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What's the Use of Guidebooks in the Age of Collaborative Media? Empirical Evaluation of Free and Commercial Travel Information

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Abstract

The success of the collaboratively created encyclopaedia Wikipedia has already questioned the model of strict separation between professional content authors and readers. Distributed content creation using digital media promises faster updates, more opinions and expertise and large amounts of information produced at virtually no cost. But virtual communities on the Internet have long been offering an additional benefit: information in discussion spaces is tailored to a specific information need. However, there is a lack of empirical data about information quality provided by virtual communities. We present a design to assess information completeness of two media using independent evaluators. The design is applied to compare guidebooks with virtual communities about travelling. The results show that information completeness of virtual communities is up to popular guidebooks.

Keywords: *virtual communities, tourism, information quality, empirical evaluation*

1. Introduction

Travellers face complex information needs characterized by highly dynamic and individual factors, e.g. weather conditions, prices, transportation, and appointments. This is even more pronounced on self-organized individual tours of independent travellers (e.g. backpackers). Guidebooks, still the most popular travel-specific information product, suffer from several weaknesses. They may contain outdated information due to time-consuming production and distribution processes. A reader does not know how information was gathered and selected. Trips, hotels etc. might be perceived to differ strongly from the description given because the traveller's preferences do not match the ones of the person giving the recommendation. It lies in the eye of the beholder what the terms "beautiful" or "difficult" mean. As an example, a traveller interviewed by one of the authors recalled that after having been travelling through New Zealand for two

months with a guidebook, he realized that sights described therein as “picturesque” always turned out to be boring. Clearly, his preferences differed from the one of the guidebook’s authors. In personal communication this can be quickly clarified: one can ask a question to clarify or find out what a description means and what the preferences of the person are.

While information technology has bolstered virtual communication and many large, free virtual communities about travelling exist, the question remains whether these virtual communities are able to serve as information systems i.e. are able to satisfy information needs, and whether the information can match other sources (e.g. guidebooks) in terms of quality. The notion of virtual communities has been described from different perspectives, like groups where members give each other social support (Rheingold 1993) or as a means to tie customers to a brand or business (Hagel & Armstrong 1997). But the ability of virtual communities to act as information systems, i.e. to create and distribute information in a not-work-related context (Prestipino 2004, Prestipino & Schwabe 2005) has only recently been investigated. While several arguments for high performance of virtual communities may seem obvious, there is little empirical data about the quality of information in virtual communities and if it should be considered as an option when choosing among information sources. While earlier exploratory studies by the authors hint at the potential, a larger study with a sound methodological design was missing. Two questions had to be addressed: what is information quality and how can it be measured? This paper will address these questions in the following chapter. Chapter three will present our design for assessing information completeness and apply this design to guidebooks and virtual communities. The results are reported in chapter four and discussed in the conclusion.

2. Related Work and Hypotheses

On a conceptual or theoretical level, the notion of information quality has been widely discussed in literature. Different dimensions of these concepts have been formulated and were integrated into different frameworks. Alter (1992) lists as relevant criteria: Types of data, accuracy/precision, age, time horizon, level of summarization, completeness, accessibility, source as well as relevance/value. Senn (1990) refers to the attributes of accuracy, form, frequency, breadth, origin and time horizon. More recent approaches propose frameworks on more abstract levels which specify algebraic relations for different information quality dimensions (Cappiello, Francalanci & Pernici 2004, Scannapieco & Batini 2004).

While these different conceptualizations of information quality can hardly be integrated into one consistent framework, they also lack in many cases concrete methods how to analyze the mentioned attributes (cf. Gackowski 2004). In addition to this, we found few well controlled studies which empirically investigate dimensions of information quality from a user’s perspective with participants evaluating actual content. Rittberger (2000) proposes a relationship between certain characteristics of discussion spaces and information quality. But the validity of these characteristics as indicators of information quality is not shown.

In this paper, we propose an information assessment approach using independent raters to empirically evaluate information in virtual communities and printed guidebooks. Virtual communities do not externalize all their knowledge in advance, thus approaches based on the assessment of data quality in information products are not adequate.

