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Perceived information transparency in B2C e-commerce: An empirical investigation

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ABSTRACT

Consumers abandon their online purchases at an e-commerce website partly due to the lack of information transparency of the website. We identify the antecedents of consumers' perceived information transparency of an e-commerce website and its effects on consumers' online purchase intention. We collected data through a scenario-based survey conducted in a laboratory setting. We found that (1) product transparency, vendor transparency, and transaction transparency significantly influence perceived information transparency; (2) perceived information transparency significantly increases consumers' online purchase intention; and (3) perceived risk partially mediates the effects of perceived information transparency on purchase intention.

1. Introduction

The rapid development of business-to-consumer (B2C) e-commerce has largely benefited consumers, such as facilitating their search for product information and improving the quality of their online purchase decisions [60,61]. However, there is also evidence of deterrence to consumers' purchase decisions because of the lack of necessary information. That is, the information provided by e-vendors does not always satisfy online consumers' information needs. The information needed by consumers is sometimes not available, and in some instances, the required information is deliberately not provided by the e-vendors, leading to the issue of lack of *information transparency*. For example, some vendors failed to provide privacy policy regarding how they utilize the customer's information collected.[1] Some online vendors of used cars are unwilling to disclose clear warranty policy about their products [19].

Anecdotal evidence indicates that the lack of information transparency is one of the top 10 factors that lead to consumers' final abandonment of online purchases [2]. This partly explained why e-commerce sales in 2016 accounted for less than 9% of the total sales despite the rapid development of e-commerce in the U.S. [79]. In particular, consumers believe that in most B2C e-commerce websites, the information for making a purchase decision is insufficient, incomplete, or just plainly wrong, resulting in refusal to make a purchase. In a survey conducted by the E-Tailing Group and ARS Ecommerce Inc., 76% of subjects stated that they find information insufficient to make an online purchase and 72% of them complained that the incomplete product information makes them finally abandon an online purchase [67]. We cite a consumer's feedback posted on Canon USA website (http://www.usa.canon.com/) as an example demonstrating the existence of lack of information transparency in the B2C e-commerce context:

> *"At the time I was shopping for the printer, almost no useful information at all was available on the Canon website about this printer. What took its place was a lot of marketing puffery. Over in the corner of one page, I did finally notice a button which downloads a dreaded PDF file, claiming to explain the product in detail (I didn't even notice this button the first two times I visited the site, and I was looking carefully. It's hard to imagine all the other users were able to find it…)"* [2]

Prior research also indicates that consumers are increasingly being plagued by such a lack of information transparency in online transactions [32,94]. In the B2C e-commerce context, information transparency is defined as the extent to which website information is available and accessible to consumers [32,94]. Although information transparency has been recognized as a key factor affecting consumers' purchase behaviors in e-commerce, the underlying mechanism by which information transparency influences consumers' purchase intention is still unknown, and thus, no practical guidance is available to e-vendors to improve the transparency of their websites to attract consumers and increase the purchase from their sites. We, therefore, aim to investigate and answer the following two research questions:

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[1] https://www.ftc.gov/news-events/press-releases/2015/12/lifelock-pay-100-million-consumers-settle-ftc-charges-it-violated.

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1. *What types of information on a B2C e-commerce website influences consumers perceived transparency towards the website?*
2. *How does consumers perceived information transparency towards a B2C e-commerce website influence their intention to purchase from the website?*

To investigate the research questions, we use the consumer service life cycle (CSLC) framework. The framework delineates consumers' information needs across the stages of the purchasing process from first learning about a product, then acquiring it by taking ownership, and finally disposing it or replacing it [9,10,52]. It provides a guideline for assessing the types of information that would reduce the inconsistency between vendors' provided information and consumers' information needs, thus improving consumers' perceived transparency of a B2C e-commerce website.

The remainder of this study proceeds as follows. Section 2 reviews the literature and provides a theoretical foundation for the study. Section 3 develops the hypotheses. Section 4 describes our methodology. Section 5 reports our data analysis and results. Finally, Section 5 discusses the findings, identifies the limitations, and highlights the implications of this study.

2. Theoretical background

2.1. Prior research on information transparency

The importance of information transparency has been addressed in many studies [32,35,90,94]. In the context of search engines and online recommendation systems, a transparent system is stated to be a system that enables users to understand the underlying algorithm of the system. In other words, transparency helps users understand "how a particular output is obtained from an input" [41,54]. As both search engines and recommendation systems act like a "black box," without offering users any insight into the system logic or justification for the search/recommendation results, users need to be able to look inside the "black box" in a manner that makes it a "transparent box" [74]. Similarly, in the context of B2 B and B2C e-commerce, information transparency in terms of availability and accessibility of website information opens up the black box of the e-vendor, product, and transaction process aspects on the website, thereby satisfying consumers' information needs with regard to these three crucial aspects of the purchase decision [32,94]. The common connotation in these studies is that information transparency occurs when the information provided by e-vendors' fulfills users' information needs and when it could be easily accessed and clearly understood by users.

This study intends to fill three gaps on information transparency, which we identified in the literature. First, prior research on the effects of market information did not drill down to examine the specific effects of the information antecedents from an information transparency perspective.[2] Some just included one or two dimensions. For example, Pavlou et al. [61] studied only the effect of privacy/security. Sismeiro and Bucklin [75] examined only the effect of users' effort in accessing company pricing policies. As we elaborate in Section 2.3, we conceptualize information transparency with three dimensions of transparency (product, vendor, and transaction), each consisting of three to five sub-dimensions of transparency (see Fig. 1).

Second, although Granados et al. [34]'s study provides a conceptual framework for information transparency that integrates the past related research, they did not empirically investigate the effects of information transparency. Accordingly, they call for research on the impact of information transparency on consumers. In the present study, we examine the effect of information transparency on consumer's intention to purchase and the reduction of consumers' perceived risk.

Third, our conceptualization of information transparency is theory driven that can be applied to a wide range of industries. Although Granados et al. [34]'s study is comprehensive, their framework is based on the online travel industry only (e.g., Expedia, Orbitz). Thus, it is understandable that their study does not consider certain dimensions of information transparency (e.g., shipment) that requires shipping of physical goods. Our model is based on the CLSC framework that can apply to physical goods and delivery services.

2.2. The CSLC framework

We drew up the CSLC framework to conceptualize perceived information transparency and build up a taxonomy of information transparency. The CSLC framework describes the four stages that consumers undergo in a purchase process (i.e., requirement stage, acquisition stage, ownership stage, and retirement stage) and also the specific information needs at each stage [18,36,42]. Table 1 describes the information pertaining to different stages of the CSLC framework.

In the "requirement" stage, a consumer ascertains that the usefulness of the product in fulfilling his/her needs and his/her requirements for the product attributes is established. The second stage of "acquisition" includes the ways to order, to pay for, and finally to obtain the product. In the third stage of "ownership," the customer seeks support for changes and upgrades, monitoring of operations, maintenance, training, and so on. In the final stage of "retirement," the consumer disposes the product by transfer of ownership or actual discard [10,40,41,71].

The validity of the CSLC model as a theoretical framework for identifying consumers' information needs as the determinants of their evaluation of a B2C e-commerce website has been confirmed in prior literature. For example, Kim and Benbasat [51] adapted the CSLC model to evaluate customers' information needs in B2C e-commerce. Similarly, Lightner [55] used the CSLC model as a guide to identify information requirements during a purchase cycle that facilitate consumers' evaluations of a website. In addition, Cenfetelli and Benbasat [9,10] used the CSLC model as a guide to analyze the information needs for e-services in the B2C e-commerce context and found positive effects of the information needs on consumers' perceived service quality and on their satisfaction with B2C e-commerce websites. Xu et al. [91] drew upon the CSLC model to study the service provided at the requirement and specification stage.

The above review suggests the usefulness of the CSLC model as a valid theoretical foundation for investigating consumers' information needs in B2C e-commerce transactions, justifying our use of the model to investigate the transparency phenomenon.

2.3. Consumer's perceived transparency in the B2C e-commerce context

We identify the antecedents of perceived transparency according to the CSLC model reviewed earlier. Table 2 summarizes the antecedents.

In this study, consumers' perceived transparency is conceptualized as a composite of three dimensions: perceived product transparency, perceived vendor transparency, and perceived transaction transparency. Perceived product transparency refers to the extent to which consumers could easily access and clearly understand the information needed to evaluate the performance of a product, such as price information, quality information, and feature information; perceived vendor transparency refers to the extent to which consumers could easily access and clearly understand the information that consumers need to evaluate the performance of an e-vendor, such as the e-vendor's identity information, contact information, and rules of engagement (e.g., warranty and refund policy); and perceived transaction

[2] Although past literature has investigated the effects of market information [e.g.,61], few studies have examined the effect of information from an information transparency perspective. As highlighted by Granados et al. [34], information transparency implies the information provider's intention to reveal or withhold the information. However, variables such as information availability and information sharing do not necessarily suggest that the disclosure of information can be intentional.

