Exploring the Effects of Personalized Advertising on Social Network Sites

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ABSTRACT

With the advancement of social media and information technology, the number of people using social commerce has highly increased in recent years. Through the AI models, sellers can promote personalized advertisements base on consumers' browser history or behavior preferences. This study will investigate how advertising perceptions will influence advertisement effectiveness. We used online survey to collect 1215 participants from Facebook. The relationship between advertising perception, consumer engagement, and purchase intention will be verified through partial least square (PLS). The finding shows that when consumer perceive interactivity and intimacy, will increase consumer engagement. Furthermore, consumer engagement can influence purchase intention. The result is not only verified that perception of relevance, intimacy, and likeability can increase perceived personalization advertising, also verify that relevance and likeability can increase consumer engagement or purchase intention through increasing perceived personalization advertising. These results confirmed that personalized advertisement can enhance advertising effectiveness.

1. Introduction

Social media, such as Facebook and Instagram, drive the online interactions and sharing among people as technology has entered the era of Web 2.0. These media are combined with existing e-commerce and a new type of e-business – social commerce – is born. The term "social commerce" was first seen in 2005, when Yahoo started to describe online consumers ratings and reviews on products and their sharing behaviors. The popularity of smart phones prompts the changes in consumers' shopping habits, as they can shop any time anywhere without the need to physically visit a store, and the products they buy are shipped to their doorstep, which eventually stimulates the opportunities of online shopping. Social commerce lowers the bar for sellers such as small business or micro-seller to build a platform, as it becomes a channel of exposure for everyone. It allows sellers to interact with consumers for greater intimacy, which in turn leads them to purchase.

The technological advancement in terms of AI and computer hardware means that today's computers are more capable of processing massive data than ever. The e-commerce platforms allow for browsing the paths traveled by viewers and their shopping habits. The algorithms analyze, predict, and ultimately provide personalized advertisements to catch the attention of consumers. Personalization not only means to satisfy consumers with their expectations, but also allows consumers to know that a brand can satisfy their needs directly; in addition, it provides a unique interactive experience, as salespersons are given the opportunity to interact with shoppers during the sale process, which gives shoppers a better impression about the brand.

The social commerce has changed the habits of traditional buying and selling thanks to the advancement of artificial intelligence and big data technologies in recent years. Personalized recommended accelerate the marketing schedule while attracting consumers' eyes more accurately. Previous studied were mostly focused on the technical development of personalized recommendations, which cannot be said for the influence of consumers' perceptions on personalized advertising. This study is aimed to learn more about the influence of personalized social commerce advertising on reaction to advertising, social network reaction and advertising effect. By summing the above, this study serves five purposes as follows:

1. Determine the dimensions of personalized recommendation and perceived social advertising through literature review, establish conceptual framework and model for the study and develop questions for the questionnaire.
2. Examine consumers' personalized and social perceptions of social advertising by distributing online questionnaire and examine reliability and validity analyses on the questions using confirmatory composite analysis (CCA).
3. Investigate the causality between social network perception and perceived personalization of advertisement effects based on data analysis results using PLS analytic model.
4. Test the advertisement effects of personalized recommendation for any difference in various product types, including search goods, experience goods and credence goods.
5. Conclude based on analysis results and provide theoretical and practical implications for future studies or development of marketing strategies for social commerce.

2. Literature review

2.1. Social media advertising

2.1.1. Social commerce

The social commerce is defined as a branch of e-commerce that is established on social media. It allows social media users actively to participate in a market selling products and services. The biggest difference from e-commerce is that it is built on existing social platform technology; the influence is inflicted on the purchase behaviors of consumers through social media supported commercial events, such as customer recommendation, user interface and shopping cart (Chen & Shen, 2015). Consumers can directly get information and post their reviews on social media. The structure of social commerce is defined as the structure derived from social media platform, including online forums, ratings, communities, reviews and recommendations (Hajli, 2015). According to GlobalWebIndex, 45% of consumers checked product reviews during purchase in 2019. Social commerce becomes a new channel through which consumers' final purchase intentions are affected (Lin et al., 2019).

2.1.2. Social network advertisement

Social network advertisement is the advertisement published by businesses or sellers using social media, such as Facebook or Instagram, as an advertising channel. The network technology allows fast transmission to the page of social media users. With the interactions over social network, not only good interactions make consumers impressed by a brand, but also social media users spread the contents to more potential customers without knowing.