Our concept of information quality is based on the notion that “Information is knowledge in action” (Kuhlen 1998), meaning that information exists only in a certain context and with regard to a certain need. Thus, information quality is mainly to be evaluated from the user’s point of view. We propose four quality factors (Schwabe & Prestipino 2005):

Timeliness, completeness, structure and personalization. *Timeliness* refers to the fact, whether information is up-to-date, usually dependent on two subcriteria: how old was the information when it was entered into the system and how often does this information change in the source (Bouzeghoub & Peralta 2004).

Completeness refers to the ability of a medium to serve information needs. There are two aspects of completeness: How well does an information system satisfy the traveller's information need (in her opinion) and how complete is the retrieved information in terms of what ideal information is like. It is not feasible nor of practical value to determine how complete the output of an information system is, as compared to an ideal information. While it may be possible to return the exact actual number and addresses of a city's hotels, it is obviously impossible to return all possible information to open questions like "where can I go now for a three week holiday if I want to go swimming, but only want to spend \$1000?". Therefore we focus on the assessment of the completeness from the user's point of view. Note that we do not use the level of detail of the information as a separate criterion, as this property can only be assessed with regard to the specific need of the user and is thus captured by our assessment of completeness.

Personalization indicates how fitting the information is for a person in his real world context, and how much unnecessary and unsuitable information is returned to him. Personalization can additionally be defined in an information system context as the possibility of accessing information that is specifically customized for a user's context and possibly creating a personal view of an available information space.

Structure refers to presentation and structure of information, which may greatly affect efficiency of information access and learning and is therefore closely related to the criteria accessibility and understandability found in literature. We that argue access to internet-based information systems is widely available, so there is no significant difference in accessibility to both media. In this study we focus on the planning phase of a trip rather than ad-hoc information needs while touring, where quick response would be an issue. Understandability is influenced by structure but also by the specific setting (information need, prior knowledge of the asker) and thus is captured by our criteria completeness and personalization

2.1 Hypothesis

Aim of this paper is to assess information completeness in guidebooks and virtual communities. Guidebooks are produced by for-profit companies engaging several distinct professional roles: paid authors, graphic designers, publishers and so on. The book is produced in a systematic process, usually benefiting from experiences made with the production of earlier editions. Lonely Planet guidebooks and its rivals often exceed 1000 pages of densely printed pages. It is an information product, which cannot tailor information interactively to a highly specific need. The information therein is based on the knowledge of a small number of persons.

A virtual community has no distinct authors; instead it connects a large number of people, who all may contribute their knowledge independent of physical location and time. A virtual community enables communication between humans, i.e. questions are asked in natural language, allowing for fine distinctions and high expressiveness. Questions may be clarified in a conversation, as often the full or real information need is not clearly known in advance to the asker (Belkin 1982). Communication in the virtual community is immediately visible to others, so it is possible to add missing or correct wrong information. Unlike with guidebooks, any member of the community can immediately share his experiences. The effort of producing information is distributed among the community members, who contribute without financial reward, thus resulting in cost free information provision. Information is produced mostly when it requested for the first

time, and therefore has not to be conceptualized in advance. While electronic guidebooks may offer almost unlimited storage capacity, the cost of entering all information possibly relevant to any user would defy a commercial business model. Such an information system would also need to provide a correspondingly powerful way of specifying queries. Also users may lack the ability to use a complex retrieval system and artificial query language.

In summary, virtual community may provide tailored, reviewed information produced by a large number of contributors using natural language. Because

- more contributors produce information,
- information is reviewed by a large number of contributors who can check and fill in missing information,
- user's information need is specified using natural language,
- we see reason to propose the following hypothesis:

Virtual Communities have higher information completeness than printed guidebooks.

