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Understanding information system success model and valence framework in sellers' acceptance of cross-border e-commerce: a sequential multi-method approach

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Abstract
As cross-border e-commerce becomes more popular among global consumers and more important to global trade, there is a growing need for e-commerce research that explores the factors contributing to the success of global electronic markets. Yet, most extant literature on cross-border e-commerce is carried out from a buyer's perspective. In this study, we contribute by arguing that the success of cross-border e-commerce is also determined by the behavior of sellers and their decision on which platforms to participate. To accomplish our research, we apply a sequential multimethod approach and draw on the information system success model and valence framework to conceptualize our work. We carried out interviews in a qualitative study of Chinese cross-border e-commerce sellers to uncover the key factors about which these sellers may be concerned, and the reasons why they engage in cross-border e-commerce. Our work then develops new operational definitions for concepts of system quality, service quality, perceived benefit and perceived cost relevant to the context of cross-border e-commerce. Next, we develop and test a research model to identify the most salient factors using data collected from a sample of 198 sellers in a Chinese cross-border e-commerce platform. Our quantitative results explain over 67% of seller intentions to participate in cross-border platforms, with trust and perceived benefits most important to that decision process. While other factors such as service quality were also found important, perceived costs had no direct effect. The theoretical contributions of the work and the practical implications for cross-border platforms are presented.

Keywords Cross-border e-commerce · Trust · Information system success model · Valence framework · Sequential multimethod approach

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1 Introduction

Developments in e-commerce and economic globalization have fueled the growth of cross-border e-commerce (CBEC). Buyers and sellers in online transactions are not limited to a domestic e-marketplace but instead operate in a broader and more general global market. According to the Alibaba Group's report, global B2C CBEC transactions amounted to $230 billion in 2014 and are projected to increase to $1 trillion by 2020 [1].

CBEC provides opportunities to both developing and developed countries to get benefits from global transactions. China has become a major market for CBEC, with a compound annual growth rate of 30% each year since 2012, and the volume of its CBEC is approximately 20% of its total volume of foreign trade [2]. It has been predicted that China will transcend the USA, UK, Germany, France, and Japan and become the biggest cross-border market by 2020; moreover, Asia will become the CBEC center, with 40% of total CBEC revenues by 2025 [3]. CBEC also holds great potential for the growth of e-commerce elsewhere, such as in the European Union [4], where e-commerce has been driven by greater internet penetration, availability of credit cards, investment, availability of venture capital, education level, and spillover effects from neighboring countries [5]. Despite, the success of a number of e-marketplaces such as Amazon, eBay, and Alibaba [6], many cross-border e-marketplaces have failed in recent years due to poor performance [7]. For example, Metao.com was founded in 2013 and failed in 2016. What mechanisms underlie such failures? Unfortunately, CBEC still faces more barriers than domestic e-commerce due to its special attributes [8]. These barriers may include cultural differences, language translation, legal issues, geographic issues, localization, payments in global e-commerce trades, customs clearance problems, and logistic factors [9].

Past research has focused primarily on understanding factors contributing to the success of CBEC from a buyer's perspective. For example, work has focused on the value, such as more choices with lower prices, that CBEC provides buyers [10]. The quality of the e-marketplace experience for buyers is another potential factor for success such that buyers should experience a satisfying platform evidenced by ease of use, security and website quality and good service, among other factors [11–14]. Moreover, there is also the problem of trust building, which has been empirically studied as a crucial factor [15], along with factors such as reputation and word of mouth, which buyers may consider when making CBEC purchase decisions (e.g., [16]). However, despite those efforts, few studies have attempted to explain CBEC's success from the perspective of the seller. It has been stated that previous research has been overwhelmingly concerned with the protection of the buyers' interests and with this standpoint, has paid almost exclusive attentions on the antecedents of buyers' trust and perceived risks in e-commerce while research from the seller perspective is lagging [17]. There are some notable exceptions where e-commerce research has focused on the seller and the e-marketplace. For example, Huang developed a method to detect fraudulent merchants according to soft information extracted by affective computing web texts [18]. This system can help e-marketplace and buyers to avoid potential opportunistic behavior of sellers by falsifying bogus comments.

Liang et al. [19] proposed a credit assessment model using social capital variables extracted from the reputation system of an e-commerce platform and the associated online social network to assess C2C seller's e-credit. Elsewhere, it was found that e-business platform certification plays a moderating role in online marketplace trust-building [20]. Although these efforts included seller-side factors, the work remains primarily interested in implications for e-customers. Sellers themselves are rarely the focus. As Sun [21] has pointed out, however, the success of online transactions not only requires buyers' trust but also the sellers' trust and continued use of e-marketplaces. Our study was thus motivated to understand CBEC e-marketplace success from a seller's perspective. We contribute by conducting a three-stage sequential multimethod approach study and drawing on the information system success (ISS) model and valence framework to explore how selected factors, such as trust, perceived benefit, perceived cost, system quality and service quality of a CBEC e-marketplace platform influence the sellers' willingness to participate in such platforms. The context for our study was a leading cross-border e-marketplace in China. China holds great potential to become the largest cross-border e-marketplace in the world. Moreover, the "internet+" [22] strategy and "the Belt and Road Initiative project" [10] proposed by the Chinese government have become a powerful support structure and framework for CBEC progressing. Thus, we provide much needed evidence for understanding CBEC from the perspective of Chinese sellers. Our results have important implications for CBEC providers looking to attract sellers to their platforms. Theoretically, extant research lacks an understanding of the seller's needs from CBEC platforms, including the functionality most important to them as well as the extended services they require from CBEC platforms providers. Moreover, literature lacks valid measurement of sellers' perceptions of the value they derive from CBEC platforms and the opportunity to engage in international trade, along with any negative uncertainties and costs they experience. Therefore, to study the seller's behavior, this research combines an ISS model and a valence framework to generate a comprehensive research model. Even though the research model is not solely applicable for CBEC but is also suitable for domestic e-commerce, the operationalization of the model is informed by an initial qualitative study of Chinese CBEC sellers. Thus, our model reflects specific and deep insights on CBEC from these sellers' perspectives and their experiences with cross-border transactions.

This paper is organized as follows. First, we present a background to CBEC. Next, the detail of our three-stage sequential multimethod approach is presented. We start with the conceptualization stage, followed by the refinement stage based on our qualitative study, and then the model development and validation stage based on a quantitative study. Finally, we conclude our paper with the contributions of this research and recommendations for future works.

2 Background to CBEC

CBEC is defined as the transactions among different countries or customs areas through an e-commerce platform and cross-border logistics [23]. CBEC has progressed since a decade ago; however, academic research focused on this theme is

still rare [24]. Most of these studies are from China or have been studies conducted in a Chinese context. In general, there are three major topics in the CBEC research area. First, the intention to use is the most fundamental research topic in CBEC research. In this viewpoint, cross-border payment becomes the bottleneck in developing cross-border e-commerce [25]. Apart from payment, other factors may also influence buyers to use CBEC or to repurchase through CBEC, such as the perceived value [10], trust [26], and some general different individual attributes [27]. Second, logistic issues are more important for CBEC than they are for domestic e-commerce due to the complexity of logistical processes, such as laws and regulations, technology, cross-border payments, and electronic customs clearance [28]. The third topic in CBEC research concerns laws, regulations and policies. For CBEC, supportive policies and laws can not only improve the performance of companies that adapt CBEC as their innovative marketing strategy [29] but also promote international exports for countries and international trade [30].

