

A game of perceived risk in social commerce transactions – A suggestion for the integration of the trust (payment) feature on social commerce platform sales

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THE AIMS OF THE PAPER

To decrease perceived risks and opportunism in social commerce transactions, many social media sites have integrated the checkout feature to their model of social media platform sales, which allows customers to immediately check out without being navigated to other websites. However, this feature is not agreeable to many merchants due to the uncontrollable customer data and other problems. Therefore, the purpose of the paper is to discuss whether merchants should set up the checkout feature in order to increase sales and decrease perceived risks as well as opportunism in social commerce or not.

METHODOLOGY

To pursue this purpose, the article adopts Prisoner's Dilemma in game theory to analyze the game of perceived risk that relates to making the deal between sellers and buyers in two possibilities including (1) Do not set up checkout function in social commerce, and (2) set up the checkout function in social commerce.

MOST IMPORTANT RESULTS

The results show that opportunistic behaviors and perceived risk are the obstacles that negatively affect reciprocal trust, and deter the success of social commerce transactions. Therefore, the role of trusted intermediaries in s-commerce transactions is necessary. As a result, integrating the checkout feature in s-commerce platforms is a better way to decrease perceived risk between buyers and sellers. Furthermore, it also facilitates removing the opportunistic behavior in social commerce and positively promotes the success of transactions.

This study provides a new approach in research of trust and perceived risk in s-commerce. In particular, the paper applies game theory to address two possibilities of the role of s-commerce platforms in online transactions in order to mitigate perceived risk and opportunistic behaviors among buyers and sellers.

RECOMMENDATIONS

This study motivates online merchants will move to other services such as the checkout feature of these s-commerce platforms. It also convince other merchants to apply this feature when it is available. Further, the paper raises the attention of social network sites (SNS) providers to complete and update their features, which brings better user experience. More important, it promotes the development of social moral to make trust based on reciprocity become a kind of social custom.

Keywords: social commerce, opportunistic behavior, perceived risk, game theory, trusted intermediary

INTRODUCTION

The participation of social media platforms such as Facebook, Instagram, Tiktok and etc. in global e-commerce has further changed to the whole e-commerce world when leading to a new evolution named social commerce or s-commerce. Accordingly, the global market for social commerce was over 500 billion USD in 2020. This figure is estimated at approximate 3 trillion USD in 2026 (ReportLinker 2021).

There are many different definitions of social commerce. For instance, social commerce is conceived as the use of Internet-based media to join the activities such as buying, selling, comparing, marketing and sharing of products and services in marketplaces and communities (Zhou *et al.* 2013). By contrast, other scholars consider s-commerce as a subset of e-commerce that uses social networks to support online buying and selling goods (Liang & Turban 2011, Sharma & Crossler 2014). In the research of social commerce, Lee J.Y. classifies definitions of social commerce into two major categories. First, social commerce is another type of e-commerce that develops from the existing social media sites such as Facebook, Instagram and so on. In this narrow perspective, social media sites are the pre-requisite for the foundation of the s-commerce, which means that users can make purchases or share products from their social media sites' accounts with the "Buy" or "Share" buttons. Simply speaking, social media sites are working as the connectors, supporters or mediators between online buyers and sellers. On the other hand, in the broader perspective, s-commerce is defined as social networks developing from existing e-commerce sites. The latter definition involves any form of community or social connection surrounding products or services (Lee 2015). In this paper, I adopt the narrow definition of social commerce to limit the research perspective.

Social commerce has become attractive to both buyers and sellers due to many differences from the traditional e-commerce market including: (1) social interaction, (2) business goals, and (3) customer connection. Social commerce offers a more interactive environment allowing customers to share information with friends and other customers. Therefore, it can be said that social interaction is the symbol of social commerce. Further, instead of being disconnected to the community, customers in social commerce are able to approach a huge community of users when making purchases. More specially, customers in social commerce can play the

role of sellers through continued communication with the sellers (Jang *et al.* 2013, C. Wang & Zhang 2012, Y. Wang & Yu 2017). According to Lee, J. Y., the social media sites such as Facebook, Youtube and Instagram might include "BUY" buttons on ads and posts, which allows users to buy products without leaving the social media websites. Furthermore, users can "LIKE" the businesses' pages to become part of a community of buyers offered promotions and discounts. More specially, the user's friends are also notified of the user's "LIKE" or "BUY". So, regarding merchants, social commerce supports to spur businesses' sales as well as improve their interaction with potential customers (Lee 2015).