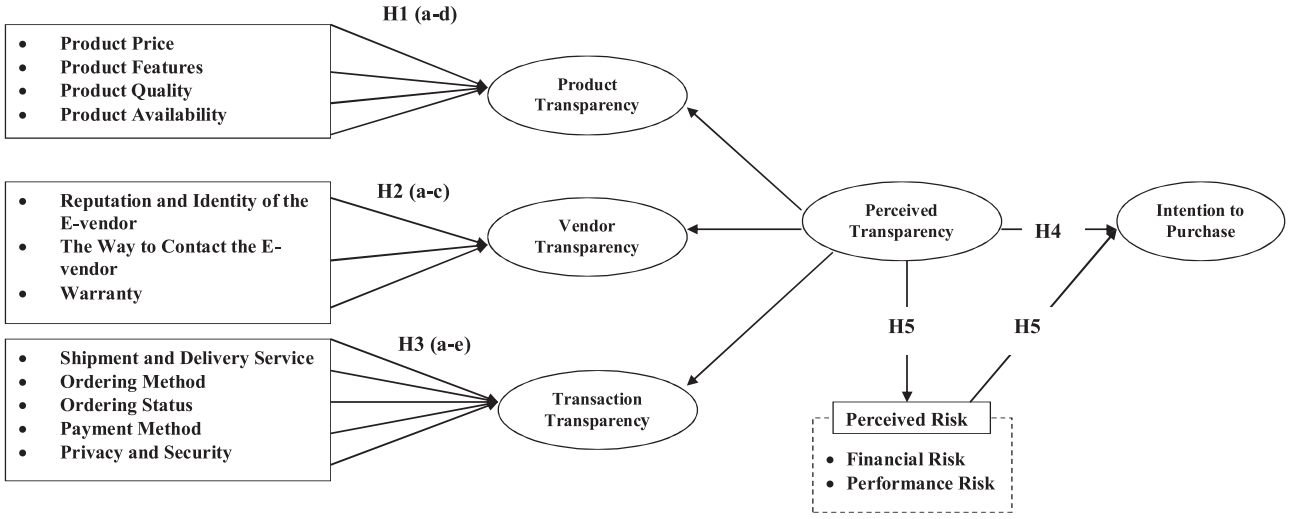

Fig. 1. Research Model.

Table 1
Consumer Service Life Cycle.

Main stages	Dimensions	Descriptions (In the context of B2C e-commerce)
Requirement	Establish requirements	To determine what product a consumer requires
	Specify	To determine a product's attributes
Acquisition	Select source	To determine from which e-vendor a consumer will purchase a product
	Order	To order a quantity of a product from an e-vendor
	Pay for	To transfer funds or extend credit
	Acquire	To take possession of a product
	Test and accept	To ensure that a product satisfies a consumer's specifications
Ownership	Monitor	To monitor use and performance of a product
	Update	To update a product if new attributes, new products, or automatic updates to the product are available
	Maintain	To repair a product
Retirement	Return or disposal	To return or dispose of a product
	Account for	To calculate where and how much is spent on a product

Table 2
Transparency Antecedents and Consumer Service Life Cycle Model.

Dimensions of Perceived Transparency	Antecedents of Perceived Transparency	Dimensions/subdimensions of the CSLC Model
Perceived product transparency	Provision of the information related to product price	Requirement stage
	Provision of the information related to product features	- Establish requirements
	Provision of the information related to product quality	- Specify
	Provision of the information related to product availability	
Perceived vendor transparency	Provision of the information related to reputation and to identity of an e-vendor	Acquisition stage
	Provision of the information related to the way to contact an e-vendor	- Select source
	Provision of the information related to an e-vendor's warranty	Acquisition stage
		- Select source
		Ownership stage
		- Update
		- Maintain
		- Retirement stage
		- Return and disposal
Perceived transaction transparency	Provision of the information related to the ordering method	Acquisition stage
	Provision of the information related to the ordering status	- Order
	Provision of the information related to the payment method	Acquisition stage
	Provision of the information related to the privacy and security policies	- Pay for
	Provision of the information related to the shipment and delivery services	Acquisition stage
		- Acquire
		- Test and accept

transparency refers to the extent to which consumers could easily access and clearly understand the information that consumers need to evaluate the reliability of the transactional processes, such as the information on ordering and payment methods as well as the privacy and security policies.

We conceptualize the three dimensions of perceived transparency based on the spatial and temporal separations between consumers, products, and e-vendors. Such three separations in the B2C e-commerce are identified as follows: (1) the spatial and temporal separation between consumers and products, (2) the spatial and temporal separation between consumers and e-vendors, and (3) the temporal separation between payment and delivery services in the transactional process. In particular, the spatial and temporal separation between consumers and products in the B2C e-commerce reduces consumers' ability to

understand a product by physically "examining" or "testing" it, resulting in their strong needs for product-related information [46,47]. The spatial and temporal separation between consumers and e-vendors prevents consumers from communicating with e-vendors face to face; as a result of the lack of interpersonal communications in the context of B2C e-commerce, it is difficult for consumers to acquire sufficient knowledge about the e-vendors and judge vendor credibility before completing purchases, hence leading to their strong needs for vendor-related information [61,76]. The temporal separation between payment and delivery services in the B2C e-commerce prevents consumers from obtaining a product immediately after payment, thereby increasing consumers' concerns that a variety of unregulated activities may happen during the transaction process [60,61,76]. Thus, there is a great need for information that enables the consumer to understand the manner in which the transactional process is conducted on the website.

To summarize, the three separations result in information needs that are considered as the crucial determining factors of online consumers' ultimate purchase behavior [60,61]. Perceived product transparency, perceived vendor transparency, and perceived transaction transparency collectively lead to consumers' overall perceived transparency toward B2C e-commerce websites. Thus, in our research, perceived information transparency is conceptualized as a second-order construct made up the following first-order constructs, namely, perceived product transparency, perceived vendor transparency, and perceived transaction transparency.

3. Hypotheses development

3.1. Antecedents of perceived information transparency

The proposed theoretical model for the study is presented in Fig. 1. As shown in Table 2, perceived product transparency is formed when the needed product information is easily accessible and clearly understood by consumers. At the "requirement" stage of CSLC, consumers have specific requirements for information on product attributes [55], such as product features and functions, to facilitate their understanding of a product [41]. In the B2C e-commerce context, consumers do not have the opportunity to physically observe a product, which makes it difficult for them to judge the design and appearance of the product [60,66]. Thus, e-vendors use audio, visual, and other sensory channels on the Internet to display product feature information to help consumers to fully understand the product and determine whether the product features can satisfy their needs [80,82]. In the B2C e-commerce context, consumers do not have the opportunity to test the product before purchase and thus cannot determine with regard to the proper functioning of the product. Therefore, information pertaining to product quality, such as quality certification issued by a third party and previous consumers' comments on the product quality, can mitigate consumers' concerns about the product performance and is needed by consumers to facilitate their understanding of the product quality [6,50].

Another information component is product price. Incomplete price information where tax or delivery charges are not mentioned creates uncertainty on the final price that consumers have to pay for the product [25,48]. Thus, detailed price information (e.g., separately listing the delivery fees, taxes, and sales price of the product and listing the product price as published on other B2C websites to facilitate comparison) helps consumers to correctly understand the product price.

Finally, consumers need product availability information, so that they do not unnecessarily spend time browsing and selecting a product that has already been sold out [32,88]. Thus, information on stock availability is also needed to improve consumers' perceived product transparency.

To summarize, product features, quality, price, and availability information of a product are critical for consumers to make a well-informed judgment of a target product and to determine their perceived product transparency. Thus, we consider information pertaining to product features, quality, price, and availability of the product as antecedents of consumers' perceived product transparency; our first hypothesis is as follows:

H1. Provision of price (H1a), features (H1b), quality (H1c), and availability information (H1d) of a product offered for sale on a B2C website will positively influence consumers' perceived product transparency.

Similarly, consumers' perceived vendor transparency manifests when vendor information that consumers need is easily accessible and clearly understood by them. The CSLC model indicates that after going through the "requirement" stage, consumers must locate an appropriate source for the target product at the "acquisition" stage [40,41]. Consumers not only are concerned that an e-vendor may disappear or even not exist in the cyberspace, but also worry the inadequate after-sale support from the e-vendor, all of which can mitigate their purchase intent [51]. Thus, the information pertaining to the e-vendors' reputation, contact method, and warranty policies is needed by consumers to facilitate their selection of e-vendors.

If e-vendors provide their identity-related information on their e-commerce websites, such as detailed company profiles and third-party certificates for their reliability, consumers can appropriately assess prior performance and accordingly predict future performance of the e-vendor [51,53], leading to perceived vendor transparency. Similarly, e-vendors' contact information including physical address and hotline links also enhances consumers' perceived transparency of the e-vendors [66]. This is because, unlike a mortar-and-brick store that needs huge financial and labor investment, an online store can be set up and operated at a relatively low cost and the contact information, such as, physical address and telephone or fax number to some extent implies that the e-vendors have some financial foundations to support their online business [51,54]. Furthermore, the display of hotline links also indicates e-vendors' willingness to provide consumers with instant aids and their consideration of consumers' welfare. Thus, consumers have the opportunity to understand the e-vendors to a deeper extent [58].

Online consumers often worry that e-vendors will refuse to take any responsibilities for a dysfunctional product once they receive consumers' payment and sell the product out [61]. Thus, they need access to and understand information on the postpurchase services delivered by e-vendors, such as return policy, money-back guarantee, and maintenance services, to evaluate the reliability and responsibility of the e-vendors [69], which in turn creates perceived transparency toward the e-vendors. The provision of such information reflects that e-vendors would like to take responsibility for a dysfunctional product and considers consumers' welfare and needs to be important. Thus, we posit the following hypothesis.

