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## **What Makes a Review Credible? Heuristic and Systematic Factors for the Credibility of Online Reviews**

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# What Makes a Review Credible? Heuristic and Systematic Factors for the Credibility of Online Reviews

*Full Paper*

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## **Abstract**

In the digital transformation era, online reviews have become an important source of information for decisions about purchases. Research shows that online reviews influence users' behaviors and product sales. However, questions remain about how and why users assess the credibility of online reviews for different products/services on different websites. Using semi-structured interviews as a way of understanding how users assess the credibility of online reviews, we propose a comprehensive credibility analysis model for online reviews. The proposed model extends a model we previously proposed; and uses the Heuristic Systematic Model (HSM) as a theoretical lens, which helps us to understand different features that impact the credibility of online reviews. Our findings reveal several factors which impact the credibility of online reviews that have not been identified in the previous literature.

**Keywords:** Online Reviews, Heuristic-systematic Model, Review Credibility, Decision Making

## 1 INTRODUCTION

Web 2.0 has facilitated the proliferation of online reviews, through which people can share product information and their purchasing experiences for goods or services (Cheung and Thadani 2012). Previous works have shown that online reviews can shape users' decision making (Park et al. 2007) and product sales (Costa et al. 2019). Also, online reviews have been found to help increase the revenue of e-commerce platforms significantly (Filiari et al. 2018).

While online reviews have benefits to both customers and vendors, reviews are user-generated, and the information is not always verifiable. Considering that only around 56% of the consumers find online reviews on e-commerce websites as credible (Ansari and Gupta 2019), finding ways of evaluating the credibility of online reviews has become an important problem. The uncertainty about the credibility is due to two reasons: (i) the huge amount of unfiltered information with unverified authors (Cheung et al. 2009), and (ii) the lack of general rules or standards for posting online information (Ghasemaghaei and Hassanein 2015). In addition, research has also explored the consequences of suspicious reviews. For example, Dellarocas et al. (2007) showed suspicious reviews will damage the reputation of businesses. In another article, Lee et al. (2014) studied the effect of manipulation on consumer welfare and explored the impact of competition on firms' manipulation levels.

Thus, finding deceptive behaviour and decreasing the number of fake reviews has attracted the attention of researchers in the past decade. However, a considerable amount of deceptive online reviews are still present today - estimations hold that up to one out of three of all reviews are fake (Munzel 2016), which highlights the importance for online users to use strategies to discern credible reviews from those that are suspicious. However, little is known about how and why users process the credibility of online reviews and make decisions, particularly for different types of products on different websites. Findings from prior studies such as Cheung and Thadani (2012) shows that the content of a review and its author have impacts on the credibility evaluation of online reviews. However, these aspects have not been studied and analysed in depth. Thus, the purpose of our work is to better understand how users judge the credibility of online reviews by conducting user-interviews to get an in-depth understanding of the factors previously identified, namely content, author and receiver. Although there are different definitions for credibility in the related literature, based on Wathen and Burkell (2002), Cheung et al. (2012), and our previous work Abedin et al. (2019), we define credibility as: "believability" or "the characteristic that makes people trust and believe something or someone". An online review which is viewed as credible "is accepted and believed by the receiver and affects their subsequent behavior" (Chaiken 1980; Cheung et al. 2012; Wathen and Burkell 2002).

In our previous work (Abedin et al. 2019), we presented a credibility analysis model for online reviews based on literature analysis and heuristic-systematic model (HSM) as a theoretical lens. This paper extends that model through in-depth interviews with 21 online shoppers who use online reviews to decide on purchases. The underlying question addressed in this paper is: *How do users evaluate the credibility of online reviews for different products and services?* This study contributes significantly to the knowledge of information credibility and especially online reviews in different ways. First, to the best of our knowledge, as one of the first qualitative studies on the credibility of online reviews, this research provides rich descriptions of how people assess the credibility of online reviews, through user interviews. Such descriptions are important for both academic and practitioner as they help understand different features which impact the credibility of online reviews. Second, through a thorough analysis of the information collected from user interviews, we present deeper insights of previously identified factors such as content, author and receiver (through identifying sub-categories related to these). Third, we extend the model we previously proposed, to provide a comprehensive model incorporating the factors identified above.