Over the last year, Facebook and Instagram – the two biggest social media platforms have made significant updates for their social commerce models that allow sellers to close the loop between awareness and purchase with checkout feature. This allows customers to immediately check out on Facebook or Instagram without being navigated to other websites. Furthermore, it offers both buyers and sellers fairness and security when making transactions on social media sites (Instagram 2020, Lea 2021). However, this new feature is not agreeable to many merchants due to the uncontrollable customer data – as the most concerned reason. Accordingly, brands seem to miss ability to build direct relationship with their customers as well as miss chance to capture loyal customers' email (Digiday 2021). Therefore, the purpose of the paper is to discuss whether online merchants should set up the checkout feature in social commerce or not. To pursue this purpose, the article adopts game theory to analyze the game of the perceived risk that relates to making the deal between sellers and buyers in two possibilities including (1) Do not set up checkout function in social commerce, and (2) set up the checkout function in social commerce. The paper is constructed into three major sections. In the first section, a review of previous literature on trust, opportunistic behavior, and perceived risk in social commerce and game theory in online transactions is presented. Second, the "perceived risk game" in social commerce transactions is formed. Then, two possibilities of perceived risk game relating to making a deal in social commerce transactions is analyzed. Third, the discussion of the study including research implications, limitation and future direction is presented.

LITERATURE REVIEW

Despite some differences, it is clear that social commerce naturally involves the characteristics of e-commerce such as: everything is digital, the higher speed with lower costs, global search, information sharing, customized products but lack of trust and high risk (Kaur 2011). Obviously, two aspects including trust and risk are especially highlighted in these environments.

Effects of trust on social commerce transactions

According to Csonka-Ambrus (2020), trust factor is highly appreciated in the virtual world due to the missing of the physical context in online commercial activities. That the parties do not meet in person is the loophole for fraudulent acts to occur. Previous literature reveals the important role of trust in the success of online transactions because it is the foundation to build customer relationship and generate purchase intention (Gibreel *et al.* 2018, Liu *et al.* 2018). In the research about the impact of trust in e-commerce, Aranyossy & Magisztrák (2016) confirm that a high level of e-trust is relative to more frequent purchase in e-commerce. Therefore, building e-trust is the method to improve the growth of e-commerce. Scholars though provide many different definitions for trust, there are two major streams. First, trust is conceptualized as a unilateral factor that derives from characteristics of vendors and platforms such as competence, benevolence, and integrity (Che *et al.* 2017, Csonka-Ambrus 2020). For instance, according to Gefen (2000), trust refers to one's confidence in or favorable anticipation of another person's conduct based on previous contacts. Accordingly, trust for online merchants stems from a confident attitude and security toward the other party, as well as a readiness to tolerate future damage from the trusted party. By contrast, other scholars conceptualizes trust as a two-way factor, founded on reciprocity. It means that trust should be generated from both trustors and trustees. Accordingly, two users will trust each other (Kwon & Lee 2014, Nguyen *et al.* 2010). Serva and colleagues define reciprocal trust as "results when a party observes the actions of another and reconsider one's attitudes and subsequent behaviors based on those observations" (Serva *et al.* 2005, 627). According to Liang *et al.* (2011), in s-commerce, especially customer-two-customer s-commerce in which there is only a commitment between buyers and sellers, trust should be considered a two-way

process between buyers and sellers rather than a one-way process. Kumi & Sabherwal (2018) reveal that reciprocal trust removes selfish behaviors. Further, it also promotes prosocial behaviors in order to create trust within the online social communities. However, according to Serva *et al.* (2005) reciprocal trust is not visible to interacting parties. It is basically a dynamic process of trust exchange between two parties. Therefore, it is also a loophole for opportunistic behavior in online commercial transactions due to the virtual and anonymity nature of the internet.