According to the Stimulus-Organism-Response Framework Theory (S-O-R) proposed by Mehrabian and Russell (1974), when a consumption behavior occurs, consumers are subject to the simulation of the following factors: product quality, price, interactions and word of mouth. They lead to psychological actions, and the motivations in practicality and enjoyability generate influence on consumers' perceptions and emotions. Finally, consumers display various reactions, including purchase behavior and brand awareness. With consumer's consumption behaviors and change of technology in mind, studies were conducted based on the S-O-R theory in the attempt to investigate consumers' behaviors in e-commerce and social media. Dabbous et. al. studied the relationship between social media and offline purchase intention based on the S-O-R model and positive influence was observed in the results due to the stimulation of enjoyability, consumer engagement and brand awareness (Dabbous & Barakat, 2020). The framework of this study was modeled based on the S-O-R theory to explore the reactions to advertisement due to the perceptual changes generated by consumers with advertisements of various product types for stimulation in a social commerce environment.

2.1.3. Personalized advertising

Personalized advertising is defined as an advertisement created based on personal information that identifies a person, such as name, email address, home address, and consumptions behaviors like the person's shopping history, visited websites and preferred products (Yuan & Tsao, 2003). According to the definition proposed by Imhoff et. al., personalized advertising allows businesses to identify consumers and treat them as independent individuals in order to provide personalized messages, advertisements and even special discounts for consumers based on of personal transaction bills (Imhoff et al., 2001). Thanks to network technology, personalized advertising is presented in various forms, such as customized advertising or interactive advertising, as opposed to the traditional advertising via newspaper or TV where it is unable to focus on specific customer groups. The core is built upon the personal information of consumers (Yu & Cude, 2009).

Previous studies pointed out that personalized advertising increases consumers' attention, making them believe the advertised products are related to them. However, many users are concerned about unwilling disclosure or abuse of their private information. Malleiros et. al. manipulated the level of personalized advertising to investigate the influence of consumers' attentions through simulation of hotel booking advertisements. The results indicated that businesses still have to be aware of personalization at an appropriate level to keep consumers from believing that privacy risks outweigh benefits provided by personalized advertising (Malheiros et al., 2012, May 5).

2.2. Perceived social advertising

2.2.1. Interactivity

The most important function of social media in social commerce is to provide an interactive platform for real-time communications and exchange of thoughts between brands and consumers. The interactions come in the form of content generation and sharing, such as a

consumer sharing their shopping experience or forwarding a shopping message. The referral of consumers brings subjective and objective supports to advertised contents (Dabbous & Barakat, 2020; Zhang et al., 2014). Previous studies on interactivity were focused on communications between people and interactions between machines and people as technology advances (Alalwan, 2018). It is shown that consumer engagement has positive influence and deepens the relationship between a brand and consumers (Murdough, 2009). Interactivity can be a factor with which a consumer establishes trust in an online virtual community (Wang et al., 2013). Therefore, we hypothesize:

H1. The interactivity of social advertising increases the consumer engagement in consumers.

2.2.2. Credibility

Credibility is the level of an advertisement receiver's subjective and objective trust on advertised contents (Yaakop et al., 2013). In previous literatures, important factors affecting receiver and message contents based on perceived quality are influence, credibility and relevance; and the factors to evaluate transmission media based on technical quality are novelty, availability and flexibility. Finally, the results combining system quality, perceived quality and technical quality suggests that the greater the system quality, the greater the credibility, and the more easily to convince advertisement receivers to believe in advertised contents (Wathen & Burkell, 2002). Credibility is closely linked to the perceived business integrity and benevolence. It is learned from previous studies that an advertisement with greater attractiveness and expertise has positive influence on advertising attitude and purchase intention. An advertisement from a community friend on a social media platform has greater credibility (Sokolova & Kefi, 2020). The contents published by someone with many followers tend to have positive influence on credibility (De Veirman et al., 2017). Therefore, we hypothesize:

H2: The credibility of social advertising increases the consumer engagement in consumers.

2.2.3. Reciprocity

Reciprocity is considered a benefit from participating in social activities. It brings information providers benefits, allowing them to expect that their contributions are returned in favor in the future. Studies have shown that those who helped others on a social media platform tends to be helped more quickly (Kankanhalli et al., 2005), and that encourages the responsibility in members of social interactions to help others, thus more responses over social network (Wasko & Faraj, 2005). A social media user who help people frequently on a social media has positive influence on the willingness to share information (Liu et al., 2016). In addition to obtaining information that one wishes to know or increasing one's knowledge from messages provided by others, studies have also shown that reciprocity provides two-way exchanges of information, which has positive influence on mutual trust between those on the platform (Wang et al., 2013), and helps the development of interpersonal relationship (Maheshwari et al., 2020). Social media platform members feature reciprocity as opposed to traditional e-commerce websites. For this, the following hypothesis was proposed:

H3. The reciprocity of social advertising increases the consumer engagement in consumers.

