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A Cross-National Study on the Perception of Algorithm News in the East and the West

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ABSTRACT

Although algorithms have been widely used to deliver useful services, how users actually experience algorithm-driven news remains unclear. This study examines user attitude and perception of algorithmic journalism and identifies the similarities and differences in experience and satisfaction formation. A comparative study between the United States (U.S.) and South Korea was conducted to examine how the two countries' users experience the quality of algorithm-driven news services and how individuals perceive the topics of fairness, accountability, and transparency. The notable similarities and differences are found by performing a comparison of cognitive processes. The major attitudes toward algorithm news are similar between the two countries, although the weights placed on the qualities differ. South Korean users put more weight on performance qualities, and U.S. users place relatively greater emphasis on procedural features. Different patterns of algorithm news experience imply the contextual nature of algorithm: how users perceive and feel about topics in algorithm news and how they use and engage with algorithm news depend on the context where the experience is taking place. The analysis suggests the importance of user-perceived issues and the contextual nature of such issues.

KEYWORDS

Algorithm Journalism, Automated News, Comparative Study, Cross Algorithm User Experience, Cross-National Analysis

INTRODUCTION

The drastic increase in the use of algorithms has been driven by advances in artificial intelligence techniques (Shin, 2019). Recently, algorithms have been increasingly used in the media, particularly in news services (Fletcher & Nielen, 2019; Diakopoulos & Koliska, 2016). Algorithms are used in the news industry to personalize news offerings to increasingly specific user preferences. Algorithmic journalism (AJ) produces the most relevant news article recommendations to users based on their personal preferences and interests (Zheng, Zhong, & Yang, 2018; Beam & Kosicki, 2014). These services can be useful because information overload is problematic because too much information, especially of little relevance, causes confusion. One of the advantages of AJ is that these services help users sort articles of interest (Thurman & Schifferes, 2012). With advanced and sophisticated algorithms, AJ has become popular and widespread (Jung et al., 2017).

Despite the increasing popularity and adoption, what users of the services enjoy or prefer and how the user experience (UX) is improved by automated processes or algorithmic curation (Beer, 2016; Helberger, Karppinen, & D'Acunto, 2018; Beam & Kosicki, 2014) remain unclear. Algorithmic services have been demonstrated to improve UX and increase revenues of, for example, news services and online providers, but how they improve UX remains an open question. Little knowledge is available

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about how users experience AJ: how they feel about news selected by algorithms, how they think the algorithm works, and how their perception plays out in the experience (Knijnenburg et al., 2012; Shin & Park, 2019). Based on this revealed gap in the knowledge, this comparative inquiry attempted to find similarities and differences in individuals' AJ consumptions in the U.S. and Korea.

Both countries have been actively developing algorithms and AJ are becoming popular trends in both societies (Shin, 2019). Comparative frames offer a better understanding because an algorithm system is a complex entity and related issues are complicated.

In the comparison of the two countries, we focused on users' cognitive process: how users evaluate the qualities of the AJ news, how users make sense of the new AJ process, and users' level of satisfaction with algorithm news. With user-based AJ in place, following inquires will be useful: how users recognize the function and value of AJ, how users' attitudes/motivations are created, how the perceptual process works, and how people perceive trust in algorithms and interact with AJ. How individual users encounter AJ contents and interact with these systems are legitimate topics and practical concerns when designing AJ and user-centered algorithm systems in lieu of system-oriented methods. To assess this issue, this study attempts to examine a cross-country AJ model incorporating system quality (fairness, accountability, and transparency; FAT) and perceived value (utility, convenience, and accuracy) as antecedent factors of confirmation and satisfaction. With this model in place, this study explores the experience of receiving news through AJ by focusing on the following comparative angles:

RQ: What are the cross-national differences in user attitudes and motivation for adopting AJ content?

1. Are there differences between U.S. and South Korean (hereafter, Korean) users regarding their perceptions of FAT in AJ news?
2. Do U.S. and Korean users perceive the quality of algorithm news differently?
3. How much do the users in the U.S. and Korea trust AJ and how does that level of trust influence the satisfaction of AJ?

With the RQs established, this study presents a conceptual model that addresses user value perception for using algorithmic services. A study showed that perceptions of FAT strongly impact perceived value and satisfaction of algorithmic services (Shin & Park, 2019). Comparative observations in the U.S. and Korea would be useful to examine how value is constructed in both countries and recognize which factors influence user confirmation and satisfaction. The results of this study make two contributions to the literature on automated news and algorithm curations.

First, the AJ user model advances the current user research on news consumption and user literature by recognizing algorithmic heuristics, UX, and their underlying relationship. Because algorithm-based journalism services are rapidly developing, the existing technology acceptance model-based frameworks require updates in line with ever-changing user experiences in algorithmic environments. Although the concepts of FAT have been widely touted when developing algorithm services (Diakopoulos & Koliska, 2016; Klinger & Svensson, *in press*), what they are or how people actually perceive and experience them remain unclear (Zheng, Yang, & Li, 2014). In the AJ context, numerous questions remain inconclusive as to how users perceive the services experienced through algorithms, how algorithms influence user satisfaction and trust, and how users react to their experiences with algorithm-based news. One of the contributions is to highlight the users' cognitive and emotional mechanism, that is, how individuals perceive and process technological features (Kim, Shin, & Park, 2015), how algorithms elicit user motivations (Shin & Biocca, 2018), and how technological cues trigger user experiences (Shin, 2017).

Second, the FAT issues have been thorny subjects in AJ as well as overall algorithm services (Ananny & Crawford, 2018). Algorithmic decision-making has been criticized for its potential to increase discrimination, unfair process, and information asymmetry. Against the concern, however, research regarding these topics, namely, the user experience of AJ, remains largely unexplored. Users' perceptions about how algorithm works are an essential component of a feedback loop that can cause systems to behave in undesirable or unexpected manner (Rader, 2017). Understanding users' beliefs is a critical procedure towards understanding effects of algorithms and potentially designing AJ that are more user-centered and human-oriented. These topics have rarely been researched from a cross-country context. Because these topics are contextual in nature, cross-country comparative frames would provide notable insights into the understanding of FAT issues in AJ.

The findings of this study guide practitioners in the provision of appropriate interfaces and interaction designs for news algorithms and other algorithm-based technologies. The algorithm user experience is complicatedly related to the users' contextual features. Because the results highlight the emerging issues of FAT in AJ, the findings can provide implications regarding how to elicit user satisfaction with process that are more transparent and fairer. The findings provide useful strategies for global firms to develop user-algorithm frameworks that lead to the successful introduction of international algorithm news services. With globalization, an overall increase in use of AJ has been observed. Understanding how people in different countries use AJ adds a new level to how global news can be organized and produced. The results of this study can be valuable to firms in their attempts to improve algorithm development and to identify the causes influencing cognition and behavior cross-national contexts. The algorithm industry has been attempting to make services more accurate and satisfying (Zheng et al., 2018). Because algorithms represent specific user dimensions, a thorough user analysis based on UX is necessary for effective development and diffusion.

LITERATURE REVIEWS

Algorithms and Algorithmic Journalism

Automated news is possible because of algorithms (Moller et al., 2018). Recommender systems are used by news services to help users access the ever-growing set of services and data available on the internet (Shin, Zhong, & Biocca, 2020). The user chooses news to read or products to purchase, and the system then proposes items that may potentially interest the user based on his/her history. Thus, users are provided recommendations based on products they have already rated or viewed. Recently, recommendation algorithms have been widely used in news recommendations. Nearly all the content people see on online news is chosen not by human editors but by algorithms using massive quantities of data about each user to deliver content that he/she might find relevant or engaging (Beam & Kosicki, 2014). Algorithms determine the news seen on social networks and the search results reviewed on news sites. With the advancement of algorithm technologies, AJ has been widely adopted and is expected to be further diffused in societies. AJ shapes profiles of users' news preferences based on their behavior on the internet. AJ aims to identify news that best fits user preferences (Shin et al., 2020).