3. Methodology and Data Collection

The rigorous comparison of printed guidebooks and information provided by virtual communities poses many challenges:

1. Representative sample size: As it is clearly not feasible to study all guidebooks or all tourism communities, the choice of a representative sample is key. There are two approaches to make representative choice of communities: Either one chooses to standardize the communities (interaction form, size, language etc.). One can then argue that a specific form of community is superior or inferior to a specific kind of guidebook. This requires good knowledge of the relevant tourism community dimensions to be standardized. This knowledge is lacking. We therefore choose to follow the second approach and to take the "knowledgeable traveller's" perspective. A knowledgeable traveller chooses a virtual community that is easy to find, seems to be large and active (judging from the archive of past communication) and clearly denotes it is relevant to the topic he is interested in, e.g. by its name or motto. As for guidebooks, he will choose a highly visible and well-known brand (i.e. the Lonely Planet guide). In order to check the stability of our results we purposefully choose countries of different size. The specific selection of the sample is described in section 3.1.

2. Selection of questions: While it may be possible to analyse the content of a guidebook, this approach is clearly not feasible for a large tourism community. Thus we evaluated the completeness according to a standard set of "typical" travel questions. The choice of questions is paramount for a fair comparison of media. A group of neutral travellers generated those questions reflecting their travel experiences (ref. section 3.2)

3. There is no absolute measurement for information completeness. Thus, we used raters to assess information completeness. If the raters would know the treatment (i.e. whether they rate a travel book or a community) they may be biased. We therefore introduced an intermediate step of summarizing the identified information before presenting it to the raters (section 3.3). For evaluation, the raters received a randomized mixture of summaries from both treatments (section 3.4).

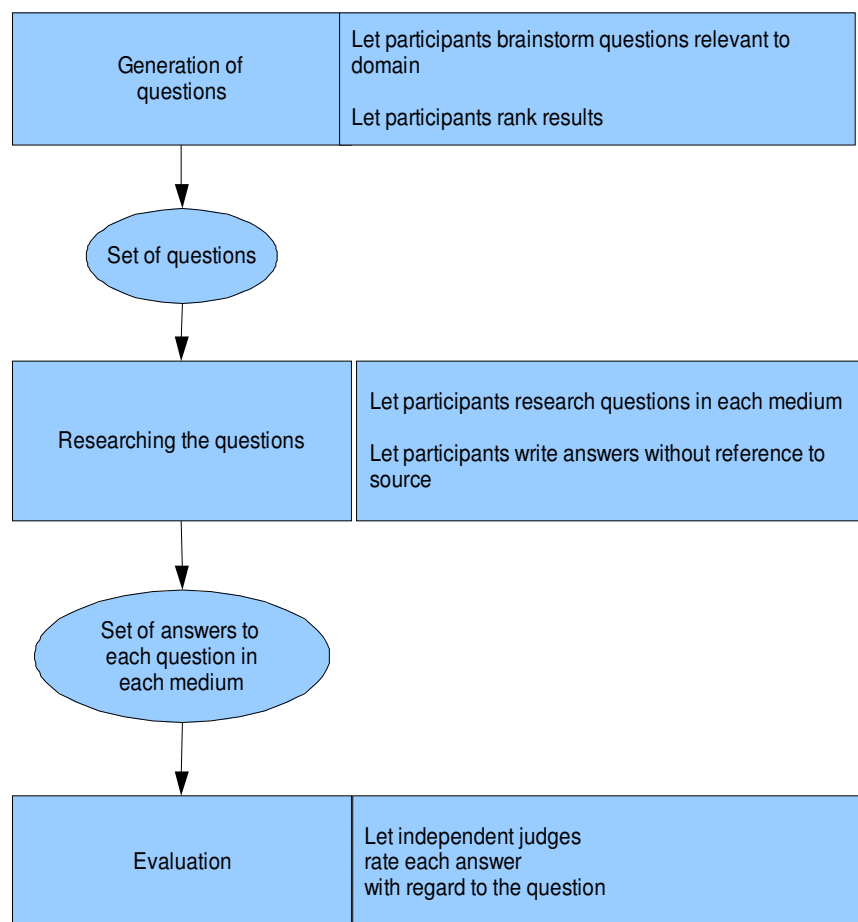


Figure 1: A three-phased research procedure for the empirical assessment of information quality

Failure to systematically address those three methodological issues led us to check the results of our prior exploratory studies (Prestipino & Schwabe 2005). We now believe the study design (see Figure 1) is a research contribution itself. It may help comparing the information quality between conventional media and digital media in other contexts.