H2. Provision of identity- (H2a), contact- (H2b), and warranty-related information (H2c) of the e-vendor will positively influence consumers' perceived e-vendor transparency.

The third dimension of perceived transparency is transaction transparency. Consumers may perceive a high level of transaction transparency, when they can easily access and clearly understand detailed transactional information. As the CSLC model states, after deciding on a target product and selecting a source for the product (i.e., a target e-vendor), consumers will actually place an order and pay for the product, and their primary objective at this stage (i.e., "acquisition" stage and "ownership" stage) is to locate the information that helps them fulfill the whole transaction process, ranging from placing an order and paying for the product to ordering delivery services [51]. Using the CSLC as a guide, Lightener [55] summarized that e-vendors should provide consistent consumer services to help consumers take possession of a product at the "acquisition" phase, including assisting them in understanding the purchase process, placing order, confirming order placement, accepting payment, providing secure payment,

informing the delivery schedule, and tracking the delivery status of the order. Thus, consumers must have access to and understand the five types of transactional information, namely, information pertaining to ordering method, payment method, ordering status, the delivery of a target product, and the privacy and security policies of the B2C e-commerce, to feel satisfied with the whole transaction process and develop perceived transaction transparency.

Consumers need to know the ordering and payment methods well for the focal purchase because some consumers do not have sufficient knowledge of B2C e-commerce and are not sure how the products can be successfully ordered and paid for in the absence of prior experience or knowledge [51,55]. By providing detailed information on ordering and payment methods, e-vendors procedurally direct consumers to order and pay for a target product online. Such information can reduce consumers' uncertainty of the process [73], thus enhancing perceived transaction transparency. Furthermore, information on ordering status is also needed by consumers. This is because temporal separation, which is the time lag between payment and delivery in the B2C e-commerce context, may cause concerns as to whether the order is successfully placed and whether the target product would be delivered safely and timely [61]. Thus, the provision of ordering status information mitigates the information asymmetry and contributes to the development of perceived transaction transparency.

In addition, information on privacy and security policies also increases consumers' perceived transaction transparency. This is because once consumers disclose their personal information to e-vendors, such as name, gender, and credit card number, they lose control of the information and they have uncertainty as to whether e-vendors will appropriately use and safeguard the information [6,61]. The information on privacy and security policies mitigates their financial and privacy concerns of data being fraudulently used by other parties in the transaction process [83].

Finally, as there is a considerable time lag between ordering and receipt of a product, which is an aspect of temporal separation attributed to B2C e-commerce, consumers have to wait for several days (i.e., delivery time) to acquire a target product in the B2C e-commerce, information related to delivery services, such as expected delivery time, delivery method, and the delivery agent, will be needed by consumers to minimize their uncertainty of the whole delivery process and reduce their anxiety caused by their inability to monitor and control the delivery services [61]. As a result, the provision of delivery information will increase their perceived transaction transparency.

To summarize, by providing transactional information, e-vendors can satisfy consumers' requirements in respect of "acquirement" and "ownership" stages of the CSLC, reducing the asymmetry between consumer expectations of transactional information and website-provided information, thereby increasing perceptions of transaction transparency. Thus, we posit the following hypothesis.

H3. Provision of transaction fulfillment-related information [i.e., shipping and delivery service (H3a), ordering method (H3b), ordering status (H3c), payment method (H3d), and privacy and security policies (H3e)] on the B2C website will positively influence consumers' perceived transaction transparency.

3.2. Direct effect of perceived transparency on the intention to purchase

A fundamental objective of e-commerce research is to investigate and understand how consumers' intention to purchase products can be influenced by effective and efficient website designs [55,58]. We, therefore, investigate the potential consequences (e.g., intention to purchase) resulting from the enhanced perceived transparency.

Prior research suggests that consumers would like to purchase the products that provide the greatest benefits [92]. This research builds on the work of Zeithaml [92] and Dodds, Monroe and Grewal [20] who suggest that consumers depend on the extrinsic cues, such as product attributes, to form their evaluations of products, which, in turn, determines the potential benefits they may obtain from the purchase [20,92].

Zhu [94] indicated that information transparency in the electronic marketplaces (e.g., the B2B and B2C electronic marketplaces) enables "more effective and efficient matching of buyers and sellers." In this sense, consumers benefit quite a lot, such as money and time saving, from the transparent marketplace by spending less effort to locate the products that best fit their needs. Granados and his colleagues have investigated the airline B2C e-marketplace and empirically confirmed that a transparent website benefits consumers by providing more information at a very low cost and facilitates their decision-making process [31,33,35,36]. In our research, we conduct an in-depth investigation on the transparency aspect to understand how it is interpreted by consumers in determining the perceived benefits of B2C transactions. We argue that it is the perceived transparency of information on the website (made up of perceived product, vendor, and transaction transparencies) that facilitates consumers' purchase decision, and therefore, it should be considered as a reflection of potential benefit and a factor that determines intent to purchase from a B2C e-commerce website. Therefore, we hypothesize the following:

H4. High consumers' perceived information transparency will lead to high intention to purchase.

3.3. Indirect effect of perceived transparency on intention to purchase mediated by perceived risk

To better understand the nature of the effect of perceived information transparency on intention to purchase, we draw upon the perspective of the agency theory to explicate transactional arrangements between self-interested parties (principal and agent) with incongruent goals in the presence of information asymmetry [1,45]. It has been empathized that the agency theory research in the context of information systems should focus on risks [21]. The reasoning is that the principal has imperfect information about the agent's contribution. This imperfect information on the agent gives rise to the principal's perceptions of risk. Applying the agency theory to the e-commerce environment, the transaction process and outcome can be potentially harmful to buyers, thus raising their risk perceptions [61].

Based on the agency theory, we further propose that the effect of perceived transparency on intention to purchase is mediated by the perceived risk of purchasing a product online. Perceived risk is particularly relevant to our research context for three reasons. First, online shopping involves risks because a consumer may not be able to perfectly predict the consequences of a shopping decision, and sometimes, the results could be unpleasant [5,13]. Second, risk is more prominent in online shopping than in traditional store shopping because of the spatial and temporal separation between the consumers and e-vendors [78]. Indeed, research has shown that perceived risk is an important factor in influencing both initial purchase intention and repeat purchase intention [60]. Third, perceived transparency is expected to reduce the information asymmetry between the users (principal) and a website (agent) [81], thereby reducing their perceived risk.

Five dimensions of perceived risk (i.e., performance risk, financial risk, social risk, psychological risk, and physical risk) have been identified in the literature [23,42,49]; however, the most important risk factors that deter online consumers' purchase decision are performance risk and financial risk [72]. We build on this stream of research and extend it to evaluate how perceived risk can be reduced by increasing perceived transparency. We conceive that the other three dimensions are less pronounced in our research context − purchasing a product online. Particularly, social risk (probability that a product purchased results in disapproval by family or friends) is less relevant. Online shopping is more likely to be goal-oriented than offline shopping [93]. Thus, psychological risk (probability that a product results in

inconsistency with self-image) is kept to a minimum. Finally, many products can be delivered online (e.g., movie, music, and software). Physical risk (probability that a product purchased results in personal injury) may not be very salient.

We therefore use performance risk and financial risk in our study to determine consumers' purchase intention along with perceived information transparency. Furthermore, as consumers may unconsciously involve in a tradeoff among the different forms of perceived risk and generate certain overall expectations regarding the online purchase, some recent studies have proposed to view perceived risk as a higher order unidimensional construct that encompasses several risk dimensions [23,72,77]. Thus, this research considers perceived risk as a second-order construct (comprising two first-order constructs, namely, performance risk and financial risk) that determines consumers' intention to purchase from a B2C e-commerce website.

To hypothesize the relationship between information transparency and risk, we draw upon the agency theory. The important features of the agency problem are that the principal and agent have different interests and that the principal has imperfect information on the agent's contribution. In the e-commerce context, the spatial and temporal separation of the online setting creates information asymmetries to the vendor's advantage [61], as the vendor (agent) might misrepresent the vendor's true attributes (lack of vendor transparency), offer false product information (lack of product transparency), and provide unclear transaction details (lack of transaction transparency) to the principal (consumer).

Thus, the agent (vendor) typically has more information than the principal (consumer) in terms of the quantity and quality of information on its products, vendor characteristics, and transaction practices. Under this condition of information asymmetry, it is difficult for the consumer to distinguish among high- and low-quality vendors/products because e-commerce websites might try to hide their true information to obtain unfounded earnings [61].

By contrast, when consumers' perceived information transparency is high during B2C e-commerce transactions, this perception can largely reduce their perceived risk and in turn strengthen their intention to purchase for two reasons. *First*, perceived product transparency facilitates consumers' understandings of a product and thus mitigates consumers' concerns of purchasing a dysfunctional product online. This mitigation of concerns can in turn reduce consumers' perceived risk of purchasing the product online and finally increases their purchase intention. *Second*, consumers' perceived vendor transparency reduces consumers' concerns of transacting with a dishonest or fake e-vendor in the B2C e-commerce context. As a result, their perceived probability and severity of adverse consequences (i.e., perceived risk) of transacting with the e-vendors are minimized before a purchase. Thus, consumers' intention to purchase is largely encouraged.

