Dang-Pham, D., Nguyen, L., Hoang, A. P., Pittayachawan, S., Akbari, M., & Nkhoma, M. (2021). Categorizing young Facebook users based on their differential preference of social media heuristics: A Q-methodology approach. *Pacific Asia Journal of the Association for Information Systems, 13*(1), 71-96. https://doi.org/10.17705/1pais.13103

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Pacific Asia Journal of the Association for Information Systems

ISSN 1943-7544

Research Paper doi: 10.17705/1pais.13103 Volume 13, Issue 3 (2021)

Categorizing Young Facebook Users Based On Their Differential Preference of Social Media Heuristics: A Q-Methodology Approach

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Abstract

Background: *Social media have become an integral part of our modern society by providing platforms for users to create and exchange news, ideas, and information. The increasing use of social media has raised concerns about the reliability of the shared information, particularly information that is generated from anonymous users. Though prior studies have confirmed the important roles of heuristics and cues in the users' evaluation of trustworthy information, there has been no research–to our knowledge–that categorized Facebook users based on their approaches to evaluating information credibility.*

Method: *We employed Q-methodology to extract insights from 55 young Vietnamese users and to categorize them into different groups based on the distinct sets of heuristics that they used to evaluate the trustworthiness of online information on Facebook.*

Results: *We identified four distinct types of young Facebook user groups that emerged based on their evaluation of online information trustworthiness. When evaluating online information trustworthiness on Facebook, these user groups assigned priorities differently to the characteristics of the online content, its original source, and the sharers or aggregators. We named these groups: (1) the balanced analyst, (2) the critical analyst, (3) the source analyst, and (4) the social network analyst.*

Conclusion: *The findings offer insights that contribute to information processing literature. Moreover, marketing practitioners who aim to disseminate information effectively on social networks should take these user groups' perspectives into consideration.*

Keywords: Social Media, Social Network, Information Trustworthiness, Information Credibility, Credibility Heuristics.

Citation: Dang-Pham, D., Nguyen, L., Hoang, A. P., Pittayachawan, S., Akbari, M., & Nkhoma, M. (2021). Categorizing young Facebook users based on their differential preference of social media heuristics: A Q-methodology approach. *Pacific Asia Journal of the Association for Information Systems, 13*(1), 71-96. https://doi.org/10.17705/1pais.13103

Introduction

Social media have become an integral part of our modern society by providing platforms for users to create and exchange news, ideas, and information. They have transformed the ways people search, consume, generate, and distribute information (Bruns, 2016). The faster information cycle that hybridizes press on social media has taken over traditional news cycles, which has resulted in exponential growth in the quality and speed of news dissemination (Ngai et al., 2015). At the same time, the development of the Internet leads to high social media penetration around the world, reaching 50% of the total population in 2020 at an 8-10% annual growth rate (WeAreSocial, 2020). With 3.8 billion users who spend more than two hours a day on social media usage, there is a growing number of popular social networks that dominate the market such as Facebook, YouTube, LinkedIn, Twitter, Instagram (WeAreSocial, 2020). In Vietnam, Facebook has more than 46 million active users per month, who are using this social platform for different purposes including entertainment, civic, economic, and personal ones (Statista, 2020).

The increasing use of social media for reading news has raised concerns about the reliability of the shared information, particularly information that is generated from anonymous users. In a social crowdsourcing platform, any user can contribute by editing public content; thus, the validity of such user-generated content remains questionable. Previous efforts have been spent to identify characteristics that could predict a 'trust score' of these public contents, such as objectivity, completeness, and pluralism (Choi & Stvilia, 2015; Chung et al., 2012; Metzger & Flanagin, 2013) or the clarity of information (Nurse et al., 2011; Teng et al., 2014). Some argued that social media users who consume online information have limited cognitive capacity and can only recognize and process few heuristics at a time when evaluating the trustworthiness of information (Lang, 2006). Furthermore, information processing theories posit that different elements of online information have varied levels of impact on perceived credibility, which is the function of the element's likelihood of being noticed and its values (Fogg, 2003; Hilligoss & Rieh, 2008; Petty & Cacioppo, 1986). Among the plethora of heuristics that have been identified by prior studies, it is crucial to determine the ones that are perceived by the users as the most important. This research aims to answer three research questions:

- **RQ1.** What are the distinct types of young Facebook user groups that emerge based on their evaluation of online information trustworthiness?
- **RQ2.** What heuristics of online information trustworthiness are perceived to be important by young Facebook users?
- **RQ3.** What are the distinct sets of heuristics that different Facebook user groups use to evaluate online information trustworthiness?

In this research, we have classified a sample of young Vietnamese Facebook users into different user groups. Members in each group shared similarities in their ranking of the trustworthiness heuristics, based on their distinctive views and behaviors on a set of given topics. We evaluate different trustworthiness heuristics of online news that they perceive and, thus, provide empirical support for different mechanisms, under which social network users gain their trust.

The paper is organized as follows. The next section provides a review of related works and theories that investigate the trustworthiness of online information. We then describe our research methodology and design. The analysis process and the consequential findings of the four user groups are presented next. The last section concludes and discusses our implications.

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DOI: 10.17705/1pais.13103

Literature Review

Social media enables interactive information sharing and contributions among users, content creators, experts, or even the governments (Bruns, 2016). As the rise of social media leads to a large amount of information being disseminated across different platforms, much attention has focused on the trustworthiness of information on social media (Banerjee et al., 2017; Duong et al., 2020; Zhang & Gupta, 2018), especially when anonymous users can post their content or share news from other unauthorized sources (Duong et al., 2020). Trustworthiness is defined as the users' willingness to rely on the targeted sources, which make users believe in or feel that these sources can help to solve their problem and fulfill their expectation (Banerjee et al., 2017). From the relationship perspective, the trustworthiness of social media can reduce or increase users' efforts to verify the provided news and information generated from the discussions on social media (Zhang & Gupta, 2018). It enhances user engagement on social media and results in efficient collective discussions and contributions (Lin & Xu, 2017).

There are differences between trust and trustworthiness in cyberspace. While trust refers to the belief that an individual has about the target subject (Alarcon et al., 2016), trustworthiness is linked to the trait or characteristics of the target subject (Banerjee et al., 2017). Accordingly, online trust can be developed through direct experience or interactions with the social media platforms and relevant members (Yu et al., 2015). Conversely, the trustworthiness of social media can be judged according to the indirect interactions or secondary information (Alarcon et al., 2016). Therefore, perceived trustworthiness results from an evaluative process that is based on the selected criteria of social media sites, which can be characterized by the facets of ability, benevolence, and integrity (Alarcon et al., 2016). Ability refers to the relevant competency of the online information sources have on the topics they share and discuss. Benevolence is the belief that the information providers are willing to support and help the followers. Integrity is the set of values/morals that information providers maintain in information exchanges. Despite the debates about the distinction between trust and trustworthiness, most agreed that trustworthiness would be essential for developing subsequent trust toward the targeted social media (Yu et al., 2015; Alarcon et al., 2016). If people perceive the trustworthiness of the online groups, they would increase the interactions or information exchange with social media and in turn trust the advice and recommendations (Filieri, 2016).