3.1 Choosing a Representative Sample Size

Guidebooks and discussion spaces for the following five countries were evaluated: Brazil, Australia, Great Britain, Greece, and United States of America. All guidebooks used were published by Lonely Planet, one of the most popular guidebook publishers for independent travellers, and the latest edition available¹ was used in all cases. The virtual communities were chosen based on the clear focus on the respective country and the time they had been alive (to minimize the risk of a community suddenly “dying” during the study). Activity rates for the virtual communities were calculated by using automated counting tools or by manually counting representative months of the four quarters of 2005 (i.e. January, April, July, and October). The countries, the respective discussion spaces as well as activity rates are shown in Table 1.

¹ Britain: 5th ed. March 2003; Greece: 6th ed. March 2004; USA: 3rd ed. March 2004, Brazil: 5th ed. January 2002; Australia: 12th ed. January 2004

Table 1: The evaluated virtual communities for the five countries and activity rates

Country	Online Community	Average number of messages per month (2005) ²³
Brazil (BRA)	Virtual Tourist Forum http://www.virtualtourist.com/	461
Australia (AUS)	newsgroup rec.travel.australia+nz	370
Great Britain (GB)	Thorn Tree Forum UK & Ireland http://thorntree.lonelyplanet.com/categories.cfm?catid=25	5238
Greece (GRE)	newsgroup alt.travel.greece	96
United States of America (USA)	newsgroup rec.travel.usa-canada	1821

3.2 Generation of Travel-Related Questions

The test questions for our evaluation were generated by conducting a brainstorming session with five recruited participants. The researchers did not participate in the brainstorming, but moderated the session. Participants were asked to anonymously generate typical questions they knew from preparing a travel. In a second step, each participant ranked the resulting questions. After consolidation, nine questions from the twenty highest-ranked questions were taken (after excluding those redundant or not suited for diverse countries, e.g. “can I communicate in English?”, obviously unsuitable for asking about English-speaking countries) and adapted, i.e. the question about safety of a destination was put in the context of the respective countries by choosing a city.

3.3 Summarizing Answers Provided by Guidebooks and Communities

Subsequently, the list of questions was researched by nine different participants who used printed guidebooks as well as virtual communities to answer the questions. Participants were given an introduction into the guidebooks and the internet communities. To generate information from virtual communities, participants would formulate a question and post it in the chosen discussion space of a virtual community. Answers posted to this question by the community would be evaluated after two weeks in a second session. They would also search discussion archives afterwards.

² Due to the continuous and extensive deletion of community content in the Thorn Tree Forum provided by Lonely Planet, we took the data of January 2006 to estimate the number of discussion threads per year. The estimation is a conservative one, probably slightly underestimating the real number.

³ Data for the newsgroups was gathered using Google Groups, e.g. <http://groups.google.com/group/rec.travel.usa-canada/about>

As an example, the question “Who can tell me where the best flea markets in Sidney are?” led to several answers in the forum, including the following:

“Dunno about flea markets, the real ones usually get announced on fliers etc. But if you like markets, check out Glebe Market (at the school, Saturday mornings), Bondi market (Sundays, I think?) and Paddy's market (week-ends, Fridays too now I think). Personally, I liked the one in Glebe.”

Finally participants would write a short text with relevant information they gathered from the respective source. The rationale for this design is that the persons evaluating these texts in the next step would not know whether information came from a guidebook or a virtual community, thus avoiding a possible bias. There was a large time limit given, which was never passed. The research of the nine participants resulted in 90 pairs of questions and researched answers (nine questions x five countries = 45 per medium).