Although few would dispute the vast benefits offered by algorithms and AJ, especially in terms of efficiency through improved automation and quality through sophisticated filtering, AJ raises ethical and societal concerns. AJ relies on data and assumptions, and both are subject to biases and unfairness. Some AJ sites are promoting attention-grabbing content ultimately harmful to users, such as sensationalism, propaganda, and the filter bubble (Diakopoulos & Koliska, 2016; Shin & Park, 2019). Once a story is promoted by AJ, a sudden increase is observed in its popularity and viewership. These systems have been demonstrated to have a self-reinforcing nature and are easily vulnerable to manipulation (Möller et al., 2018). These two topics have recently been mentioned in popular press articles, and the problem of manipulation is garnering greater attention among practitioners, industry, and policymakers (Fink, 2018). Additionally, increasing concern over the transparency of algorithm services, which requires firms be transparent and open concerning the strategy, structure, and underlying procedures of algorithms used to search for, process, and provide information, has been observed (Diakopoulos & Koliska, 2016; Kemper & Kolkman, *in-press*). Transparency and fairness can significantly challenge algorithm-based services by generating a series of undesired and even critical problems in artificial intelligence (AI) systems (Burrell, 2016).

Procedural Quality vs. Performance Quality

In general, there are two distinct types of evaluating qualities: procedural aspects and performance perspectives (Shin & Park, 2019). This frame is nicely applied to AJ because they involve two steps of production: Algorithms involve systematic procedures of input and output.

The output of the AJ algorithm affects the inputs to that same algorithm. There processes are for collecting, processing, and analyzing data. Additionally, there is the outcome and results of certain services based on such process. An evaluation of algorithms should examine procedural aspects (whether accurate and appropriate data are collected legitimately) and performance perspectives (to what extent certain services are accurate, predictable, and individualized contents are provided).

Algorithms are becoming more sophisticated, convenient, and pervasive. With the fast advancement of amazing algorithms, AI has produced enormous opportunities as well as concerns among people, governments, and industry. In general, algorithms provide accuracy, usefulness, and convenience for users (Knijnenburg et al., 2012). AJ users find the services useful and convenient because the automated news services provide predictable and accurate content. These qualities are experienced by users as outcome performance when the services are rendered to users. Although these features of AJ increase the receptivity of media organizations to their audience, whether current deployments of AJ are achieving their objectives remains unclear. Users have little knowledge of which parts of their data are drawn and how such algorithmic filtering/curation occurs; additionally, they have no concrete means to influence these data-driven processes. The procedural aspects of AJ are as follows: whether the data collection process is transparent, whether recommended news articles are fair, and whether services are accountable and responsible. Notably, the impressive progress on the performance quality of algorithms, mounting expectations of fairness, accountability, and transparency is increasing. Improving outcome quality results in two controversial questions: first, how can fair algorithms be realized, and second, how can algorithms that are more accountable and transparent be developed (Diakopoulos, 2016; Rader, 2017)?

In much of the current discussions on AJ, performance quality and procedural quality have been equally highlighted. As algorithms develop and advance, there have been increasing expectations that the journalism industry should be able to prepare for the questions regarding FAT since obscure and discriminatory algorithms may produce unexpected risks, which lend urgency to a debate on how to develop AJ that is transparent, accurate, and accountable (Lee, 2018). In this study, performance quality and procedural quality are addressed regarding their different effects on users' cognitive processes and adoption.

Fairness in AJ contexts refers to that automated decisions should not produce unjust consequences or discriminatory results (Diakopoulos, 2016). A fairness question begins with doubt that algorithms always behave fairly (Beer, 2017). For instance, algorithms can embody gender biases, such as relating the word secretary more closely with the word she than with the word he. The fairness in algorithms stems from accuracy and unbiased processes. Algorithms have raised a concern that they may discriminate against certain groups. Serious concerns have been increased concerning the unfair practices of algorithmic filtering and curating processes.

The transparency in AJ contexts refers to the following: The decisions made by an algorithmic process should be visible, or transparent, to the viewers/users (Ananny & Crawford, 2018). AJ transparency may relate to the data, goals, outcomes, compliance, influence, and/or use of automated news-making systems (Shin & Park, 2019). Due to black-box nature of algorithms, their inner operations are unknown, that is, the information is proprietary and highly complex to not be understood by the general public (Courtois & Timmermans, 2018). Thus, the concepts of explainability and understandability become concerns (Meijer, 20114). When people easily figure out how an AJ works, they are more likely to use the content properly and trust the AJ and the news (Shin & Park, 2019).

Accountability of AJ is about the question, who is accountable when algorithm news get it wrong such as misinformation or fake news? Governments and news companies are deploying AI systems, but the public lacks the tools to hold these systems accountable when they fail. Accountable algorithms have it that the companies using algorithms are accountable for the results or impacts an algorithmic technology has on people and the surroundings (Lee & Boynton, 2017). Journalism industries and AI industries overall should be able to answer questions about FAT because biased and opaque algorithms can become serious risks. The risks lend pressure to a discussion on how to make algorithms fair, accountable, and transparent and, therefore, trustworthy and widely accepted.

User Heuristics of The Expectation Confirmation Process

As algorithm-based news content provides various innovative features, it is critical to recognize what users' expectations are and how they are formed and how users' recognized confirmation affects satisfaction. Expectation confirmation theory (ECT) can be a good frame for this task as the theory posits that both pre-behaviors and post-behaviors influence confirmation, which in turn influence satisfaction and continuance intention (Bhattacherjee, 2001; Shin & Biocca, 2018). Per ECT, higher perceived performance leads to positive confirmation and the level of confirmation then provides the basis for following actions. Users feel satisfied or unsatisfied based on their confirmation levels. While satisfied users form an intention to reuse the product in the future, dissatisfied customers discontinue the subsequent behavior.

ECT is used in this study as a lens to examine the UX of algorithm news content. ECT is right for this analysis since it is structured to describe user behaviors as a function of expectations, performance, and confirmation of beliefs based on cognitive processes. As algorithms and recommendation systems afford users unique experiences, ECT can be extended by incorporating algorithm-specific factors (such as transparency and accuracy) as antecedents of confirmation and trust and utility/convenience as a performance value.

USER MODELING OF AJ

With the aforementioned in mind, we formulate a series of hypotheses and a model. The AJ user model includes cognate constructs that influence satisfaction, which is influenced by performance value. FAT are conceptualized as normative expectations of users and are considered antecedents of confirmation of AJ procedural quality, and the model includes the additional key factor of trust.

Normative Expectations: Transparency, Fairness, and Accountability

FAT are emerging concepts accompanying the increase in the use of automated algorithms (Ananny & Crawford, 2018). These concepts are types of normative expectations, that is, perceptions regarding what algorithms should do in the process of offering algorithm services (Shin & Park, 2019). There are increasing concerns about the use of data, which may be shared illegally or abused. Regarding the algorithms that underpin the journalism environment, users' comfort level with sharing their personal information may heavily depend on why and how their data are being utilized. Automated data decisions may be incorrect, unfair, nontransparent, or unaccountable (Crane, 2016). AJ news entails such FAT issues in greater detail. FAT brings up key considerations in the design and development of AJ (Diakopoulos & Koliska, 2016). AJ is essentially developed to provide precise recommendation systems (Shin & Park, 2019). Whether such recommended results actually reflect individual needs/preferences, how the processes are performed, and whether the results are reasonably accountable remain open questions (Kitchin, 2017). With a transparent process, users can revise their input in order to improve recommendations. Algorithm users are able to figure out the logic and process of AJ. The providers of AJ are encouraged to ensure that the results are accurate and legitimate to increase user trust. Transparency, fairness, and accountability play significant roles in AJ by improving user trust in algorithms (Diakopoulos & Koliska, 2016). When transparent, fair, and accurate services are ensured, people are more likely to consider the news to be more credible. Highly transparent AJ can grant users a sense of personalization, and concomitantly, responsible and fair news affords users a sense of trust that fosters a sense of satisfaction and continued use (Shin & Park, 2019). The user awareness and understanding of how and why a particular recommendation is produced was found to be significant. Great visibility and clear transparency regarding relevant feedback increase search performance and satisfaction with the system (Sloan & Warner, 2017). Hence, the following relationships are hypothesized:

H1: Users' perception of transparency positively affects user confirmation of AJ.
H2: Users' perception of fairness positively affects user confirmation of AJ.
H3: Users' perception of accountability positively affects user confirmation of AJ.