## 2 RESEARCH BACKGROUND

Prior studies have investigated the credibility of online reviews from different perspectives. Cheung et al. (2012) examined the impact of argument quality, source credibility, review consistency and review sidedness on review credibility, using the elaboration likelihood model (ELM). They found that argument quality was the main influencing factor. In addition, review consistency, review sidedness, and source credibility are positively associated with review credibility. They realized that receiver involvement and expertise moderate the effect of review sidedness on review credibility such that review sidedness has a stronger influence on review credibility when the recipient of a review has a low involvement and a high expertise level. Luo et al. (2015) investigated how readers' sense of

membership in electronic word-of-mouth context moderates the impacts of influencing factors on the credibility evaluation of online reviews. They found that the impact of argument strength, review rating, and review sidedness on review credibility are positively moderated by readers' sense of membership, and the influence of review objectivity on review credibility is negatively moderated by readers' sense of membership. Filieri (2016) used a grounded theory approach to realize how travellers assess the trustworthiness of online reviews. Based on interviews with 38 travellers on TripAdvisor, a theoretical framework was developed to explain perceived review trustworthiness. Ketron (2017) studied the impact of the quality of grammar and mechanics on review credibility through the lens of ELM. Results showed that reviews with high quality of grammar and mechanics perceived more credible, while online reviews with low quality of grammar and mechanics are not as credible. According to this study, quality of grammar and mechanics is more important for online reviews related to experience products and reviews with a shorter length. Chakraborty and Bhat (2018) studied the impact of the source (writer), review quality, review consistency, review sidedness, and receiver on credible online reviews. They found that source and review quality have more significant influence than review consistency and receiver factors on credibility evaluation of online reviews. In addition, they revealed that credible online reviews influence hedonic brand image more than functional brand image. Filieri et al. (2018) analysed the effects of source credibility, current review, long review, factual review, relevant review, and overall ranking score on online review diagnosticity. They found that overall ranking score, current review, and relevant review are perceived as diagnostic, while long reviews are not perceived as diagnostic information. Results of their research revealed that review quality dimensions and ranking score impact perceived information diagnosticity in high involvement level. Huang et al. (2018) studied the influence of the font of online reviews (easy-to-read vs. difficult-to-read) on consumer evaluation. Results showed that the feeling of ease in reading leads readers to perceive the reviewers as more credible, consequently increasing the influence of the online reviews, while difficulty in reading lowers perceived credibility of reviewers; thus, decreases the influence of online reviews. Although prior studies contribute to our understanding of the credibility of online reviews, little effort has been made to realize the sub-categories of author credibility and argument quality. In addition, there is a lack of studies regarding how and why online users evaluate the credibility of online reviews. To this end, this research conducts in-depth semi-structured interviews to propose a comprehensive credibility analysis model.

## 2.1 Heuristic-systematic Model

Dual-process theories provide a comprehensive view of individuals' information processing strategies and show how they form the outcomes of their decisions and establish their validity evaluation (Eagly and Chaiken 1993; Ruiz-Mafe et al. 2018). The Elaboration Likelihood Model (ELM) (Petty and Cacioppo 1986) and the Heuristic-systematic Model (HSM) (Chaiken 1980) are two of the leading dual-process models. Based on these theories, individuals process information using two routes: (1) Systematic information processing in HSM (central route in ELM); and (2) Heuristic information processing in HSM (peripheral route in ELM). The systematic processing factor is associated with the analysis of relevant pieces of information such as argument quality, while the heuristic processing factors are related to the environmental characteristics of information such as author credibility or information consistency (Luo et al. 2015). The systematic processing factor is usually used when the reader is able or motivated to understand the message. Heuristic factors are mostly used when the reader is unable or not motivated to engage in much thought about the quality of argument in a message. While ELM assumes that the message receiver takes either the central or peripheral route to make a decision (Cheung et al. 2012; Yan et al. 2016), HSM highlights that systematic and heuristic processing may occur simultaneously or independently (Ruiz-Mafe et al. 2018). In other words, the co-occurrence of the two routes means that the two information processing modes can affect each other and appear simultaneously (Ruiz-Mafe et al. 2018). In our previous work and the present study, we develop the credibility model for online reviews based on HSM rather than ELM. This is because we consider that content-related and environmental factors often co-exist in online reviews platforms, and the message receiver may use these two information processing modes concurrently to make decisions (Ruiz-Mafe et al. 2018; Zhang et al. 2014).