3.4 Evaluation

To avoid distorting effects caused by exhausted participants and keep time and effort for them within reasonable limits, the 90 question-answer pairs were divided into three sets, each containing 30 pairs. Hence, one group consisting of nine subjects evaluated one set, i.e. 30 pairs. These 30 pairs consisted of 15 pairs extracted from the printed guidebooks and 15 pairs extracted from the virtual communities. The sets were created randomly, but in a way ensuring that both conditions for the same question and country were not evaluated by one person and that each question type (1-9) was evaluated by each group.

The 27 participants were given the question/answer pairs of their set and asked to judge a given answer in relation to its respective question. In order to avoid overly sceptical judgement and judges looking for a rather elusive concept of perfect information, the following question was asked: “Is the information given sufficient to enable me to take action or make a decision?”

We recorded two different measures. Firstly, participants were asked to evaluate each question/answer pair by judging if the answers contained sufficient information for further action or decisions. This measure was recorded as a dichotomous measure since participants only had the possibility to answer with yes or no. Secondly, participants were also asked to rate the answer on a rating scale from 6 to 1 whereas 6 stood for a “very sufficient” answer and 1 stood for a “very insufficient” answer. We recorded the dichotomous measure to force participants to come to a clear decision if they would actually use the information in a real situation. The rating scale was used to gain a more fine grained measure which allowed us to compare the two media on a more differentiated statistical base. Concerning our hypothesis we state correspondingly that:

H1.1 For the dichotomous measure, virtual communities have higher information completeness than printed travel books.

H1.2 For the rating scale, virtual communities also have higher information completeness than printed guidebooks.

4. Results

The difference between the “printed guidebooks” ratings and the “virtual communities” ratings were assessed by calculating their means and using statistical inference tests for the dichotomous measure (section 4.1) as well as for the rating scale (section 4.2). To assess the quality of our ratings, we calculated the interrater agreement among our

evaluators (section 4.3.) In section 4.4, we discuss the importance of a community’s activity for its information quality.

4.1 Judgements for the Dichotomous Measure (Yes/No)

The proportional agreement to the dichotomous measure (yes/no) for the two media “printed guidebooks” and “virtual communities” as well as for the five countries are shown in Figure 2. On a descriptive level the figure shows that for four countries the virtual communities have a higher proportional agreement to the question “Is the information given sufficient to enable me to take action or make a decision?”. The difference amounts to at least .06. Only for one country (Greece) the proportional agreement for the virtual community is .1 lower compared to the agreement for the printed guidebook.

Because of the comparatively low interrater agreement (see section 4.3) we used the arithmetical mean of the nine raters for each question for further analysis. The overall proportional agreement to the items in the “printed guidebook” condition resulted in $M = .731$ ($STD = .303$) whereas the agreement for the “virtual community” condition resulted in $M = .815$ ($STD = .237$). A paired t-test for these aggregated ratings failed to reach significance with $t(44) = 1.379$; $p = .175$.