To summarize, perceived information transparency will mitigate risk perceptions associated with transactions on a B2C e-commerce website, thus increasing their intention to purchase from the website. Thus, we posit the following.

H5. High perceived information transparency will lead to high intention to purchase, mediated by a low perceived risk.

4. Method and framework

To test our hypotheses, we collected data through a scenario-based survey conducted in a laboratory setting. We recruited and invited participants to a laboratory to perform an online shopping task at a given B2C e-commerce website. To ensure the data quality, the participants' evaluation of the website and the shopping experience was based on a specific shopping task.

4.1. Measurement development

Perceived risk (i.e., financial risk and performance risk) and purchase intention have been extensively studied in the past. Our measures for these two constructs were adapted from pertinent prior literature. In particular, perceived risk was measured using items developed by Grewal and Gotlieb [37], whereas purchase intention was measured with items developed by Everard and Galletta [22].

We conceive perceived transparency and perceived risk as second-order factors; that is, the overall perceived transparency and overall perceived risk are respectively determined by the sum of the first-order transparency dimensions and risk dimensions [4,59]. For the first-order factors, we used reflective items given that these items are highly related among themselves conceptually [29]. However, the second-order factors were measured as formative, and they are indicated by or are the sum of the areas of knowledge at the lower level.

In addition, we could not find well-established multi-item measures for perceived transparency and its antecedents. We therefore developed new measurement instruments for these constructs. The development of the measurement instrument was carried out in two stages. The first step was similar to Moore and Benbasat's procedure [57] in which a large pool of items identified from existing scales in the literature and additional items were added to generate new measures that captured the different dimensions of these two constructs in our research model. As the objective of the first step of measurement development was to ensure content validity [57], we invited seven participants (four students from the Department of English and Communication and four assistant professors in MIS) to generate enough candidate items. Then, the instrument was submitted to a panel of graduate students majoring in MIS to obtain their views on which items were appropriate for inclusion.

A card sorting exercise was next used in the scale development process [57]. The newly created items, together with the items taken from the extant literature, were shuffled into a random order and presented to the judges (one assistant professor and four doctoral students in MIS). Before sorting the cards, the definition of each construct was provided for the judges. Each judge sorted the items into groups according to the predefined categories. A "too ambiguous/doesn't fit" category was included so that the judges were not forced to fit any item into a particularly predetermined construct. Furthermore, they were required to write down their justifications if they thought a specific item should not belong to any of the provided constructs. Following these pretests, we refined the wording of ambiguous items and eliminated the redundant or confusing ones. The procedure finally generated 12 transparency antecedent dimensions (37 items in total) and three transparency dimensions (13 items in total). A list of all measurement items that were finally used in data analysis was given in the Appendix A. A seven-point Likert-type scale, with the endpoints labeled as "strongly agree" and "strongly disagree," was used for all of the items.

Several factors that have been previously shown to be related to perceived transparency, perceived risk, and intention to purchase were measured in the background questionnaire before the experimental tasks, so that their effects on the three constructs could be controlled. These factors included consumers' product knowledge, risk preference, familiarity with the e-vendors, and general web experience. The measures for these control variables were adopted from extant literature (see Appendix A).

(1) Product knowledge: Consumers product knowledge influences their perceptions of product transparency. Experts with good knowledge of a product can better understand the related product information on the website and thus will perceive a high level of product transparency as compared to persons with little knowledge of the product.
(2) Risk preference is a stable personality trait that reflects a person's tendency to be attracted or repelled by alternatives that are

perceived as risky [85]. Previous research has found that people's inherent risk preference in combination with situational factors determines their risk perception [85]. Given this, a consumer's risk preference can significantly influence his perceived risk, which in turn influences his intention to purchase.

(3) Familiarity with the e-vendor refers to one's level of knowledge of an e-vendor [27]. Repeated customers, by virtue of their prior interactions with the e-vendor, should have a much better understanding of the e-vendor than first-time consumers. Accordingly, consumers familiarity with the e-vendor may influence their perceived vendor transparency.

(4) General web experience: a consumer's general web experience on the Internet may enhance a person's familiarity and knowledge on the Internet and web-based applications, reinforcing their belief toward purchasing through the Internet [14]. Lohse and his colleagues, for instance, reported that length of time as an Internet user as well as frequency and amount of time using the Internet per visit were positively related to the intention of online purchasing. Therefore, consumers general web experience on the Internet was used as a control variable.

4.2. Websites, participants, and data collection procedure

To identify a pool of e-commerce websites for our scenario-based survey, a research assistant (RA), who was not aware of the purposes of this study, was instructed to use Google to search for online stores for digital cameras and jackets. We considered both digital cameras and jackets as the focal products in the survey because they were respectively viewed as a typical example of each of the two types of products: experience products and search products [39]. To ensure the generalizability of the findings, we included both types of products in this study. The RA was asked to pick the listed B2C e-commerce websites on search results pages starting from page 3, and then he was asked to exclude famous or known websites for the next step. We did not choose those well-known websites to minimize the influence of the participants' prior online shopping experience at these websites.

Through a series of pretest, we then chose 11 B2C e-commerce websites that exhibited different levels of transparency and were not well-known to the local community where the survey was conducted (see Table 3). With respect to the expected level of transparency, for example, the website http://www.digicombos.com/ provided very detailed price information including the original price, tax and delivery charges, whereas the website www.onecall.com only provided a total price without listing the specific components. We explored and included these 11 websites to ensure that the 12 transparency antecedents were all covered and reflected as two levels (available vs. unavailable) in these websites.

One hundred thirty-eight undergraduate students from a major university in Hong Kong participated in the survey. They were year 2 or above undergraduate students, including 41.6% males. Upon arrival, they were randomly assigned to one of the 11 real websites. Each participant performed an online shopping task for a jacket or a digital camera in an assigned website and then completed a questionnaire to evaluate the website. To ensure that their product knowledge on digital cameras would not influence their evaluations, we only selected individuals who were not experts in digital cameras. Furthermore, those who never purchased any products online were not invited as some basic prior knowledge was required to complete the online shopping tasks.

Table 3
Websites for the Survey.

Jacket (J)	Digital Camera (DC)
J1: www.altrec.com	DC1: http://www.digicombos.com/
J2: www.66north.com/us	DC2: http://www.expansys-usa.com/
J3: www.basspro.com	DC3: www.onecall.com
J4: www.travelcountry.com	DC4: http://www.newegg.com/
J5: www.backcountry.com	DC5: http://shop.boomj.com/
J6: www.appoutdoors.com/index.htm	

The survey proceeded as follows. First, an RA introduced the survey to the participants. During the process, participants were allowed to ask questions to ensure full understanding of the survey procedure. Then, the participants completed a background questionnaire intended to collect their demographic information. In the next step, the participants were asked to finish two tasks. The first task was to imagine a scenario *in which they were thinking about buying a digital camera/jacket as a birthday present for a good friend* and then to select a product in the website assigned to them. After completing the online shopping task, they were required to complete an online questionnaire which included items to measure the independent variables in our research model, namely, the antecedents of perceived transparency, and the dependent variables, namely, perceived transparency, perceived risk, and intention to purchase. There was no time limit set for completing these tasks.

To make the study realistic, the participants were told that they had the liberty to choose any digital camera or jacket for the experimental task. A reward of an HK$100 coupon was given to each participant.

5. Data analysis and results

The research model is empirically analyzed using partial least square (PLS). We use the software SMART PLS 2.0 [68] to test the psychometric properties of all measures and estimate the strength of the relationship between the variables, as illustrated in Fig. 1.

5.1. Data analysis for the measurement model

The research model presented in Fig. 1 indicates two levels of factors or latent variables. The first-order factors are the three dimensions of perceived transparency (perceived product transparency, perceived vendor transparency, and perceived transaction transparency), and the two dimensions of perceived risk (financial risk and performance risk). PLS allows the testing of the higher order models by using the hierarchical component model [7,24]. Hierarchical component model approximates second-order factors by using the repeated indicators used for the first-order factors. That is, a second-order factor is directly measured by observed variables for all the first-order factors. The model can then be estimated by the standard PLS algorithm [11,89].

To assess the reliability (individual item reliability and internal consistency) and validity of the reflective constructs, we examined the item loadings, the composite reliability of constructs, and average variance extracted (AVE). All of the reflective constructs show strong positive loadings significant at the 0.001 level, indicating high individual item reliability. Furthermore, all composite reliability and Cronbach's alphas are equal to or greater than 0.70, which is the threshold value for acceptable reliability [29]. The AVE, which measures the variance captured by the indicators relative to measurement error [24], is also adequate (greater than 0.50 to justify the use of a construct [29]). The composite reliability, Cronbach's alphas, and AVEs for all reflective constructs are indicated in Table 4.

Gefen and Straub have suggested two criteria to examine discriminant validity [29]. First, the measurement items must load highly on their theoretically assigned latent constructs, but not highly on others. Second, the square root of AVE must be much larger than the correlation between the construct and other constructs. The first criterion is demonstrated by the factor- and cross-loading report in Appendix B, whereas the second criteria fulfillment is fully satisfied by the data in our study, as given in Table 4.