Perceived Performance

Ease of use and usefulness have been widely employed as the basis for analyzing user acceptance of technology (Shin, 2017). There has been an intense focus on these perspectives in research of user acceptance and the adoption of recommendation systems (Jung et al., 2017; Knijnenburg et al., 2012; Zheng et al., 2014). In perceived usefulness, this study considers the aspect "capable of being used advantageously" compared with other services. This study attempts to conceptualize usefulness in relation to relative advantage and how consumers perceive AJ as useful and convenient compared with other news services. Convenience has been drawn from perceived ease of use: the degree to which a person believes that using a certain system will be effortless (Shin, 2010). Users may consider AJ acceptance in terms of how useful and convenient they are to use. Related to usefulness and convenience, accuracy is a critical quality determinant in AJ. The accuracy of prediction algorithms has been a key quality criterion for AJ. Perceived accuracy is regarding how well the news recommendations fit an individual's preferences (Knijnenburg et al., 2012). Thus, we propose the following hypotheses:

H4: Confirmation has a positive effect on the perceived usefulness of AJ.
H5: Confirmation has a positive effect on the perceived convenience of AJ.
H6: Confirmation has a positive effect on the perceived accuracy of AJ.

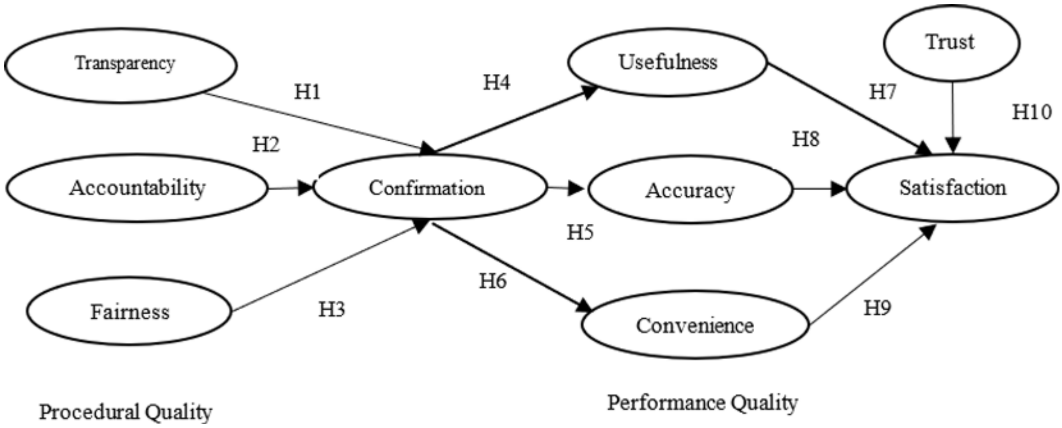
When users confirm usefulness, they tend to be satisfied. In the same manner, when users understand the convenience of AJ, their satisfaction levels increase. These relations have been widely confirmed in various services (Shin & Biocca, 2018 for virtual reality; Shin, 2010, for SNS; Kim et al., 2015, for smartwatch). The most notable example is Zheng et al. (2014), who argue that transparency and accuracy are the determinants of satisfaction.

H7: Perceived usefulness positively influences satisfaction with AJ.
H8: Perceived accuracy positively influences satisfaction with AJ.
H9: Perceived convenience positively influence satisfaction with AJ.

Trust

With the rise of algorithmic news, questions of increasing urgency are how to trust algorithmic systems, how to believe the algorithmic process, and how to trust the results of algorithmic services (Alexander et al., 2018). Particularly notable are concerns about the credibility and trustworthiness of automated news (Montal & Reich, 2017; Wolker & Powell, *in-press*). Trust in algorithmic media is especially relevant and timely when autogenerated propaganda threatens the sustainability of algorithm-enabled news. News through AJ has a low value for users if they do not trust the system.

Figure 1. Algorithm news experience model



Trust can be built by using a recommender system and describing how it generates recommendations and why it recommends an item.

Shin (2011) argued that trust plays a key role in technology adoption, particularly in complicated systems. Numerous studies have consistently shown the key role played by trust in the process of acceptance, continuance intention, and diffusion (Zhang et al., 2014). Whether users' trust certain systems or services obviously affects the users' assessment and such assurance influences the users' willingness to provide more data to the systems and services (Bedi & Vashisth, 2014). In the context of AJ, trust is defined as the reliability to believe in the accuracy of the news articles and using the recommender system's capabilities (Shin & Park, 2019). Thus, trust signifies how reliable and credible the system is. Many trust factors affect the decision to use a technology, but few studies have focused on algorithm services, particularly those used in AJ.

H10: Trust positively influences the satisfaction of AJ.

STUDY DESIGN

The study was based on surveys conducted with samples from the U.S. and Korea. From January to December of 2018, a pool of respondents was collected who had prior experience with AJ or similar algorithm services. Because the survey's main goal was to examine AJ consumption, users who claimed to have not consumed any algorithm-related news were excluded. With the initially collected data, a data reduction was performed in terms of the consistency of the responses, valid responses, and reliability of the answers.

Questionnaire Design

The initial version of the measurments was based on scales developed and validated in previous studies, as indicated: Normative expectations (Shin & Park, 2019; Shin, 2019), perceived performance (Jung et al., 2017; Knijnenburg et al., 2012; Zheng et al., 2014), and trust (based on Bedi & Vashisth, 2014; Shin, 2011). As the scales were developed for use in other contexts, the first stage of the research focused on evaluating their application in different nations. To check this, Korean and American users of algorithm services were interviewed in-depth, in order to capture possible relevant factors, as well as to fit the original indicators to both culture and languages. Four respondents were interviewed in Korea and five in the U.S. Respondents were asked to highlight service attributes related to the constructs of interest that they considered to be relevant. The interviews lasted on average two hour. The items were then adapted so a higher level of equivalence could be obtained. A marketing professor, a native speaker and proficient in Korean, translated the resulting questionnaire to English. The questionnaire was back translated to Korean by a Korean scholar, proficient in English, to ensure that the translated version had the identical meaning in both languages. Several modifications were necessary to maintain the equivalence in both languages, since certain words and phrases had no exact equivalent in Korean. The instrument was refined with the conduction of pre-tests on different small samples in both countries, totaling 102 participants. The pre-tests were conducted both on the web and in person (three pre-tests for each data collection method), resulting in the elimination of some items and re-wording others, in order to obtain the final form of the questionnaire. The first part of the questionnaire contained questions with transactional variables, intended to identify usage profile, and filter questions to separate the sample with respect to a user's service plan and carrier. The second part presented questions to capture the perception of respondents about the constructs of interest, measured on five-point Likert scales ranging from strongly disagree to strongly agree with the neither agree nor disagree as the central point. The third part involved demographic questions.

Sample Selection

Considering the nature of comparative studies, efforts were made to collect equivalent data. A total of 280 questionnaires were acquired in Korea, 260 of which were valid (92.8%). Due to restrictions related to cost and time, convenience sampling was employed. After discarding unreliable responses, 203 valid questionnaires remained. In the U.S., 271 questionnaires were finalized, of which 262 (96.6%) were complete. After discarding questionnaires involving insincere or inconsistent responses, 260 questionnaires were considered for further analysis. Structural equation modeling, independent *t*-tests, and multigroup analysis were used to confirm the proposed model and test the hypotheses.

Procedures For Data Collection

Data collection occurred during the months of February and July 2019, on a temporary website created to host the research instrument. A link to the website was sent via e-mail to undergraduate

Table 1. Demographics of survey respondents

Korea (260)		The U.S. (262)	
Age	**Number**	**Age**	**Number**
Less than 20 years	90	Less than 20 years	69
21–30 years	111	21–30 years	131
31–40 years	49	31–40 years	30
Over 40 years	10	Over 40 years	32
Prior experience	Number	Prior experience	Number
1–5 months	120	1–5 months	90
6–12 months	82	6–12 months	110
More 1 year	33	More 1 year	20
More than 2 year	25	More than 2 year	32
Gender	Number	Gender	Number
Female	122	Female	132
Male No response	133 5	Male No response	120 10

Table 2. Descriptive statistics

	South Korea	United States
Age (Mean/Standard Deviation)	39.12/14.24	40.11/16.23
Gender (female rate)	52.30	51.11
College educated	42.11	41.34
Algorithm service experience	2.3 years	2.1 years

and graduate student discussion groups in Korea and the U.S. To increase response rate and quality of data, a small gift coupon was provided for selected respondents. Marketing and research firms branched each site handled the data collection. For collecting both samples, ethical clearances were approved by corresponding intuitional review boards.