2.3. Perceived personalized advertising

2.3.1. Relevance

Relevance is defined as the level that a consumer perceives an advertisement and autocorrelation, as well as the degree that helps fulfill personal needs, targets or values. Celsi and Olson (1988) reported that the level of consumer engagement is affected by the perceived personal relevance, which is in turn converted into actions, such as searching or shopping. Previous studies have shown that an advertisement with stronger relevance attracts more attentions, has influence on the willingness of consumers to accept social advertising and constantly increases the efficiency of online advertising (Zeng et al., 2009). In a social commerce platform, it is easier for sellers to spread advertisements than a traditional e-business unilaterally and to customize various personalized messages or posts efficiently based on the database of consumers' behaviors, preferences and records (Srinivasan et al., 2002).

In addition, Lu et al. (2010) reported that the perceived relevance comes from the process of trust building. Trust is easily built based on friends in social media or group members sharing the same interests or values, as opposed to total strangers. Therefore, stronger relevance is perceived. The stronger relevance a consumer perceives, the greater relevance to consumers' needs or behavioral preferences and greater willingness to keep watching (Zhu & Chang, 2016), which in turn creates more positive memory for the advertisement. It is believed that this information is useful for the consumers themselves (Alalwan, 2018). Hence, the following hypotheses were proposed:

H4a. The relevance of personalized advertising increases the consumer engagement in consumers.

H4b. The relevance of personalized advertising increases the perceived personalization in consumers.

2.3.2. Intimacy

Intimacy is defined as the very close and mutually understandable relationship that consumers has for a brand, including the same values, mutual sympathy, commitment and sense of safety (Bauminger et al., 2008; Brock & Zhou, 2012). Previous studies have shown that the establishment of intimacy includes intimate interactions and relationship. In interactions, both parties are willing to share their personal and private information and their impressions for one another; the development of intimate relationship includes the trust to one another and willingness to disclose information (Rosh et al., 2012). Based on the establishment of intimacy, it has been proposed in studies that consumers sharing personal information or willingness of future transactions is based on the good intimacy between consumers and sellers (Jeon & Kim, 2016). There were also studies suggesting that intimacy results in high engagement and mutually reliable relationship between consumers and sellers (Ponder et al., 2016). Commitments and intimacy, on the other hand, serve as the intermediary between trust and loyalty (Tabrani et al., 2018). Thus, the following hypotheses were proposed:

H5a: The intimacy of personalized advertising increases the consumer engagement in consumers.

H5b: The intimacy of personalized advertising increases the perceived personalization in consumers.

2.3.3. Likeability

When a fan page of a brand is followed by a large number of followers, it means that these followers are interested in the brand when they like or subscribe the fan page. Either academically or practically, therefore, businesses evaluate how popular a brand or spokesperson is based on this, as it is more attractive and persuasive and displays stronger influence (De Veirman et al., 2017). When consumers view an influential brand as an opinion leader, the messages it provides become more valuable, and the messages are spread more rapidly and widely as the number of followers increases (Yoganarasimhan, 2012). There were also studies suggesting that the greater the likeability, the more the consumers believe the information provided is correct and the more willing they are to interact with the brand (Xiang et al., 2016). As a result, the following hypotheses were proposed:

H6a. The likeability of personalized advertising increases the consumer engagement in consumers.

H6b The likeability of personalized advertising increases the perceived personalization in consumers.

The more a consumer perceives personalization in advertisement, the greater the support he/she has for the community, as it makes the consumer feel that the advertisement meets his/her needs and stimulates him/her to interact with others, which indirectly leads to a good relationship and trust in the group. In addition, studies have shown that interactions in communities generate presence and bring influence on consumers' attitudes and behaviors (Zhang et al., 2014). Shanahan et al. (2019) reported that social platforms provide a channel for businesses to create a closer relationship with customers and, thus, lead to a deeper consumer engagement and reliance on the businesses. Therefore, the following hypotheses were proposed, as it is believed in this study that the stronger a consumer perceives personalization in advertisements, the higher level of consumer engagement and purchase intention it leads to.

H7. The perceived personalization of consumers increases consumer engagement behaviors.

H8. The perceived personalization of consumers increases purchase intention.