Furthermore, we developed formative constructs as a composite of multiple measures [56]. Unlike reflective measures where a change in the construct affects the underlying measures, formative constructs work differently. Changes in the formative measuring items cause

Table 4
Construct Attributes (Reflective Constructs Only).

Variables	Mean	s.d.	Composite Reliability	Cronbach Alpha	1	2	3	4	5	6	7	8	9	10	11	12	13
1.FEATR	4.48	1.1	0.81	0.70	**0.72**												
2.AVAILA	4.93	1.52	0.91	0.81	0.38**	**0.92**											
3.CONTACT	4.77	1.37	0.88	0.74	0.48**	0.28**	**0.89**										
4.WARTY	4.02	1.19	0.89	0.84	0.48**	0.35**	0.49**	**0.78**									
5.ORDMTH	4.58	1.19	0.90	0.83	0.60**	0.46**	0.60**	0.51**	**0.87**								
6.PRVSE	4.42	1.3	0.88	0.80	0.44**	0.40**	0.41**	0.62**	0.60**	**0.85**							
7.PAYMTH	4.54	1.23	0.89	0.82	0.53**	0.43**	0.57**	0.47**	0.71**	0.46**	**0.85**						
8.PRDTN	4.4	1.28	0.95	0.93	0.68**	.34**	0.45**	0.55**	0.57**	0.49**	0.58**	**0.89**					
9.VENTN	4.01	1.23	0.94	0.92	0.47**	0.31**	0.61**	0.67**	0.62**	0.61**	0.50**	0.60**	**0.9**				
10.TRSTN	4.78	1.16	0.96	0.94	0.45**	0.33**	0.52**	0.44**	0.70**	0.49**	0.51**	0.61**	0.64**	**0.92**			
11.FINRSK	4.47	1.05	0.90	0.86	−0.10	−0.02	−0.14	−0.02	−0.08	−0.07	−0.04	−0.22	−0.13	−0.16	**0.84**		
12.PFMRSK	4.46	0.9	0.88	0.85	−0.10	0.03	−0.16	−0.08	−0.02	−0.05	−0.04	−0.25	−0.23	−0.12	0.76**	**0.74**	
13.INPCH	3.83	1.41	0.96	0.93	0.44**	0.39**	0.38**	0.36**	0.49**	0.35**	0.49**	0.61**	0.56**	0.55**	−0.25	−0.32	**0.94**

Note.
FEATR: Product Feature.
AVAILA: Product availability.
CONTACT: Way to Contact the E-vendor.
WARTY: Warranty.
ORDMTH: Ordering Method.
PRVSE: Privacy and Security.
PAYMTH: Payment Method.
PRDTN: Product Transparency.
VENTN: Vendor Transparency.
TRSTN: Transaction Transparency.
FINRSK: Financial Risk.
PFMRSK: Performance Risk.
INPCH: Intention to Purchase.
** $p < 0.01$

changes in the formative constructs [44]. In this sense, the objective of formative constructs is to retain the unique variance of each measure and not just the shared variance among measures [62]. Thus, a common factor analysis is inadequate for formative constructs because there is no requirement that the measures of the construct be highly correlated [70]. Diamontopolous and Winklhofer [18] suggest that if any of the item weightings for formative measures are nonsignificant, it may be appropriate to remove nonsignificant indicators (one at a time) until all paths are significant. Furthermore, to ensure that multicollinearity between construct items is not present, researchers suggest that one can use variance inflation factor (VIF) statistic to determine the items that are appropriate for inclusion [18,62].

To examine the content validity of formative constructs, we provide both item weightings and VIF statistic in Table 5. According to Diamontopolous and Winklhofer's suggestion, if the VIF statistic is higher than 3.3, multicollinearity poses more of a problem [17]. Our VIF statistics are far lower than the benchmark of 3.3, indicating the nonsignificance of multicollinearity between the construct items. Furthermore, we find that only one item weighting (in bold) is not significant. We decided to retain this item because it measures the essence of the construct: product quality. As previous research suggests, we should retain some nonsignificant indicators to ensure that the construct is still measuring the entire domain [8].

Table 5
Item Weightings and Variance Inflation Factors (Formative Constructs Only).

Items	Item Weightings	T-value	Variance Inflation Factor (VIF)
PRICE1	0.54	3.61	1.08
PRICE2	0.72	4.76	1.00
PRICE3	0.62	3.83	1.08
QUALT1	0.69	4.95	1.04
QUALT2	0.31	1.62	1.13
QUALT3	0.83	8.32	1.16
RPTID1	0.60	4.12	1.17
RPTID2	0.74	6.21	1.10
RPTID3	0.73	6.35	1.09
SHPDLV1	0.84	9.10	1.31
SHPDLV2	0.80	8.93	1.36
SHPDLV3	0.66	5.21	1.21
ORDSTA1	0.79	7.30	1.44
ORDSTA2	0.68	4.27	1.50
ORDSTA3	0.73	5.26	1.09

Note#1–QUALT: Product Quality; RPTID: Reputation and Identity of the E-vendor; SHPDLV: Shipment and Delivery Services; ORDSTA: Order Status.
Note #2: The designation of a construct as formative or reflective depends on the nature of the construct. Petter et al. [62,p. 635] provide guidelines on the designation. Two of the decision rules are whether the construct indicators need to covary with each other and should be interchangeable or not. For example, we specified product price as formative because the three price items need not covary or be interchangeable with each other. That is, the website showed the total price (item 2) does not mean the website will show the price comparison (item 1) or money saved (item 3), and vice-versa. Similarly, for product quality, a website showing ISO quality certification (item 1) does not necessarily mean the website needs to show consumer review (item 2) and experts' comments (item 3).

5.2. Data analysis for the structural model

The standardized PLS path coefficients for testing the structural model are shown in Fig. 2. We applied the standard bootstrap resampling procedure (1000 samples) to generate t-statistics and standard errors [12] to assess the significance of the paths (refer to Fig. 2).

As shown in Fig. 2, Hypotheses H1–H3 were not all fully supported by our bootstrapping results. Results indicated that only the availability of product features ($\beta = 0.15$, $p < 0.05$) and that of product quality ($\beta = 0.16$, $p < 0.05$) were the positive indicators of perceived product transparency, partially supporting Hypothesis H1. Furthermore, the provision of the information related to the reputation and identity of the e-vendor ($\beta = 0.12$, $p < 0.1$) and e-vendor's warranty policy ($\beta = 0.17$, $p < 0.05$) significantly increased perceived vendor

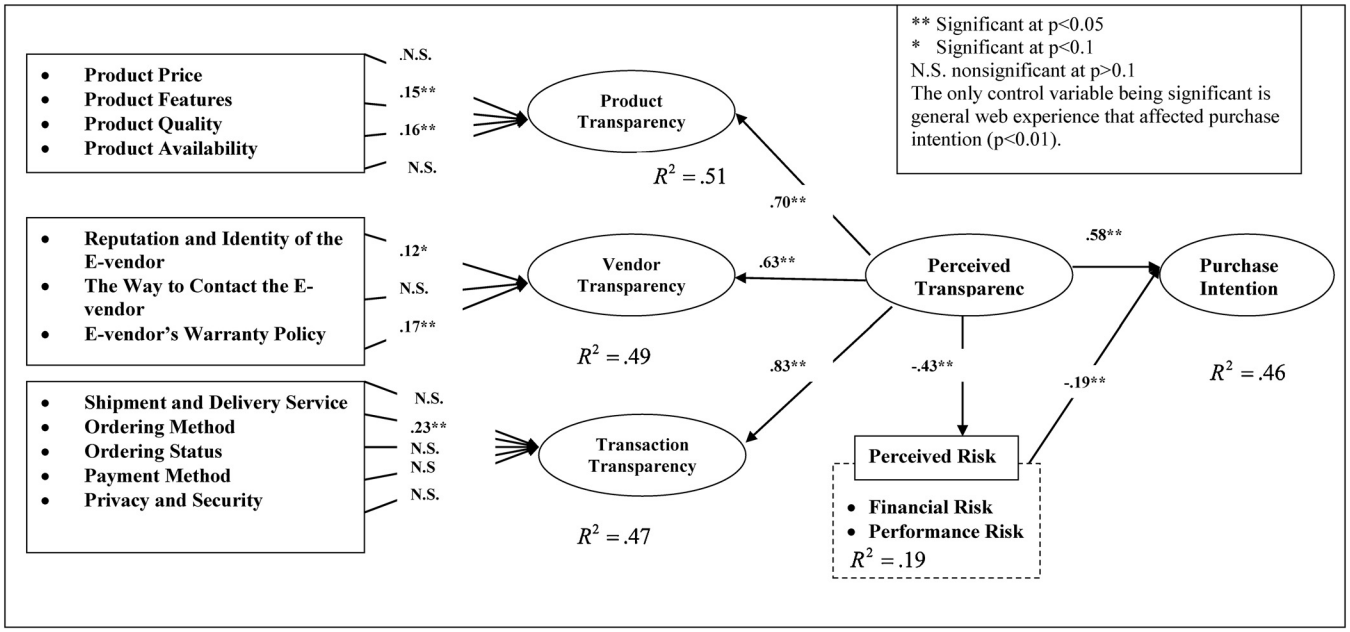

Fig. 2. PLS Results.

transparency, partially supporting Hypothesis H2. Finally, in respect of transactional information, only availability of ordering methods ($\beta = 0.23$, $p < 0.05$) was found to exert a significant effect on perceived transaction transparency, partially supporting Hypothesis H3. The variances in perceived product transparency, perceived vendor transparency, and perceived transaction transparency were 51%, 49%, and 47%, respectively, indicating the variances were largely explained by the transparency antecedents.