Data Measurements

All of the measures in this study were based on measures validated in the literature and considered reliable. The measured items were tested with Cronbach's alpha, which the score varied between 0.68 and 0.90, suggesting acceptable internal consistency and, thus, acceptable reliability (Table 1). The convergent validity for the proposed constructs is suitable, as evidenced by the average variance extracted (AVE). Discriminant validity is tested by comparing the square of the correlation between two constructs and the average variance extracted (AVE) of each construct. Discriminant validity can be satisfied if its independent variance is higher than shared value with other constructs (Fornell & Laker, 1981). Since all square roots of the AVEs are higher compared to all inter-construct correlations, thus discriminant validity is confirmed (Hair et al., 2010). The descriptive statistics for each of the measurement items are detailed in Table 2. This finding indicated overall positive responses to the constructs measured in this study. The standard deviations for all variables were desirable, indicating that the item scores were around the average scores.

Table 3. Reliability and validity

		South Korea		United States	
	Factor	Cronbach's alpha	AVE	Cronbach's alpha	AVE
	Transparency	0.717	0.671	0.783	0.665
Procedural	Fairness	0.788	0.626	0.783	0.558
	Accountability	0.795	0.7613	0.859	0.823
	Usefulness	0.758	0.7170	0.775	0.577
Performance	Accuracy	0.866	0.8380	0.757	0.632
	Convenience	0.851	0.8106	0.776	0.746
	Trust	0.888	0.8520	0.880	0.665
Attitude	Confirmation	0.908	0.8636	0.908	0.867
	Satisfaction	0.889	0.8196	0.889	0.812

Table 4. Factor loadings (Rotated Component Matrix: Korea: the U.S.)

	Component						
	1	2	3	4	5	6	7
Transparency	0.722:0.781 0.711:0.729 0.701:0.724						
Fairness		0.791:0.849 0.722:0.811 0.721:0.801					
Accountability			0.743:0.769 0.711:0.766 0.699:0.719				
Usefulness				0.720:0.782 0.699:0.711 0.622:0.694			
Accuracy					0.788:0.853 0.699:0.783 0.648:0.784		
Convenience				0.726: 0.800 0.700:0.789 0.699:0.722			
Trust			0.783:0.800 0.727:0.743 0.688:0.722				
Confirmation						0.772:0.888 0.711:0.873 0.698:0.706	
Satisfaction							0.687:0.656 0.672:0.623 0.644:0.611

*Extraction method: Principal Component Analysis; Rotation method: Varimax with Kaiser Normalization

CORRELATION

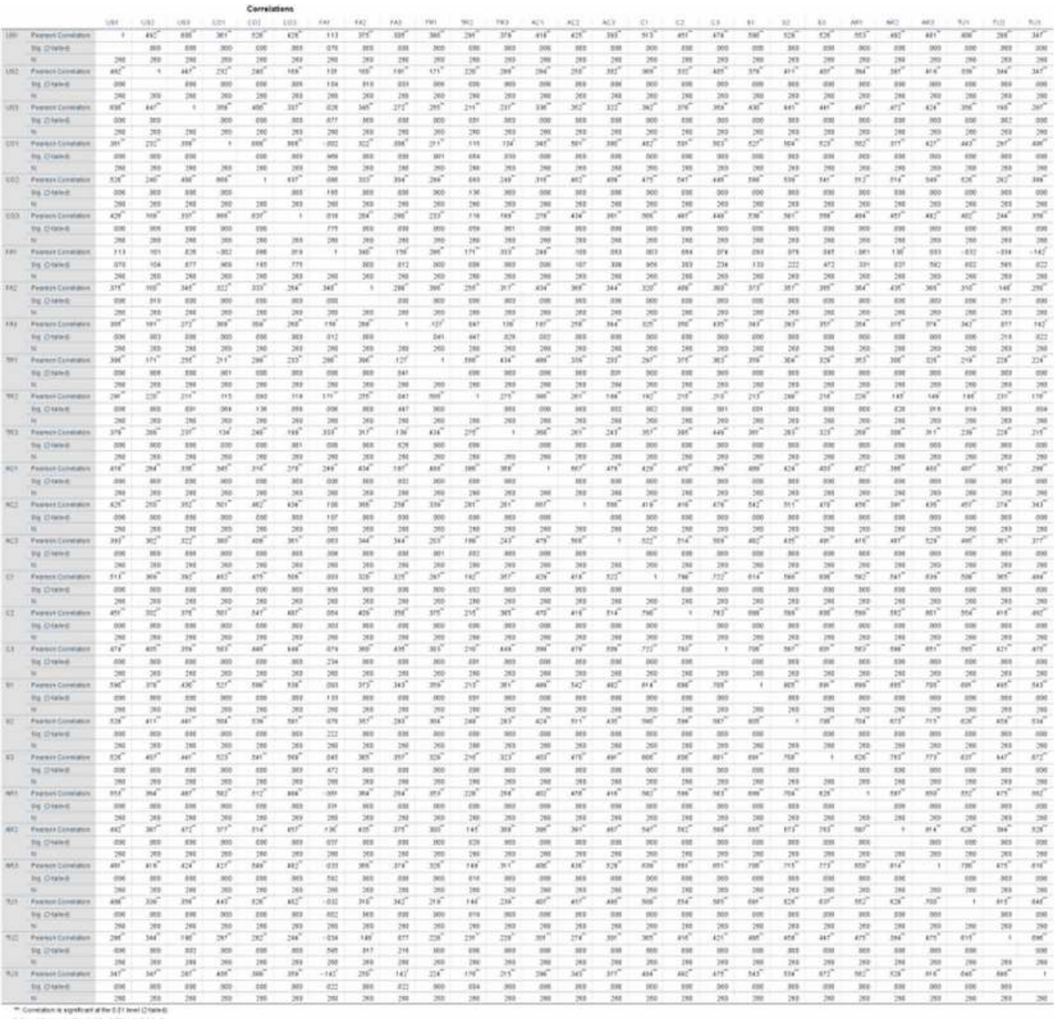
Measurement Equivalence

Multiple-group equivalence test was used to analyze the cross-national invariance and the hypotheses concerning the differences in attitudes between the U.S. and Korea. First, multiple single group models with the same item-factor structure were tested to see if the same model form held across groups. The second stage is to compare the unconstrained model with a constrained one, in which equality constraints were imposed across the two samples (Jensen & Wagner, 2019). The factor structure was similar across nations, if the fit of the unconstrained model did not differ significantly from the fit of the constrained one. The results indicate similarity in the fit of the unconstrained and constrained models, implying invariant factor structures across the two countries.