Research motivation

Many studies have determined the cues and heuristics that influence the users' evaluation of online information trustworthiness. For instance, Metzger (2007) summarized a total of 25 cues that affected the users' evaluation of online information credibility, including source citations, author identification, and the organization of the website. Huerta and Ryan (2003) analyzed 13 peripheral cues, which were categorized into cues about the website, the source's author, and the message itself. With specific regard to the credibility of online health information, Freeman and Spyridakis (2004) analyzed 17 features that included the design of the information website, the editorial review process, and sponsorship by credible organizations. George et al., (2016) highlighted five factors that are interpreted by the users such as involvement, skills and knowledge, experience, context (e.g., the user's environment, expectations, situational norms), and individual characteristics. Similarly, the trustworthiness of the social media can be evaluated by cue-based and experience-based evidence (Lin & Xu, 2017; Wang et al., 2004).

Though prior studies have confirmed the important roles of heuristics and cues in the users' evaluation of trustworthy information, there has been no research–to our knowledge–that categorized Facebook users based on their approaches to evaluating information credibility. There are few studies that segmented users of web 2.0 sites such as Facebook, as compared

to profiling works that focused on customer relationship management (CRM) and target marketing (Bhattacharyya et al., 2017; Shao et al., 2015).

There are many reasons for segmenting, categorizing, or profiling social media users. For instance, Bhattacharyya et al. (2020) employed principal component analysis and machine learning techniques to segment Yelp users for improving recognition systems. Campbell et al. (2014) used latent class analysis to segment consumers based on their attitudes toward social network marketing to better understand the consumers' reactions to such marketing approach. (Wisniewski et al., 2014) profiled Facebook users based on their privacy management settings for improving user personalization on social media. van Dam and Van De Velden (2015) used the k-means clustering technique to segment Facebook users who were followers/fans of an organization for improving CRM. Similarly, Shao et al. (2015) performed k-means clustering to segment Facebook users based on their motivations for socializing, entertainment, attention-seeking, and information seeking. Prior studies have also employed Q-methodology to segment social media users. For example, Dang-Pham et al. (2015) employed Q-methodology to segment Facebook users based on their concerns when using this social media, and Morton and Sasse (2014) employed the same approach to categorize users based on their information-seeking behaviors.

By segmenting young Facebook users based on their distinct approaches to evaluating online information trustworthiness, we aim to contribute to the body of knowledge about the segmentation of web 2.0 users which is currently under-researched (Bhattacharyya et al., 2017; Shao et al., 2015). Our research findings can inform CRM and social network marketing practices. In addition, a deeper understanding of how Facebook users evaluate trustworthy information helps to address the growing issue of fake news on social media (Sterrett et al., 2019). McGrew et al. (2017) found in their study that many young Internet users were unable to recognize reliable news from misleading ones; these uninformed users posed a greater challenge than fake news itself. Social media has also become more popular as the source of health-related information for young users, yet little is known about how these users interact with such information and assess its credibility (Goodyear et al., 2019). Moreover, there have been conflicting findings regarding whether millennials tend to trust the information on social media more than traditional news (Johnson & St. John, 2020). As such, it is timely and critical to explore how young users evaluate and perceive online information trustworthiness on social media so that effective interventions can be designed to address the issues related to fake news and alternative facts.

Finally, the ongoing development of machine learning techniques and the rapid adoption of social media has enabled automated solutions for segmenting and profiling social media users (see e.g., Greco & Polli, 2020). Although these solutions can analyze large data sets to come up with micro-segments based on a variety of features, the user segments resulting from such an automated approach may be limited to the users' observable behaviors and characteristics, such as their demographics, posts, and relationships with other users. Our study aims to investigate the users' process of considering and prioritizing the cues and heuristics when evaluating online information trustworthiness, by employing the Q-methodology which enables accounting for the users' subjectivity (Watts & Stenner, 2012).

Theoretical background

From information processing literature, several theoretical frameworks explain how people assess the credibility of online information. For instance, the elaboration likelihood model (ELM) and the dual processing model of credibility evaluation posit that information seekers rigorously examine information quality cues for evaluating credibility when they are highly motivated, i.e., following the central route, whereas heuristics or "mental shortcuts" are preferred for credibility assessment when people are less motivated i.e., following the peripheral route (Metzger & Flanagin, 2013; Petty & Cacioppo, 1986).

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DOI: 10.17705/1pais.13103

Social identity theory (SIT) explains how social groups can influence how individuals evaluate information credibility. People tend to identify themselves as members of particular groups, i.e., the in-groups, which help them to differentiate themselves from others i.e., the out-groups (Hogg & Reid, 2006). People are more likely to accept and comply with norms, shared values, and advice from in-group members than from those who belong to the out-groups (Nguyen et al., 2016). This also influences the way people believe the shared reviews and relevant information (Lin & Xu, 2017). Moreover, the perception of group relevance motivates individuals to shortcut their processing of information (Qu & Lee, 2011). Sharing similar socio-demographic backgrounds between people and in-group members influences their trust in information sources as well (Simon et al., 2016).

Prominence-interpretation theory (PIT) can also be used to explain the process of assessing the targeted online sources' trustworthiness. According to this theory, the users' assessment of credibility is the product of their interpretation and the heuristics' prominence (Fogg 2003). Prominence is about the noticeability of the credibility cues, and interpretation refers to the users' personal judgments of these cues. (Fogg, 2003) further identified five factors affecting the prominence of the cues, namely user's involvement, topic, user's task, user's experience, and individual differences. The user's assumptions, skills, knowledge, and the contexts of credibility assessment also affect interpretation (Fogg, 2003).

According to Hilligoss and Rieh (2008)'s unifying framework of credibility assessment, information seekers assess the credibility of information objects by processing through three levels of credibility judgments: construct, heuristics, and interaction. In the first level, information seekers construct their definition of credibility, which includes believability, verifiability, and trustworthiness. In the second level, information seekers pay attention to the heuristics which consist of "rules of thumb" for them to make judgments about credibility. More specifically, these rules of thumb comprise media-related heuristics that are linked to specific mediums (e.g., websites, peer-reviewed journals, or books), source-related i.e., known versus unfamiliar and primary versus secondary sources, endorsement-based i.e., involving perceptions of popularity and authority, and aesthetics-based heuristics. In the third level, information seekers consider the cues of the particular information objects to evaluate credibility (Hilligoss & Rieh, 2008). This consideration, which is more cognitively demanding than relying on the broad heuristics as mentioned above, involves interactions with content cues, peripheral source cues, and peripheral information object cues. Content cues are attributes of the content itself, such as the use of multiple sources or the currency of the reported event. Peripheral source cues include the affiliation, reputation, and educational background of the information sources which can be individuals, organizations, or any social aggregators. Finally, peripheral information object cues are available in the appearance and presentation of the information. For instance, information seekers reported examining the credibility of information based on its use of old English or the "scientific mood" provided by the information source (Hilligoss & Rieh, 2008).

Overall, the theoretical frameworks reviewed in this section posit that the users have unique approaches to evaluating information trustworthiness, which involve analyzing trustworthiness cues and heuristics. Against this backdrop, this research aims to categorize different types of Facebook user groups based on their evaluation of online information trustworthiness.