Fig. 3 delineates the relationship between consumers' perceived transparency and intention to purchase. It shows that perceived transparency has a significant effect on the intention to purchase ($\beta = 0.58$, $p < 0.05$), thereby supporting H4. The proposed mediation hypothesis (H5) was tested using a statistical technique suggested by Baron and Kenny [3]. The following conditions must hold to establish mediation: (1) a significant relationship exists between the independent variable and the dependent variable; (2) a significant relationship exists between the independent variable and the presumed mediator; and (3) in the presence of a significant relationship between the mediator and the dependent variable, the previous significant relationship between the independent variable and the dependent variable is no longer significant (full mediation) or the strength of the relationship is significantly decreased (partial mediation).

The association between perceived transparency and perceived risk was significant ($\beta = -0.44$, $p < 0.05$) indicating that perceived transparency exerts significant direct influence on perceived risk. When consumers' intention to purchase was regressed on both perceived transparency and perceived risk, a significant relationship was found between perceived transparency and purchase intention ($\beta = 0.58$, $p < 0.05$), as well as between perceived risk and purchase intention ($\beta = -0.19$, $p < 0.05$), indicating a strong independent effect of these two factors on intention to purchase. Although the direct effect of perceived transparency on purchase intention was significant, the strength of the effect was reduced (from $\beta = 0.66$, $p < 0.05$ to $\beta = 0.58$, $p < 0.05$) when perceived risk was included as a mediator, indicative of a partial mediating effect of perceived risk on the relationship between transparency and purchase intention. However, the indirect effect of perceived transparency on purchase intention through perceived risk ($-0.44 \times -0.19 = 0.08$) was relatively small when compared to the direct effect of perceived transparency on purchase intention (0.58). The variance in purchase intention explained by perceived transparency and perceived risk in this study was 46%, confirming the importance of perceived transparency and perceived risk in explaining consumers' purchase intention. The majority of the variance in intention to purchase was explained by the direct effect of perceived transparency rather than the indirect effect.

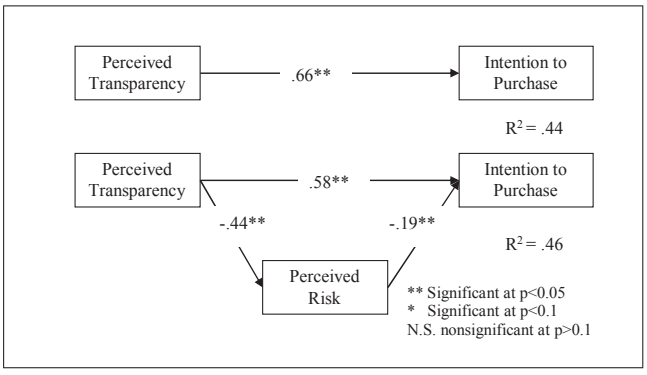

Fig. 3. Mediation Effects.

To examine the significance of the partial mediation, we conducted the bootstrapping mediation test to examine the mediating role of perceived risk [63]. Preacher and Hayes [63] determined that the key condition is to test whether the indirect effect is significant. Accordingly, this study applied PROCESS for SPSS with 1000 bootstrapped samples to estimate such an indirect effect (coefficient a × coefficient b) [64]. The results show that the significant indirect effect of perceived information transparency on intention to purchase was 0.08, which had a 95% confidence interval that did not include zero [0.01, 0.14]. In addition, the direct effect of information transparency on intention to purchase was also significant ($p < 0.01$). Therefore, perceived risk partially mediated the relationship between information transparency and intention to purchase, partially supporting H5.

Moreover, the results of the structural model show the effects of the first-order dimensions on their second-order aggregate construct. It is important to note the paths from the first-order dimensions to the second-order factors are weights, not reflective loadings (path-coefficients) and thus they must be accordingly interpreted as follows: The three dimensions of perceived transparency had significant weights on

their aggregate construct, ranging from 0.63 to 0.83, demonstrating that the second-order factors are related to the first-order factors with strong paths.

We calculated the effect sizes for H1 to H4 based on Cohen's *f*2 [15]. Cohen considered an effect size of 0.02, 0.15, and 0.35 as small, medium, and large, respectively. Regarding H1, the effect sizes of product features (H1b) and product quality (H1c) on perceived product transparency are 0.42 and 0.04 respectively; reputation and identity (H2a), contact method (H2b), and warranty policy (H2c) on perceived vendor transparency are 0.11, 0.06, and 0.29, respectively; and ordering method (H3b) on perceived transaction transparency is 0.16. The effect sizes of the rest of the H1 and H3's sub-hypotheses are all less than 0.01. However, H4's effect size is 0.78, a very large effect size. The effect size for H5 is 0.084, a small-to-medium effect size. H5's effect size is calculated based on the product a × b, where coefficient a represents the effect of X (independent variable) on M (mediator), and coefficient b represents the effect of M on Y (dependent variable) [65].

6. Discussion and contributions

6.1. Discussion

We found that 5 of 12 transparency antecedents were supported as significant contributors to the aggregate transparency construct: product features, product quality, e-vendors' warranty policy, and ordering methods ($p < 0.05$); reputation and identity of e-vendor were marginally significant ($p < 0.1$). The significant effects of product features and product quality are consistent with those of prior research, thus showing their important roles in affecting intention to purchase from an e-commerce website [86]. Similarly, e-vendors' warranty policy and reputation were found to reduce seller uncertainty in the context of used car online auction markets [19].

The rest of the seven dimensions were not significant: product price, product availability, the way to contact the e-vendor, shipment and delivery service, ordering status, privacy and security, and payment method. As website systems become more pervasive and intuitive with most of them showing information such as product price, availability, and payment method, they are no longer differentiators for information transparency. Instead, these information dimensions are taken for granted. Our reasoning can be explained by the schema theory [87], which holds that people make judgments through a top–down process (conceptually driven) that call upon prior knowledge. According to this schema theory, we argue that people may not have these information elements in their mental schema for evaluating websites because they are not highly relevant elements to consider. Thus, respondents might not have drawn on these aspects when forming their perceptions of perceived information transparency.

However, it does not mean that the nonsignificant transparency antecedents are not important. For example, Table 4 shows that product availability is still significantly correlated with product transparency ($r = 0.34$), ways to contact e-vendor is highly correlated with vendor transparency ($r = 0.67$), and both payment method and privacy/security guarantee are highly correlated with transaction transparency ($r = 0.51$ and 0.49, respectively). Our interpretation is that these information antecedents are absolutely important but not relatively so in the presence of other significant antecedents found in our model. Without those significant antecedents in our proposed model, the nonsignificant transparency antecedents could be statistically significant. For example, the information on privacy and security policies (nonsignificant in our results) is found to be helpful in reducing a buyer's concern about the online transaction process [61].

6.2. Limitation and suggestions for future research

Several limitations of this study should be noted, and we call for future research to address these limitations. First, when exploring the antecedents of perceived transparency, we only focused on the informational factors (e.g., information types). There definitely exist noninformational factors that exert effects on consumers' perceived transparency, but were not included in this study. We expect this study plays an illuminating role in providing preliminary guidelines for future research. We strongly recommend scholars to explore the noninformational factors. For example, the information format, which refers to how information is presented and organized (list versus matrix) on a website, can have a significant effect on consumers' information acquisition and processing [7,38,43]. As consumers' perceived transparency is highly correlated to consumers' acquisition and understanding of the needed information, the information format may also exert effects on consumers' perceived transparency and should be investigated in further research.

Second, this research only focused on consumers' purchase intention as the key transparency outcomes, and as a result, we could not sufficiently generalize the positive effects of perceived transparency to other consumers' behavioral intentions such as consumers' word-of-mouth (WOM) toward a B2C e-commerce website. We suggest that scholars include more behavioral outcomes to further testify whether perceived transparency always exerts positive effects on consumers' behavioral intentions.

Third, similar to many e-commerce studies [16,84], the participants in this study were not required to make a real purchase, and as a result, they did not need to provide real personal information to register and submit their credit card information in the checkout process. The unreal purchase experience undermined participants' perceptions that they were really making an online purchase and consequently some factors that were regarded as the optimal and necessary considerations before purchase, such as whether the privacy and security policies were provided on websites, may not significantly influence their perceived transparency toward the websites. In this sense, we suggest other scholars develop experimental websites and create a real shopping scenario for participants in future studies.

The other limitation is that we only used perceived performance risk and perceived financial risk as dimensions of perceived risk because they are most relevant in the context of B2C e-commerce, and the primary focus of this study is on the factors of information transparency. Nevertheless, future research about perceived risk may consider identifying a full set of risk dimensions of perceived risk to examine whether the current results will hold.

Finally, as the participants recruited in our study were all college students as consumers, the results generated from our sample pool might not be directly applied to other populations. In addition, we did not directly measure information providers' intention to reveal or withhold information; thus, the results might not be generalized to the perspective of information providers. Instead, we measured *consumers' perceived* information transparency because consumers are in a better position to judge whether they can understand the information clearly to meet their needs.[3] Nevertheless, future research should solicit the response from the information providers to better gauge their intention to reveal the information to consumers.