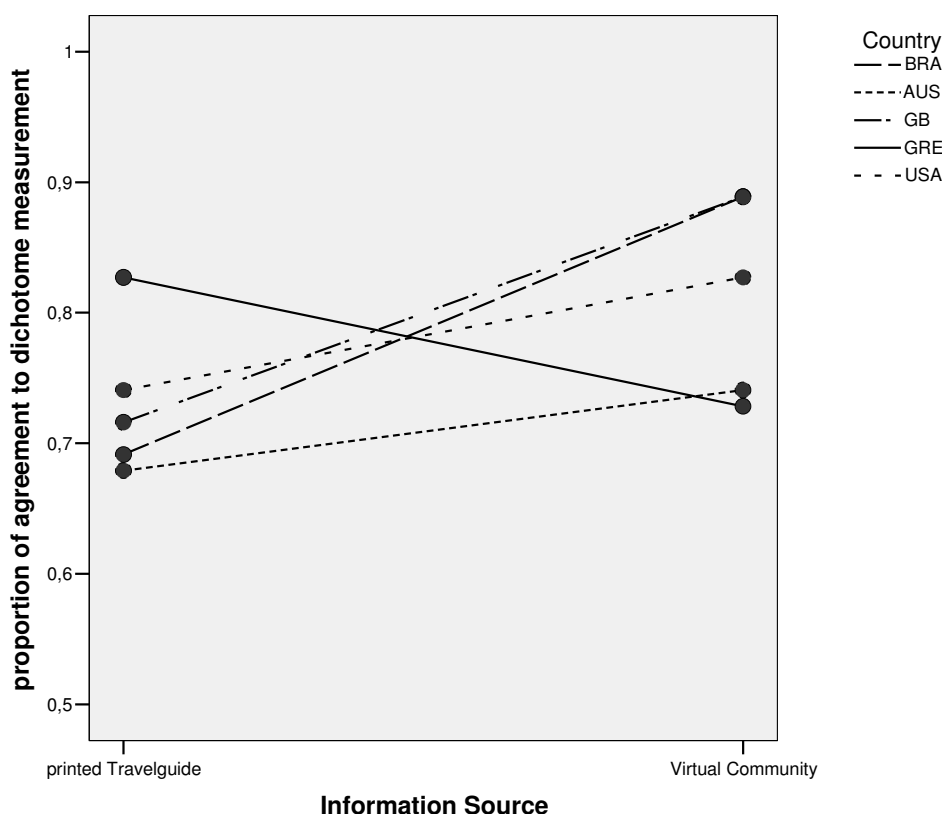


Figure 2: Proportional agreement to the dichotomous question: “Is the information given sufficient to enable me to take action or make a decision?”

The slight advantage of virtual communities for the dichotomous measure fails to reach statistical significance. Therefore, we have to reject our hypothesis H1.1 that for the dichotomous measure virtual communities have a statistically higher information

completeness than printed guidebooks. However, our data strongly indicate that virtual communities are at least on an equal level compared to printed guidebooks. The power of our test amounts to $\lambda = 10$ for an effect of $\Omega^2 = .1$, which results in the probability of committing a Type II error of $\beta < .1$. Hence, the probability of virtual communities having lower information completeness than guidebooks can be considered as exceedingly low.

4.2 Judgements on the Rating Scale (6-1)

The mean ratings on a scale from 6 to 1 for the two media “printed guidebook” and “virtual community” as well as for the five countries are shown in Figure 3. Again, the figure shows that for four countries the communities are evaluated higher by at least .31 scaling points compared to the printed guidebook. Only for Greece this relationship was reversed: the virtual community was evaluated lower by .67 scaling points compared to the printed guidebook. Hence, the results of the rating scale correspond to the results of the dichotomous measure. This can be taken as an indicator that participants understood these two measures in the same way and filled out the questionnaires attentively.

The aggregated arithmetical mean for the “printed guidebook” condition turned out to be $M = 4.12$ (STD = 1.01) whereas the mean for the “virtual community” condition turned out to be $M = 4.30$ (STD = 0.87). A paired t-test failed to reach significance with $t(44) = -1.034$; $p = .31$.