2.1 Supplier participation in CBEC platforms

Popular CBEC platforms, such as LightInTheBox, DHgate and AliExpress, boast tens of thousands of sellers. They compete, in part, through their ability to attract sellers and products to their platforms. Sellers face an initial choice as to whether they wish to participate solely in domestic e-commerce versus CBEC, but having made a decision to consider CBEC, they face additional choices, such as whether to set up their own site, participate on a popular CBEC marketplace platform or potentially on multiple CBEC platforms. Sellers' choices have been studied in the context of domestic e-commerce platforms in China [31]. However, for the cross-border e-commerce e-marketplace, there are likely to be additional factors, which have not yet been fully researched, influencing the sellers' decision.

3 Stage 1: Conceptualization of the initial framework

The first stage in a sequential multimethod approach is the development of an initial research framework [32]. In this study, we aim to explain the decision of CBEC suppliers to participate and make use of a specific CBEC platform in order to access the global consumer market for their products. To consider the determinants of supplier intentions to participate in a CBEC platform, we draw on two popular theories. First, the ISS model [12] explains how the attributes of a system are fundamental to its usage. The model provides a particularly useful framework for understanding which system attributes are relevant to users and how these attributes influence usage behavior. Second, the valence framework, measuring the difference between the positive (e.g., benefits) and negative (e.g., costs) valences [33], has recently been applied in the e-commerce context to explain how users aim to maximize their overall 'net' utility. The two underpinnings, benefits and costs, are discussed next.

3.1 Information system success model

Through a systemic review of research between 1981 and 1987 [34], the original ISS model was revealed in 1992. In this model, six dimensions of success are identified, namely, system quality, information quality, use, user satisfaction, individual impact, and organizational impact [35]. Afterwards, to meet the needs of researchers in the e-commerce environment, DeLone and McLean [12] updated their ISS model with three modifications. First, supplementing the existing dimensions of system quality and information quality, service quality was added as a new dimension to make the whole model more comprehensive in evaluating the overall quality of e-commerce success. Second, system use was separated into use and intention to use, providing a nonmandatory system use option. Finally, individual and organizational impacts were combined into net benefits to make the model more parsimonious [36]. The final model could be described as one reflecting system quality, information quality, and service quality as factors that positively affect a user's intention to use and satisfaction, both which can lead to actual usage and can positively influence net benefits [12]. As suggested by Petter et al. [34], the ISS model is applicable in various contexts, and this model has been successfully applied empirically in e-commerce. For example, Wang et al. [36] combined the ISS model and the commitment-trust theory to study how information quality, system quality, and service quality could positively affect a user's stickiness intention through trust in e-commerce. Their work also showed how information system quality influences user behavior through trust. Thus, supporting the role of trust in an ISS model. Similar to Wang et al.'s study, Fang et al. [36] also applied an extension of DeLone and McLean's ISS model to study the online consumers' repurchase intention [37]. Their study pointed out the significance of trust and net benefits in affecting consumer repurchase intention. From the above, it is reasonable to infer that the higher the quality of the information system, the greater will be perceptions of trust and value. Taken together, we believe that the ISS model is well suited in the context of CBEC for the research on a seller's behavior. Based on the ISS model, there are three indicators of a CBEC platform's quality that may be relevant to a seller's intentions: system quality, service quality, and information quality.

3.2 Valence framework

The valance framework is also applied to inform the development of our research model. This framework, proposed by Peter and Tarpey [33], considers perceived risk/cost and perceived benefit as two fundamental aspects of decision-making. Risks and costs are defined as a seller's belief about the potential uncertain negative outcomes from the online transaction. Benefits are defined as a seller's belief about the extent to which seller will become better off from online transaction through a certain website. According to the theory, a net positive valence, i.e. a situation where benefits are more than costs, should result in a higher positive behavioral intention. The valance framework has been empirically proved to be a valid model for the e-commerce environment and has been employed as a theoretical background

to study CBEC consumer behavior [10]. For instance, to study consumers' behavior in e-commerce, Kim et al. [13] introduced trust and satisfaction into the valence framework. Their study thus supported the relevance of trust alongside risks and benefits to study behavior in e-commerce. More specifically, they illustrated that trust could act as an antecedent for both perceived benefit and perceived cost. Mou et al. [38] covered trust beliefs and behavior intention with the valence framework in e-health services, while Lu et al. [39] also incorporated payment trust into their valence framework for mobile payment. The extended valence framework, inclusive of trust, as proposed by Kim et al. [13] is the most relevant model to our research. From this perspective, a seller's intention to participate and make use of a CBEC platform is a function of their trust in CBEC platform, and the benefits they will derive from online transaction, but tempered by any risks and they cost relating to potential uncertain negative outcomes from the online transaction.

3.3 Initial research framework

Because the ISS model is primarily dealing with the perceived characteristics or attributes of the information system itself as the basis for the user's evaluation and usage of the system, whereas the valence framework is mainly focusing on the anticipated cost and benefit arising from use, we apply both models in our research to facilitate a robust examination of the factors influencing choice of sellers to make use of e-marketplace platforms. Thus, we consider the seller's behavior from both the user's usage experience (CBEC platform system) and the user's outcome beliefs (perception of value). Even though these theories can explain many IS phenomena, the concrete content for different systems and for different kinds of users may be different. Third, the updated ISS model proposed by DeLone and McLean [12] includes net benefit as a dependent variable which is consistent with the valence framework concept of net valence (i.e., perceived benefit and perceived cost). Moreover, previous research in both theories within the online shopping context has included trust as an intermediate variable. Therefore, integrating these two models is believed to be acceptable and reasonable.

Drawing on these models, we developed an initial framework for the research (Fig. 1) that we could then subsequently refine in Stage 2 of the study. A refinement was necessary because of the need to identify the appropriate components of perceived benefits, perceived costs, and quality that are relevant to sellers in a CBEC context. For example, while past work has identified utilitarian benefits, such as monetary savings, convenience and product choice, [10] as factors motivating buyers in the CBEC context, the benefits for sellers are less well established in the literature. Similarly, while system quality factors from a buyer's perspective typically include ease of product selection and payment flow [40], sellers must engage with platforms to curate their product catalogs, upload images, resolve logistics issues, and so forth. We describe our refinement of the model next.

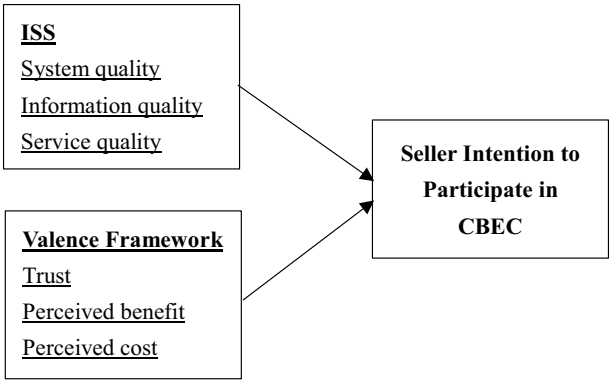

Fig. 1 Initial research framework

4 Stage 2: Refinement of the research framework

As with other applications of the sequential multimethod approach [32], the purpose of stage 2 is identifying all new constructs and items needed for accomplishing the model validation which typically involves a qualitative study. This was important to providing us greater insight into the context under study along with the usage experiences of sellers on Chinese CBEC platforms. The sellers we interviewed were all users of multiple CBEC platforms and were able to provide views across platforms. This was important to facilitate our development of a more generalizable model. Interviews were carried out in Chinese and then translated.