6.3. Contributions

6.3.1. Theoretical contributions

This study makes three major theoretical contributions. First, this study provides a rich understanding of perceived transparency in the context of B2C e-commerce. Although the concept of information transparency has been proposed for decades, the construct lacked a

[3] Presenting information clearly to users also shows how information transparency differs from information availability and information sharing. It is insufficient for the information to be just available or shared, and it needs to be presented in a clear manner and easy to access; otherwise, users might be frustrated with information overload [34].

clear conceptualization and measurement. This study abridged the theoretical gap by grounding on the CSLC framework to identify consumers' information needs and develop a multidimensional construct with three subdimensions (perceived product transparency, perceived vendor transparency, and perceived transaction transparency). We also developed the measurement items and empirically testified them. By doing this, we bring information transparency perceptions to the forefront of the e-commerce.

Second, the successful identification of transparency antecedents enriched the existing theories on information transparency. Many prior studies have empirically validated the significant influence of information disclosure on consumers' perceived transparency [27,28,30,60], whereas this research further analyzed the types of information that were displayed on a B2C e-commerce website and how they generated consumers' perceived transparency. The findings imply that not all the information related to the B2C e-commerce can enhance consumers' perceived transparency of the websites. In this sense, the general investigation on information disclosure is insufficient when we attempt to interpret the antecedents of perceived transparency, and we should focus on the detailed contents of information disclosure. Furthermore, our study can guide future research on where to focus its effort regarding improving information transparency.

Third, this study proposed and empirically testified an underlying mechanism by which perceived transparency affected consumers' purchase intention. Most existing studies explained the relationship between transparency and consumers' purchase intention by using price discovery mechanism. In particular, a transparent market facilitated price discovery and always resulted in a low product price which in turn enhanced consumer willingness to purchase [32,94]. However, this study interpreted the mechanism by proposing that perceived transparency enhanced consumers' purchase intention by directly providing them with information benefits (i.e., reduce search cost and increase search efficiency) or by indirectly helping them reduce potential losses/risks (i.e., risk of purchasing a dysfunctional product or transacting with a dishonest e-vendor). Thus, this study enriched our understandings of the consequences of perceived information transparency.

Further, to better conceptualize the nature of perceived information transparency in online environments and theorize its effect mechanisms, we proposed that online transactions be viewed as agency relationships. The perspective of the agency theory brings forth the underlying agency problems of asymmetrical information. Our study extends the agency perspective to e-commerce environment by proposing perceived information transparency as an effective way to reduce information asymmetry between the principal and the agent and accordingly reduce consumers' perceived risk and increasing intention to purchase. In addition, we integrate the marketing theory (CSLC framework) and IS (information transparency) theory with the economic (agency) theory. In doing this, this research improves our understanding of how theories from different domains can be informed by each other to reduce the agency problems of information asymmetry in an e-commerce context.

6.3.2. Practical contributions

For business executives who may be concerned about the economic potential of their transparency strategies, this study provides some guidelines. First, this research facilitated practitioners' understanding of the important role played by information transparency in the B2C e-commerce context. Although anecdotal evidence has indicated the positive effects of perceived transparency on consumers' purchase intention, e-vendors may be still concerned about whether they should undergo the risk of losing information advantage and suffer financial losses if they voluntarily improve the transparency level of their websites [32,94]. In this sense, information transparency is considered as a selling strategy, and e-vendors can retain the information asymmetry to their own advantage by deliberately packaging market information, such as concealing or distorting information. Results of this research provided sound evidence confirming the adverse consequences of the lack of information transparency in the B2C e-commerce and posited that even if e-vendors could successfully retain their information advantage, they might still suffer financial losses caused by consumers' abandonment of their purchase if information transparency is lacking. Thus, this study provides a new insight for practitioners to evaluate and select a selling strategy.

Second, this research also provides actionable design guidelines for practitioners to improve the transparency level of their B2C e-commerce websites. In particular, e-vendors now have a guideline to capture the real information needs of consumers, and by providing the information that consumers really need on the websites, e-vendors can more efficiently enhance consumers' perceived transparency of the websites. For example, the results indicated that certain website information (i.e., product quality and ordering methods) assumed more important roles in affecting consumers' perceived transparency when compared to other types of information. Thus, to enhance consumers' perceived transparency and encourage their purchase intention, e-vendors should weigh more heavily on these types of information and fully and clearly disclosure them on websites.

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Appendix A. Measurement Items

- Product Price
  - The website compared the price of the product with those in other websites.
  - The website showed the total price of the product (e.g., including shipping fees and taxes) before the order was placed.
  - The website showed the money that could be saved if the product was bought from it.
- Product Features
  - The website provided consumers with detailed product manufacturing information (e.g., manufacturer and country of origin).
  - The website described the attributes of the product in detail.
  - The website used multimedia to present the product features.
  - The website provided pictures to show the appearance of the product.
- Product Quality
  - The website provided quality certification of the product (e.g., ISO quality certification).
  - The website provided other users' comments on product quality.
  - The website presented expert comments on product quality.
- Product Availability
  - The website showed whether or not the product is available.
  - The website provided information about the availability of the product.

- Reputation and Identity of the E-vendor
  - The website presented whether the vendor is a listed company.
  - The website provided the vendor's name and detailed company profile.
  - The website showed its third-party certificates for its performance in the past.
- The Way to Contact the E-vendor
  - The website offered ways to contact the e-vendor.
  - The website provided the customer hotline.
- Shipment and Delivery Services
  - The website described the delivery method(s) of the product in detail.
  - The website informed consumers in advance of the expected delivery time and charges involved.
  - The website provided the carrier's name and a tracking mode of the shipment.
- Ordering Method
  - The website indicated how products can be ordered step by step.
  - The website offered instructions for the whole process of ordering.
  - The website described the way to order the product in detail.
- Order Status
  - The website provided consumers with detailed instructions on how to check their order status.
  - The website provided consumers a link to check their order status.
  - Consumers could receive an e-mail to confirm whether or not the order process was successful.
- Privacy and Security
  - The website provided the guarantee that consumers' personal information is protected online.
  - The website showed that it could protect credit card information by encryption during a transaction.
  - The website provided third-party authentications, such as Trusted Commerce, Hacker Safe, TRUSTe, and Verisign Secured to show that consumers' personal information is safely transmitted and stored.
- Warranty
  - The website explained the return policy for the products it sold in detail.
  - The website provided a detailed instruction of product return procedure.
  - The website showed whether or not the money-back guarantee is available.
  - The website provided the service policy for its consumers, such as installation and maintenance services.
  - The website showed the instructions on how to request for installation and maintenance services in detail.
- Payment Method
  - The website explained various ways to pay for the product.
  - The website showed detailed instructions on how to pay for the product.
  - The website explained each payment method available in detail.
- Perceived Product Transparency
  - I could fully understand the product after I visited the website.
  - After browsing the website, I had a clear idea about the product.
  - I had a clear understanding of the product after navigation the website.
  - After browsing the website, I was able to know the product very well.
  - Overall, the product was transparent to me after I browsed the website.
- Perceived Vendor Transparency
  - I could easily understand the e-vendor by browsing the website.
  - I was familiarized with the e-vendor after I navigated the website.
  - After browsing the website, I was clear about the profile of the e-vendor.
  - I had a clear idea about the e-vendor, after visiting the website.
- Perceived Transaction Transparency
  - I clearly knew how the transaction was carried out in the website.
  - I was clear about the way to complete the transaction in the website.
  - I had a clear idea of the transaction process in the website.
  - I was familiarized with the transaction process in the website.
- Perceived Financial Risk
  - Considering the potential costs involved, I would worry about purchasing the product.
  - I think that the purchase of the product would lead to financial risk for me, because of the possibility of higher maintenance and repair costs.
  - Given the potential expenses associated with purchasing the product, too much risk is associated with purchasing the product.
  - I would be concerned that I may not get my money's worth from the product when buying it.
- Perceived Performance Risk
  - When I'm buying from the online website, I'm confident of the product to perform as expected.
  - When I'm buying from the e-store, I'm sure about the product's ability to perform satisfactorily.
  - Considering the possible problems associated with the product's performance, too much risk would be involved with purchasing the product from the e-store.
  - Too much uncertainty is involved in terms of performance of the product from the e-store.
  - I would be afraid that the product would not provide me with the level of benefits that I expected it to.
  - When buying the product, I would worry about how reliable the product will be.
- Intention to Purchase from the Online Store
  - I would consider purchasing the product from this online store.
  - I would purchase the product from this online store.