2.4. Consumer engagement

Consumer engagement comes from good interactive relationship and there are benefits to be received in the non-transactional behaviors, such as receiving information and becoming more popular (Molinillo et al., 2020). The social commerce is built upon the technological foundation of social medial and Internet for online transactions. The good side is faster diffusion through sharing by consumers. The combination of social media and marketing strategy improves the efficiency of business processes, such as customer relationship management, marketing events and sales events. The diversity of social media functions include forwarding posts, pictures and communities (Bugshan & Attar, 2020). In addition, the interactive behaviors on social platforms allow businesses to share information at minimal costs, through which the trust and loyalty are built between businesses and consumers and consumer engagement or purchase intention is improved (Bianchi et al., 2017). Studies have shown that the emotional relationship generated during consumer engagement has positive influence on purchase intention and recommendation (Farivar et al., 2018; Pöyry et al., 2013).

Consumer engagement reflects the interactions and engagement of an independent consumer in social media, including likes, reviews and sharing. The more a consumer displays engagement, the more time or attention he/she spends on the brand. Over time, as a profound

relationship is developed between a brand and consumers, it is easier to impose influence on purchase decisions (Dabbous & Barakat, 2020). Therefore, it is believed in this study that the stronger the consumer engagement, the more influence on the purchase intention. Hypothesis 9 was proposed as follows.

H9. The level of consumer engagement in a consumer increases his/her purchase intention.

2.4.1. Purchase intention

The purchase intention is defined in this study as the possibility that a consumer buys a brand or product online based on the information received in an advertisement. This intention ultimately affects the purchase decision, which is an indicator to evaluate whether the message in advertisement is successfully delivered (Lee et al., 2017). Previous studies have reported that the more creative an advertisement is, the more capable it is to establish a positive influence to increase consumers' purchase intention and encourage the decisions to buy (Shen et al., 2020).

2.4.2. Moderating effect

Consumers focus on different aspects of different product types. For example, search goods and experience goods originate from information asymmetry between consumers and businesses. Search goods feature the lowest information asymmetry, as consumers may search all the information about how good/bad a product quality is before buying, and this is common in home appliances; for experience goods, consumers cannot evaluate the quality of product and a decision can only be made through using the product or experiencing the service, and this is common in, for example, foods in a restaurant; credence goods are services or products whose quality is still difficult to be determined even after the services or products have been used for a while, and examples are medical or legal services. It is believed in this study that the above may bring different influences on the advertising effects. Therefore, hypothesis was proposed below with the product type as a moderating variable.

H10. Product type generates the moderating effect between perceived advertising and purchase intention.

3. Research methodology

3.1. Conceptual model

Based on the above discussion, this study develops the conceptual framework as Figure 1. The study consisted of two parts; the first was to investigate the physical and psychological perceptions generated after consumers received advertisement, including the influence of perceived on consumer engagement and perceived personalization; and the second was the reactions generated by perceptions, including the influence of consumer engagement and perceived personalization on purchase intention. This study also uses product types as moderating variables to verify the relationship between perceptions and reactions. The product types including search goods, experience goods and credence goods.
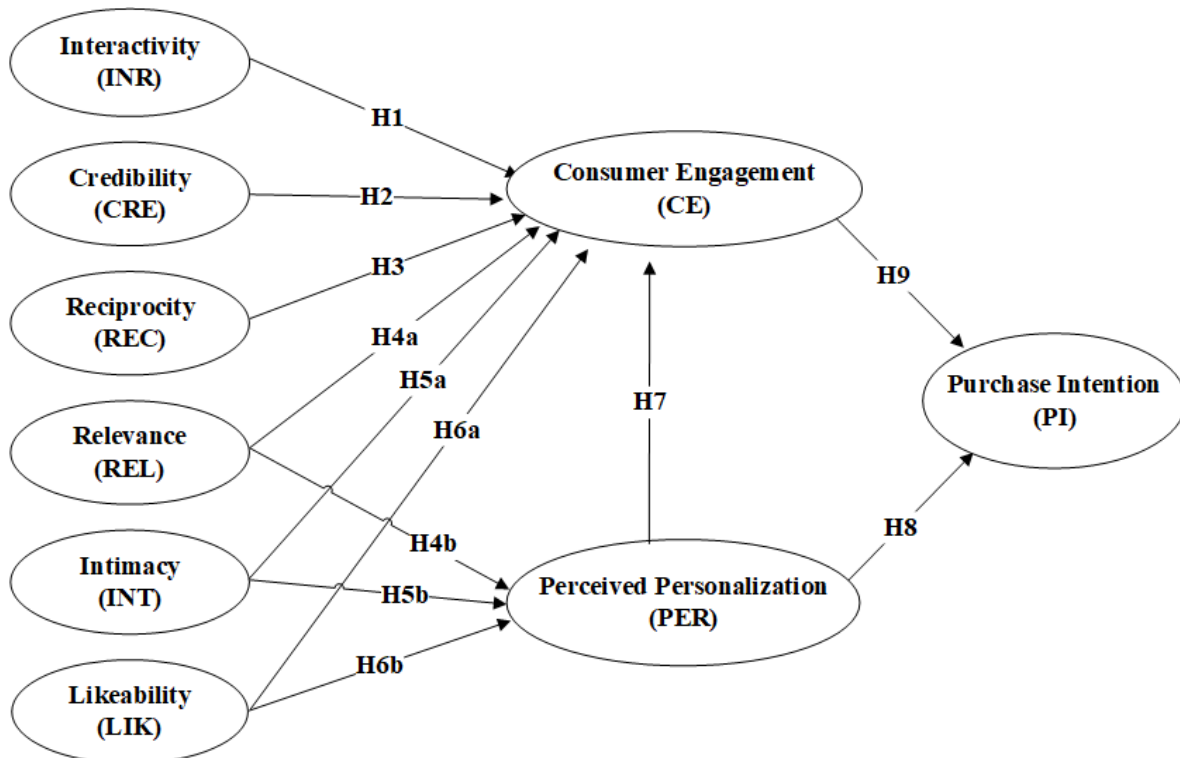
Figure 1. Conceptual model