Heuristics of online information trustworthiness on Facebook

We reviewed the extant literature to identify the trustworthiness heuristics and loosely classified these heuristics into three themes: (1) the content of online information, (2) the original sources of information, and (3) the Facebook sharers or aggregators who disseminate the information from its original source. To improve readability, the identified trustworthy heuristics are summarized in table 7 (see Appendix), and their descriptions are provided in the below sections.

The content of online information

The trustworthiness of online information relates to the individuals' assessment of whether the information's content follows their perceptions of norms, expectations, and conventions (Choi & Stvilia, 2015). According to these researchers, content-related factors are categorized into intrinsic quality, interactions between the content and the readers' prior belief, and reinforcement of content's expertise. The intrinsic quality of information refers to the persuasive power of the arguments which are embedded in the content. Such quality is the extent to which readers consider all information and arguments as persuasive in defending their positions (Choi & Stvilia, 2015). For example, information is perceived as high quality when it meets the readers' expectations about its timeliness, completeness, depth of reported story, accuracy, usefulness, and relevance. Timeliness refers to the currency of reported stories (Teng et al., 2014). Completeness is the breadth and scope which the information covers, and depth of the reported story refers to the detailed analysis provided in the stories (Nurse et al., 2011). Accuracy is the extent to which the presented information has a high level of correctness without conflicting information (Choi & Stvilia, 2015). Relevance means the information provided is relevant to the reader, which is highly connected with the audience's interests. Usefulness is the extent to which readers accept that online information would enhance their online activities (Teng et al., 2014). The topic of information also influences users' decisions regarding trusting information, especially when it exhibits the topic-dependence of the content (Nurse et al., 2011).

The content is deemed trustworthy when it demonstrates novelty and competence (Metzger & Flanagin, 2013). Message valence is found to affect individuals' responses, and there are inconsistent findings of whether positive or negative messages have a stronger impact on those responses (Kusumasondjaja et al., 2012). Similarly, scholars highlighted objectivity (i.e., the information is unbiased and has non-persuasive intent), clarity (i.e., the information is clear and easy to understand), variety (i.e., providing multi-faceted stories and covering multiple perspectives) as important characteristics of a trustworthy content (Chung et al., 2012; Nurse et al., 2011). Taken together, these characteristics of trustworthy contents are closely associated with the ELM's central route (Jessen & Jørgensen, 2012), in which users draw on critical considerations of arguments and their relevance to the issues before forming an attitude towards the arguments (Sher & Lee, 2009).

Personal factors also play an important role in evaluating information trustworthiness. As people tend to rely on their existing beliefs to interpret the message's impact, their prior knowledge concerning the content is influential to the judgment of credibility (Slater & Rouner, 1996). Drawing on the notion of selective distortion, contents that are congruent with people's beliefs would influence attention and interpretation (Messing & Westwood, 2014). Choi and Stvilia (2015) suggested that familiarity with a given topic could influence the assessment of web credibility. In other words, users tend to trust stories that are interesting or important to them (Messing & Westwood, 2014).

The types of news (i.e., local/national, or international news) affect news consumption behavior (Hermida et al., 2012). Likewise, people assess the trustworthiness of online information by examining features of the content such as graphs, whether the content is shared from another source (i.e., not written by the person posting the content), the tone of writing (e.g., use of slangs, icons, marketing language) (Chung et al., 2012; Hermida et al., 2012; Jessen & Jørgensen, 2012). People tend to perceive the contents as worth reading when they see a large number of people react to the content. By receiving a large number of reactions, likes, shares, and comments, the content owner facilitates two-way communication and mechanism for public feedback, which in turn increase readers' perceptions of fairness, credibility, and transparency of the content (Li et al., 2010; Hayes & Carr, 2015). Furthermore, to utilize the widespread nature of social media, the number of interactions on sharer's post should also be taken into considerations. Social media posts that have many "likes" or

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DOI: 10.17705/1pais.13103

"reactions" also positively associated with users' perceptions of content trustworthiness (Li et al., 2010). The level of consistency regarding approval or disapproval between the sharer's post and the comments it receives was also found to affect the readers' assessment of credibility (Hayes & Carr, 2015).

The original sources of online information

Previous studies have identified several attributes of an information source as antecedents for users' perceived trustworthiness of online information, which include source familiarity, appearance, and expertise (Chung et al., 2012; Metzger & Flanagin, 2013; Teng et al., 2014).

Source familiarity is one of the influential factors that is exposed to the audience (Chung et al., 2012). For example, if individuals recognize that they have known the source before, they are more likely to trust that source (Metzger & Flanagin, 2013; Nurse et al., 2011). Similarly, when information seekers identify that the source is relevant to their social groups, they will perceive the source as having a clear identity, thus trusting the information (Metzger & Flanagin, 2013). Besides, the source's popularity and reputation would also lead to positive attitudes towards the produced news, which in turn, increases the likelihood of perceived trustworthiness (Nurse et al., 2014). Spence et al. (2013) suggested that if the source is affiliated with prestigious universities, or be attached with the seal of approvals from well-known companies i.e., indicating the source's credible affiliations, audiences would trust the content more.

Other peripheral cues of the source would relate to its physical attributes and appearance. Metzger and Flanagin (2013), for example, found that readers' main consideration in credibility assessment is the visual design elements of the source. This is because online users do not often have much time for evaluating the site in detail, they are likely to assess only the visual elements (Metzger & Flanagin, 2013). Likewise, if the source has many advertisements, these advertisements could be perceived as intrusive and annoying, which leads to the low perceived credibility of news (Zha & Wu, 2014). Source's functionality, which refers to the functions that affect users' experience is another heuristic (Chung et al., 2012). For example, readers would see the source to be more credible if it is free of bugs and errors, includes search and share functions, offers more than one language, or has high loading speed (Chung et al., 2012).

Source expertise refers to the professional knowledge that the communicator has about products/services (Chung et al., 2012; Teng et al., 2014). Such expertness could be observed through the source's collective expertness itself (i.e., the professional knowledge that the communicator has about products/services), the source's editorial process, source's specificity on a topic (i.e., the source that does not cover a broad range of topics), and source's authority and officiality (i.e., who authored the information, what the author's credentials and qualifications are) (Chung et al., 2012; Kusumasondjaja et al., 2012; Metzger & Flanagin, 2013; Nurse et al., 2011; Teng et al., 2014). Other attributes that show professionalism, such as the source's integrity – the degree of honesty, sincerity, willingness to make the best judgment of the source – have also been found to help people determine the trustworthiness of online information (Dickinger, 2011; Nurse et al., 2014). Additionally, affective dimensions are also persuasive intent heuristic. For example, users often try to detect ulterior motives that might underlie information that they find online, e.g., the source's motive is commercial or religious, and use this as a primary cue to determine credibility (Metzger & Flanagin, 2013). The recognition of source origin (i.e., local/national, or international news) also affects news consumption behavior (Hermida et al., 2012).

The Facebook sharers or aggregators

To capture the full characteristics of the social media sphere, we explore Facebook sharers or aggregators who disseminate the information from its original source as a distinct dimension.

This dimension is developed based on the tendency that people normally trust online sources that are either recommended by known others, or those that come from unknown persons in the form of aggregated testimonials, reviews, or ratings (Morris et al., 2012; Turcotte et al., 2015). Such trust is derived from three main categories of heuristics, which are the sharer's familiarity, the sharer's expertness, and the congruence between users and sharer (Morris et al., 2012).