4.1 Research method for Stage 2

Because the ISS model and valence framework were two separate evaluation models, we conducted two separate sets of interviews, with the first set of interviews focused on the ISS model and the second focused on the valence framework. If we explored both frameworks at the same time, we were worried about perfunctory responses due to the long interview duration time.

According to the initial research framework showed in Fig. 1, this research involves 7 variables, including system quality, information quality, service quality, trust, perceived benefit, perceived cost, and intention to use. It is easy to obtain all items of these constructs from previous research in e-commerce. However, considering that this study's context (from CBEC) and perspective (from the seller) is different from that of the extant research, through in-depth interviews, we attempted to find some different content with respect to research constructs. Therefore, according to the theoretical background, we conducted two separate rounds of interviews. Apart from trust and intention to use, which, from the buyer's perspective, are similar in e-commerce, by focusing on the quality of the CBEC system (system quality, information quality, and service quality) and perceptions (perceived benefit and perceived cost), we aimed to learn more information on the user experience of the seller from the seller's perspective.

The first set of interviews was focused on the valence framework. Although previous studies have explored the dimensions of benefits and costs in an e-commerce setting [39], these studies have more often focused on a buyer's perspective. Given the complex transaction nature of CBEC, viewed from the seller's perspective, the potential benefits and costs may be different. Therefore, qualitative interviews were adopted to identify from the seller's perspective, the potential benefits and costs of conducting CBEC business.

We conducted interviews with 14 randomly selected sellers who have been selling products through the cross-border e-marketplace for at least 3 years. As they all used multiple cross-border e-marketplaces to conduct their business, these sellers had enough knowledge and experience to answer our questions. Therefore, the results are considered to be reliable and valid. One-on-one interviews lasting approximately 10 min were conducted by the authors of this study in an informal environment. The interviewees were asked to answer two open-ended questions associated with our research topic: "What benefits do you perceive when you engage in CBEC?" and "What cost or risk do you perceive when you engage in CBEC?"

Another set of interviews was conducted with 14 other sellers to identify the key factors associated with the ISS model and a seller's satisfaction. In particular, system quality and service quality have been considered as the predictors of behavioral intention. The questions probed the seller's complaints about the CBEC platform.

In the next step, the records and transcripts from interviews were open and axial coded, following Corbin and Strauss [41]. The open coding process was conducted by the authors, and the concepts extracted from the transcripts were identified. Afterward, to reduce the number of concepts, these concepts were grouped into categories that reflected the commonalities.

4.2 Qualitative data analysis and results

As a result of the first set of interviews, 22 concepts and 9 categories were identified from the open coding process. Similar concepts were grouped into the same category, which were further classified according to their properties (Table 1). In our study, there are 5 categories for perceived benefit and 4 categories for perceived cost.

When we were asking about the benefit that our interviewees received through CBEC, all people mentioned that a high level of profit was the most attractive aspect of doing CBEC business.

"The long distance generates a high price difference compared to the domestic market which makes the profit higher." (Seller of electronic product, 3 years of experience).

"We sell our products both to domestic and overseas markets for roughly the same price, but the exchange rate between the US dollar and Chinese RMB creates a higher profit." (Seller of electronic product, 5 years of experience).

Another common answer for the perceived benefit is the sales volume (86% of all respondents). For this category, interviewees mention the high order volume, high sales volume, high customer volume and stable customers.

Table 1 Coding results for perceived benefit and perceived risk

Domain	Category	Concepts	Frequency	Percentage
Financial benefit	Profits	High profit	14	100
	Sales volume	High order volume, high sales volume, high customer volume, stable customers	12	86
Product benefit	Brand	Proprietary brand development	4	29
Strategic benefit	Trend	Long-term development, development tendency	3	21
Marketing benefit	Competition	More market, less competition	4	21
Financial cost	Monetary loss	Chargebacks, costly rent, Sales return	7	50
Logistic cost	Logistic issue	Long duration of logistics, costly logistics, high packet loss probability, costly customs clearance	7	50
Marketing cost	Market trends	Unpredictable foreign markets, difficult inventory control	6	43
Product cost	Patent disputes	Patent infringement	6	43

"There are many customers around the world; we can sell our products to both the B-buyer (business) and the C-buyer (customer), which gives us a high order volume. The B-buyers are more stable than the C-buyers." (Seller of clothing, 10 years of experience).

"Cross-border e-commerce is another marketing channel, which creates a high sales volume compared to just the domestic market." (Seller of accessory, 4 years of experience).

There were four interviewees willing to utilize cross-border e-commerce to develop their own product and store brands. This indicates that increasing brand awareness may be a potential benefit for sellers.

"We wish to develop our own brand in foreign markets. So, it will help to create more sales volume in the future." (Seller of clothing, 10 years of experience).

Indicating that keeping up with changing situations may be a potential benefit for sellers, three interviewees highlighted that cross-border e-commerce is a trend for future business.

"Cross-border e-commerce is a development tendency that is consistent with global market trends." (Seller of housing and homes, 3 years of experience).

Indicating that low competitive pressure and a high sales volume are potential benefits for sellers, four interviewees mentioned that in cross-border e-commerce, there is an acceptable level of competition, as there are more markets and less competition.

"There are less sellers and more customers than there are in the domestic e-commerce marketplace, which gives us a chance to face low competitive pressure." (Seller of mobile accessories, 5 years of experience).

When we moved to perceived cost in cross-border e-commerce, half of our interviewees mentioned monetary loss, which included chargebacks, high commissions, and sales return.

"We are worried about chargebacks; the e-marketplace helps to detect spiteful chargeback buyers, but it still happens, so we only do business with America and European countries." (Seller of toys, 4 years of experience).

"The overseas storage costs me a lot, and it is more expensive to return our products back to me than to locally dispose of them because of the freight and customs clearance fee." (Seller of electronics, 3 years of experience).

The logistics cost is another important aspect of the perceived cost. Interviewees in this category mentioned the long duration of logistics, costly logistics, high packet loss probability and costly customs clearance.

"The logistics time is long, and sometimes we lose our product." (Seller of clothing, 3 years of experience). This statement indicates delivery risk is a potential cost for sellers.

"The customs clearance cost me a lot, but not in all countries, nor for all trades." (Seller of electronics, 5 years of experience). This indicates that the cost of customs duties may be a potential cost for sellers.

There are six interviewees who are concerned with managing their inventory, as the foreign market trends are unpredictable.

"We need to know what customers we really need, but we sometimes do not. If our product is not selling well, how to manage our inventory will become a serious problem." (Seller of electronics, 3 years of experience). This indicates that market orientation is difficult to predict.

The last important aspect of the perceived cost is the patent dispute issue (43% of respondents).

"If our products are tortious or suspected of infringement, the e-marketplace will close our online store, and this will cause sales delays." (Seller of electronics, 3 years of experience).

As a result, this study firstly identified the specific perceived benefits and perceived costs in CBEC from seller's perspective. Then, the domains were classified and elaborated as financial benefit, product benefit, strategic benefit, marketing benefit, financial cost, logistic cost, marketing cost, and product cost according to the attributes of every specific issue. These domains would be further used as items for perceived benefit and perceived cost of valence framework in stage 3.

The result of coding data from the second set of interviews is shown in Table 2. Given the sellers need to use the CBEC platform to manage their online shop, we focused our questioning mostly on seller's complaints (or satisfaction) with the platform's success in supporting processes such as product uploading, product management, order management, and logistics. Five system quality categories and one service quality category were identified. The system quality factors related to the ease of uploading and managing products on the site, while the service quality factors related to training and security, among other issues.