## 3 RESEARCH METHODOLOGY

This study applied a qualitative research approach to gain insights into how users of online reviews process different reviews and assess them as being credible. Guided by the research question and synthesis of the literature, a list of interview questions was developed. While interviewing respondents, we did not focus on a specific website or product types as opposed to similar prior studies (e.g. Filieri 2016) to realize the reaction of respondents on different websites or for different products.

Interviewees were asked to state their opinion and experience with online reviews, such as how long they have been using the online review as a source of information and how do they use online reviews. At this stage, using critical-incident technique (Flanagan 1954), the conversation led to further questions regarding the credibility of online reviews. The respondent then was asked to share their perceptions about the features of a credible online review and its author.

Purposive sampling was preferred to maximize the diversity of the sample (Miles et al. 1994). Purposive sampling tries to select respondents according to criteria determined by the purpose (Miles et al. 1994). As a result, interviews with users of reviews with different backgrounds were arranged. In addition, we encouraged participants to recommend others using recruitment techniques such as word-of-mouth and snowballing techniques. In total, the primary researcher conducted face to face semi-structured interviews (all in English) with 21 respondents (9 women and 12 men) who varied in levels of experience in the use of online reviews and who had different occupations (lecturer, engineer, marketer, student). Before conducting interviews, ethics approval had been granted for the present study. The interviews lasted between 30 and 60 minutes. Table 1 presents the profile details of the respondents.

ID	Occupation	Gender	Experience Years	ID	Occupation	Gender	Experience Years
ID1	Student	M	5 years	ID12	Marketer	F	11 years
ID2	Data scientist	M	8-10 years	ID13	Researcher	F	6 years
ID3	Application developer	M	10 years	ID14	MSc Student	M	12 years
ID4	Researcher	M	8 years	ID15	Academic Tutor	M	8 years
ID5	Data Scientist	M	3 years	ID16	Researcher	F	4 years
ID6	MSc Student	F	2 years	ID17	Researcher	F	10 years
ID7	Web developer	M	3-4 years	ID18	Researcher	M	4-5 years
ID8	Consulting Engineer	M	2 years	ID19	Researcher	F	11 years
ID9	Lecturer	M	2 years	ID20	Researcher	F	10 years
ID10	MSc Student	F	8 years	ID21	Researcher	M	8 years
ID11	Researcher	F	2 years	Total	-	12 M/ 9 F	6.33 years in Avg.

*Table 1. Detailed Respondents Profile.*

The interview data were coded based on open, axial, and selective coding (Corbin and Strauss 2008). Some codes were generated in an in-vivo manner by synthesizing what interviewees stated, such as “the number of reviews” and “writing style”. Some codes were produced based on the interpretation of the data, such as “ample amount of information” and “website specificity”. The remainder was developed by using existing constructs, such as “argument quality” and “review sidedness”. Furthermore, the data were coded in the second round assisted by NVivo 12, and not surprisingly, the two processes of coding generated almost the same categories. To further evaluate the validity and reliability of the categories, a draft of findings was distributed to the two other researchers in this project and four interviewed participants. No code was changed after this checking.

## 4 FINDINGS

Based on the data from our interviews and using HSM as a theoretical lens, the findings are grouped into the following categories: (i) systematic factor that include argument quality; (ii) heuristic factors including external consistency, internal consistency, information rating (endorsements), review recency, the number of reviews, writing style, author credibility, review extremity and review sidedness; and (iii) moderators that include receiver-related factors, website-related factors and product/service types. In the next sections, these factors are discussed in detail.

### 4.1 Systematic Factor

The data highlight that respondents discuss the quality of the content as the main criterion (systematic factor) to process online reviews. Some studies have defined this systematic factor as argument quality in the context of online reviews (Cheung and Thadani 2012).