3.2. Measurement development

We developed a questionnaire to collect the data. There are 31 measurement indicators were identified based on literature review, of which 13 measured the users' perceived personalized advertising, including relevance, intimacy, likeability and perceived personalization; 15 measured users' perceived social advertising, including interactivity, credibility, reciprocity and consumer engagement; and 3 evaluated user-generated reactions as purchase intention. The Likert's 6-point scale was introduced to prevent central tendency. For the scale used, 1 meant "very unimportant" or "never," whereas 6 indicated "very important" or "always."

3.3. Data collection

Online survey was adopted for the study and those who have watched social media advertisements were selected as the subjects of study. This study was a collaboration with InsightXplorer, a market research consultant firm. The IX Survey system was used to develop the online questionnaire for sample collection. A questionnaire was developed for the pilot study based on operational definition and a total of 539 copies were retrieved. The retrieved questionnaires were subject to reliability and validity analyses to verify the consistency and stability of questionnaire and whether it was able to measure the purpose of the study effectively. The questions in the official questionnaire were modified according to the results from the pilot study questionnaire, investigating whether there was any difference in Facebook users facing various product types. A total of 1,215 copies of questionnaire were collected to verify the hypotheses proposed in the study.

3.4. Data analysis procedure

The pilot study questionnaires collected were subject to descriptive statistical analysis, reliability analysis, validity analysis and confirmatory composite analysis (CCA) as the

attempt to verify and identify the best-fit factor dimensions. At the end of official questionnaire collection, CCA was performed to examine the reliability and validity of the samples. Next, the partial least squares (PLS) were conducted to examine the validity of model, parameter estimation and causality between dimensions, and to verify whether hypotheses stood.

4. Results and analysis

4.1. Sample descriptive analysis

The 1,215 valid copies of official questionnaire collected were subject to descriptive statistical analysis for the distribution of gender and age. 48.1% or 585 of the respondents were male and 51.9% or 630 were female. By age, 30.4% or 369 of the respondents were 29 or younger, 36.4% or 442 between 30 and 39, and 33.3% or 404 40 or older. The means of the questions fell between 3.29 and 4.39. The standard deviations of the questions between 0.90 and 1.44.

4.2. Confirmatory composite analysis

The Cronbach's α was greater than 0.8 for all dimensions selected for this study, suggesting good reliability of the questionnaire. The factor loading was greater than 0.708 for all questions. CR was greater than the threshold of 0.6 for all dimensions, while AVE was greater than 0.5, signifying good convergent validity. Finally, we use the Heterotrait Monotrait Ratio criterion (HTMT) to check the discriminate validity, where good discriminant validity requires the criterion lower than 0.9 for all dimensions. The results all met the required criteria are provided in Table 1 in detail.

Table 1.
Confirmatory composite analysis result

	α	CR	AVE	INR	CRE	REC	REL	INT	LIK	PER	CE
INR	0.94	0.95	0.80								
CRE	0.92	0.95	0.81	0.85							
REC	0.89	0.93	0.82	0.81	0.83						
REL	0.95	0.96	0.86	0.75	0.74	0.64					
INT	0.90	0.94	0.84	0.70	0.66	0.58	0.86				
LIK	0.91	0.94	0.85	0.75	0.77	0.70	0.88	0.82			
PER	0.95	0.97	0.91	0.73	0.69	0.60	0.85	0.87	0.80		
CE	0.95	0.97	0.90	0.64	0.59	0.50	0.73	0.81	0.67	0.82	
PI	0.95	0.97	0.90	0.65	0.64	0.55	0.80	0.80	0.78	0.82	0.9