Opportunistic behavior in online commercial transactions

According to Williamson (1985, 47) opportunism is defined as "self-interest seeking with guile. This includes but is scarcely limited to more blatant forms such as lying, stealing and cheating, and calculate efforts to mislead, distort, disguise, obfuscate, or otherwise confuse". In their research, Wang and colleagues reveal that it is easy for opportunistic behavior to occur in e-commerce platforms because buyers and merchants are separated by space and time. As a result, the increase in information asymmetry may generate the opportunistic behavior in the e-commerce environment. Further, these scholars also classify opportunistic behavior into passive and active forms. Accordingly, active opportunism highlights proactive cheating behaviors (i.e., receiving payment but not delivering products, delivering fake or non-alignment products, or frauds in price, description and promotions and so forth). Whereas, passive form of opportunistic behavior mainly focuses on concealing critical information or escaping responsibility (J. Wang *et al.* 2021). Obviously, prior literature mainly concentrates in sellers' opportunistic behavior in e-commerce platforms. For instance, Jiang & Zhou (2022) indicate that the anonymity of internet generates chances for sellers to accomplish opportunistic behaviors. Or according to Ba & Pavlou (2002), a seller's opportunistic behavior can be in many different forms such as incomplete disclosure of information, quality cheating, contract default, or even delay in product shipping and so forth. As a result, fear of such behaviors results in the mistrust of buyers in online transactions. By contrast, other research reveals that buyers can also have opportunistic behaviors in online transactions. According to Khan (2015), merchants can also suffer buyer's opportunistic behavior in case of chargeback fraud. Hereby, a buyer claims a refund for a purchased

item without returning the item to the seller. The purpose of this behavior is to obtain free item online. Or in other research, Guo and colleagues reveal that online sellers may bear other risks such as fee for credit companies, risk of account termination on the digital platform if negative comments from buyers are excessive (Guo *et al.* 2018). Generally, opportunistic behavior can arise from both buyers and sellers in the virtual environment, which may result in distrust and perceived risk from both buyers and sellers' perspectives.

Effects of Perceived risk on social commerce transactions

Scholarly work has found social commerce adoption as well as its relations to perceived risk through many different models and theories such as Technology acceptance model (TAM), theory of planned behaviors (TPB), Theory of reasoned actions (TRA), social learning theory and so forth (Sarker *et al.* (2019)). Most research revealed that perceived risk has a negative effect on the success of social commerce transactions. Accordingly, perceived commerce risk might reduce purchase intention of online users in social commerce (Ashoer 2016, Lăzăroiu *et al.* 2020, Turel *et al.* 2016). Perceived risk is defined as the "degree to which individuals believe that if they purchase products or services through the internet, they will suffer losses" (Lim 2003, 222). Perceived risk is also considered as a multifaced construct that relates to negative consequences in different domains. According to many scholars, perceived risk has been a significant negative factor that deters online transactions (Featherman & Pavlou 2003, Kim *et al.* 2005, Ling *et al.* 2011). It means that online transactions can be failed if customers perceive risk in the shopping procedure. However, it is clear that these studies mainly focus on the consumer perspective to analyze the relationship between perceived risk and social commerce transactions. As mentioned above, both consumers and merchants can perceive risk when getting into social commerce transactions due to the characteristics that everything is digital, information sharing is one of the core factors, and the critical thing is that both sellers and buyers can have opportunistic behaviors. According to Tullberg (2008), without the institutional protection, both parties in social commerce transactions can perceive risk. The reason is that customers often prefer receiving products before paying while sellers also want the money before delivering goods. Therefore, in this paper I use the definition of the

perceived risk that is "the potential for loss in the pursuit of a designed outcome in using an e-service" (Yang *et al.* 2015, 11). Furthermore, a new approach – game theory is also adopted to analyze the perceived risk between merchants and consumers in social commerce transactions.

Game theory and its application in analyzing online transactions

The purpose of game theory is to explain the situations in which decision-makers interact. It was developed by John von Neumann and Oskar Morgenstern. Later works by other economics such as John Nash, Eric Maskin and so forth have researched and established game theory with application to a huge range of areas such as social science, logistic, biology etc. (Osborne 2004). Game theory is also regarded as a method of researching strategic interactions which are also called the strategic game. Accordingly, the decision-makers are referred as the players and each player has a set of possible actions and preferences. In other words, a strategic game involves three components such as (1) a set of players (or agents), (2) a set of actions for each player (or agent), and (3) preferences about the action profile for each player (or agent). A solution is the possible outcome of the game (Osborne 2004). There are many different types of game theory. However, two basic branches include cooperative games and non-cooperative games. Cooperative games seek the results, in which groups of players form into coalitions and coordinate actions in order to obtain their winnings. In other words, cooperative game focuses on abilities of each coalition of agents to capture value. Cooperative game examines circumstances in which actors might collaborate to produce value by forming coalitions, as well as scenarios in which agents compete to capture value (Chatain *et al.* 2014). On the other hand, non-cooperative games deal with scenarios, in which players selfishly pursue individual rewards. In other words, non-cooperative game occurs when no cooperation is allowed among players. Accordingly, the main purpose of players is to point out a satisfactory solution point, also called Nash equilibrium. This is the point, referring the best response of each user's selected strategy to other user's strategies. Based on characteristics of the players, sets of actions, a non-cooperative game can be in many different forms. For instance, it should be non-zero-sum if the sum of the players' objective functions can not be made zero, or a zero-sum game if the sum of objective functions is zero. Further,

relying on the action sets of the players, there is an infinite game or a matrix game. By contrast, a game can be single-act or multi-act, which depends on the number of times the players can act (Basar 2010).