Sharers or aggregators can be considered as the sources of information, therefore, some heuristics relate to them are similar to the heuristics of the original sources defined in the prior section. For example, Morris et al. (2012) identified that users tend to rely on their recognition of sharer's name (e.g., known by the users before) when making credibility assessments. In the same vein, the sharer's popularity and reputation, sharer's affiliations, and sharer's identification are also important factors while evaluating the trustworthiness of the content (Morris et al., 2012; Messing & Westwood, 2014; Turcotte et al., 2015). According to Metzger and Flanagin (2013), social endorsement is a powerful heuristic, in which a great number of endorsements from others regarding an unfamiliar sharer can reduce people's initial skepticism about the sharer. In that sense, a sharer who has many followers or a verification seal could be seen as a trustworthy source (Messing & Westwood, 2014).

Expertness and intrinsic quality of the sharer is another dimension to assess trustworthiness. On one hand, as similar to the source-related heuristics, expertise and integrity are also found as meaningful heuristics (Morris et al., 2012; Turcotte et al., 2015). On the other hand, the activities of sharers are also essential. For example, if a sharer tends to respond to or debate with commenters i.e., indicating the sharer's activity, he or she would be perceived as more trustworthy (Chung et al., 2012). In social media practice, interactivity facilitates the active consumption of information, which encourages two-way communication between sharers and users. Similarly, the sharer's frequency of sharing information also indicates the responsiveness and currency of that sharer, thus affecting the credibility assessment of the post (Morris et al., 2012). Sharer who has a similar shared post that shows their expertise in that field, and sharers who exhibit that they want to do good, which indicates sharer's benevolence, would have a direct positive effect on overall trust (Park et al., 2014; Dickinger, 2011).

Another factor impacting the sharer-related perception of trustworthy content is the interpersonal relationship strength between that sharer and other users. While strong ties reflect a close relationship such as friends or family, weak ties refer to the interactions with online acquaintances and strangers. These ties allow information dissemination among different groups, and weak ties especially play a crucial role in facilitating information seeking among acquaintances (Jessen & Jørgensen, 2012). In other words, the sharer's relationship with users has an impact on users' trust (Dickinger, 2011). Other studies asserted that demographical similarity and physical proximity can influence tie strength (Spence et al., 2013). As such, users are more likely to trust the sharer's content when they see the congruence in demographics between the sharer and users' profile information (Christofides et al., 2009; Stieglitz & Dang-Xuan, 2013).

Methodology

We employ Q-methodology to extract insights from the participants and to explore the heuristics of trustworthiness that young Vietnamese users use to evaluate the trustworthiness of online information on Facebook. Q-methodology allows the quantitative analysis of rich qualitative data about the respondents' subjective opinions with factor analysis methods (Watts & Stenner, 2012). This methodology does not require a large sample size, despite its utilization of the quantitative factor analysis method to categorize the participants based on their thought patterns. Q-methodology was used to explore the determinants of the perceived

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DOI: 10.17705/1pais.13103

authenticity of photographs on social media (Lobinger & Brantner, 2015), and classify Facebook users on their perception of the platform (Orchard et al., 2015). Researchers also used Q-methodology to find different users' viewpoints on social networking sites, namely impression management, lurker, social media enjoyer, relationship focus, and social value orientation (Kim, 2018).

We recruited fifty-five (55) participants from Facebook by posting a public advertisement for three months. The average age of our sample is 28 years old, which is aligned with the focus on young Facebook users. The gender ratio is quite balanced, with 53 per cent of participants are female and 47 per cent are male. We asked the participants to rank the 50 identified heuristics (see table 7 in Appendix) based on their importance for evaluating the trustworthiness of online news, with the scale ranges from -6 to +6 (i.e., the least important to the most important heuristic). First, they classified all items into three collections of heuristics: the important ones, the unimportant ones, and the indifferent ones. Second, they proceeded to sort the items in each collection. In particular, the participants would put the single most important heuristic in one +6 position, the next two important heuristics in two +5 positions, and so on. The same task was performed for the unimportant collection. The indifferent heuristics were sorted and put in the remaining open positions in the distribution. As we restricted the participants to place the items in available cells following the distribution, we recovered their subjective assessment of the item's importance.

The qmethod statistical package in R was used to perform the Q factor analysis (Zabala, 2014). We implemented different combinations of rotation methods (i.e., varimax, oblimin, and cluster) and correlation methods (i.e., Pearson, Spearman, and Kendall correlations) to evaluate a series of clustering solutions ranging from two to six user groups. The appropriate clustering solution was selected based on three main quantitative criteria: (1) the total explained variance of the solutions, (2) the correlations between the clusters, and (3) the number of respondents per cluster which had to be more than one participant. We examined the profiles of the clusters based on their collective demographics, solutions that produced overlapping profiles or unimportant ones were discarded. The principal component analysis with Spearman's correlation and cluster rotation method produced four groups of users that had a total explained variance of 31.4 percent. All groups achieve high composite reliability values (>0.95) (see table 1).

Table 1. Q-factor solution

Group	# of members	Eigenvalues	Explained Variance	Composite Reliability
1	23	7.4	13.4	0.99
2	12	4.5	8.2	0.98
3	5	2.9	5.3	0.95
4	5	2.5	4.5	0.95

Findings

We reviewed the extant literature and loosely classified the heuristics that influenced the users' perceived trustworthiness of online news on SNS into three themes: 1) the original sources of the news, 2) the content of the news, and 3) the Facebook sharers or aggregators who disseminate the news from its original source. Fifty (50) heuristics of trustworthiness were identified from the three categories discussed in the literature review section (see table 7 in appendix).

Our data analysis categorized 45 out of 55 participants into four groups, with 23, 12, 5 and 5 participants per group, respectively. The factor analysis indicated that the other 10 participants did not belong to either of these four groups. While groups 1 and 3 show more a balanced gender ratio, groups 2 and 4 each has a dominant gender. The members in groups 1 and 2 are older than others. The z-scores demonstrate the similarities of the groups: groups 1 and 2 are moderately correlated, and group 4 is the most unique among all groups. Consistent with our expectations, the majority of members from all groups get information from multiple sources, both local and international news (see table 2).

Table 2. Types and locations of news consumed by group members

Types of News						
Group	**# Members**	**Products and services**	**Science and education**	**Entertainment**	**Politics**	**Daily news**
1	23	16 (70%)	5 (22%)	20 (87%)	16 (70%)	13 (57%)
2	12	11 (92%)	8 (67%)	8 (67%)	8 (67%)	2 (17%)
3	5	4 (80%)	2 (40%)	4 (80%)	3 (60%)	4 (80%)
4	5	3 (60%)	1 (20%)	2 (40%)	3 (60%)	1 (20%)

Location of News					
Group	**# Members**	**Mostly local news**	**Both local and international news**	**Mostly international news**	**International news only**
1	23	2 (9%)	16 (70%)	4 (17%)	1 (4%)
2	12	4 (33%)	7 (58%)	1 (8%)	0 (0%)
3	5	1 (20%)	3 (60%)	1 (20%)	0 (0%)
4	5	1 (20%)	3 (60%)	1 (20%)	0 (0%)

Based on the user groups' approaches to evaluating the trustworthiness of online news on Facebook, we named the groups: (1) the *balanced analyst*, (2) the *critical analyst*, (3) the *source analyst*, and (4) the *social* network *analyst*. Figure 1 provides an overview of all groups, with the horizontal bars and their lengths indicate the priorities assigned by each group to the specific sets of heuristics of online news trustworthiness.