4.3. Partial least squares

Overall model analysis results
A PLS path analysis was conducted based on the hypothetical model developed from literature review to verify the relationships between perceived social advertising and perceived personalization, and consumer engagement, perceived personalization and purchase intention. Figure 2 shows the overall model path analysis, and Table 2 shows the hypotheses testing results.
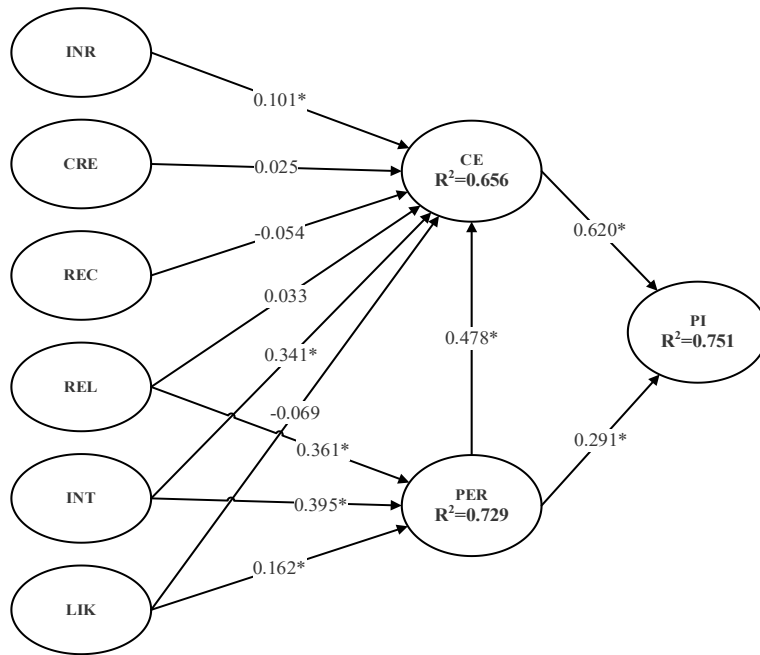
Figure 2. PLS model path analysis result
Note. indicates t>1.645 and p<0.05

Table 2.
Results of hypothesis testing (N=1215)

Hypothesis	β	t-value	p-value	Result
H1：INR → CE	0.101	3.308	0.000	Accepted
H2：CRE → CE	0.025	0.769	0.442	**Rejected**
H3：REC → CE	-0.054	2.017	0.044	**Rejected**
H4a：REL → CE	0.033	0.786	0.432	**Rejected**
H4b：REL → PER	0.361	10.571	0.000	Accepted
H5a：INT → CE	0.341	9.216	0.000	Accepted
H5b：INT → PER	0.395	13.29	0.000	Accepted
H6a：LIK → CE	-0.069	1.955	0.051	**Rejected**
H6b：LIK → PER	0.162	5.098	0.000	Accepted
H7：PER → CE	0.478	12.765	0.000	Accepted
H8：PER → PI	0.291	9.89	0.000	Accepted
H9：CE → PI	0.620	21.608	0.000	Accepted

All our hypotheses are supported, except H2, H3, H4a, H5a and H6a. We use R square (R^2) to test the explanatory power of the model. It is the percentage of an exogenous variable explaining variance vs. an endogenous variable and falls between 0 and 1, and the greater R^2 is, the greater explanatory power the model has. The analysis results indicate that R^2 is 0.656 for consumer engagement, 0.729 for perceived personalization and 0.751 for purchase intention.

4.3.1. Model analysis results by groups

By summarizing the results, it is found that the product type, as the moderating variable, has moderating effects on perceived social advertising, perceived personalized advertising, consumer engagement and purchase intention and, therefore, hypothesis H10 stands. Table 3 provides the test results for each group, where the "V" signifies items with significance from PLS testing, and the moderating effects on each group in detail.

Table 3.
Moderating effects result

Hypothesis	Result
H1：INR → CE	All accepted
H2：CRE → CE	**All rejected**
H3：REC → CE	**All rejected**
H4a：REL → CE	**All rejected**
H4b：REL → PER	All accepted
H5a：INT → CE	All accepted
H5b：INT → PER	All accepted
H6a：LIK → CE	**All rejected**
H6b：LIK → PER	Partial accepted
H7：PER → CE	All accepted
H8：PER → PI	All accepted
H9：CE → PI	All accepted

The product type results by group indicate that the contents of most interactive advertisements improve consumer engagement, reflect the feature of social platforms to communicate in real time, and attract consumers' attentions on products more effectively through the contents of interactive advertising. However, the interactivity of experience goods does not improve the willingness of consumer engagement. It could be that the key to this type of products is the personal experience. The link to consumer engagement is weak even after learning the experience shared by others. Possibly, the conversion to the attitude toward a brand or product, or influence on purchase decision, leads to insignificant result. Next, for experience and credence goods, the user's likeability improves perceived personalization, but this path does not hold for search goods. It is possible that consumers watch the advertisements of search goods for product information and the center of attention is the subjective information of product.