There is a variety of literature relative to game theory adoption in e-commerce. The main research areas comprise competition, logistic networks, management, and consumer behavior. For instance, many scholars reveal the effective application of game theory for solving the problems relative to transshipment, security, and credit management in e-commerce (Guangxing 2007, Reyes 2005, Shao *et al.* 2014). By contrast, other scholars were interested in the information asymmetry in e-commerce. Lin (2014) made a research on the “lemon” problem of the e-commerce market based on game theory. Accordingly, the scholar reveals that it is difficult for consumers to judge the quality of the information provided by the sellers due to the virtual character of network transactions. Therefore, to pursue the maximization of self-interest, the merchants might conceal the true information, which leads to information asymmetry in transactions. In another aspect, Hu & Tang (2014) adopted game theory to analyze the price and the behavior of price coordination in the appliance industry in Chinese e-commerce. Hereby, he revealed that home appliance companies should pay attention to technology and product innovation to get out of the price war trap and maintain the market competition environment. Jianya *et al.* (2015), on the other hand, used game theory to construct a competitive model in e-commerce between small and large firms in terms of generating sales strategy. In another study, (Lv *et al.* 2022) adopted the evolutionary game theory to stimulate multiple complex live streaming e-commerce networks. Their study provides insights into the popularity of live streaming information in social networks.

Generally, there have been a large number of research adopting game theory to study the issues in e-commerce. However, there is a lack of research in the social commerce perspective as well as the research of perceived risk in online transactions based on game theory. This is an opportunity for this paper to fill this gap.

Modeling and study of perceived risk based on game theory

From the “Prisoner’s Dilemma” to the “Perceived risk game” in social commerce transactions

One of the most well-known strategic games is the Prisoner’s Dilemma, which origins from a story of suspects in a crime. Accordingly, there are two suspects being arrested (A and B). However, police do not have enough evidence for a conviction. Therefore, following the separation of two suspects, the police offer them the same choices.

The strategic game is modeled as follows:

1. Two suspects A and B..
2. Two actions for each suspect: silent or betray.
3. Each suspect has a set of preferences: if A or B confesses and the other keeps silent, the betrayer will be immediately released while the silent will be in jail for 3 years. If both A and B keep silent, they will be in jail for 1 year. If both A and B confess, they will be in jail for 2 years. The payoff matrix is shown in Table 1.

In this case, both A and B join a game of cooperation or non-cooperation. While the cooperative result is collective rationality, the non-cooperative result assumes that rational individual participants pursue individual rewards. From the matrix, it is clear that prisoners A and B would get a better reward if they cooperate, which means that if both of them are silent, they will be in jail for 1 year. However, the truth is that both prisoners are isolated and due to human selfishness together with the fear of the other side of betrayal, both A and B will choose to confess for a better individual reward. Therefore, the strategy of “betray, betray” would be the best strategy for both prisoners. And this is also the Nash equilibrium of this case.

The prisoner’s dilemma can indicate the reasons for “a perceived risk game” in social commerce transactions. As mentioned in the previous part, perceived risk is considered as the important negative factor that deters the success of social commerce transactions. Furthermore, due to the virtual

Table 1. Prisoner’s dilemma payoff matrix

	Prisoner B (silent)	Prisoner B (betray)
Prisoner A (silent)	1,1	3,0
Prisoner A (betray)	0,3	2,2

Source: Osborne 2004

character of network transactions, there exists hidden or unknown information of buyers and sellers. These lead to the circumstances when getting into a social commerce transaction, both buyers and sellers will have two sets of actions including (1) deal versus no deal, and (2) perceive risk versus do not perceive risk. These two sets of actions lead to two premises, describing two behaviors of buyers and sellers as below:

1. If buyers or sellers perceive risk, they will not make the deal
2. If buyers or sellers do not perceive risk, they will make the deal

Modeling game of perceived risk relating to making a deal in social commerce transactions based on game theory