Common Method Bias

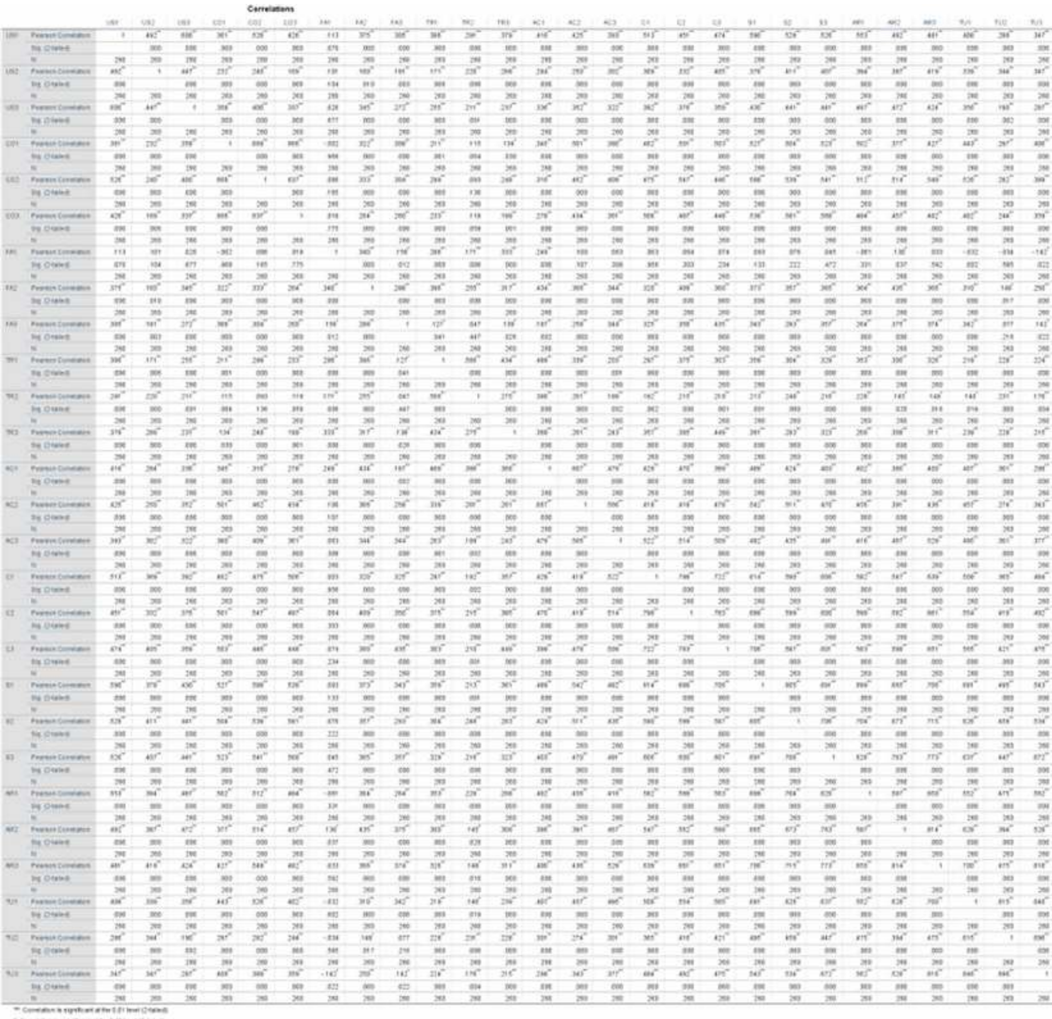
Since our data were collected from a single source, common method bias test should be examined to see if the majority of the variance could be accounted for by one general factor. We used Harman's one-factor test (Podsakoff et al., 2012), the most commonly used technique for addressing common method variance to rule out the influence of common method bias. We compared the one-factor

Figure 2. Correlation matrix of the Korean sample



Harman's confirmatory factor analysis solution to a five-factor solution. The results showed that the first factor accounted for only 22.38% of the variance, less than 50%, and this finding could be accepted. Also, common method variance was tested by using the marker technique (Podsakoff et al., 2012). The results indicated the inclusion of the common method variance in 5-factor model did not improve the overall model fit of 4-factor model significantly. It was found that the single-factor solution did not fit the data well, *Chi-Square* (147)=3,651, $p < .01$; comparative fit index = .41; Tucker–Lewis index = .31; root-mean-square error of approximation= .19, and was indeed significantly worse, *Chi-Square* (10)=3,118.24, $p < .01$, than the five-factor solution. Thus, it was determined that the common method bias was not a problem in this study.

Figure 3. Correlation matrix of the U.S. sample



RESULTS

Model Fit

The use of SEM commonly involves using several indices to measure model fit. A variety of fit indices is used for the validation of model fit, including X^2. Because X^2 (df) is sensitive to sample size, the fit indices such as normed fit index (NFI), Root mean-square error of approximation (RMSEA), and comparative fit index (CFI) more correctly reflect model fit (Hair et al., 2010). Results were acquired for the Incremental fit index (IFI) = 0.84; 0.83, the root mean-square residual (RMSR) = 0.05/0.04, the NFI = 0.78/0.77, and the CFI = 0.82/0.84. Hoelter's values showed acceptable results because both cases were within the suggested criteria ($75 \leq$ value < 200). Although NFI and CFI were lower than recommended value, other fit indices showed the satisfactory criteria. Considering together, these figures show evidence of reasonably good fit. Internal consistencies for the three scales were also strong, that is, supported by a coefficient alpha of 0.93. The model fit is therefore considered acceptable, and ten structural relations were analyzed with the model. The fit indices showed satisfactory fit of the fit.

Nationality-Related Differences

The independent *t*-test was conducted to verify possible statistical differences of measures between the two country samples. Summated scales were used to examine any differences between the two countries regarding the variables included in the model. Summated scales were computed by averaging the responses to individual items belonging to each of the constructs. Standard deviations and averages are presented along with corresponding t-tests for differences in Table 5. The independent t test showed higher levels of performance qualities among Korean users, and the U.S. users were more concerned with procedural features. The U.S. users were more concerned with FAT compared with Korean users. Korean users are significantly more concerned with accuracy, usefulness, and convenience than the U.S. users. Regarding trust, the Korean users were significantly more trusting than the U.S. users (M_{US}=4.08, M_{Korea} =3.76, t = 0.00). Satisfaction was lower in the U.S. sample than in the Korean one (M_{US} =4.03, M_{Korea} = 4.443, t = 0.00). The U.S. shows a higher level of confirmation than Korea (M_{US} =4.24, M_{Korea} = 4.03, t = 0.00). Overall, the table reveals that the items significantly different from one another. The items are not distinct in every case, but clear and significant differences in the factors across countries are observed.

Multigroup Analysis: Testing for Multigroup Invariance

Multigroup analysis conducted in AMOS software evaluated the structural paths from the model across the two groups by employing the method of Jensen and Wagner (2019). Table 4 illustrates the results of the multigroup analysis. Because standardized coefficients are sample specific and incomparable across samples, unstandardized coefficients were utilized to compare the results because they retain their scale effect. The two models indicated good fit with the data, and distinct patterns were observed that supported the hypotheses.

Notably, the two hypotheses that correspond to the procedural and performance metrics, respectively, were rejected in each case. The results indicated notable differences in path formation and item composition, providing insights on dissimilar value structures (Table 6). In the U.S. case, the paths from convenience and accuracy to satisfaction are rejected, and in the Korean case, the paths from transparency and fairness to confirmation are rejected. Additionally, the paths from transparency, accountability, and fairness to confirmation were significant with high coefficient values in the U.S. case (0.463; 0.478; 0.459), whereas the counterpart values were either low or rejected. In general, procedural qualities were important antecedents to confirmation for the U.S. users (CR 4.168; 5.330; 3.389), whereas performance qualities were more important determinants to satisfaction to the Korean users (CR: 9.767; 5.078; 3.120). The results of squared multiple correlations also supported the idea of different value structures in the two samples. The R^2 of confirmation in the U.S. was 0.73, and the counterpart value was 0.54. Similarly, the R^2 of satisfaction in Korea was 0.74, and the counterpart value was 0.45. Additionally, the R^2 of accuracy and satisfaction of Korea was noticeably higher than that of the U.S..

Figure 4 shows the validated model with the unstandardized coefficients and their significance for both samples. Korean unstandardized coefficients are shown first, and the U.S. coefficients shown in bold.