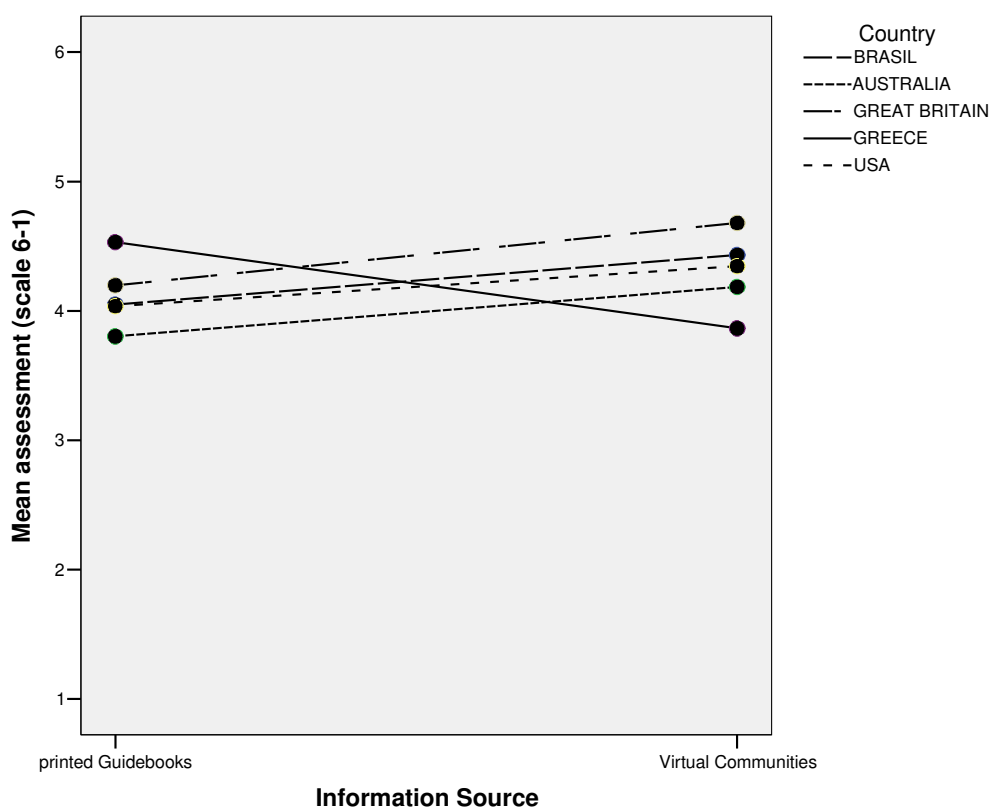


Figure 3: Mean assessment rates (scale 6-1) for the two media “printed guidebooks” and “virtual communities” as well as for the five countries

The results of the rating scale correspond to the results of the dichotomous measure. The slight advantage of the virtual communities fails to reach statistical significance.

Therefore, we have to reject our hypothesis H.1.2 that for the rating scale virtual communities have a statistically higher information completeness than printed guidebooks. As pointed out in section 4.1 our data strongly indicate that virtual communities have at least the same level of information completeness as printed guidebooks.

4.3 Interrater Agreement

To assess the interrater agreement of the dichotomous measure (yes/no) we calculated Krippendorff's alpha (Krippendorff 2004) for each of the three groups since within one group all participants evaluated all questions. For the nine participants of Group 1 this index turned out to be $\alpha = .269$, for Group 2 it turned to be $\alpha = .321$ and for Group 3 it turned out to be $\alpha = .443$.

To assess the interrater agreement of the rating scale (6-1) we calculated intraclass correlations for each of the three groups. The ICC (2-factorial, not adjusted) value for single measures for Group 1 turned out to be .387, for Group 2 it turned out to be .425 and for Group 3 it turned out to be .568.

Because of the low interrater agreement which points to a low reliability of single ratings we decided to take the arithmetical mean of the nine raters for each question for our data analysis. Even though this results in a loss of power for statistical analysis this seemed to be a more reasonable advancement in our case since the reliability can be increased decisively by calculating the average between a number of raters. The ICC (2-factorial, not adjusted) value for average measures shows this increase in reliability. For Group 1 it turned out to be .85, for Group 2 it turned out to be .87 and for Group 3 it turned out to be .92.

4.4 Community Activity as Factor for Information Completeness

A comparison of the five virtual communities showed that the community covering Greece differed strongly from the other four communities. The community about Greece had decisively lower activity values than all other communities. The community covering Australia which had the next higher activity values had on average almost four times as many messages per month for 2005.

After comparing printed guidebooks and virtual communities over all our data we also analyzed our data without Greece which resulted in an evaluation only including virtual communities with an average number of at least 370 messages per month. For the dichotomous measure this analysis resulted in a mean over aggregated ratings for the printed guidebooks of $M = .707$ (STD = .319) and in a mean of $M = .836$ (STD = .205) for the virtual communities. A paired t-test turned out to be significant on a significance level of $\alpha = 0.1$ with $t(35) = -1.959$; $p = .058$ (2-tailed). In accordance with Bortz & Döring (2002) we used $d = ((\mu_1 - \mu_2)/\sigma_{diff}) * \sqrt{2}$ to determine the effect size for this paired t-test. The effect size for the dichotomous measure resulted in $d = .462$ which can be regarded as a small to medium effect size.