Based on the previous part, a few assumptions are offered as below:

1. In social commerce transactions, there are three parties including: Buyers, Sellers, and social media platforms. Hereby, there are two circumstances for social media platforms including: (1) purely working as supportive platforms without participating in the commercial transaction, and (2) working as the trust (payment) party between buyers and sellers.
2. The seller's value includes: products or services, and the information of these products and services
3. The buyer's value includes: money to pay for the products & services, and time & effort to find and select products and services
4. Assume that the social commerce transaction is equal, which means that the value of both buyers and sellers are equal
5. There is opportunism in the transaction, which means that both sellers and buyers are seeking to maximize their individual interests
6. There is the information asymmetry between buyers and sellers, which means that there exists hidden and unknown information in online transactions
7. Both buyers and sellers have two strategies including
 - If they perceive risk, they will NOT make the deal
 - If they do NOT perceive risk, they make the deal

The game of perceived risk relative to making the deal in social commerce is divided into two pos-

sibilities based on the joining of social media sites in the transaction.

Possibility 1: Social media sites purely work as supportive platforms without participating in the commercial transaction

Without participating in the commercial transaction, social media sites purely work as connectors between buyers and sellers. In this circumstance, social networks companies rely on a supply-driven direct-to-customer (DTC) model to connect brands to buyers, and an ad-based business model to drive awareness and sales. The business model focuses on reaping the benefits of advertising to vast networks of users. Furthermore, social media sites have also utilized the role of influencers, who amassed followers and were able to sway followers' buying decisions. However, most purchases were navigated to other external e-commerce websites (Davis & Yang 2020). It means that, when shoppers click "BUY" buttons embedded in the Ads or the products, the system would navigate to the brands' websites where consumers and merchants accomplish the commercial transaction privately. In case that merchants do not have websites, the transaction would be confirmed by private messengers between buyers and sellers. Furthermore, the arrangement of the orders' payment and shipment is out of control for social media sites. The transaction game is formed as below:

- Players: Buyers and Sellers
- Sets of actions: (Perceive risk, No deal) and (Perceive No risk, Deal)
- Sets of preferences: there are 4 tactics of the matrix action between sellers and buyers:
 1. No risk + Deal; No risk + Deal: This is the expected situation in social commerce when both merchants and consumers perceive no risk in the transaction. Accordingly, the transaction is successful. As a result, buyers received desired products while sellers receive equal compensation. Due to the assumption of fair transactions, the net profits of both buyers and sellers are 0.
 2. Risk + No deal, Risk + No deal: in this circumstance, both parties perceive risk in the social commerce transaction. Hence, they do not make the deal and the transaction would fail. No party receives the desired compensation. So, their profits are also 0.

3. Risk + No deal, No risk + Deal: in this circumstance, buyers perceive risk from the social commerce transaction and fail to make payment. However, sellers offer the clear and right information about the product and still deliver at the right time. The transaction fails. If buyers are opportunistic, sellers would suffer losses. Whereas, buyers are profitable.
4. No risk + deal ; Risk + No deal: sellers perceive risk in the transaction and do not deliver the product as the commitment. Whereas, buyers perceive no risk and still make payments. The transaction fails. If sellers are opportunistic, buyers would suffer losses while sellers are profitable.
5. The payoff matrix is presented in Table 2.

Table 2. Payoff matrix between buyers and sellers

Buyer	Seller		
		No risk + Deal	Risk + No deal
	No risk + deal	0,0	Loss, Profit
	Risk + No deal	Profit, Loss	0,0

Source: own construction

From the payoff matrix, it is clear that the best strategy for both buyers and sellers is (perceive no risk + Deal, perceive no risk + Deal) if both parties join a cooperative game. However, due to several assumptions mentioned above, both parties would join a non-cooperative game. Accordingly, if the seller perceives no risk and makes the deal, the buyer is opportunistic and chooses no deal to get profit. if the seller perceives risk and fails to make the deal, the buyer will choose no deal to protect him/herself from the loss. Similarly, this process would be the same in the case of the buyer.

For the buyer, to protect him/herself from the seller's opportunistic behavior while remaining his/her value, he/she will choose "Risk + No deal"

Similarly, the seller will choose "Risk + No deal" to protect him/herself.

As a result, the best strategy, in this case, will be (Risk+ No deal, Risk + No deal) for both buyers and sellers. And this is also the Nash equilibrium of the game. This is of course the unexpected case of social commerce transactions because the transaction basically fails. In other words, the opportunistic behavior of buyers and sellers would increase the perceived risk and result in the failure of social commerce transactions.