Under product uploading activities, we found that the system's upload speed and ability to handle bulk uploads were the most important factors that influence a seller's satisfaction. As an interviewee said, "The upload speed is slow and there is

Table 2 Summary of factors influencing satisfaction of usage

Dimension	Category	Comments
System quality	Product upload	Rigid uploading template, screen stuck, bulk uploading problem, slow uploading, adding draft saving function, limited categories and specifications, table editing deficiency
System quality	Product management	Auto push function for overdue products, auto push function for safe stock
System quality	Order management	Adding remark function, adding order sort function by dispute time, adding fuzzy search function, adding detail export and detail search function
System quality	Logistics	Limited logistics options
Service quality	E-marketplace service	Lack of training, bad customer service
System quality	Others	Adding sub-account authority, push function and control mechanism for malicious buyers

not any self-driven function (i.e., customized template). The specific templates are already set as default, but we wish to use our own template." Another interviewee said, "There are always some strange problems, for example, sometimes, the website was stuck, and bulk upload function is not easy." Other interviewees make additional comments on gaps in system functionality such as "We need a draft saving function during editing of uploads"; "The diversity of categories and specifications is limited, for example, the specifications of cell phone protecting covers are numerous, but the system only allows us to provide a maximum of 10 different specifications"; and "We cannot edit the inserted table very well, for example, centering and aligning functions."

In relation to product management activities, we found that the push function was the most general problem. A responder complained that, "The auto-push function for overdue products is not user friendly; sometimes, a system email said the product will be overdue in the next 3 days and when the date occurs, the items are displayed as sold out automatically." Another responder simply suggests that "We hope there is a push alerts for the safety stock."

Under order management, there were four recommendations from interviewees for adding more managerial functions. Firstly, the remark function needs to be added, as suggested by a responder that "The remark function is not appropriate; we can only remark our orders but not buyers; it will be convenient if we can remark buyers, because the same buyer has the same request in general." Secondly, an interviewee talked about sort function of dispute orders, "We hope that we have a sort function for dispute orders which allow us to sort by dispute time." Thirdly, the search function needs to be improved. A responder said that "There is no fuzzy searching system; We have to type all letters of a buyer or order number; it does not work even with a capitalization error." The last interviewee mentioned that, "We need details of our orders, so we hope that this website can add export and search functions for all the details of our orders."

Finally, under logistics related activities, an interviewee mentioned, "The logistics selecting options are limited, there are a few logistics companies, but sometimes, our favorite logistics company is not in the list. So, we have to input a fake tracking number that cannot be tracked by buyers."

We asked interviewees for more general suggestions on ways in which the platform could increase their satisfaction levels. Interviews surfaced many aspects of service quality. Training was one such aspect. For example, one interviewee said, "To do business well in my product category, I need the portal's support for more data analysis; we need more training on this point." Another interviewee said, "We have less offline training on this website compared to my experience with other e-marketplace." In addition to training, customer service was mentioned as another major problem in service quality. For instance, interviewees mentioned that the platform provider's customer service is "slow", "indifferent" and sometimes "cannot solve problems."

Interviewees also raised additional system limitations. Sub-account authority was mentioned as an issue. Sellers want to manage their employees by giving them access to different functions of operation in their virtual stores. An interviewee said, "We hope that the system is able to establish sub-account authority to help our management." Others raised financial security and the need for platforms to mitigate the risk of malicious fraud by buyers "Some buyers complain about poor quality of products after purchase, and require us to deliver again, otherwise they threaten to open a dispute; if the price is not expensive, we have to redeliver the same product to avoid bad records; we wish to have a rating system for buyers as well, so that complaints or disputes from malicious buyers would not affect our reputation so much."

In previous studies [14, 42, 43], information quality refers to the accuracy, timeliness, completeness, and usefulness of information provided by the information system. Although sellers might benefit from information quality in relation to the outputs they receive on orders and other summary reporting, we were surprised that sellers did not make any suggestions or complain about information quality issues. Only one interviewee felt that training on analytics should be more accessible. One possible explanation for this finding is that information quality relates more to buyer concerns, because most information on the platform is generated by the website and sellers. None-the-less, given the lack of emphasis placed on output and reporting by the interviewees, we decided to omit information quality from further consideration.

As a result, the categories were classified and elaborated as products upload, product management, order management, logistics, e-marketplace service, and other issues according to the attributes of every specific issues. These categories would be further used as items for system quality and service quality of ISS model in stage 3. Even though these new identified items were not only solely aiming at CBEC, but also suitable for domestic e-commerce, these items were more specific than previous studies [e.g. 14].

5 Stage 3: Development and validation of the refined model

The third stage of our multimethod sequential design involves the development and empirical validation of the refined research model.

5.1 Research model and hypothesis development

Based on the results of the Stage 2 qualitative study and utilizing the categories from Tables 1 and 2, we present our refined research model in Fig. 2. For system quality, service quality, perceived benefit, and perceived cost, the model depicts the specific features relevant to sellers in the CBEC context. In addition to the benefits listed in Table 1, based on previous research, we also considered the relevance of convenience as an item for measuring perceived benefit [13]. Convenience is an overall evaluation of the perceived benefit of using an e-marketplace. This item has originally been viewed from the buyers' perspective; however, we believe that this also emerges in the sellers' site when the sellers use the e-marketplace to run their cross-border business and daily operations. For perceived cost, we added overall risk as an additional item, which was derived from previous research [13]. Overall risk, similar to "convenience", can be considered with respect to a seller's perceived benefit. Overall risk is used to evaluate the overall perceived cost rather than the other specific costs, such as financial costs, logistic costs, marketing costs, and

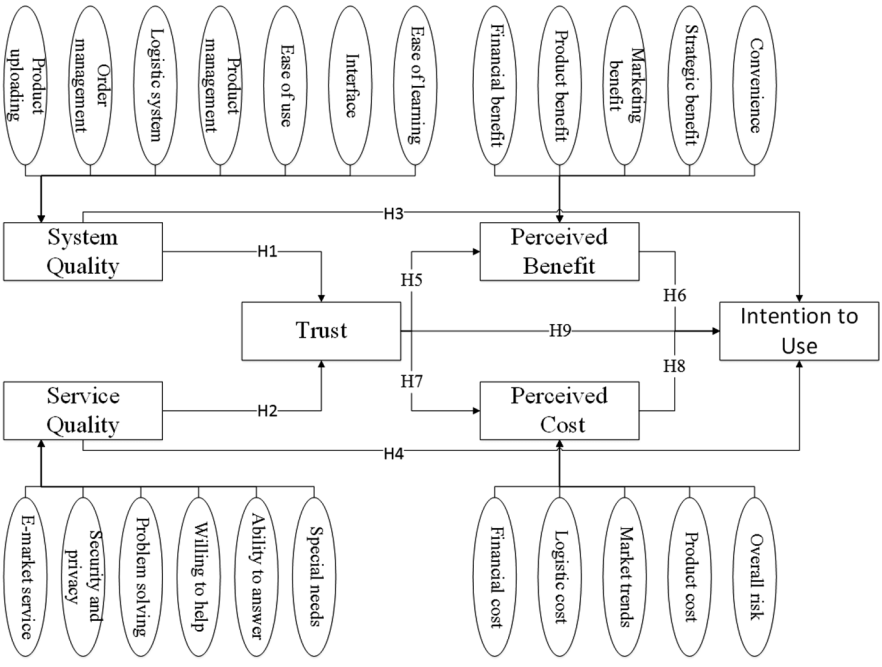

Fig. 2 The refined research model

product costs. In addition to the items in Table 2, we also consider some generic system quality factors from previous studies [14]. For system quality, we add ease of use, interface user friendly, and ease of learning, whereas for service quality, we add ability to solve the seller's problems, ability to meet the seller's special needs, ability to answer the seller's question, willingness to help, and security and privacy protection.