For the rating scale (6-1) this analysis resulted in a mean over aggregated ratings for the printed guidebooks of $M = 4.023$ (STD = .950) and in a mean of $M = 4.412$ (STD = .753) for the virtual communities condition. A paired t-test turned out to be significant on a significance level of $\alpha = 0.1$ with $t(35) = -1.871$; $p = .070$ (2-tailed). The effect size for the dimensional scale calculated the same way as the effect size for the dichotomous measure resulted in $d = .441$.

5. Interpretation

In this study, we systematically compared information completeness in printed guidebooks and virtual communities. While the slight advantage found for virtual communities does not reach statistical significance, our results show that virtual communities have at least the same level of information completeness as guidebooks.

Our results showed advantages of the virtual communities compared to the guidebooks for four of our five investigated countries. The activity rates for these countries show that the virtual community covering the respective country (Greece) has a decisively lower number of messages per month compared to the other researched communities. We conclude that besides the period of time a community has been active the activity rate of the community is a crucial factor for the provided information quality. If data for Greece is omitted which means only including virtual communities with an activity level of at least 370 average number of messages per month virtual communities have a significantly higher ($p < .1$) level of information completeness.

For further research we would, therefore, consider a reformulation of our original hypothesis. We assume that information quality, especially completeness but presumably also other quality attributes, strongly depends on activity parameters of the community. To define crucial activity parameters (e.g. number of authors, number of messages, number of replies etc.) and to detect decisive thresholds relating to information quality seems to be a fruitful approach for further research.

6. Conclusion & Future Work

In this paper we presented a rigorous design for evaluating information completeness from a user's point of view and could show that free virtual communities are able to produce satisfying information products. Earlier exploratory studies (Prestipino & Schwabe 2005) showed similar results, but were possibly biased towards questions suited for virtual communities and lacked rigour. In the study presented in this paper the questions were rather general: almost no context information or individual preferences were provided. Thus, the potential of virtual communities to create highly individualized information using natural language communication was not fully exploited, and better results might be expected if such questions are evaluated. For abstract concepts like information quality the comparatively low interrater agreement is a difficult problem, which may be addressed by more thorough training of participants. With reference to rated information quality we found an outlier for the least active virtual community. Further research is needed if this is a consistent, inherent characteristic of virtual communities and if categories of activity level and quality exist.

In another comparison by Giles (2005), Community based information from Wikipedia (<http://en.wikipedia.org/>) and the Encyclopaedia Britannica was examined by domain experts. Wikipedia was found to be almost up to the Encyclopaedia Britannica, with the same number of major mistakes and a higher amount of smaller errors, omissions and misleading statements.

While more data is needed, it may be possible that virtual cooperation technology has changed transaction cost for collaboration such that commercial manufacturing of information by small groups of professional authors may not be necessary any more for certain domains. This would end the age of information asymmetry where few information producers provide information to many consumers without scrutiny and without the possibility of free public feedback or discussion: in a virtual community every person may share his experience with others. For tourism, this has a significant impact: not only might guidebooks be replaced by free collaborative information spaces created by virtual communities, e.g. Wikitravel (<http://wikitravel.org/>). Also, travellers

using community based information own a stronger position against service providers, as they do not have to rely on advertisement, and low-quality services and scams are published much more. Better information leads to better travel quality, as it improves decision-making and learning about other countries and culture. For information providers it means they have to rethink their role: rather than organizing the production of content for information products, they should take on the role of value-adding moderators who add quality control to community processes and improve or change existing content for specific customer groups or domains, by structuring, rewriting or packaging content. Another opportunity is the integration of companies related to a community's domain, e.g. tourism companies. How can these companies use virtual communities as a way of distributing information and interacting with community members?

For scientists our results motivate the need for further research on virtual communities as information systems. While many research activities are found about social processes in communities, we lack insight about quality aspects and how the creation and distribution of information may be supported by better tools. Virtual communities today use tools designed decades ago. We believe there is large potential in improving support tools for these communities.

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