DISCUSSION

This study attempted to cross analyze the AJ experience model to identify possible cross-national value differences in the algorithm news consumption. Because users' cultures and media ecology differ, the cross comparison revealed similarities and differences in users' AJ experiences in the two countries, leading to an inference about the contextual nature of algorithm news. In the comparison

Table 5. T-test for national differences

	South Korea		The U.S.		*t*-test value (Sig.)
	Mean	Std. Deviation	Mean	Std. Deviation	
Usefulness1	4.07	1.068	2.50	1.134	7.072 (0.000)**
Usefulness2	3.76	1.127	3.65	1.248	
Usefulness3	3.85	1.202	3.85	1.202	
Conveneince1	4.48	1.269	3.09	1.257	6.783 (0.000) **
Conveneince2	4.33	1.174	4.10	1.394	
Conveneince3	4.65	1.254	4.23	1.662	
Fairness1	3.59	1.407	4.35	1.092	-5788 (0.000) **
Fairness2	3.70	1.384	4.25	1.249	
Fairness3	3.96	1.218	4.03	1.133	
Trans1	4.09	1.276	4.24	1.115	-1.801 (0.042)*
Trans2	3.96	1.439	4.20	1.301	
Trans3	3.74	1.221	3.81	1.140	
Acount1	4.12	1.426	4.33	1.211	-1.086 (0.048)*
Acount2	4.38	1.391	4.47	1.284	
Acount3	4.06	1.019	4.06	1.019	
Confirm1	4.05	1.158	4.35	1.158	1.587 (0.000)**
Confirm2	4.04	1.093	4.24	1.093	
Confirm3	4.02	1.080	4.12	1.080	
Satis1	4.38	1.138	4.32	1.135	0.801 (0.000)**
Satis2	4.55	1.202	4.51	1.200	
Satis3	4.40	1.310	4.40	1.310	
Acurracy1	4.78	1.289	2.68	1.241	11.18 (0.000)**
Acurracy2	4.38	1.378	3.59	1.600	
Acurracy3	4.18	1.296	3.67	1.591	
Trust1	3.99	1.287	4.46	1.333	3.219 (0.01)*
Trust2	4.11	1.490	3.37	1.269	
Trust3	4.14	1.533	3.37	1.439	

*p<0.05; **p<0.01

of the two countries, we focused on users' cognitive process: how users evaluate the qualities of AJ news, how users make sense of the AJ news-making process, and users' level of satisfaction with the suggested news. The model implies that interacting with algorithms involves a number of cognitive processes. To understand user attitudes and behaviors of AJ, research must consider system quality, user heuristics, and performance value. Developing effective user-centered algorithm services requires understanding users' cognitive processes and reflecting them in design work.

The findings imply that people's perceptions of algorithmic processes are contextual. This implication is consonant with Shin and Park's argument (2019) that similar algorithms can be viewed differently depending on the circumstances or the contexts in which the algorithms are developed,

Table 6. Summary of hypothesis testing

Hypothesis	South Korea				United States			
	Unstandardized coefficient	SE	CR	Support	Unstandardized coefficient	SE	CR	Support
H1 (TR-C)	0.066	0.123	0.539	No	0.463**	0.112	4.168	Yes
H2 (AC-C)	0.709**	0.134	5.284	Yes	0.478**	0.090	5.330	Yes
H3 (FA-C)	0.416	0.208	1.997	No	0.459**	0.136	3.389	Yes
H4 (C-U.S.)	0.695**	0.066	10.615	Yes	0.434**	0.073	5.848	Yes
H5 (C-AR)	0.871**	0.074	10.828	Yes	0.584**	0.077	7.604	Yes
H6 (C-CO)	0.807**	0.074	10.868	Yes	0.651**	0.096	6.789	Yes
H7 (U.S.-S)	0.151*	0.048	3.120	Yes	1.420**	0.284	5.007	Yes
H8 (AR-S)	0.607**	0.062	9.767	Yes	0.157	0.096	1.623	No
H9 (CO-S)	0.221**	0.044	5.078	Yes	0.058	0.044	1.329	No
H10 (TU-S)	0.186**	0.033	5.713	Yes	0.256**	0.037	6.947	Yes

* *p*<.05; ** *p*<.001

Table 7. Squared multiple correlation comparison

	South Korea	United States
Confirmation	0.547	0.742
Convenience	0.532	0.268
Accuracy	0.705	0.484
Usefulness	0.498	0.775
Satisfaction	0.856	0.639

Note: The result of multicollinearity test shows no signs of a multicollinearity problem.

Figure 4. Compared unstandardized coefficients (*p < .05; **p < .01)

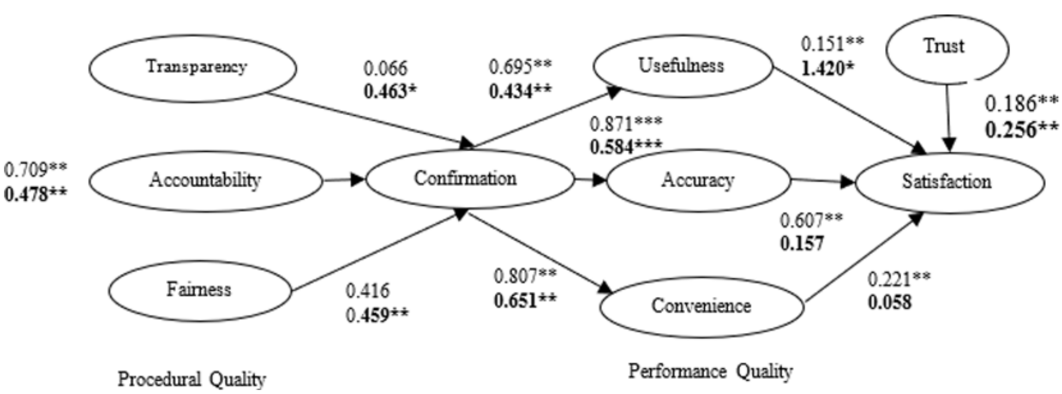


Table 8. Summative findings

RQ	Findings
What are the cross-national differences in user attitudes and motivation for adopting AJ content?	The results report national differences of users' perceptions of and attitudes toward AJ in the two countries. There are differences in cross-national behaviors in terms of procedural and performance quality of AJ. There are also differences in cross-national estimates of trust and satisfaction, which could be due to differences in the study sample, study design and cultural differences in the use and service types of AJ.
RQ1: Are there differences between U.S. and South Korean users regarding their perceptions of FAT in AJ news?	The notable similarities and differences are found by performing a comparison of cognitive processes. The major attitudes toward algorithm news are similar between the two countries, although the weights placed on the qualities differ. South Korean users put more weight on performance qualities, and U.S. users place relatively greater emphasis on procedural features. Different patterns of algorithm news experience imply the contextual nature of algorithm: How users perceive and feel about topics in algorithm news and how they use and engage with algorithm news depend on the context where the experience is taking place.
RQ2: Do U.S. and Korean users perceive the quality of algorithm news differently?	By proposing procedural qualities (i.e., transparency, fairness and accountability) influence confirmation that in turn affects performance qualities (i.e. usefulness, convenience and accuracy), the model reveals the mediating role of confirmation in the relationship between procedural qualities and performance qualities. A strong mediating role of confirmation between the procedural qualities–procedural qualities implies the importance of measuring confirmation separately from algorithm service qualities when modelling the effects of quality on outcome constructs. This relationship also suggests that confirmation is critically important for examining trust and satisfaction.
RQ3: How much do the users in the U.S. and Korea trust AJ and how does that level of trust influence the satisfaction of AJ?	The Korean users were significantly more trusting than the U.S. users. Satisfaction was lower in the U.S. sample than in the Korean one. The U.S. users navigate to algorithmic news on social media with generalized skepticism because most people in the U.S. have low trust in how algorithm news is selected and tend to be skeptical of how algorithms select news.
Common conclusions	-AJ should establish user trust and credibility through clear FTA. AJ must transcend perfunctory transparency or mechanical accuracy and fulfill actual user needs and perspectives. -Understanding user affordance facilitates the development of a user-centered interface for AJ

adopted, and used. Users' perceptual system quality plays a critical role in the consumption of news content and the adoption of the system overall (Zheng et al., 2018). The algorithmic heuristic occurs when users' subjective perceptions about procedural qualities act as a mental shortcut of usability, satisfaction, and trust. Users' perceptual cognizance of AJ quality and trust are key heuristics in determining the effects of objective systems on the three aspects of UX: system characteristics, contextual factors, and perceived value. The results also show that users find the capability to actively shape or control news recommendation mechanisms as a useful and necessary feature. We infer that users actively engage and contribute to news recommendations and algorithms respond to the users' desires. AJ recommends the content users want to see; thus, the content is based on the users' cognitively reconstructed reality.

Procedural Quality Versus Performance Quality

It is shown that users in both samples who perceive AJ services as high quality and useful generally have positive confirmation, resulting in high satisfaction. Users who perceive AJ as transparent are more likely to show a positive attitude and favor the procedural aspects of algorithms. Users who have positive conformation of AJ are more likely to trust, which then lead to satisfaction of AJ services.

