83) = 4.43$, $p < .05$. Specifically, when information originated from official information sources, the system was perceived as having more integrity.

There was a significant main effect of the Twitter usage of the participants on the intention to use the system again (ITU 1), $F(1,83) = 4.75$, $p < .05$. Specifically, non-frequent twitter users had higher intention to use the system again than frequent Twitter users.

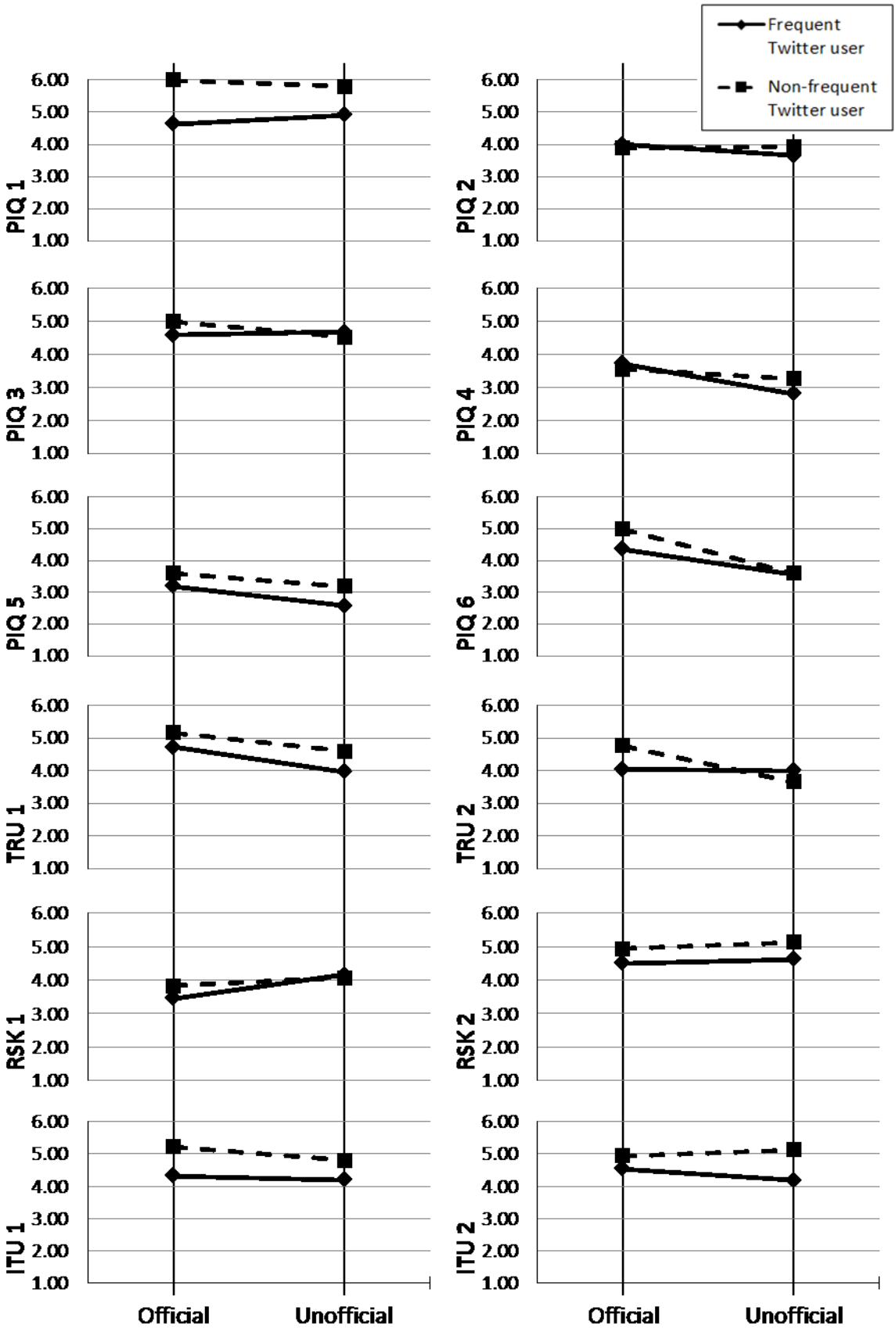

Figure 3: Means for two way Anova (information source and twitter usage)

5 Discussion and Conclusion

The primary objective of our study was to investigate the implications of using Twitter as a source for travel warnings in information systems. We found that both the information source and characteristic traits of the target audience play an important role for several aspects of perceived information quality and the resulting consequences for the intention to use the system.

There were no direct significant effects of information source and travel frequency on system acceptance (RQ1). That is, neither our experimental manipulation of the information source of being either official or unofficial nor the respondents' trait of being either frequent or non-frequent travelers had a significant influence on the respondent's intention to use the system. However, we found significant effects of both travel frequency and information source on several aspects of perceived information quality which might lead to an indirect influence on intention to use. Surprisingly, frequent travelers perceived the currency of the provided information as higher than non-frequent travelers. This is indeed unexpected, because there is no direct, intuitive connection between a respondent's frequency of traveling and her perception of how sufficient the currency of the presented travel risk information is. Also, the sufficiency of the amount of the presented information was perceived higher by frequent-travelers than by non-frequent travelers. The reason for that might be that frequent travelers require less information than non-frequent due to their higher travel experience. Interestingly, the level of detail of the presented information was rated higher by frequent travelers than non-frequent travelers, but only if the presented information was denoted to originate from an official information source. This means that frequent and non-frequent travelers perceive the same information only differently, if the information source is official. Not surprisingly, the empirical evidence shows that information denoted as originating from an official information source was perceived as being more reliable.

There was a significant effect of Twitter usage on the system acceptance (RQ2). We found that non-frequent Twitter users are more likely to use the system than frequent Twitter users. A possible explanation for this effect is that frequent Twitter users would not use a system specifically designed for travel risk information, but rather their general Twitter client. Additionally, there were significant effects of both Twitter usage and information source on several aspects of perceived information quality and trusting beliefs. Analogous to the above, non-frequent Twitter users perceived the currency of the information as higher than frequent Twitter users. As non-frequent Twitter users are less used to the high currency of information on Twitter, they may perceive the presented information as more current than frequent Twitter users. As could be expected, when information denoted as originating from an official information source was presented, respondents perceived the information as being more reliable. Additionally, if information denoted as originating from an official information source was presented, respondents perceived the system as being more sincere.

As we specifically wanted to investigate the interplay of information source and target audience to guide future artifact development, our findings bear some interesting insights. First, as could be expected, allegedly official information was perceived as more reliable and made the overall system appear more sincere. However, our empirical data shows no significant effects for many items like accuracy, relevancy or even competence when manipulating the information source to be either official or unofficial. Hence, we found no extensive evidence that user-generated travel risk information would be per se unsuitable as an information source for a travel risk application. Indeed this type of information might complement official information sources with the potential of providing latest first-hand information. Second, our data suggests that our proposed travel risk application might

be best positioned in the target audience of non-frequent Twitter users that travel frequently as all significant effects we found point into that direction.

6 Literature

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