#### 4.1.1 Argument Quality

The main factor that participants used to evaluate the credibility of online reviews is the quality of the argument in the reviews. Respondents stated that a review which has relevant content and is written based on factual information with an ample amount of information is perceived as a credible review. The following three sub-categories of argument quality were specifically noted during the interviews:

- **Relevancy:** Participants discussed that a credible online review tends to be stated in a relevant manner and comprehensively develops product/service aspects. For example, one respondent mentioned *“He puts negative review not because of foods, just because of a person. And it is not that relevant. And I cannot put much weight on it”* (respondent #2).
- **Ample amount of information:** Respondents stated that ample amount of information presented in textual or visual structures is a vital element of a credible online review. As stated by one of the respondents *“Well, first of all, I prefer not to be an insult in the comments, but even if there is, there should be enough evidence to back it up, also if it is like too nice but without any reason, I usually don’t trust it, because there might be the seller himself writing it or some of his friends”* (respondent #17).
- **Factuality:** Users view as credible a review which is factual and based on specific details. *“It is more than just one-word review, based on detail and it is not just an opinion, there is some information, like some kind of fact”* (respondent #15). *“some specific number can help us a lot in the comments. I mean specific details with numbers”* (respondent #2). *“photos are important besides the comment, it is like evidence, like a witness for the comment, I’m not just talking, you can see”* (respondent #9).

#### 4.2 Heuristic Factors

According to interview data, users do not always process online reviews based on the systematic factor (argument quality). Instead, they rely on other factors called as heuristic cues including review extremity, review sidedness, external consistency, internal consistency, information rating, review recency, the number of reviews, writing style and author credibility.

##### 4.2.1 Review Extremity

Respondents have mentioned that extreme reviews can be less credible because they could be very emotional, or they could be written by owners in a very positive or by competitors in a highly negative way. For example, one participant stated that *“If it is a very extreme description (complaint or compliment), in both cases it does not worth to trust”* (respondent #1). In addition, another respondent stated *“what I could differentiate is for some hotels, whether the reviews are honest or not based on their language because usually the people who want to increase the rating of the hotel, they will give too many positive words, like “this is best”, I think this is not honest and they have more adjective than actual massage”* (respondent #18).

##### 4.2.2 Review Sidedness

Several participants mentioned that receiving information on two-sided reviews enhances the comprehensiveness of a review because two-sided reviews discuss both positive and negative of a product/service (Abedin et al. 2019). For example, one respondent mentions *“I trust to the reviews which also talked about both positive and negative of the product in the same comment”* (respondent #3).

##### 4.2.3 External Consistency

In an online review context, a single review usually is seen with a set of other reviews. Users adopt a review easier which is consistent with a group of reviews (Aghakhani et al. 2017). For example, one of the interviewees stated, *“if it is a four-star rating but all the written reviews are one, I am not gonna believe that it is a four-star rating”* (respondent #12).

##### 4.2.4 Internal Consistency

Internal consistency indicates the consistency within a single review (e.g. stars and content). For instance, considering review content and review valence (stars rating) come from two different sources, the review valence might not match with review content. This internal inconsistency confuses the reader and then weakens the accuracy of a review (Li et al. 2018). *“I think this one (this review) should be credible, and it has given 4 stars, so it is not like that everything is good, but it is noisy and still gives 5 stars, I mean if it is noisy give 4 stars not five. If you are unhappy about something, if the*

*problem is not that important but yet it bothers you, give 4 stars. But if everything is perfect give 5stars... If someone says something opposite of himself that means he is not trustable* (respondent #12).

#### 4.2.5 Information Rating (Endorsement)

The interview data reveal that the opinions of other readers, which form information rating, can be one of the shortcuts used to evaluate information. For example, one respondent mentioned, *"I think the reviews which have more likes are more credible because I know there is something in this review that more than one person confirmed or approved that"* (respondent #16).

#### 4.2.6 Review Recency

Based on interview data, review recency influence users' evaluation of reviews credibility. For instance, one respondent stated that *"one thing that is very important in my opinion is the time. You know when that person sent this comment because we know that during the time, for example, you want to buy something from a person, Ok? That person during the time and the product during the time can be changed"* (respondent #2). Another interviewee mentions *"I see the time of the review if it is like four years ago, I will ignore it, but if it is for six months ago I read it"* (respondent #3).