The findings show that procedural qualities and performance qualities are valid differentiators of AJ use and satisfaction in the two countries. The AJ users in the two countries, however, differ in how they felt, perceived, and preferred to interact with AJ in terms of the procedure–performance framework. From the findings, we infer that the value structure differs in the two countries regarding process versus performance. User motivations in different contexts are a critical explanatory variable when identifying cross-national AJ experience patterns. Results of difference tests indicate that each component of procedural qualities and performance qualities differs, implying that the needs and values of algorithm users between the two countries may differ. The findings indicate that Korean AJ users are more affected by qualities regarding performance of AJ services such as accuracy, usefulness, and convenience than by procedural qualities, whereas users in the U.S. reveal opposite preferences. Notably, the differences in patterns are also linked to perceived quality. Users who perceive outcome values of AJ also think accuracy and convenience key factors that influence their satisfaction. Users who perceive procedural values also consider transparency and fairness quality to be key factors that influence their confirmation.

The R-squared measures in the model support the arguments. Performance qualities such as usefulness, accuracy, and convenience explain 74% of the variance in satisfaction with AJ for Korean users, and 65% for U.S. users. Procedural qualities explain 73% of the variance in confirmation for U.S. users, and 54% for Korean users. Korean users are more likely to be gratified with utility of AJ than U.S. users, whereas U.S. users are more likely to be confirmed through procedural quality than their Korean counterparts. Other underlying factors might explain confirmation for Korean users, and there might be other variables accounting for satisfaction for the U.S. users. Maybe the U.S. users expect more than performance in terms of algorithm satisfaction, whereas Korean users expect more than FAT in terms of confirming the procedural qualities. Although high R-squared values are not necessarily good, we infer that perceived procedural and performance qualities are perhaps meticulously interdependent factors that co-influence AJ users across countries, as proposed by Shin and Park (2019).

These differences are largely due to the different public attitudes toward computer algorithms. A survey demonstrated that the U.S. public—by and large—is skeptical about the capacity of algorithms (Pew Research Center Survey, 2018). More than half of the U.S. population feels that automated programs will inevitably reveal some level of human prejudice. The public is concerned that algorithms might infringe privacy, fail to reflect the details of complicated situations, or simply put the people they are evaluating in an biased situation. People's perceptions of algorithmic decision-making can be contextual. People in the U.S. might be more skeptical about the algorithmic features when used in the AJ context than Koreans. This finding is partially consistent with Zheng et al.'s finding (2019) that U.S. users prefer human-reporter–written news to algorithm-generated news, whereas Chinese users show the opposite preference. Similarly, Flether and Nielsen (2019) found the U.S. users navigate to algorithmic news on social media with generalized skepticism because most people in the U.S. have low trust in how algorithm news is selected and tend to be skeptical of how algorithms select news. Although we cannot assert that Korean users have more faith in how algorithms select news, perhaps Korean users do not understand exactly (or less care about) how the news they receive is curated/filtered by what algorithms; thus, they uncritically receive news including the concerns regarding FAT. Although the U.S. users may not understand the specific algorithm process either, there are widespread concerns about FAT and skepticism of algorithmic selection; thus, individuals in the U.S. tend to critically review the issues, including FAT (Pew Research Center, 2018). Korean users feel more comfortable with algorithms, assume procedural aspects are legitimate, and tend to trust algorithms more than U.S. users (H10; beta: 0.186 vs 0.256; CR 5.713 vs. 6.947). Korean users may consider the AJ more trustworthy and reliable than U.S. users. They probably are more concerned with the results/performance of the recommended news by AJ regarding whether they are predictable and accurate and how convenient and useful rather than how and why their data are being used and when.

The findings show that similar algorithms can be viewed differently depending on the circumstances or the contexts in which they are accepted. These inferences from the findings are conceptually related to findings in the literature. For instance, studies by Shin and Choo (2012) and Jensen and Wagner (2019) have demonstrated that user experiences of media/technologies are largely reliant on national characteristics. This study attempted to examine why users from the U.S. and Korea experience AJ differently. Possible explanations for the difference include that algorithm technologies are more widely used and available in Korea than in the U.S., and the advanced technological infrastructure in Korea has spurred rapid adoption and satisfaction with the algorithm medium (Shin, 2019). A general social norm is that algorithm technologies are bounded with legal provisions and regulatory limitations (data policy and privacy regulation) in the U.S. that are relatively narrow in scope, and that algorithm service offerings are limited compared with those in Korea, where rates of algorithm adoption and diffusion are fairly high in the world. Hence, it is clear that the substantial differences between the algorithmic environments of the two countries would influence user attitudes toward, and motivation for using, algorithm services. There may be differences in the social and cultural milieu that guide the diverse motivations for utilizing algorithm services. This cultural dimension was not considered in this study, but further research may explore this area.

Our results show that the relation between procedural and performance qualities is more intricate when such a distinction is applied to cross-national contexts. Users in the two countries who believed algorithm services as high quality and usable generally had positive confirmation, which rendered high satisfaction. Those who perceived algorithms as procedural were more likely to show a positive attitude and like the transparent processes of algorithms. The findings also reveal that users in both countries differ in how they think about and prefer to interact with algorithms in terms of process and performance dimensions. Based on the findings, we infer the value structure of the two countries differs in terms of process versus performance. User motivations in different contexts are a critical explanatory power when considering cross-national algorithm adoption patterns. Results of difference tests imply that the needs and values of algorithm users between the two countries may also differ. The findings also reveal that Korean users are more affected by accuracy qualities of AJ than by transparency utility compared with users in the U.S., who had the opposite views.

Implications

The primary contribution of this study is the application of expectation–confirmation–satisfaction frame from information system in the algorithm news domain.

Theoretical Implications

The quality of user experience is complicatedly related to the users' contextual individualities and this is true regarding AJ. However, not many attempts have made to investigate cultural or national characteristics closely related to user experience. The key goal of this study was to reveal potential national differences related to the user experience of algorithms and to measure them cross-nationally with AJ.

This study makes three contributions to the ongoing body of literature. First, a main contribution of this research is the cross-country framework we propose to understand why people perceive certain features used in algorithms as good or invalid. Our framework identifies six properties of features, for instance, fairness, transparency, and accountability as latent considerations that confirm people's heuristic judgment, and usefulness, accuracy, and convenience as antecedents of satisfaction. Our findings have heuristic implications. At a high-level, we show that people's attitudes toward algorithms are contextual and call for further research on the relation of contextuality and culture/individual features.

Second, this study explored the nature of qualities in algorithms by clarifying procedural and performance qualities in AJ cross-nationally. The theoretical contribution of this study is the examination and proof of the mediating role of confirmation between procedural and performance qualities in the satisfaction-trust process. The mediating effects of confirmation on performance qualities imply that people use procedural features as judgmental cues assessing performance values (Shin & Park, 2019). User's perceived procedural qualities serve as judgmental rules of thumb for values, satisfaction and trust. Much of the user interactions, limitations, and affordances in algorithms are dependent upon user heuristics. Users rely on heuristics to make assessments of quality efficiently, quickly, and repeatedly, with limited information about material features (Shin, 2019). AJ is no exception to this tendency. Due to the complexity of algorithm systems, users rely on heuristics to navigate the algorithm services to assess qualities in making decisions about AJ. People use their own heuristics when forming judgements and making decisions about AJ. Ordinary users are not familiar with the details of algorithm operation and structure. When they are making decisions about AJ, they are often content to trust a plausible judgement that comes to mind, like a vague perception of transparency, fairness, and accountability.

Third, the results showed that algorithm use and interactions were positively related to perceived values, which were significantly associated with the users' notions of transparency and accuracy and with future intention. The findings of this study implied the connections between a dynamic experience, algorithm services, and users' interactions with the automated environment. The implied links constitute a theoretical advancement of user heuristic research. In the expectation–confirmation theory literature, perceived values have been considered to influence expectations, which then leads to confirmation. The heuristic model in this study shows how such values are formed and how they together influence confirmation in the context of algorithms. The model shows how perceived values are related to confirmation, which then influences usability and satisfaction. User attitudes are formed through underlying perceptions including transparency, accuracy, and perceived value. Assessing these perceptions improves predictions of AJ content adoption and the diffusion of algorithm services. By identifying antecedents of perceived value and by clarifying cognitive processes, this result provides modest but meaningful theoretical progress regarding expectation–confirmation theory.