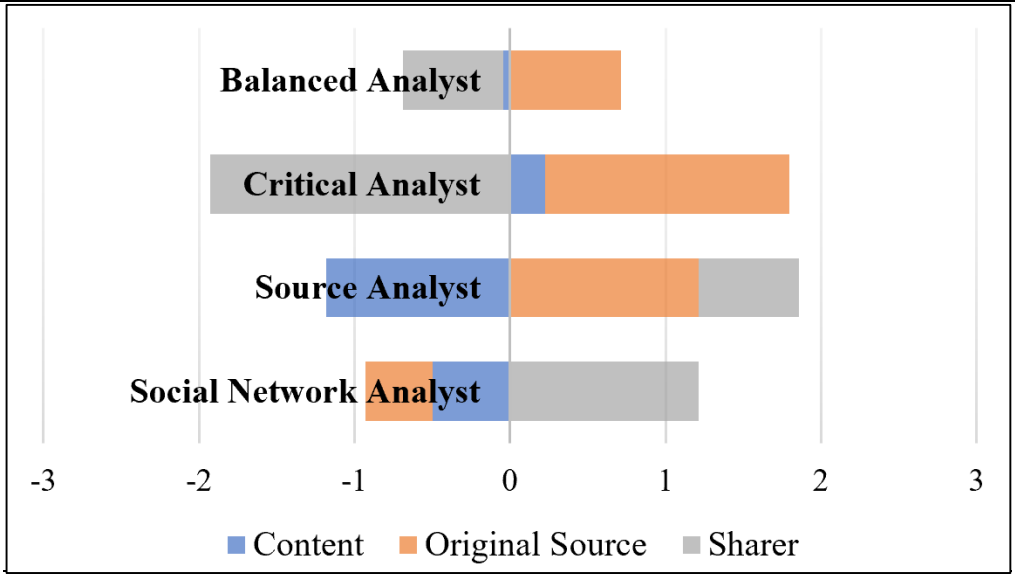

Figure 1. Summary of the four user groups

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DOI: 10.17705/1pais.13103

The score that denotes the length of the bar is calculated by summing the ranks of the heuristics that belong to a category, i.e., the news content, the original source, and the sharer, and then divide this summation by the total number of items within that category. A positive score indicates that the category has many heuristics which were ranked as important, i.e., positive ranks, while a negative score implies a category that has many items ranked as unimportant, i.e., negative ranks, for trustworthiness evaluation by the users. In summary, the balanced analysts can be distinguished by their sole focus on source-related heuristics. While both the balanced analyst and the critical analyst put less emphasis on analyzing the sharers, critical analysts take more extreme evaluation. Besides, the source analysts consider the source and sharer-related heuristics as important. The social network analysts completely ignore the characteristics of the original sources while solely focusing on sharer-related heuristics.

Balanced Analyst

The balanced analysts holistically examine the content of the shared news, its original sources, and the sharers and their shared posts on Facebook. After they assess the shared content based on their knowledge, they start to examine features related to the original source such as the source's authority and source's integrity. The features of the shared content are also important, which consist of the completeness, the variety and the objectivity of such information. On the other hand, though the sharer's expertise is important in evaluating the credibility of shared news on Facebook, balanced analysts often disregard the popularity or reputation of the sharers, and the number of followers. Characteristics of the Facebook post are also unimportant to these users as they tend not to care about the number of likes, comments on the post, nor the advertisement on the website. In sum, the users' own knowledge, the expertise of the original sources, and the expertise of the sharers contribute more to trustworthiness than their appearance and reputation. This group neither prioritizes nor neglects too much the heuristics that belong to the original source and the sharer.

Table 3. Characterizing heuristics of the balanced analyst

Ranking of important heuristics for evaluating the trustworthiness of online news			
18. Your knowledge of the shared content	+6	*20. Sharer's post has many "likes" or "reactions"*	–6
35. Source's authority and officiality	+5	*31. Source has many advertisements*	–5
39. Sharer's expertise	+5	*44. Sharer has many followers or a verification seal*	–5
2. Completeness of information	+4	38. Sharer's popularity/reputation	–4
10. Variety (multifaceted stories)	+4	45. Congruence in demographics between the sharer and your profile information (e.g., location, gender)	–4
27. Source's integrity (e.g., honesty, sincerity, willing to make the best judgment)	+4	21. Post has many comments	–4
Notes: *Italic texts* represent the distinguishing heuristics ranked by the members of Group 1. In other words, the differences between these criteria's rankings provided by Group 1 and by other groups achieved statistical significance.			

Such an assessment approach of the balanced analyst could be attributed to this group's preference of reading entertainment news (87%). Analyzing the trustworthiness of entertainment news would require examining the richness and depth of the reported stories, rather than the logical arguments and facts. Therefore, while subjective knowledge helps these users to quickly ascertain the trustworthiness of the information; heuristics such as the

source's authority and officiality, complete and multifaceted stories, and the integrity of the sources are perceived to contribute to credible entertainment news.

Critical Analyst

The critical analysts focus more on content-related heuristics such as objectivity, accuracy and clarity when evaluating online information trustworthiness. Online information is credible when it provides multifaceted stories, the source's collective expertise, and the use of graphs in the shared content. On the other hand, they tend to ignore the interpersonal relationship between them and the sharers of online information on Facebook. They also disregard characteristics of the Facebook posts containing the online information, such as the number of likes, comments, shares, and the consistency of the news posted by the sharers on their personal Facebook pages.

Table 4. Characterizing heuristics of the critical analyst

Ranking of important heuristics for evaluating the trustworthiness of online news			
5. Objectivity (unbiased and have non-persuasive intent)	+6	*49. Sharer's relationship with you*	–6
3. Accuracy (free-of-error, no conflicting information)	+5	*37. Sharer's name recognition (i.e., known to you before)*	–5
8. Clarity of information (clear and easy to understand)	+5	21. Post has many comments	–5
10. Variety (multifaceted stories)	+4	47. Sharer has similar shared posts	–4
25. Source's collective expertise	+4	38. Sharer's popularity and reputation	–4
17. Content has graphs	+4	*20. Sharer's post has many "likes" or "reactions"*	–4

Notes: *Italic texts* represent the distinguishing heuristics ranked by the members of Group 2. In other words, the differences between these criteria's rankings provided by Group 2 and by other groups achieved statistical significance.

These critical analysts pay more attention to the heuristics that belong to the news sources but not those of the sharer. They mostly read news about science and education (67 percent) and are least likely to read news about daily events (17 percent). Thus, the platform or medium via which the news is delivered does not affect its trustworthiness if the original sources are perceived as credible.