#### 4.2.7 The Number of Reviews

According to interview data, users reduce uncertainty by collecting more information about a service or product. Because an increase in the number of reviews leads to an increase in the amount of information and consequently reduce uncertainty. For example, one respondent stated that *"if you just see five reviews, and the review point is around 4.6 that is not a credible review, at least for a good restaurant you can see around 600 or 700 or 1000, definitely rate for 1000 reviews is more credible compared with a restaurant with rate 5 with just 10 reviews, so the number of reviewers is really important for me...so the number of reviewers and time they put their review are the most important factors for me to evaluate the credibility of that review"* (respondent #8). Another interviewee mentioned, *"I check the total numbers of reviews if it is only a few it is not trustful, if they have a lot, then maybe it is more trustful"* (respondent #20).

#### 4.2.8 Writing Style

Writing style is defined as "the way text is written referring to the type of language used, syntactic and semantic elements included, and the rhetorical strategies applied"(Hernández-Ortega 2018). During the interviews two factors emerged as sub-categories of writing style i) linguistic correctness and ii) readability which individuals use to evaluate the credibility of online reviews.

- **Linguistic Correctness:** Participants stated a review which has lots of linguistic mistakes seriously weaken the attention of the reader from the main argument. For example, one respondent mentioned that *"like if something hard to read, I just avoid reading it, like if the grammar is so bad, and it does not make sense, I just ignore it, so I try to find something that I can read in proper English. And it's kind of deal with the credibility if it is written in a better way. I want to see something correct, and clear and to the point"* (respondent #7). However, with the advent of artificial intelligence and the proliferation of bot-generated content, there are some users who did not pay attention to linguistic correctness for credibility evaluation of online reviews. For instance, one interviewee stated that *"Most probably perfect grammar would show that it is written by a robot, but ok you can build a robot to make grammatical mistakes"* (respondent #21).
- **Readability:** Based on interview data, reviews which are difficult to read have a smaller impact on readers than easy to read reviews. *"...I guess if it is easy to read because sometimes it is difficult to understand the person reasoning if you cannot understand what they are writing* (respondent #15). *"I think a credible review should not be formal, they should be in an informal way, if something is formal means maybe it is computer-generated, but if it uses some jocks. It does not mean when you see something formal, it is fake. But when something is informal, it means it is not fake, it's a threshold. It gives you the uncertainty that maybe this one is fake or not* (respondent #10).

#### 4.2.9 Author Credibility

Based on findings from interviews, author (source) has an impact on the credibility of online reviews and the author's profile information is important determinants of credibility evaluation. In addition, participants expect the combination of cues in the author's profile to be in a complementary way. In other words, neither author reputation nor author involvement conveys *comprehensive* information

about the credibility of an author. However, the combinations of these cues help readers to reduce the uncertainty about the author and then judge the credibility of him/her.

As suggested by previous studies (Shan 2016; Xu 2014), the author profile on most online reviews platforms includes both system-generated cues, such as reputation (badge), and self-generated cues, like a profile picture. Thus, we categories findings from interview data about the credibility of the author based on system-generated and self-generated cues. Table 2 demonstrates the constructs, the definition for each construct and examples from interviews that refer to a particular author’s review.

	Construct	Definition	Example
System-generated Cues	Author reputation	Whether the author has the badge or title, like top reviewers or local guide	<i>“In Alibaba for example, this reviewer just has a heart, you need to have hearts to get the diamond, so the diamond is more valuable like that guy is more experienced, and because they are more experienced they have more valuable reviews” (respondent #19).</i>
	Verified purchase	A badge which shows whether a reviewer made a purchase or has the experience of using the product (Kim et al. 2018).	<i>“When it is a user on an e-commerce website, I probably affect trust any verified purchase. As long as it is a verified purchase where there is a little tick which says this person bought it” (respondent #12).</i>
	Experience	Number of years in a specific website as a reviewer (registration date)	<i>“The first thing that I look at, how long have been in the website (the person), because if someone has been there for such a long that they would have the more credible sources because they have been there for such a long time, so they know the system and...” (respondent #4).</i>
Self-generated Cues	Pattern of the author	Patterns and range of activities of a single author	<i>“The review distribution is important for me if you see someone that only gives people excellent review, it makes you feel that he/she is an easy person, so I don’t rely on her/his comments” (respondent #14).</i>
	Sociability	Number of friends or followers	<i>“...I pay attention to the number of followers, that more follower, the more reliable would be for me” (respondent #1).</i>
	Author involvement	Number of reviews/photos/ number of travels	<i>“For hotels, I see how many hotels that person has booked, how often they have gone, how many reviews they have done, so for the hotel, I check the profiles” (respondent #12).</i>
	Personal identity discloser	The extent to which the author discloses his / her profile photo, Real name, location, age, etc.	<i>“I think this package is very important, for example, look the profile image, because for example, shows that this person is professional, compared with this one in the same condition, because he has profile image, the name, sometimes, for example, he puts his name XYZ not credible for me, the profile image, local guide, the number of reviews, the number of photos, the number of likes, real name. I mean this is a package, it is not just a parameter.” (respondent #9).</i>