Possibility 2: Social media sites work as the trust (payment) party in the commercial transaction

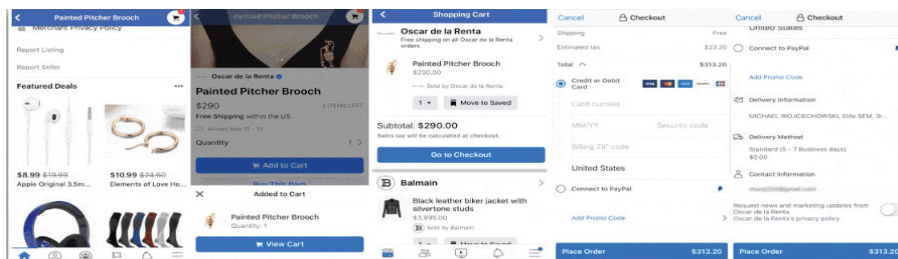
The participation of third-party institutional mechanisms in online transactions is mentioned in previous literature as a solution to facilitate transaction success. Head *et al.* (2002) reveal that third-parties or referees play an important role in e-commerce because they offer independent recommendations on the trustworthiness of e-vendors. Further, their research also focuses on the role of trust seals, provided by the third-party, to assure consumers that e-vendors are reliable and credible. In other research, Atif (2002) indicates that third-party (or trust service provider) is important to increase confidence in e-commerce transactions. Trust service provider (TSP) will work as an internet-based intermediary that assumes responsibility for a smooth transaction in e-commerce. Trusted intermediary can guarantee to forward the goods to customers and the payment to merchants. According to Pavlou & Gefen (2004), third-party institutional mechanisms are suitable for online marketplaces in which transactions with new or unknown sellers are accomplished under the guarantee of the third-party. Their research results show that the perceived effectiveness of feedback mechanisms and trust in the intermediary increases buyers' trust in online sellers. Then, it improves transaction intention. Further, these scholars also

reveal that, in reality many e-commerce platforms such as Amazon, eBay have established third-party institutional mechanisms as the means to mitigate risk in transactions, build customers' trust and encourage online transactions. By contrast, other studies focus on the role of third-party payment in e-commerce transaction. For instance, Jiang & Song (2010) show that a third-party payment platform offers many advantages such as mitigating risk of bad credit, handling problems of returning and exchanging merchandises, or providing real time transaction querying. Accordingly, most popular third-party payment systems include Paypal, Alipay, Bulapay (Huang *et al.* 2014). Further, Ma & Song (2011) also discuss that the third-party of trust is considered the method of transfer of trust and promote online transaction. These scholars find that consumers tend to believe in online stores if they perceived association between online stores and trust of the third-party.

Based on previous literature, in the second possibility, we consider the situation that social media sites will work as the third-party (payment) in s-commerce transactions. Particularly, social media platforms such as Facebook launched "the

checkout features" for both Facebook and Instagram apps in 2019 for the US market. Accordingly, merchants can use Commerce manager to set up a shop with checkout feature. Basically, the checkout feature allows customers to complete the commercial transaction within the app or directly on the site (Figure 1). As a result, customers no longer need to be navigated to other e-commerce websites to finish their shopping transactions. According to Facebook's rule, the product must be placed and delivered within 3 days from the date of purchase. The merchants also provide buyers with valid tracking information on all purchases. If sellers have not fulfilled the order within 30 days from the date of purchase, the order would be automatically canceled. The payouts process would be issued within 30 days after the merchants mark the order as shipped. Facebook and Instagram would collect a commission on every order with the selling fee is 5% per shipment or a flat fee of 0.4 USD of shipments of 8 USD or less. However, these selling fees would not change the prices for consumers (Facebook 2021).

Figure 1. Checkout feature on Facebook app



Source: Wojciechowski 2019 1

In other words, social media platforms probably work as the third-party of trust (payment) which guarantee the commitment between buyers and sellers. Furthermore, the safeguard of social media platforms also eliminates the problem of opportunism in transactions. The transaction game, now, is formed as below:

- Players: Buyers and Sellers
 - Sets of actions: (Perceive risk, No deal) and (Perceive No risk, Deal)
 - Sets of preferences: there are 4 tactics of the matrix action between sellers and buyers:
1. No risk + Deal; No risk + Deal: This is

also the expected situation in social commerce when both merchants and consumers perceive no risk in the transaction. As a result, the transaction is successful. However, different from the previous case, both sellers and buyers in this possibility would get profit due to the guarantee of the third-party. It is true that sellers would increase their trust grades on social media sites and buyers would increase their shopping experience.