Trust in the context of online shopping refers to one's subjective belief that the other entity or party on the internet will fulfill its obligations [13]. Trust is generally built based on the information from small signals, symbols, or cues provided by the trusted party. Different from shopping in traditional stores, in the online marketplace, people cannot physically interact with sellers; therefore, the trust is built by the perceived system quality and service quality. According to Wang et al.'s study [36] on group-buying, significant relationships were found between the system and service quality on the website and the users' trust beliefs and usage intention. Numerous e-commerce studies have indicated that system quality and service quality can act as a signal for developing trust (e.g., [44]). It can be easily imagined that if the website provides good system quality, sellers will perceive ease of use and reliability. Additionally, good service quality can make a seller feel a sense of belonging and that the e-marketplace is serious about its responsibilities toward platform participants. In the context of CBEC where system quality requires higher standards, sellers are more sensitive to the quality of the CBEC platform. From the results of the qualitative study in Table 2, complaints regarding issues related to system quality and service quality are still the sellers' major concerns. Thus, we can conclude that not only in domestic e-commerce but also in CBEC, sellers focus on the quality of the system and can be easily affected by the quality of system. As a whole, both qualities can enhance the sellers' trust. Therefore, we hypothesize the following:

H1 System quality positively influences the sellers' trust in the CBEC platform.

H2 Service quality positively influences the sellers' trust in the CBEC platform.

For e-marketplaces to grow and take advantage of cross-side network effects to become sustainable, sellers must be willing to join and use the e-marketplace platform. The updated ISS model proposed by DeLone and McLean [12] showed that system-related and service-related quality could positively influence the intention to use. This model and assertion were confirmed by many studies and within a meta-analysis of the ISS model [43]. For sellers, a user-friendly operational system can enhance their work and increase their efficiency. Good service quality evidenced by a willingness to resolve users' difficulty and that offers enough capacity to solve problems properly and rapidly will also draw users to the platform. Similar to H1 and H2, sellers' complaints in Table 2 about CBEC systems still reflect domestic e-commerce problems, such as product uploading, product management, order management, logistic operational, and bad service problems. As system quality and service quality could affect the user's behavioral intention in domestic e-commerce [43], we believe this phenomenon also exists in CBEC from the seller's perspective.

Taken together, system quality and service quality are hypothesized to drive the users' willingness to use the e-marketplace as their preferred platform for cross-border trade. We hypothesize the following:

H3 System quality positively influences the sellers' intention to use a certain CBEC platform.

H4 Service quality positively influences the sellers' intention to use a certain CBEC platform.

Empirical evidence suggests that there is a positive relationship between trust and a variety of benefits. Kim et al. [13] suggested that customers could save cost and increase their productivity when transacting with trusted sellers. Thus, benefits could be perceived by users who trust and believe that others will fulfill their obligations. Sellers in CBEC are likely to believe that a trusted platform can fulfill its obligations to sellers and thus perceive more benefits compared to alternative platforms. On a trusted platform, they can increase their market reach, penetrate international markets and build their brands while lowering costs of transacting with international buyers. The above statement is also supported by the results of interviews shown in Table 1. For example, sellers believe that the CBEC platform can bring them more market opportunity with higher profit and less competition than domestic e-commerce platforms can and that all these benefits will be obtained only if sellers trust their CBEC platform. Consequently, they are willing to do their business based on trust because of the perceived benefits [45].

H5 The seller's trust positively influences the perceived benefit from the CBEC platform.

Perceived benefit in this study refers to the seller's subjective perceptions about the potential value of selling their goods in a certain e-marketplace. As claimed by Hadaya [46], market efficiency is increased by market aggregation, which provides opportunities for both buyers and sellers with lower transaction costs. Even though there is a lack of empirical support for the relationship between perceived benefit and intention to use from a seller's perspective, various types of perceived benefits were identified when we asked sellers why they engaged in CBEC. As shown in Table 1, sellers would like to engage their business through CBEC because they can perceive positive valence, and these positive perceptions include financial benefits (i.e., high profit and high order volume), product benefits (i.e., proprietary brand development), market benefits (i.e., less competition), and strategic benefits (i.e., company long-term development). Therefore, we believe that seller usage intentions are higher when they perceive greater benefits from a CBEC.

H6 The perceived benefit positively influences the sellers' intention to use a certain CBEC platform.

In e-commerce settings, seller perceptions of costs as risks are likely to depend on the level of trust in the e-marketplace platform. Previous studies have suggested that trust reduces the sense of risk [13, 47]. For buyers, as trust increases, they may exhibit more risk-taking behaviors and engage in a risky relationship with the vendor [13]. Similarly, if sellers trust a CBEC platform, they are more likely to perceive less cost and interact more with this platform rather than with alternatives. From the interviews, we identified four different types of perceived costs provided by sellers. These costs include financial cost (i.e., monetary loss from buyer's fraud, costly rent from platform, and sales return), logistics cost (i.e., long duration, packet loss, costly shipping, and costly clearance), marketing cost (i.e., unpredictable foreign market trends, and inventory management), and product cost (i.e., patent infringement). These four costs are highly related to CBEC rather than to domestic e-commerce. Even though we could not find literature support for these, we still capture through interviews the main concerns from sellers of what may become obstacles in doing CBEC business. In addition, with a special management mechanism, most of these costs can be avoided by the CBEC platform. For example, one seller said, "The platform should provide us with patent information and alerts for suspected infringement because if our products are tortious or suspected of infringement, the e-marketplace will close our online store, and this will cause delays in our sales". Therefore, the seller's trust in the CBEC platform can make them believe that the CBEC platform will reduce their costs.

H7 The seller's trust reduces the perceived cost of the CBEC platform.

The perceived cost refers to the sellers' subjective perceptions about the potential uncertainties or negative values of selling their goods in a certain e-marketplace. Within e-commerce, investigations have been conducted on several potential uncertainties, including financial costs, product costs, and information costs [45]. Uncertainties have also been emphasized as a realistic issue in CBEC [10]. When e-commerce moves toward globalization, it must face barriers, such as cultural differences, language translation, legal issues, geographic issues and financial issues [7]. Hence, sellers are more sensitive to perceived costs, such as credit card charge back, security, customs clearance and return costs [48]. Unpredictable demand, hidden delivery costs, the potential cost for product return and chargeback, and buyer protection are also disadvantages that will detract sellers from engagement on cross-border platforms. The effects of perceived cost on intention to use are supported in e-commerce [13].

H8 Perceived cost negatively influences the sellers' intention to use a certain CBEC platform.

The sellers' trust should also enhance their intention behaviors. On one hand, trust can amplify potential benefits and increase the tolerance of perceived costs to indirectly affect intention behaviors [45]. On the other hand, trust can directly influence intention behaviors as well [36]. Empirical evidence shows that trust significantly

influences behavioral intention in the e-commerce setting [47, 49]. Buyers and sellers wish to transact with trusted parties to save their cost and increase their benefit. Taken together, all these relationships among trust, perceived benefit, perceived cost, and intention to use are supported in e-commerce [13]. As discussed above, we also believe that these relationships exist in CBEC. Therefore, we hypothesize that:

H9 Trust positively influences the sellers' intention to use a certain CBEC platform.