- ○ I would expect to buy the product from this online store.
- Product Knowledge
  - ○ I know pretty much about jackets/digital cameras
  - ○ I do not feel very knowledgeable about jackets/digital cameras
  - ○ Among my circle of friends, I'm one of the "experts" on jackets/digital cameras
  - ○ Compared to most other people, I know less about jackets/digital cameras
  - ○ When it comes to jackets/digital cameras, I really don't know a lot
- Risk Preferences
  - ○ I like to test myself every now and then by doing something a little risky
  - ○ Sometimes I will take a risk just for the fun of it
  - ○ I sometimes find it exciting to do things for which I might get into trouble
  - ○ Excitement and adventure are more important to me than security
- Familiarity with the E-Vendor
  - ○ I am familiar with the online vendor through reading magazines/newspaper articles or ads
  - ○ I am familiar with the online vendor through visiting the site and searching for products
  - ○ I am familiar with the online vendor through purchasing products at this site
- General Web Experience

On average, how much time per week do you spend on each of the following Web activities? (Scale: None, 0–30 min, 30–60 min, 1–2 h, 2–4 h, 4–8 h, 8+ h)

- …reading newspapers on the Web?
- … reading and/or posting messages to news groups?
- … accessing information on the Web about products and services you may buy?
- … shopping (i.e., actually purchasing something) on the Web?

Appendix B. Factor Loadings and Cross-Loadings (Reflective constructs Only).

ITEMS	FEATR	AVAIL	CONTACT	WARTY	ORDMTH	PRVSE	PAYMTH	PRDTN	VENTN	TRSTN	FINRSK	PFMRSK	INPCH
FEATR1	**0.66**	0.15	0.21	0.27	0.35	0.24	0.27	0.39	0.25	0.19	−0.26	−0.26	0.15
FEATR2	**0.77**	0.34	0.34	0.40	0.48	0.38	0.43	0.61	0.36	0.33	−0.19	−0.18	0.34
FEATR3	**0.67**	0.26	0.28	0.26	0.35	0.30	0.30	0.41	0.27	0.26	−0.05	−0.07	0.42
FEATR4	**0.78**	0.26	0.47	0.35	0.47	0.23	0.43	0.55	0.41	0.41	−0.16	−0.19	0.29
AVAIL1	0.32	**0.92**	0.27	0.30	0.44	0.37	0.42	0.29	0.28	0.33	−0.14	−0.07	0.38
AVAIL2	0.34	**0.91**	0.18	0.28	0.34	0.30	0.33	0.27	0.22	0.21	−0.06	−0.01	0.30
CONTACT1	0.45	0.27	**0.89**	0.44	0.52	0.36	0.54	0.43	0.53	0.43	−0.20	−0.27	0.34
CONTACT2	0.38	0.17	**0.89**	0.38	0.51	0.31	0.45	0.33	0.52	0.44	−0.22	−0.27	0.29
WARTY1	0.35	0.27	0.41	**0.87**	0.37	0.58	0.28	0.41	0.53	0.32	−0.13	−0.25	0.30
WARTY2	0.28	0.20	0.42	**0.85**	0.43	0.52	0.34	0.37	0.57	0.37	−0.09	−0.24	0.31
WARTY3	0.29	0.22	0.32	**0.79**	0.28	0.47	0.28	0.34	0.52	0.24	−0.10	−0.13	0.14
WARTY4	0.49	0.23	0.29	**0.70**	0.41	0.42	0.43	0.50	0.48	0.37	−0.05	−0.13	0.32
WARTY5	0.41	0.32	0.36	**0.68**	0.40	0.37	0.34	0.43	0.43	0.26	−0.03	−0.13	0.27
ORDMTH1	0.42	0.30	0.46	0.27	**0.85**	0.33	0.55	0.38	0.43	0.60	−0.13	−0.10	0.33
ORDMTH2	0.47	0.43	0.49	0.42	**0.90**	0.57	0.59	0.44	0.53	0.58	−0.11	−0.14	0.48
ORDMTH3	0.63	0.39	0.56	0.57	**0.86**	0.59	0.71	0.61	0.60	0.57	−0.23	−0.24	0.43
PRVSE1	0.34	0.29	0.25	0.59	0.50	**0.90**	0.31	0.38	0.46	0.43	−0.13	−0.16	0.23
PRVSE2	0.31	0.28	0.33	0.44	0.49	**0.85**	0.42	0.36	0.50	0.40	−0.08	−0.13	0.33
PRVSE3	0.37	0.37	0.39	0.51	0.47	**0.79**	0.34	0.43	0.54	0.34	−0.17	−0.18	0.27
PAYMTH1	0.50	0.24	0.41	0.42	0.48	0.37	**0.78**	0.47	0.44	0.31	−0.04	−0.14	0.32
PAYMTH2	0.40	0.35	0.51	0.27	0.68	0.32	**0.87**	0.43	0.33	0.47	−0.16	−0.16	0.50
PAYMTH3	0.44	0.44	0.49	0.42	0.63	0.41	**0.91**	0.51	0.42	0.46	−0.16	−0.19	0.40
PRDTN1	0.58	0.30	0.36	0.44	0.51	0.41	0.49	**0.90**	0.48	0.54	−0.29	−0.31	0.48
PRDTN2	0.67	0.31	0.43	0.49	0.58	0.42	0.60	**0.92**	0.55	0.55	−0.30	−0.28	0.53
PRDTN3	0.68	0.28	0.44	0.48	0.50	0.43	0.49	**0.93**	0.57	0.52	−0.29	−0.42	0.50
PRDTN4	0.55	0.28	0.32	0.41	0.42	0.39	0.46	**0.89**	0.53	0.50	−0.38	−0.45	0.57
PRDTN5	0.59	0.18	0.31	0.47	0.40	0.36	0.38	**0.79**	0.46	0.47	−0.21	−0.41	0.57
VENTN1	0.45	0.25	0.53	0.58	0.56	0.52	0.45	0.56	**0.91**	0.56	−0.15	−0.32	0.46
VENTN2	0.38	0.24	0.50	0.64	0.52	0.54	0.43	0.50	**0.90**	0.61	−0.20	−0.35	0.52
VENTN3	0.39	0.26	0.59	0.51	0.54	0.54	0.38	0.50	**0.86**	0.51	−0.18	−0.36	0.47
VENTN4	0.42	0.25	0.50	0.60	0.54	0.51	0.38	0.54	**0.92**	0.56	−0.25	−0.41	0.53
TRSTN1	0.29	0.18	0.36	0.32	0.55	0.36	0.37	0.49	0.50	**0.91**	−0.24	−0.31	0.48
TRSTN2	0.36	0.28	0.46	0.37	0.65	0.47	0.49	0.51	0.54	**0.93**	−0.20	−0.20	0.45
TRSTN3	0.49	0.33	0.52	0.42	0.68	0.43	0.52	0.60	0.62	**0.92**	−0.31	−0.28	0.51
TRSTN4	0.41	0.30	0.44	0.37	0.60	0.44	0.43	0.55	0.63	**0.92**	−0.28	−0.35	0.53

FINRSK1	−0.27	−0.23	−0.22	−0.17	−0.21	−0.17	−0.19	−0.39	−0.25	−0.31	**0.87**	0.55	−0.34
FINRSK2	−0.07	0.01	−0.13	−0.07	−0.10	−0.12	−0.03	−0.15	−0.13	−0.20	**0.77**	0.49	−0.15
FINRSK3	−0.11	−0.06	−0.18	−0.05	−0.09	−0.09	−0.08	−0.23	−0.14	−0.22	**0.88**	0.61	−0.25
FINRSK4	−0.23	−0.02	−0.21	−0.05	−0.16	−0.11	−0.16	−0.25	−0.19	−0.18	**0.83**	0.62	−0.32
PFMRSK1	−0.22	−0.01	−0.28	−0.26	−0.25	−0.25	−0.16	−0.42	−0.46	−0.32	0.44	**0.80**	−0.41
PFMRSK2	−0.22	−0.02	−0.33	−0.27	−0.27	−0.21	−0.32	−0.44	−0.43	−0.36	0.38	**0.83**	−0.45
PFMRSK3	−0.15	−0.06	−0.14	−0.07	−0.01	−0.02	−0.07	−0.16	−0.14	−0.10	0.69	**0.71**	−0.27
PFMRSK4	−0.10	0.03	−0.05	0.00	0.03	−0.03	0.04	−0.15	−0.13	−0.07	0.63	**0.67**	−0.18
PFMRSK5	−0.11	−0.03	−0.14	−0.04	0.02	−0.01	−0.04	−0.19	−0.14	−0.10	0.61	**0.71**	−0.27
PFMRSK6	−0.19	−0.12	−0.23	−0.15	−0.06	−0.11	−0.09	−0.25	−0.19	−0.16	0.60	**0.68**	−0.25
INPCH1	0.43	0.36	0.36	0.35	0.51	0.32	0.49	0.58	0.55	0.57	−0.31	−0.42	**0.95**
INPCH2	0.34	0.36	0.30	0.26	0.41	0.31	0.43	0.53	0.48	0.47	−0.32	−0.42	**0.93**
INPCH3	0.40	0.33	0.34	0.35	0.42	0.28	0.43	0.57	0.52	0.47	−0.32	−0.43	**0.94**

Note 1: The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.874. A minimum KMO score of 0.50 is considered necessary to reliably use factor analysis for data analysis. Scores more than 0.80 are deemed as meritorious [26].

Note 2.

FEATR: Product Feature.
AVAILA: Product availability.
CONTACT: Way to Contact the E-vendor.
WARTY: Warranty.
ORDMTH: Ordering Method.
PRVSE: Privacy and Security.
PAYMTH: Payment Method.
PRDTN: Product Transparency.
VENTN: Vendor Transparency.
TRSTN: Transaction Transparency.
FINRSK: Financial Risk.
PFMRSK: Performance Risk.
INPCH: Intention to Purchase.

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