2. Risk + No deal, Risk + No deal: in this circumstance, both parties perceive risk in the social commerce transaction.

Hence, they do not make the deal and the transaction would fail. No party receives the desired compensation. However, due to the joining of the social media site in the commercial transaction, buyers could not be refunded and sellers also would not receive the payouts due to the failure of their commitment. Therefore, both buyers and sellers would suffer losses.

3. Risk + No deal, No risk + Deal: in this circumstance, buyers perceive risk from the social commerce transaction and fail to make the deal. However, they would receive penalties from the third-party for breaking the commitment. So, they get loss. Obviously, sellers would not receive the payouts. But they still protect their value. So their net profit is 0

4. No risk + deal ; Risk + No deal: this tactic is similar to the third tactic. Sellers perceive risk in the transaction and do not deliver the product as the commitment. As a result, the transaction would be canceled on the social media site and sellers also suffer reports or low trust grades from buyers and the third-party. Whereas, buyers would get a refund to protect their value. So, buyers' net profit is 0 while sellers get losses.

The payoff matrix is presented in Table 3.

Table 3. Payoff matrix between buyers and sellers with the joining of social media sites in the commercial transaction

Buyer	Seller		
		No risk + Deal	Risk + No deal
	No risk + deal	Profit, Profit	0, Loss
	Risk + No deal	Loss, 0	Loss, Loss

Source: own construction

From the payoff matrix, Nash equilibrium of this game will be (No risk + Deal, No risk + Deal) for both buyers and sellers. This is the expected outcome for both parties and leads to the success of social commerce transactions. No matter what strategies the sellers choose, buyers still select the strategy of "No risk + Deal" to get profits or protect themselves from losses. Similarly, sellers also choose "No risk + Deal" to get other profits or protect themselves from losses. Therefore, the participation of social media platforms in commercial transactions between buyers and sellers may remove the opportunistic behaviors and decrease the perceived risk of both customers and merchants. Furthermore, it also improves the accomplishment of online transactions.

In reality, the in-app checkout feature is currently only available for users and businesses in the US. According to the report of Instagram (2019), there are only 26 famous brands becoming partners for the checkout feature on Instagram's US such as Adidas, Balmain, Dior, H&M, Kylie cosmetics, NARS, Nike, Prada and so forth. However, LIFO (2020) reports that within 9 months, checkout has

supported brands to generate a major sales boost. For instance, Adidas has recorded an increase in online sales at 40% year-over-year after establishing checkout feature on Instagram. In a study about users' acceptance of mobile social commerce, Saprikis & Avlogiaris (2021) concentrate on the checkout feature of Instagram as a case study to examine factors that impact behavioral intention of online consumers on adopting mobile social commerce (MSC). The results show that compatibility and performance expectancy are major factors that influence a consumer's behavioral intention. Further, social influence and familiarity also positively affect on decisions of users to adopt "Instagram checkout" feature. According to Manzerolle & Daubs (2021), the checkout feature of Instagram and Facebook contributes to promote shopping experience and generate a shoppertainment.

DISCUSSION

Based on the practical issue that whether online merchants on s-commerce platforms such as Facebook, Instagram should install checkout feature to increase trustworthiness, sales and mitigate risk or not. This paper adopts the game theory and Prisoner's Dilemma to construct a game of perceived risk of making deal between consumers and merchants in s-commerce transactions. To begin with, the paper reveals the reasons that arrive at a game of perceived risk. First, trust based on reciprocity between buyers and sellers is the foundation of transaction success in the s-commerce transaction. However, it is hindered by the information asymmetry, arising from the virtual and anonymity nature of the internet. Second, opportunistic behavior of both buyers and merchants exists in online transactions. Third, due to these reasons, both buyers and sellers can perceive risk when getting into s-commerce transactions. In the next step, the paper develops two possibilities for social networking sites (SNS) (i.e., (1) purely work as supportive platforms without participating in the commercial transaction, and (2) work as the trust (payment) party in the commercial transaction) to explore a better method to mitigate perceived risk and opportunistic behavior among buyers and sellers in s-commerce. The results show that the participation of s-commerce platforms as trusted intermediaries can increase the reciprocal trust among e-consumers and e-merchants. In particular, no matter what strategies sellers or buyers choose, buyers or sellers still select the strategy of "No risk + Deal" to get profits or protect themselves from losses. The reason is that their transactions are accomplished under the guarantee of trusted intermediaries (or SNS) with the checkout feature. S-commerce platforms will guarantee to forward goods to buyers and the payment to sellers. As a result, it may remove opportunistic behavior and perceived risk among both buyers and sellers. Further, it also motivates transaction success and contributes to enhance a good s-commerce environment. These results are also in line with previous studies about the role of the third-party (trusted intermediary) in online transactions.