The objective information of product specifications helps understand whether the product meets the user's personal needs before making the final decision to buy. The key to advertising is to emphasize the characteristics of product, such as specifications and functions, which is not susceptible to objective likeability.

Finally, for the influence from consumer engagement and perceived personalization, the results reveal that the greater the consumer engagement, the greater the purchase intention; the greater the perceived personalization, the more positive influence from consumer engagement and purchase intention. In terms of explanatory power of each group, the results show that the perceived personalization brings greater influence than consumer engagement.

5. Conclusion and Implication

5.1. Conclusions

The relationships between perceived social advertising and perceived personalized advertising, and consumer engagement, perceived personalization and purchase intention in the overall samples are discussed herein based on the results summarized. First, the interactivity in perceived social advertising helps improve users' behavior of consumer engagement, which is similar to the argument proposed by Murdough (2009). Therefore, businesses may improve the relationship between brand and consumers by exploiting the features of real-time communication and information exchange in social platforms and expressing supports to advertising with consumer sharing and forwarding.

However, credibility and reciprocity do not improve users' behavior of consumer engagement. It could be that the trust generated in users in advertised contents, product information or brand from watching advertisements is improvement of advertisement or brand image or advertising attitude, and it is difficult to convert it into the behavior of sharing advertisement or leaving a comment, which is consistent with the argument of Wathen and Burkell (2002); or possibly a user is willing to watch advertisements because he/she has developed a certain degree of trust in the advertised brand and, thus, credibility has no influence on consumer engagement. Reciprocity involves the responsibility to offer help after receiving it. Social advertising is about conveying information for a brand. The purpose is to attract users to know and in turn forward the conveyed information for greater engagement rate. For this, reciprocity does not improve consumer engagement behavior even if it is felt in a social platform.

The next to discuss is the correlation between the characteristics of perceived personalization advertising (relevance, intimacy, and likeability) and perceived personalization. The empirical results indicate that relevance, intimacy, and likeability all improve users' perceived personalization. Personalized advertising is based on a user's own ID tags or previous history and the advertising topic is selected and sent by an algorithm. As a result, when a business is producing the contents for an advertisement, the characteristics of target group should be considered to make users believe that this advertisement is personalized for their needs and preferences, which is consistent with the argument of Alalwan (2018). The intimacy is about the close relationship between consumers and businesses. The more willing a consumer is to share his/her personal message and need, the closer to his/her need the product provided by a business is, or the more accurate an advertisement is to the consumer's preference, which is consistent with the argument of Ponder et al. (2016). Lastly, likeability comes from consumers' interests in advertisement or brans, as the more likeable brand the advertisement is produced for, the closer it is to the personal preferences of users and, thus, the more positive attitude there is to the advertising; this is similar to the argument of De Veirman et al. (2017).

In addition, to verify whether relevance, intimacy and likeability improve the perception of personalized recommended advertising, these variables are discussed herein as whether they improve consumer engagement. The empirical results show that only intimacy improves consumer engagement. It could be that the improvement of intimacy helps establish good trusting relationship between a brand business and consumers, thus improving consumer engagement. However, this cannot be said for relevance and likeability, indicating that improvement of perceived personalization is required for these variables in order to influence consumer engagement and purchase intention.

The last to discuss is the relationship between user's perceived personalization, consumer engagement and purchase intention. The results indicate that consumer engagement contributes to improving users' purchase intention, as consumer engagement suggests that consumers are engaged in a brand in a social media platform, which increases the influence on the decision to buy. This is consistent with Dabbous and Barakat (2020); the higher the level of users' perceived personalization, the more engagement behaviors are observed in social media. The positive attitudes developed to a brand lead to good relationship between social platform and businesses or even generate more reliance. This improves consumers' purchase intention, thus verifying the argument of Shanahan et al. (2019). In addition, the perceived personalization explains purchase intention better than consumer engagement.

5.2. Theoretical contributions

For theoretical contributions, previous studies focused mostly on the influence coming from advertising on social platforms. With the evolving diversity of advertisements, this study was designed to investigate whether the perceived personalized advertising deepens the influence of advertising through the three indicators of perceived social advertising and three of perceived personalized advertising. It is found in the empirical study results that, for most advertisements, social advertising has the upside of interactivity, allowing it to improve the advertising effects. For this, the contents, or events in forms of interactions between businesses and users attract the attention of users and make them willing to like advertisements, leave comments or share the advertisements, and the result is accelerated spreading of advertisements.