Table 2. Details of the Constructs for the author of the review

### 4.3 Moderators

The findings revealed several insights regarding the moderators of the relationships between the credibility of online reviews and its influencing factors. These factors do not have a direct influence on the credibility evaluation of online reviews because it is not logical for example, to say that reviews of some services or products are more credible than others. However, it is more logical to say that individuals use different factors to different degrees to evaluate the credibility of online reviews. These moderators are website factors, product/service types and receiver.

#### 4.3.1 Product/Service Types

It seems that most users assess the credibility of online reviews differently based on product/service categories. As an example, one participant expressed *“...For hotels or restaurants, I pay attention to the writer. For products online, usually, I don’t pay attention who is writing it”* (respondent #19). Another interviewee stated *“In the case of electronics, I don’t really care about the writer; if they have a verified purchase, and a lot of people found it helpful, and that is it. But, Booking, in booking I need to know the person, who has booked this”* (respondent #4).

#### 4.3.2 Website-related Factors

- Website Types: Data from the interviews show that users perceive some types of websites more credible than the others. For example one respondent stated that *“Actually, they have made this website, they can manipulate the reviews, even though it has 21 reviews, we never know whether they deleted the bad ones, so these are the people who are selling that, but for some reasons, eBay or amazon they are like middle people who actually connect seller and buyer, so they actually don’t protect the seller, so there is better chance to give an actual review, so for that reason I would rather read reviews in eBay or...”*(respondent #21). Thus, it seems that users find reviews



in independent or third-party websites more credible than reviews on the official website of a product/service.

- **Website Specificity:** According to the respondents, website specificity is another moderator which impact the user’s evaluation of online reviews. For instance, one interviewee mentioned *“Usually I try to read on different websites, so supposed if I’m searching the reviews for food, I see on google, also on Zomato, but between Google and Zomato, I trust more Zomato, I feel they are like more specifically only for food, so people who are interested in food will review there but google is a general platform, so they may not be as accurate, and also Zomato ask their own review also, so it is more trustworthy for food than google”* (respondent #18).
- **Website Reputation:** Another factor that emerged in interviews was the website reputation. For example, as mentioned by one interviewee *“... if I found it (reviews) on an unknown website which I have not bought anything from, I don’t trust it. I will definitely try other websites too. If I trust the website I usually trust the reviews”* (respondent #10).

### 4.3.3 Receiver Factors

The impacts of an online review vary for different people. Regarding the same online review, users might have different responses due to different abilities, experience and motivation (Chaiken 1980; Cheung and Thadani 2012). Findings show that motivation, ability and similarity with the author moderate the relationships between the credibility of online reviews and its antecedents.

- **Motivation:** According to HSM and our findings from the interview data, when users are highly motivated (involved) online reviews mainly work through the systematic factor (argument quality) and users spend more time for reading reviews. However, when users are not highly involved, online reviews work through the heuristic factors. For example, one participant stated that *“... if it is skin product, I care a lot about it, because for example, if they have the same price, I would like to read comments about each of them, because if it is health-related, I spend a lot of time”* (respondent #17).
- **Ability or Prior Knowledge:** Findings show that the user’s ability or prior knowledge moderate the influence of different determinants on the credibility of online reviews. For instance, one interviewee mentioned that *“If I have more doubts, more questions, then I keep on reading until it answers if I’m certain about that product or places I read fewer reviews”* (respondent #18).
- **Similarity with the Author:** Based on the theory of homophily and interviews, readers are more likely to assess the authors that are similar to themselves as more credible than those who are different (Shan 2016). For example, one participant stated that *“Because I’m an international, sometimes, I trust the reviews based on the international people rather than for example, Australian people, for a local restaurant.8 ... but not for a TV, for example, a TV should have some functions, and there is no difference between me and an Aussie guy to say”* (respondent #8).