Theoretical implications

The contribution of this study in academic aspects of social commerce is multiple. First, it helps the existing literature through the development of theoretical research to investigate the impact of a novel s-commerce service (i.e., checkout feature). As far

as it concerned, there are few studies regarding the adoption of checkout feature on s-commerce platforms before. Therefore, this paper contributes to highlight the positive impact of this novel s-commerce service in order to build trustworthiness among consumers and sellers. Second, this study provides a new approach in research of trust and perceived risk in s-commerce. In particular, the paper applies game theory to address two possibilities of the role of s-commerce platforms in online transactions in order to mitigate perceived risk and opportunistic behaviors among buyers and sellers. This is a new research direction in terms of studies on trust and perceived risk in the s-commerce environment. The result shows a similarity to previous research about the role of the third-party, working as a trusted intermediary in the attempt to build trustworthiness in s-commerce transactions. Further, the paper also rises a demand for research of perceived risk from merchants' perspective and trust based on reciprocity in the virtual world.

Managerial implications

Apart from theoretical implications, this study also contributes some practical implications as well. First, it is unquestionable that s-commerce is emerging as an effective commercial channel in these years, especially during Covid-19 and post-Covid-19 periods. In comparison to traditional e-commerce, s-commerce is dominating shoppers' interest. According to Facebook IQ (2019), 87% people surveyed will take actions (i.e., following a brand, making purchases online, etc) after seeing product information on Instagram. Therefore, this study motivates online merchants (i.e., brands, retailers, influencers) who are adopting s-commerce, will move to other services such as the checkout feature of these s-commerce platforms. To add to this, study's outcomes affirm that using the checkout feature helps removing opportunistic behavior, perceived risk and promoting sales and transaction success. Second, the fact is that this feature has not available outside the US's market. Therefore, this paper's outcome can also convince other merchants, doubting about the effectiveness of this new service, will adopt this checkout feature and apply it when it is available outside the USA. Online merchants can use this research's outcome as a support tool to define and prepare their strategies when it is available. Third, the research's result also contributes to highlight the important role of the trusted intermediary in s-commerce transactions. Therefore, it raises the attention of social net-

work sites (SNS) providers to complete and update their features, which brings better user experience. The government legislation in s-commerce need to bolster the supervision on network transactions. More important, it is also necessary to sparkplug social moral to make trust based on reciprocity become a kind of social custom.

Limitation and future research

Like other studies, this paper also has some limitations. First, this is a theoretical analysis about the benefit of the trusted intermediary in s-commerce transactions based on game theory. Therefore, it is necessary to conduct empirical research to validate the result in the future. Second, the critical thing is that this checkout feature on s-commerce platforms (i.e., Facebook or Instagram) is currently available in the US's market. So, Its popularity is limited. Third, this paper only deals with two strategies in an individual's behavior including (1) perceive risk, no deal, and (2) perceive no risk, deal. In reality, due to other influent factors, the individual's behavior is expanded to more than two strategies (i.e., perceive risk, deal; or perceive no risk, no deal; and so forth). Therefore, in the future, this study can expand its research scope to provide a more comprehensive perspective.

CONCLUSIONS

In conclusion, the paper offers the following results. First, perceived risk and opportunistic behaviors are the obstacles that deter the success of social commerce transactions. Due to risk perception, consumers and merchants may refuse to join commercial transactions on social media platforms. Furthermore, they are able to break their commitments due to the opportunism to pursue individual interests. Therefore, the participation of social media sites as the third-party of trust (payment) in the commercial transaction is necessary. Social media sites would work as the guarantee, so that both buyers and sellers could accomplish their commitments. Accordingly, the success of social commerce transactions and participants' value are assured and improved. Second, despite a little disagreement together with the skeptical thinking to the checkup features launched on social media sites such as Facebook or Instagram, these features obviously bring many benefits in terms of motivating the success of the transaction while decreasing perceived risk, removing opportunistic behaviors from both buyers and sellers.

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