5.2 Operationalizing and testing the research model

In the next step, we created our questionnaire based on a qualitative study and the literature. Appendix lists the items. All six constructs in our research model are measured with multiple items and by a 5-point Likert-scale, ranging from one (strongly disagree) to five (strongly agree). Most of the items, such as system quality, service quality, perceived benefit and perceived cost, were from the qualitative study of this research, whereas other items were adapted from prior validated scales. As our questionnaire is originally in Chinese, we conducted a back-translation procedure to ensure translation validity to English. There were two rounds of data collection in our study. In the first round, we aimed to test our self-developed items by a pilot test. Afterwards, to constitute our final version of the survey, according to the result of the pilot test, we made some changes.

We distributed our questionnaires to registered sellers who were on a CBEC platform in China. The CBEC platform we studied was the first cross-border e-commerce platform in China. Featuring over 40 million product listings from over 1.2 million Chinese suppliers, it provides a leading online marketplace for wholesale consumer products. The products are organized into fourteen product categories, such as electronics, health and beauty, apparel, sports and outdoors. The platform services 10 million buyers in countries such as the US, Canada, England, Spain, Australia, and New Zealand, among others. Sellers who had not participated in the platform satisfaction survey within the previous 3 months period were selected randomly via the CBEC firm's email system. To allow for sufficient participation in the study, we administered the main survey over a 15-day period. The participation of sellers was totally voluntary, without any loss if they refused to participate, and their anonymity was ensured. To test our hypothesis (structural model), we adopted the structural equation modeling (SEM) by AMOS 24.0.

5.3 Data analysis and results

First, we carried out a pilot test to validate the initial version of the survey questionnaire. We cleaned the data by removing questionnaires with more than 10 blanks (30 items in total) and questionnaires in which the absolute value of the Z-score of the items was larger than 3. After this cleaning process, we chose 175 (valid) out of 192 (total) questionnaires for data analysis. The loading of PB1, which asserts, "I think using this e-marketplace is convenient", did not locate to the perceived benefit construct, whereas other PB items did. PB1 is the only adapted item from the

previous research for the perceived benefit construct. It describes the sellers' overall evaluation, whereas other self-developed perceived benefits are more specific, such as financial benefit, product benefit, and market benefit. Therefore, we deleted PB1 for the following analysis. In addition, we deleted the third item of perceived risk, which reveals, "I cannot predict foreign market trends that can cause inventory control difficulty" because we were aiming to identify what factors may influence the seller's intention to utilize a certain e-marketplace. However, inventory control difficulty due to the fluctuation of foreign market trends is a general issue associated with cross-border e-commerce. In other words, sellers cannot manage their inventory control problems by switching to other e-marketplaces. Moreover, all other items aim at our cooperative e-marketplace, which means that the answer may be different if we ask them to evaluate other e-marketplaces. Therefore, we deleted the PC3 item. All other items with their intended constructs loaded as expected. After all these steps, the reliability and validity of all items should be kept in an acceptable range. Following validation in the pilot study, for the main study analysis, we then collected another 210 questionnaires from our cooperative e-marketplace. After a cleaning process, we identified 198 valid responses for subsequent analysis. For the final data, we also conducted a test for reliability and validity: all items were found to be good and without any cross-loading for data analysis. The demographic information for the study sample is displayed in Table 3. The genders were equally distributed, and most people using the CBEC website for selling were less than 40 years old. Most people in our sample were from standard stores, which represented the substantial part of the website vendors. Most people in this CBEC business had less than 5 years of experience.

Harman's one-factor test was conducted to check for common method bias [50]. An exploratory factor analysis of all the scale items revealed factors explaining 78.0% (N = 198) of the variance in our study's constructs, with the first factor explaining 30.0% which was less than 40%. In addition, we compared correlation among constructs and found no constructs with correlations over 0.9. These results suggest that no single factor explained a majority of the variance, thus supporting the idea that common method bias was not a threat to this study [10].

The standardized factor loading, alpha value, CR, and AVE for each construct with their items are shown in Table 4. All constructs were found reliable, with a Cronbach's Alpha value over 0.8 (range from 0.903 to 0.970). In total, we included 28 items in the final study. The standardized loading for each item ranged from 0.798 to 0.946, and the AVE values for the constructs were all above 0.50 (range from 0.685 to 0.835), which could confirm the constructs' convergent validity [17]. The CR values for the constructs were all above the recommended value of 0.70 (range from 0.900 to 0.968) [51]. Furthermore, no cross-loadings were observed. Therefore, we could conclude from Table 4 that we had collected a set of reliable and valid data for this research.

The discriminant validity and construct correlations for the constructs were reported in Table 5, showing the construct correlations and square roots of AVE values on the diagonal. All square roots of the AVE values were larger than the inter-construct correlation coefficients [17], which indicated that the discriminant validity for this study was good.

Table 3 Descriptive statistics of respondents' characteristics

Demographic variable	Categories	N (n = 198)	Percentage
Gender	Male	99	50
	Female	73	36.9
	Unidentified	26	13.1
Age	18–24	43	21.8
	25–30	67	33.8
	31–40	58	29.3
	41–51	6	3
	Over 50	4	2
	Unidentified	20	10.1
Working experience	Less than 1 year	61	30.8
	1–3 years	81	40.9
	3–5 years	28	14.1
	5–10 years	18	9.1
	More than 10 years	10	5.1
Store level	Top store (T)	8	4
	Preeminent store (P)	41	20.7
	Standard store (S)	143	72.2
	Below standard store (B)	6	3
Register for the website (years)	Less than 3 months	61	30.8
	3–6 months	31	15.7
	6 months–1 year	29	14.6
	1–3 years	41	20.7
	More than 3 years	36	18.2
Orders in average	None	7	3.5
	1 order in several weeks	62	31.3
	1 order per week	63	31.8
	1 order per 2–5 days	17	8.6
	1–5 order per day	31	15.7
	More than 5 orders per day	18	9.1

We used AMOS 24.0 to investigate both the measurement model and the structural model. The maximum likelihood method was used to estimate the fit of the model. The results of model fit assessment are shown in Table 6. There were three indices in the acceptable range which were Chi square/degrees of freedom ratio, IFI, and CFI. In addition, other indices that went beyond the recommended value were just close to the threshold. Overall, we believed that both the measurement model and the structural model are acceptable. According to the study from Schermelle-hengel et al. [52], to improve the model fit, we may need more samples in the future study.