This study reveals that the 3 variables of perceived personalized advertising, the relevance, intimacy, and likeability, all have positive correlation with perceived personalization. Therefore, it is suggested to include the three variables for consideration when discussion studies of personalized recommendation, or more variables can be considered. It is also verified in this study that relevance and likeability have no direct influence on consumer engagement. The perceived personalization must be improved before advertising effects are, indicating the importance of perceived personalization. It is suggested to focus more on the advertising effects from perceived personalization in future studies. Finally, as shown in the results of consumer engagement, perceived personalization and purchase intention, the perceived personalized advertising generates greater influence than perceived social advertising. Relevance, intimacy, and likeability help increase the perceived personalization in consumers and, therefore, in turn achieve the advertising effects to improve consumer engagement or purchase intention.

In addition, the difference between groups is discussed based on product types. When it comes to the different in product types, less emphasis may be placed on users' consideration of how much they like a brand for search goods. Rather, the focus should be placed on relevance and intimacy to increase consumers' purchase intention; for experience goods, on the other hand, the emphasis should be place on factors of personalization, which are relevance, intimacy, and likeability, rather than on the interactivity of advertising. The result of the study may be helpful as the basis for future studies on personalized recommendations or shed some light on the application of social business advertising.

5.3. Practical implications

For practical implications, the empirical analysis result suggests that social advertisement providers may leverage on social interactions to advertise over social media, and communicate product information through interactions with users, thus attractive consumers' eyes instead of presenting products unilaterally. For example, a post in the form of Q&A may intrigue consumers and improve the opportunities to interact with consumers in terms of leaving comments.

Furthermore, social advertising and personalized advertising are used in the study to measure the effects generated by advertising, and the personalized advertising brings better effects. Therefore, marketing personnel or advertising providers are suggested to increase the relevance between advertisements and target consumer groups during the production and publication of advertisements, as different advertisements make marketing easier. With the credence goods in the study as an example, advertisements of various health supplement products may be produced targeting on audiences of various ages or different genders, as to

improve the relevance between products and consumers' needs; for experience goods, it is possible to catch the eyes of consumers by sharing the experience of using product or service.

Since intimacy is also an effective indicator to measure personalized advertising, it is safe to maintain the interactions with users by producing contents that enhance the relationship between businesses and users; examples can be personalized discounts or feedbacks to keep consumers' purchase intention at a higher level. For users with higher level of likeability, the messages provided by businesses are more attractive. Therefore, more receivers recognizing the concepts may be attracted by promoting the features of a product and brand concepts.

The emergence of studies and applications of machine learning in recent years encourage many to propose studies on various algorithm, including new algorithm models and improvement of algorithm accuracy. The purpose of application in social commerce is to predict consumers' preferences and needs as accurately as possible with the help of computer calculations and, thus, improve the probability that advertisements hit target consumers. A questionnaire survey was performed for this study to find out how users feel after watching advertisements and the result may serve to verify the perception effects of algorithm model and accomplish the ultimate goal of improving advertising effects.

5.4. Limitations and future research directions

Despite the efforts to make the study complete in terms of hypothesis development and questionnaire design in order to ensure the quality of study results, there are still limits to the study and suggestions for future studies, as follows:

a. The samples were collected from Facebook users in Taiwan. It is unlikely that the results apply to groups in different parts of the world.

b. Three groups of products were chosen as the subject of study for different product types. In light of booming social commerce today, other types of products may be selected for future studies.

c. Six perceived behaviors of social advertising and personalized advertising were selected to measure variables of consumer engagement, personalized advertising and purchase intention. However, there are still variables in advertisement composition and the perceptions of users to be investigated. A possible topic of study can be focusing on the perceptions as the attempt to uncover more possibilities to influence advertising effects.

d. Facebook was selected as the subject of study, because it is one of the first social platform to come up with social advertising in the forms of "recommended for you" and "your friend OOO liked a fan page." Just as the questionnaire was collected, similar forms of advertising started emerging in Instagram. Since both Facebook and Instagram are the most visited major social platforms in Taiwan, and both of them have their own target costumer groups, different findings may be generated form studies on different platforms.

e. Video marketing becomes popular thanks to the booming short video clips, or shorts, in recent years. Functions related to shorts are developed and widely used on platforms, such as Instagram, YouTube and TikTok. As such, shorts may be added to enrich advertising efforts in additional pictures and texts, and a possible topic for future studies is to verify whether this will lead to different findings.

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