Source Analyst

The source analysts quickly analyze trustworthiness by focusing on the features of the original sources such as their reputation, editorial process, and recognition by themselves, rather than by examining the information content in detail as done by the balanced analysts and the critical analysts. The source analysts tend to disregard the characteristics of the content, such as its congruence with their beliefs, usefulness, topic, valence, and relevance of information. This is the only group that disregards content-related heuristics, as represented by the blue bar on the left of zero in figure 1.

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DOI: 10.17705/1pais.13103

Table 5. Characterizing heuristics of the source analyst			
Ranking of important heuristics for evaluating the trustworthiness of online news			
40. Sharer's integrity (e.g., honesty, sincerity, willing to make the best judgment)	+6	*11. Content is congruent with the reader's beliefs*	–6
24. Source's popularity and reputation	+5	6. Usefulness of information	–5
26. Source's editorial process	+5	*14. Topic of information*	–5
23. Source's name recognition (i.e., known by you before)	+4	*41. Sharer's benevolence (i.e., wants to do good things, well-meaning)*	–4
44. Sharer has many followers or a verification seal	+4	*12. Valence of information (positive or negative orientation)*	–4
22. Post has many "shares"	+4	13. Relevance of information	–4
Notes: *Italic texts* represent the distinguishing heuristics ranked by the members of Group 3. In other words, the differences between these criteria's rankings provided by Group 3 and by other groups achieved statistical significance.			

Although recognition of the original sources matters to these users, they see their interpersonal relationships with the sharer as much less critical. They associate the perceived honesty and sincerity of the sharer as a person with the number of sharer's followers, as well as the number of times their posts being shared by other users. Hence, their ranking pattern suggests that they favor 'the wisdom of the crowds'. As most of them consume daily news, their approach to evaluating online trustworthiness based on the crowds' opinions is efficient. They try to determine whether the source or sharer is well-known by the public and whether the online news posted by these sources is widely shared by the audiences.

Social Network Analyst

The social network analysts assess the trustworthiness of online information mainly via the sharers' characteristics such as their popularity, reputation, interactions with other Facebook users, and whether the sharers are personally known by the social network analysts. These members do not examine the congruence between the sharer's demographical profile and their shared content, or the consistency between the sharer's post with the comments or reactions provided to the post. Moreover, they also tend to assess the sharer's interactivity with other Facebook users who comment on the post. Compared to the number of likes of the post, it is more important to the social network analysts that the sharer actively responds or debates with the commenters than having them agree with the shared post.

Table 6. Characterizing heuristics of the social network analyst			
Ranking of important heuristics for evaluating the trustworthiness of online news			
38. Sharer's popularity and reputation	+6	*50. Congruence between sharer's profile (e.g., location/ethnic identity) and the shared content*	–6
48. Sharer's interactivity (responds to or debates with commenters)	+5	*19. Sharer's post is consistent with comments or "reactions" (e.g., approve or disapprove)*	–5
15. Types of news (local-national/international/both)	+5	*8. Clarity of information (clear and easy to understand)*	–5
18. Your knowledge of the shared content	+4	*3. Accuracy (free-of-error, no conflicting information)*	–4
39. Sharer's expertise	+4	*28. Source's design (readability and attractiveness)*	–4
37. Sharer's name recognition (i.e., known by you before)	+4	9. Novelty of information	–4
Notes: *Italic texts* represent the distinguishing heuristics ranked by the members of Group 4. In other words, the differences between these criteria's rankings provided by Group 4 and by other groups achieved statistical significance.			

This group mostly ignores the characteristics of the original sources. While they consider the types of news in their evaluation, they put less emphasis on the location of the news sources. In addition, although this group perceives the completeness and valence as important, the news' objectivity, relevance, accuracy, novelty, and clarity are disregarded. Similar to the balanced analysts, the social network analysts rely much on their knowledge when evaluating the news. The prioritized heuristics appear quite consistent with the types of news that most of these social network analysts consume, which are news about politics, products, and services. These types of news would require the users to rely on their knowledge that guides personal judgments while evaluating the credibility and intention of the Facebook sharers rather than original sources such as newspapers.

Figure 2 provides a summary of the four user groups and their different approaches to evaluating the trustworthiness of online information on Facebook, which has been discussed so far.

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DOI: 10.17705/1pais.13103

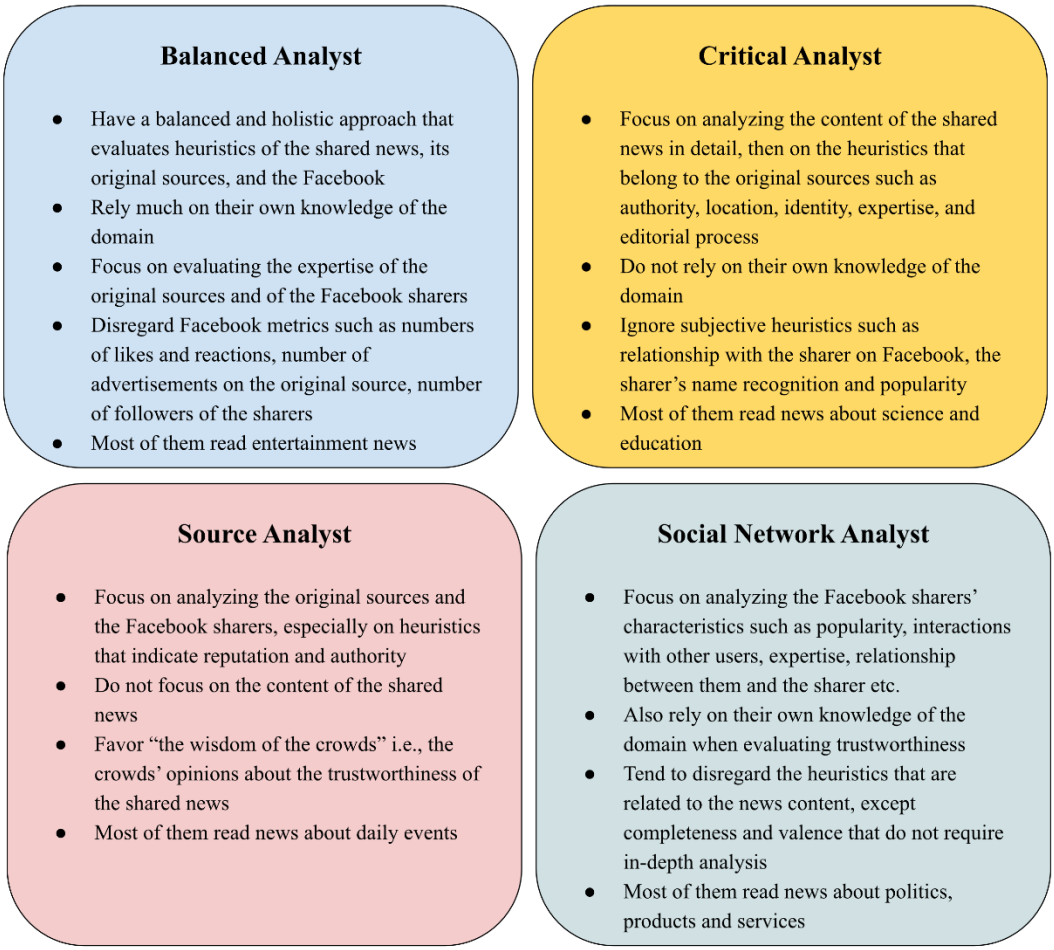

Figure 2. The four user groups and their approaches to evaluating online news trustworthiness

Discussion

In this research, we employed Q-methodology to identify four distinct groups of young Facebook users based on their different approaches to evaluating online information trustworthiness, thus answered the first research question. In doing so, we examined how these groups of users ranked the trustworthiness heuristics differently, thus answered the second and third research questions about determining the important sets of heuristics for evaluating online information trustworthiness as perceived by young Facebook users.