Practical Implications

The pragmatic implications of algorithms and AJ can be the potential for evaluating framework for user experience and design guidelines for new algorithm services. For the developers of AJ or other similar algorithmic services, the implications of this study can help advance the systems' performance and UX toward their products. From a comparative perspective, the findings also highlight the importance of considering national culture when examining users' expectations and confirmation of algorithm services.

The results of this study give two key implications to AJ practitioners. First, the most apparent differences between users in Korea and the U.S. are in value structure and procedure versus performance. Although both values are needed to understand the role of algorithms in peoples' daily lives, process and outcome influence the use and consumption of AJ differently between the two countries. The findings indiciate the importance of procedural value in algorithms, which represents user-centered algorithms, and this point should be carefully considered by the algorithm industry, especially in the Korean society, where FAT concerns have been troubling recently. Globally, algorithm users expect legitimacy of algorithms in addition to usability and convenience. In addition to the pragmatic aspect of usability that serves users' functional needs, procedural values comprise the designs and dimensions that focus on satisfying users' rights to know about the internals of algorithms.

Second, U.S. and Korean users have dissimilar value structures that influence expectations, confirmations, and satisfaction. The findings imply that the industry should examine the specific algorithm services desired by target countries or at least by a regional culture. To improve the levels of AJ user satisfaction in different countries, localized strategies should consider the cultural features unique to each country. The contrasting patterns of the two countries imply that the AJ users have diverse experiences with and expectations of algorithm services. Algorithm industry may focus on following specific questions.

RQ1. How to provide Korean users with assurable procedural features?
RQ2. How to provide a quality of performance highly usable and convenient for U.S. users?

The different formations further suggest algorithm firms should adopt localization strategies to optimally serve local audiences. The findings of the study provide hints on how to enhance fairness, accountability, and transparency in AJ and how to increase trust and thereby improve satisfaction overall.

CONCLUSION

This study reports a comparative study that examines users' perceptions of and attitudes toward AJ in the U.S. and South Korea. A cross-national analysis of AJ was conducted to investigate drivers affecting perceived qualities and satisfaction in the two countries. By proposing procedural qualities (i.e., transparency, fairness and accountability) influence confirmation that in turn affects performance qualities (i.e. usefulness, convenience and accuracy), the model reveals the mediating role of confirmation in the relationship between procedural qualities and performance qualities. A strong mediating role of confirmation between the procedural–performance qualities implies that it is important to measure confirmation separately from algorithm service qualities when modelling the effects of quality on outcome constructs. This relationship also suggests that confirmation is critically important for examining trust and satisfaction.

The results of the study suggest that while users' general attitudes toward algorithm news are similar, the weights placed on the qualities of algorithm news differ between these two countries. The Korean users put greater emphasis on the performance qualities of algorithm news, and the U.S. users place more weight on the procedural features of algorithm news. Different patterns of algorithm news acceptance imply contextual nature of algorithm: How users perceive and feel about issues in algorithm news and how they use and engage with algorithm news depend on context where the experience is taking place. This result suggests the importance of user perceived issues as well as the contextual nature of such issues. The results of this study offer a conceptual model that addresses user value perception for using algorithmic news. While the findings of this study confirm the previous research that perceptions of FAT strongly impact perceived value and satisfaction of algorithmic services (Shin & Park, 2019), the results of this study make contributions to the literature on automated news and algorithm curations. Comparative observations in the findings are useful to juxtapose how value is constructed in the countries and recognize which factors influence user confirmation and satisfaction.

LIMITATIONS AND FURTHER RESEARCH

Whereas the findings of this study are useful, the findings must be interpreted with discretion for the following grounds. First and foremost, this study conducted a cross-national comparison but excluded cultural factors. The focus of a cross-national approach in this study is basically from the intention to evade cultural factors in drawing the argument. This study excludes such cultural factors parsimonious reasons to focus on FAT issues, which are difficult to connect with cultural dimensions. This exclusion is a limitation because we do not provide a clear explanation for the national differences we observe. This topic can be a research area for further research and opens heuristic questions concerning how the perception of FAT in different contexts shapes use and provisions of FAT. Clearly, additional studies that systematically link FAT and media use and compare findings and explanatory factors across countries with different levels of algorithm media use are necessary.

Second, the data in this study have limitations. The samples were collected with self-selected convenient samplings; thus, the generalizability of the findings may be limited. Additionally, the self-reported nature of the survey may inherently be limited in conceptualizing FAT, which is highly abstract. The concerns regarding the sample and the generalizability may be inherent problems in general social scientific studies. Nonetheless, the samples could have been collected in a broader context. Additionally, this study did not include the various effects of demographic traits. Users' personality may greatly influence the consumption and adoption of AJ. Trust in algorithms may depend on a user's dispositional trust. Further research could conduct investigations while considering these excluded factors, and a time-series analysis can be accompanied with a large sample.

Third, the findings exhibit limited or partial pictures of UX with AJ. Because algorithms and AJ are still early stages of development, this study is limited in its application to other countries in that its results cannot be fully generalized to the broader population of algorithm users. We did not confirm whether AJ represents a type of recommendation system. Moreover, the concepts of FAT should be further and more clearly defined and measurably operationalized. This study attempted to address such concepts and incorporated them into the user model as antecedent factors of satisfaction and trust. Such issues are presently popular, but the factors have not been validated, and this study approached them on an exploratory basis. Although such concepts should be incorporated into algorithm design, how to accomplish this task remains uncertain. Additionally, such factors have been defined as legal concepts, and further research can define them further and develop them in reference to UX.

Altogether, the limitations imply the need for a more meticulous approach and theoretical refinement, specifically regarding how to best capture the interaction between users and algorithms, how to define the roles of trust in the course of interactions, and how to infuse social topics into the design and development of algorithms. From a long-term perspective, further research should examine a wider range of user experiences, including how users' traits influence the perceived accuracy and transparency of recommendations. Indeed, there is a growing need to create a new field around algorithm services, which examines the interplay of social and algorithms.

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APPENDIX

Table 9. Survey measurement items

Perceived Performance (Outcome)		Source
Usefulness	1. AJ news is useful. 2. AJ news is practical. 3. AJ news is functional and beneficial.	Shin, 2017; Shin, 2016; Shin, 2010; Shin & Park, 2019
Convenience	1. AJ news is convenient. 2. AJ news is easy to use. 3. AJ news is accessible.	
Accuracy	The recommended news is accurate. AJ content is fair. The AJ process is interpretable and explainable.	
Normative value (Procedural Quality)		Source
Transparency	1. The algorithm processes are transparent. 2. AJ processes are consistent. 3. Overall, AJ follows a legitimate process.	Initial notions were derived from Diakopoulos & Koliska, 2016; Shin, 2021. Shin & Park, 2019
Accountability	1. The system needs a person in charge accountable for its adverse individual or societal effects in a timely fashion (Responsibility) 2. Algorithms should be designed to enable third parties to examine and review the behavior of an algorithm (Auditability) 3. I have the ability to change algorithm system and configuration regarding privacy and results (Controllability)	
Fairness	1. The system has no favoritism and does not discriminate against people (Non-discrimination) 2. The source of data throughout an algorithm and its data sources should be identified, logged, and benchmarked (Accuracy) 3. The system follows due process of impartiality with no prejudice (Due process).	
Cognitive processing		Source
Trust	1. I trust the news recommended by AJ. 2. Recommended news from AJ is trustworthy. 3. AJ results are reliable.	Hoff & Bashir, 2015; McBride, Rogers, & Fisk, 2011; Shin, 2010; Zhang et al., 2014
Confirmation	1. AJ meets my needs overall. 2. AJ fits my expectation and needs. 3. AJ news proves my prior thinking and trust.	Kim et al., 2013; Shin, 2010
Satisfaction	1. Largely, I am fairly pleased with algorithm services. 2. Overall, the algorithm services fulfill my initial expectation. 3. Generally, I am satisfied with the contents of algorithm services.	Shin, 2010; Lee *et al.*, 2015

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