The results of the hypothesis test are listed in Table 7, and the path analysis along with the variances of research model are depicted in Fig. 3. All hypothesized paths were accepted, except H7 and H8. These two hypotheses were all associated with

Table 4 Results of confirmatory factor and construct validity analyses

Constructs	Alpha value	CR	AVE	Mean (SD)	Items	Standardized loading
System quality (SysQ)	0.938	0.938	0.685	3.77 (1.06)	SysQ1	0.827
				3.83 (1.00)	SysQ2	0.834
				3.82 (1.00)	SysQ3	0.844
				3.89 (1.06)	SysQ4	0.816
				3,94 (0.92)	SysQ5	0.826
				3.75 (1.02)	SysQ6	0.798
				3.90 (0.94)	SysQ7	0.847
Service quality (SQ)	0.970	0.968	0.835	3.90 (0.93)	SQ1	0.904
				3.96 (0.89)	SQ2	0.913
				3.95 (0.88)	SQ3	0.937
				3.85 (0.97)	SQ4	0.931
				3.77 (1.00)	SQ5	0.914
				3.83 (0.96)	SQ6	0.884
Perceived benefit (PB)	0.959	0.941	0.763	3.48 (1.12)	PB2	0.824
				3.60 (1.03)	PB3	0.871
				3.65 (0.99)	PB4	0.895
				3.61 (1.01)	PB5	0.946
				3.60 (1.05)	PB6	0.826
Perceived cost (PC)	0.903	0.900	0.694	3.68 (1.11)	PC1	0.812
				3.50 (1.07)	PC2	0.818
				3.64 (1.01)	PC4	0.896
				3.47 (1.08)	PC5	0.802
Trust (Tr)	0.924	0.936	0.832	3.85 (0.94)	Tr1	0.950
				3.84 (0.97)	Tr2	0.963
				3.41 (1.18)	Tr3	0.816
Intention to use (Int)	0.929	0.935	0.828	4.05 (0.77)	Int1	0.886
				3.85 (0.99)	Int2	0.930
				4.03 (0.80)	Int3	0.913

Table 5 Construct correlations and discriminant validity

Construct	SysQ	SQ	PB	PC	Tr	Int
System quality (SysQ)	**0.828**					
Service quality (SQ)	0.730	**0.914**				
Perceived benefit (PB)	0.676	0.802	**0.873**			
Perceived cost (PC)	0.249	0.104	0.191	**0.833**		
Trust (Tr)	0.637	0.834	0.729	0.111	**0.912**	
Intention to use (Int)	0.753	0.805	0.766	0.165	0.789	**0.910**

Diagonal bold values are square root of AVE

Table 6 Summary of model fit

Model fit	Recommended value	Measurement	Structural
Chi square/degrees of freedom ratio	< 3	2.343	2.766
RMR	< 0.08	0.052	0.265
GFI	> 0.9	0.796	0.772
AGFI	> 0.8	0.751	0.724
NFI	> 0.9	0.889	0.868
RFI	> 0.9	0.874	0.851
IFI	> 0.9	0.933	0.911
CFI	> 0.9	0.933	0.900
RMSEA	< 0.08	0.083	0.095

Table 7 Results of the structural equation modeling analysis

Hypothesis path	Path coefficient	S.E.	C.R.	*p* value	Result
H1: System quality → trust	0.131	0.049	2.705	0.007**	Supported
H2: Service quality → trust	0.853	0.071	11.930	0.000***	Supported
H3: System quality → intention to use	0.246	0.040	6.184	0.000***	Supported
H4: Service quality → intention to use	0.156	0.069	2.260	0.024*	Supported
H5: Trust → perceived benefit	0.745	0.075	9.911	0.000***	Supported
H6: Perceived benefit → intention to use	0.161	0.053	3.054	0.002**	Supported
H7: Trust → perceived cost	0.114	0.077	1.479	0.139	Not supported
H8: Perceived cost → intention to use	0.003	0.035	0.099	0.921	Not supported
H9: Trust → intention to use	0.245	0.081	3.017	0.003**	Supported

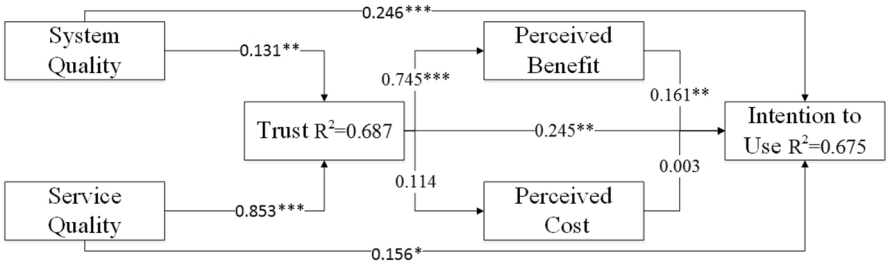

Fig. 3 Results of research model

perceived risk. H1–H4 were all derived from the ISS model, and the results were consistent with the findings of the previous research [35, 36, 43], even in the context of cross-border market from the seller's perspective. H5–H9 were from the valence framework: the results were partially consistent with previous research [13, 39, 45]. The main construct that caused this inconsistency with extant research was perceived cost because there was not any significant relationship for H7 and H8. The

potential reasons are discussed in the next section. Finally, the R^2 value for trust and intention to use were 0.685 and 0.673, respectively, which suggests a moderate robust predictive accuracy. Taking into consideration that more than 60% of the participants had been registered on the platform for less than 1 year, which indicates that most of the participants were not very familiar with the platform at the time of survey, we therefore apply register time as a control variable. When controlling for register time, compared to the results in Table 7, all hypotheses' results did not change, and the effect of register time on intention to use is not significant (− 0.56, $p = 0.236$). This might be because most of sellers with more than 1 year working experience used multi-platforms to conduct CBEC. Therefore, they could easily tell which platform was better in a short time period.

6 Discussion

The objective of this study was to understand the success of the CBEC platform, along with the crucial factors, from a seller's perspective. We carried out a sequential multi-method approach. In the first stage, we drew on the success of IS and valence frameworks to present an initial conceptual model. In the second stage, we used qualitative interviews to identify some specific elements of system quality and service quality and formed new items relevant to the context of CBEC. Even though system quality and service quality constructs were used in previous studies [14, 43], these constructs were usually presented by general items, such as an overall evaluation of system quality and service quality, but our items were more specific to the e-marketplace platform. In other words, this research gave us a deeper insight into the quality of the information system. In the second stage, by asking about the interviewees' perceived benefits and perceived costs, we also investigated the reason why sellers conducted CBEC rather than domestic e-commerce and what concerns sellers might have about their cross-border business. These results were then used in the third stage where we carried out a quantitative study to validate our research model.

According to the study from Venkatesh et al. [53] on mixed methods in information system research, this research meets the quality criteria of using this method. The quantitative study design is based on two popular theories from the previous research of information system. Due to the lack of a valid measurement, to gain a deeper insight of the CBEC user experience and the perception of value from the seller's perspective, a qualitative study (depth interview) was also needed for this research. As shown in Tables 4 and 5, the results from the qualitative study (Tables 1, 2) supported the quantitative analysis and provided a valid measurement. Overall, largely consistent with previous research of ISS models and the valence framework, the results of our research model can satisfy the initial purpose for using a mixed methods approach and are generalizable or transferable to other contexts or settings.

The results of the quantitative study offer several interesting insights into the seller's perception of the CBEC e-marketplace. First, most of our hypotheses were supported, which indicated that both the ISS model and the valence framework were suitable for understanding CBEC participation from the seller's perspective.

Second, comparing the path coefficients of H1 and H2, we found that service quality was more influential than system quality was in building the seller's trust, whereas when comparing H3 and H4, we found that system quality was more influential in shaping the seller's usage intention. This may be because services provided by the e-marketplace usually involve direct employee contact or face-to-face interaction, which makes users feel close to the service provider and increases their trust. On the other hand, sellers face the e-marketplace and associated selling systems through a technical interface. Thus, users need to find the technology platform easy to operate with convenient access to required functionality that facilitates their daily work. Thus, service quality is more important to trust and indirectly important for usage, while system quality is more directly linked to usage. Finally, we found an interesting result that H7 and H8 were not supported. To confirm this nonsignificant result for perceived cost, we used our data from the quantitative research to run solely the original valence framework model that just contained trust, perceived benefit, perceived cost, and intention to use. However, we still found that perceived cost neither affected trust nor affected intention to use. This finding may be due to the universality of cost problems among different cross-border e-marketplaces, as indicated by Turban et al. [9]. Another possible explanation for this finding is that the perceived benefit for sellers of CBEC was high enough to neutralize and surpass the perceived costs. The seller's judgment is based on the net benefits, i.e., overall value after costs are considered. For such positive net benefits to arise, the platform must be sufficiently trusted to mitigate against risks, such as financial loss. If such loss is perceived not to happen regularly enough, then it is unlikely to negatively influence usage. Perceived costs may also be sufficiently mitigated by the platform-imposed regulations that can ensure seller protection. Thus, costs are sufficiently low so as not to be perceived as a major obstacle to participation on a trusted, beneficial platform that is well supported and easy to use.