Contributions to research

Our study suggests that young Facebook users can be categorized based on their different approaches and priorities in evaluating online information trustworthiness. Specifically, these users could be categorized as (1) balanced analyst, (2) critical analyst, (3) source analyst, and (4) social network analyst. To our knowledge, this is the first attempt to segment Facebook users based on the specific behavior of evaluating online information trustworthiness.

Our segmentation, which resulted in four distinct user groups based on their approaches to evaluating trustworthy information on Facebook, provided evidence supporting the common tenet of information processing theories that the users relied on heuristics or peripheral cues to evaluate online information trustworthiness (Fogg, 2003; Hilligoss & Rieh, 2008; Petty &

Cacioppo, 1986). We were able to determine these heuristics through the data collection and analysis procedures of the Q-methodology, which focused on the users' subjective ways of ranking these heuristics based on their importance for the evaluation of trustworthiness (Watts & Stenner, 2012). Moreover, we contributed additional insights to information processing literature and theories by identifying the specific approaches of young Facebook users to evaluating online information trustworthiness, which considered and prioritized heuristics belonging to three themes i.e., the information content, original sources, and Facebook sharers or aggregators.

A closer examination of the four user groups' priorities assigned differently to the heuristics revealed further contributions to research. First, we found that the heuristics related to the Facebook sharers or aggregators were regarded by the source analyst and social network analyst to be important trustworthiness cues. This finding is in line with social identity theory's (SIT) explanation for how the users evaluate information trustworthiness under the influence of social groups (Hogg & Reid, 2006). The users who belong to the source analyst and social network analyst may see themselves as part of an online social group on Facebook, in which their influential sharers also belong to. This perception of membership makes them evaluate favorably the online information and thus they are more likely to trust it (Hogg & Reid, 2006). This finding is also consistent with those of prior studies which suggest that by trusting and reacting to a Facebook post, people demonstrate their belongingness as group members (Christofides et al., 2009; Lin & Xu, 2017; Stieglitz & Dang-Xuan, 2013).

Our findings strengthen the important roles of information characteristics and sources in driving people's perception of reliable and trustworthy online information (Choi & Stvilia, 2015; Filieri, 2016). We also found that the source of news played an important role in influencing perceived trustworthiness. This finding is in line with those of prior studies, which highlighted that the credibility of the sources improved the readers' perception of trustworthiness (Chung et al., 2012; Metzger & Flanagin, 2013; Teng et al., 2014). Consistent with prior studies, this study also suggests the impact of gender and age on social media-related behaviors (Putzke et al., 2014; Zheng et al., 2016). Most of the critical analyst's members were men, whereas there were more female members as social network analysts. These results suggest that female users would prefer taking a more intuitive approach to evaluate online information trustworthiness, while male users tended to focus on analyzing content-related heuristics. In terms of age, the balanced analyst and the critical analyst groups are relatively older, and they used a more careful approach to evaluating online information trustworthiness. Younger members in the source analyst and the social network analysis groups employed a more intuitive approach, who evaluated the trustworthiness heuristics based on other opinions, the reputation of the sources or the Facebook sharers, and the number of likes and comments. Future research should further investigate the impacts of users' demographics on the evaluation of online information trustworthiness.

Among the 50 heuristics that were ranked by the four user groups, our statistical analysis showed that 10 heuristics were ranked differently across the groups. These heuristics are: (1) objectivity of the content, (2) topics, (3) types of news (local/national/international/both), (4) the user's knowledge of the shared content, (5) congruence between the shared post with other users' reactions, (6) the number of likes/reactions given to the post, (7) source's name recognition, (8) source's editorial process, (9) source's authority and officiality, and (10) sharer having a verification seal or many followers. This finding offers two theoretical contributions. First, it suggests that empirical studies, which examine the impacts of these heuristics on the user's evaluation of information trustworthiness, would need to consider that these impacts might be different across samples of respondents. Second, we invite future research to examine these heuristics' effectiveness in terms of segmenting Facebook users, especially in a larger and more general population. The potential findings would help to identify the critical heuristics that inform more effective designs of digital literacy interventions and contribute to theoretical frameworks about social media users' information processing behaviors.

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DOI: 10.17705/1pais.13103

Contributions to practice

Our findings contribute to the development of interventions to improve digital literacy, particularly the skills to recognize reliable information from misleading one. In the age of fake news and alternative facts, being digitally literate and able to accurately evaluate online content is considered necessary for Internet users to avoid being manipulated by ill-intentioned information providers (Duong et al., 2020; Johnson & St. John, 2020; McGrew et al., 2017; Zhang & Gupta, 2018). Given that Internet users with limited cognitive capacity often rely on a set of heuristics to evaluate online information trustworthiness, digital literacy interventions should focus on the heuristics that are prioritized by different user groups as identified in our study.

We recommend designing digital literacy training programs that focus on helping social media users recognize and evaluate the heuristics related to the original sources of online information, as these heuristics were prioritized by three out of four user groups when evaluating online information trustworthiness. For example, as Facebook implemented the feature that displays information about the source of the shared news (if available), the digital literacy program should raise awareness about such features and other characteristics of the original sources that indicate their trustworthiness.

This study also provides segments of young Facebook users for marketing practitioners to identify their audience and the factors that trigger their trust. Specifically, marketers could adjust the ways of delivering information to ensure the level of trustworthiness perceived by social media users. For example, when curating content about products and services for users in the social network analyst group, marketers should focus on choosing the strategic sharers and influencers who could endorse such content. On the other hand, if marketers target users in the critical analyst group, they should prioritize the characteristics of the content such as objectivity or clarity of information.

To our surprise, the findings suggested that content-related heuristics were less important for the users' evaluation of online information trustworthiness as compared to the other heuristics. A possible explanation for this finding could be that examining the content may cost more time than looking at more visible cues of the sources or sharers, such as name recognition or the number of followers. The examination of the content would be deemed as impractical by the users, especially when they would quickly scan through several posts at a time on their Facebook newsfeeds. Combined with the findings of the users' focus on evaluating the source-related heuristics, these insights inform the ways to help information providers and marketers to tailor their messages to gain the users' trust. Information providers and marketers should focus on creating social media pages or profiles that promote the trustworthiness heuristics to deliver a positive first impression to the users before they start to examine the information content more closely.

Conclusion

As people increasingly rely on social media as their main source of information, the trustworthiness of the user-generated content becomes a pressing problem for users, practitioners, and researchers alike. We examined how different groups of young users came to trust online information on Facebook. Using the Q-methodology, we identified four groups of users–the balance analyst, critical analyst, source analyst, and social network analyst–based on their different priorities that were assigned to the heuristics when evaluating online information trustworthiness on Facebook.