Using the HSM as a theoretical lens and based on findings in the interviews, we extend our prior model (Abedin et al. 2019) to incorporate our new findings as shown in Figure 1.

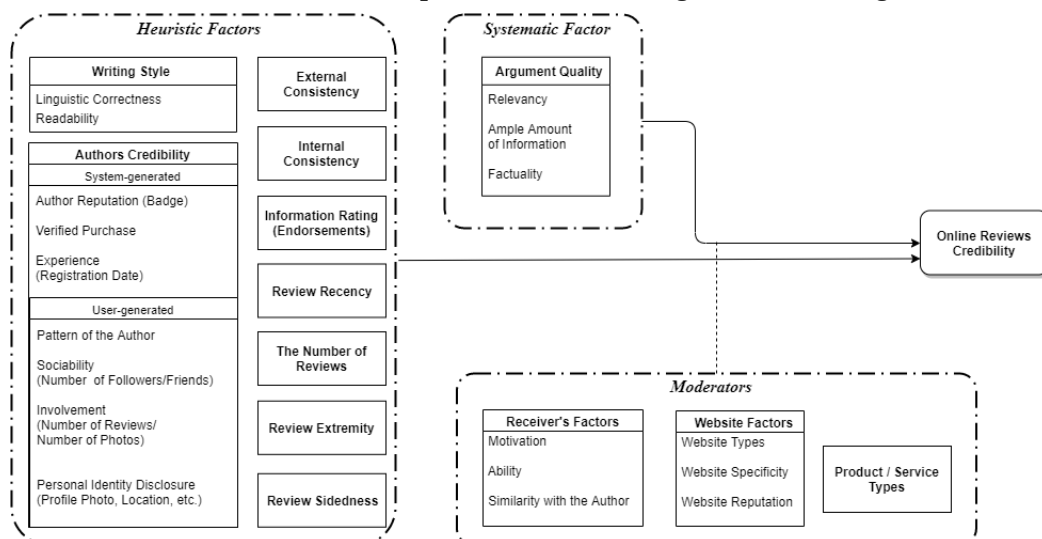


Figure 1: Heuristic and Systematic Factors for Credibility of Online Reviews with Moderators

## 5 DISCUSSION

The findings from this paper shed light on the factors that users apply to evaluate the credibility of online reviews. These factors have been categorized into three groups based on the HSM: (i) systematic factor (argument quality); (ii) heuristic factors including review sidedness, review extremity, information rating (endorsement), external consistency, the number of reviews, internal consistency, review recency, and author credibility; (iii) moderators including receiver factors, website factors and product/service types. These factors have enabled the development of a comprehensive credibility analysis model for online reviews shown in figure 1.

Understanding the impact of these specific cues potentially reveals how individuals use online review features when they assess the credibility of reviews. Our study shows that individuals tend to use argument quality as a key factor for evaluating the credibility of online reviews. Prior studies (Kim et al. 2018; Shan 2016) also have empirically discovered that argument quality directly impacts the attitude of the receiver towards that information. This study extends argument quality by identifying three sub-categories namely relevancy, ample amount of information and factuality. Users of reviews depend on facts provided by authors who express their experiences in the form of pictures, videos and links. Users tend to consider these facts as evidence or proof of statement which deals with credibility. Ample amount of information and relevancy are other factors which influence the credibility of online reviews because richer content with relevant information improves the comprehensiveness of an argument.

Further, in this study, we found that, in addition to looking at argument quality, there are heuristic factors which individuals use to assess the credibility of online reviews. Review extremity is one of these cues that affect users evaluation of online reviews. Individuals evaluate the reviews in terms of whether it covers both negative and positive aspects of a product/service. This is aligned with attribution theory (Crowley and Hoyer 1994), which states two-sided information weakens uncertainty of the receiver and accordingly strengthen the believability of the information.