Our research has some limitations. First, the identified heuristics of online information trustworthiness would be most applicable to samples of Facebook users whose characteristics

are similar to ours. Besides demographics such as genders and age, the users' different cultures may affect their approaches to evaluating online information trustworthiness. It would be worth exploring the effects of cultural dimensions, such as those outlined in Hofstede's framework (Hofstede, 2001), on these approaches. For instance, Vietnamese culture has high collectivism, low masculinity, and high uncertainty avoidance, which implies the general orientation that favors the group's opinions and norms (Hofstede, 2001). Second, our small sample size prevents the research findings from being generalized to the larger context. Future studies, especially those employing quantitative approaches, are invited to validate our study's four different groups of Facebook users in the general population. Moreover, it would be helpful to further explore the different approaches to evaluating online information trustworthiness, which are affected by demographical and cultural factors.

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DOI: 10.17705/1pais.13103

Acknowledgments

We are grateful for the support provided by our former Research Assistant Ms. Diem-Trang Vo (currently Ph.D. Candidate in the School of Business & Management at RMIT Vietnam).

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DOI: 10.17705/1pais.13103

Appendix

Table 7. Heuristics of online news' trustworthiness

	ID	Description	G1	G2	G3	G4	References
Content of information	1	Timeliness of information	1	0	–1*	0	Teng et al., 2014
	2	Completeness of information	4*	2	–3*	3	Teng et al., 2014; Nurse et al., 2011
	3	Accuracy (free-of-error, no conflicting information)	2	5*	3	–4*	Choi and Stvilia, 2015; Teng et al., 2014
	4	Depth of reported story	0	2*	0	–1*	Nurse et al., 2011; Teng et al., 2014
	5	Objectivity (unbiased and have non-persuasive intent)	3*	6*	1*	–3*	Chung et al., 2012
	6	Usefulness of information	–1*	–3	–5	1*	Nurse et al., 2011; Teng et al., 2014
	7	Tone of writing (e.g., slang, icons, marketing language, low English)	0+	0+	–1+	0+	Choi and Stvilia, 2015
	8	Clarity of information (clear and easy to understand)	1	5*	0	–5*	Nurse et al., 2011
	9	Novelty of information	–1	–3	–2	–4	Metzger and Flanagin, 2013
	10	Variety (multifaceted stories)	4	4	–3*	1*	Chung et al., 2012
	11	Content is congruent with reader's beliefs	0*	–2	–6*	–2	Messing and Westwood, 2014
	12	Valence of information (positive or negative orientation)	0	0	–4*	3*	Kusumasondjaja et al., 2012
	13	Relevance of information	0	0	–4	–3	Choi and Stvilia, 2015; Nurse et al., 2011; Teng et al., 2014
	14	Topic of information	–2*	–3*	–5*	1*	Messing and Westwood, 2014
	15	Types of news (local-national/international/both)	–3*	2*	–1*	5*	Hermida et al., 2012
	16	Is a shared post/news (not originally written by the sharer)	–3	0	–3	0	Jessen and Jorgensen, 2012
	17	Content have graphs	3	4	0	0	Chung et al., 2012
	18	Your knowledge of the shared content	6*	–1*	1*	4*	Slater and Rouner, 1996
	19	Sharer's post is consistent with comments or "reactions" (e.g., approve or disapprove)	–3*	–2*	2*	–5*	Hayes and Carr, 2015
	20	Sharer's post has many "likes" or "reactions"	–6*	–4*	–1	–2	Li et al., 2010
	21	Post has many comments	–4	–5	2*	0*	Li et al., 2010
	22	Post has many "shares"	–2	–2	4*	0*	New
Original sources of information	23	Source's name recognition (i.e., known by you before)	2*	0*	4*	–3*	Metzger and Flanagin, 2013; Nurse et al., 2011
	24	Source's popularity and reputation	1	3*	5*	–1	Nurse et al., 2014
	25	Source's collective expertness	3	4	2	1	Chung et al., 2012; Teng et al., 2014
	26	Source's editorial process	1*	2*	5*	–1*	Kusumasondjaja et al. 2012
	27	Source's integrity (e.g., honesty, sincerity, willing to make the best judgment)	4*	2*	0	–1	Nurse et al., 2014; Dickinger, 2011
	28	Source's design (readability and attractiveness)	0	0	–2*	–4*	Metzger and Flanagin, 2013

	29	Source's motive (commercial/religious)	–1	1*	–2	3*	Metzger and Flanagin, 2013
	30	Source's specificity on a topic (i.e., not cover a broad range of topics)	0+	–1+	0+	–2+	Nurse et al., 2011
	31	Source has many advertisements	–5*	0	–2	–2	Zha and Wu, 2014
	32	Source's clear identity and objective	1	3*	0*	2	Metzger and Flanagin, 2013
	33	Source's functionality (e.g., no bugs, has search and share functions, offer more than one language, loading speed)	–2*	1	2	0	Chung et al. 2012
	34	Source's affiliations (with prestigious universities, seal of approvals from well-known companies)	2	1	3	2	Spence et al., 2013
	35	Source's authority and officiality	5*	3*	1*	–2*	Metzger and Flanagin, 2013
	36	Local or international source	–1*	3	1	2	Hermida et al., 2012
Facebook sharers and aggregators	37	Sharer's name recognition (i.e., known by you before)	–2	–5*	–1	4*	Morris et al., 2012
	38	Sharer's popularity and reputation	–4	–4	0*	6*	Messing and Westwood, 2014; Morris et al., 2012
	39	Sharer's expertise	5	–1*	1*	4	Turcotte et al., 2015; Morris et al., 2012
	40	Sharer's integrity (e.g., honesty, sincerity, willing to make the best judgment)	3*	1	6*	1	Turcotte et al., 2015
	41	Sharer's benevolence (i.e., wants to do good things, well-meaning)	–1*	1	–4*	3	Dickinger, 2011
	42	Sharer's identification (e.g., using real avatar and name)	2	1	3	–1	Turcotte et al., 2015; Morris et al., 2012
	43	Sharer's affiliations (with prestigious universities or reputed companies)	1	–1*	2	2	Morris et al., 2012
	44	Sharer has many followers or a verification seal	–5*	–1*	4*	–1*	Messing and Westwood, 2012
	45	Congruence in demographics between the sharer and your profile information (e.g., location, gender)	–4	–2	–1*	–3	Christofides et al., 2009; Stieglitz and Dang-Xuan, 2013
	46	Sharer's frequency of sharing information	–2	–3	0	2	Morris et al., 2012
	47	Sharer has similar shared posts	–1	–4	–2	0	Park et al., 2014
	48	Sharer's interactivity (responds to or debates with commenters)	–3*	–2*	3	5	Chung et al. 2012
	49	Sharer's relationship with you	2	–6*	–3*	1	Jessen and Jorgensen, 2012
	50	Congruence between sharer's profile (e.g., location/ethnic identity) and the shared content	0	–1	1*	–6*	Spence et al., 2013

Note: asterisk (*) indicates the item can be used to distinguish the group at p-value < 0.05; (+) denotes consensus in ranking among all groups; "G" stands for "group"

https://aisel.aisnet.org/pajais/vol13/iss1/3
DOI: 10.17705/1pais.13103

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https://aisel.aisnet.org/pajais/vol13/iss1/3
DOI: 10.17705/1pais.13103