Our findings further illustrate that external and internal consistencies are two other heuristic cues. The impact of internal and external consistencies can be confirmed based on the spreading-activation model (Collins and Loftus 1975) and cognitive dissonance theory (Hinojosa et al. 2017), spreading-activation model states things will go on smoothly when the existing facts are consistent with previous belief and information. In addition, based on cognitive dissonance theory, people tend to continue a consistent set of attitudes and cognitive inconsistencies trigger psychological tension. Thus, receivers are more likely to adopt an online review which is consistent with most reviews and are more likely to be doubtful toward a review which is opposed to most reviews.

Individuals also evaluate reviews in terms of whether the information is recent or not because both products or services might change during the time, and it is possible that a review which is written a long time ago would not be perceived as credible by a recent consumer. Conversely, a recent review is more credible for a user to evaluate the quality of a service/product since it presents an overview of its existing quality. Another heuristic cue that users consider to assess the credibility of online reviews is information rating or social endorsement. This is aligned with the study by Pornpitakpan (2004) and Luo et al. (2015), which demonstrated that a reader's attitude towards information will be affected by the attitudes of other community members.

Furthermore, the number of reviews affects users' evaluation of online reviews. This finding is consistent with prior studies (Lee and Koo 2012) which state that an increase in the number of reviews leads to more credibility. Also, writing style is another heuristic factor that impacts on user's decision-making process (Abedin et al. 2019). In our study, we found that two aspects play an important role in writing styles of reviews: (i) linguistic correctness and (ii) readability. Linguistic correctness reveals some characteristics of the author. For example, errors such as grammatical mistakes show lack of attention to detail or lack of educational level. However, according to the interview data, it is not a general rule for all users to assess the credibility of online reviews because some respondents believe that bots can easily write reviews without any mistakes. Secondly, reviews that can be easily processed are generally seen more familiar since users hold a naïve theory that familiar content is easier to process than unfamiliar. Authors in fluent information seem more familiar, and it is easier to believe those with whom we are more familiar, accordingly authors in fluent reviews are more likely to be judged as credible. This finding confirms the prior studies (Huang et al. 2018; Schwarz 2011).

Our findings suggest that author credibility is another factor which impacts the credibility evaluation of online reviews. Social Information Processing Theory (Walther 1992) shows that in computer-mediated communication people employ alternative signals to make a judgment about other people rather than nonverbal signals in face to face interactions. Since the author (reviewer) profile is the

most common source of information, presented on online reviews platforms, people use different information in the author profile to assess the credibility of the author. According to a study by (Sundar et al. 2007), when several cues are presented at the same time, it is more probable their impact be realized in combination with each other instead of a separate piece of information.

Furthermore, based on HSM and our findings from interviews we argue that when people are highly motivated or have the ability (e.g. prior knowledge about the product/service) they pay more attention to the argument quality rather than heuristic factors like the author. Conversely, when they are not motivated enough they use some heuristic cues such as external and internal consistencies to evaluate the credibility of online review.

We also argue that although people mainly rely on content related factors when they are highly motivated, they also rely on heuristic factors such as the author. This is consistent with HSM, which advocates that information processing typically involves a mixture of both systematic and heuristic factors. In addition, the degree of reliance on systematic and heuristic cues depends on the product/service types as well. Respondents declare that in the case of experience goods or services like perfume, wine or a restaurant, which are more subjective in nature, heuristic cues like the author have more impact on their evaluation. However, in the case of search products, which are more objective in nature, users usually pay more attention to sub-categories of argument quality such as factuality and relevancy.

In addition to receiver factors and product/service types, we found that website-related factors also moderate the relationships between the credibility of online reviews and its antecedents. For example, users find independent or third-party websites more credible than the official website of a product or services. Some website like *Zomato* for food or *TripAdvisor* for hospitality seem more credible for some users because of their specificity- it is more likely that expert people put reviews on these websites.

Beyond these insights, in this paper, we found three sub-categories of argument quality namely, relevancy, ample amount of information and factuality, also sub-categories of author credibility such as reputation, experience, and involvement. Future studies are needed to test the relationships between the constructs as well as test the reliability of the model and its factors emerged from this study. In addition, an interesting area of research would be identifying strong predictors of the credibility of online reviews among different messages, authors, receivers and product/service types.

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