7 Conclusion

CBEC plays a crucial role in the cross-border business model and is also an important part of national revenue. Most extant research on CBEC is from the buyer's perspective; however, sellers are also an important aspect, and their participation is critical for the development of cross-border e-markets. Only if the e-marketplace satisfies the sellers can it can attract more and better sellers and provide the appropriate sellers for the maximum interests of buyers, thus generating more profit for the e-marketplace itself due to the positive feedback that arises. This research applied a sequential multi-method approach to investigate the key factors for the success of CBEC from the sellers' perspectives. To discover the new dimensions of system quality, service quality, perceived benefit and perceived cost, we conducted interviews for a qualitative study. We found that product uploading, order management, logistics issues, and product management were the main concerns of sellers with respect to system quality, with training an essential element of service quality. We also indicated that the main categories of perceived benefit for sellers were from financial, product, strategic, and management aspects, while financial, logistic,

product, and market trends aspects were associated with the perceived costs. Afterwards, we applied the ISS model and valence framework to uncover the mechanism of trust building and intention behavior. Finally, most of our hypotheses were supported; however, perceived cost was not influential in a seller's use of the cross-border platform.

7.1 Theoretical contributions

This study first contributes to theory by building a comprehensive model to explain the reasons why sellers are willing to engage in CBEC. By combining two theoretical models, we indicated that system quality and service quality could significantly increase a seller's trust on one cross-border e-marketplace and together with perceived benefit, could lead to seller's intention to use. This research model clearly separates the reasons of intention to use into website and seller perspectives, which makes the explanatory power stronger. Second, for sellers of CBEC, through a qualitative study, this study develops new items with respect to system quality, service quality, perceived benefit, and perceived cost, and these factors or items have not been empirically tested before. The new scales were found reliable and valid and can be used for further research into cross-border platforms. Compared to previous items, the new items associated with system quality and service quality are more specific rather than indistinct and can be used for further research on e-commerce. We believe that these new, specific system quality and service quality items can also be applied to study domestic e-commerce and the user experience from a seller's perspective. Meanwhile, the new items related to perceived benefit and perceived cost are more suitable for the context of CBEC. Finally, we confirm the applicability of the ISS model and valence framework to understanding CBEC from a seller's perspective. However, perceived cost is less influential. Future work should focus more on net overall benefit in predicting seller intentions.

7.2 Practical contributions

This study also makes several managerial implications for the cross-border e-marketplace. First, e-marketplaces themselves should focus on improving system quality to keep their long-term sellers from exhibiting switching behavior; however, to build trust and subsequent cooperation, they also need to improve service quality by providing more training meetings for both newcomers and sellers who may have the potential intention to use their marketplace. As shown in Table 2, specific issues associated with system quality and service quality, such as product upload issues, product management issues, order management issues, logistics issues, and e-marketplace service issues, were indicated. Platform websites, including domestic e-commerce websites, often provide reasonable system quality, but losing sight of service quality can negatively impact usage. In contrast, service quality may be an important point of differentiation and, for both buyers and sellers, may become one of the main attractors to a platform. Thus, in a long-term relationship, platforms need to focus more on their services to avoid user loss. Moreover, service quality,

such as seller's training, is more important in CBEC than in domestic e-commerce because of the unpredictable foreign market trends, different foreign laws, and cross-border logistics issues. Second, perceived benefits are strong attractors for both cross-border and domestic sellers; therefore, we recommended that cross-border e-marketplaces and domestic e-marketplaces that are planning to expand cross-border business, recruit sellers by focusing on the contents in Table 1 (perceived benefit). This includes financial benefits, product benefits, strategic benefits, and marketing benefits. There is more market and less competition in CBEC than in domestic e-commerce: this will provide sellers a good opportunity to develop their own brands and make a higher profit and is the reason why more and more sellers from domestic markets are moving toward global markets. Third, the perceived cost seems to have no relationship with trust and intention to use. However, the cross-border e-market must still solve these problems (Table 1 perceived cost), as they are qualifying criteria and important to the overall net benefit evaluation. Novel systems or institutions that reduce cost and risk may give a platform an advantage. These may include product quality control, as one interviewee mentioned patent infringement, market direction training from platform service, fraud buyer detection mechanism, and compulsory logistics insurance. In addition, relevant companies, such as logistics companies, banks, law companies, and stock companies, may also develop their service by targeting the needs of cross-border e-marketplaces to reduce risks inherent in the CBEC trade.

7.3 Limitations

This study has several limitations. First, the sellers were limited to the specific Chinese CBEC platform studies, and thus the results may not generalize well to other cross-border e-marketplace companies. However, when we conducted interviews, we found most of the sellers use multiple platforms to do their business, which suggests our result may have broader applicability. Second, as all sellers are from China, the universality of this research may be limited. Even though China is predicted to be the biggest marketplace for CBEC, seller perceptions across more countries, such as the USA, UK, Germany, France and Japan, need to be investigated. Thus, the research model needs to be affirmed in future work, using data collected from users of other cross-border platforms. Third, the items identified are new to CBEC research; however, all constructs have been explored in information system research. Therefore, future research may also concentrate on developing new constructs and theories.

To make the research model robust, two more improvements need to be considered in future. First, the sample size should be enlarged to fully support and generalize the findings. Second, the research design is cross-sectional. Even though some extant research supports the links between quality of information system to behavioral intention via trust [36] and from trust to behavioral intention via perception of value [45], the causality between these variables in the combined research model from the seller's perspective in cross-border context needs to be further verified.

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Appendix: Questionnaire

Constructs	Items	Source
System quality (SysQ)	1. It is easy to use this e-marketplace website	Adapted from Wang [30]
	2. The interfaces of this e-marketplace website are user friendly	
	3. It is easy for me to become skillful at using this e-marketplace website	
	4. The product uploading system of this e-marketplace (e.g., uploading speed, draft saving function, uploading template) is convenient for me	New item (product uploading)
	5. The order management system of this e-marketplace (e.g., order searching, order remarks, order sort function) is convenient for me	New item (order management)
	6. The logistics system of this e-marketplace provides enough options for me	New item (logistics)
	7. The auto push function of this e-marketplace for overdue products and safe stock is convenient for me	New item (product management)
Service quality (SQ)	1. This e-marketplace website shows a sincere interest in solving my problem	Adapted from Wang [30]
	2. This e-marketplace website service is always willing to help me	
	3. This e-marketplace website service is good at providing security and privacy protection	
	4. This e-marketplace website service has the appropriate knowledge to answer my questions	
	5. This e-marketplace website service understands my specific needs	
	6. This e-marketplace provides me with enough training and good customer service	New item (e-marketplace)

Constructs	Items	Source
Perceived benefit (PB)	1. I think using this e-marketplace is convenient	Adapted from Kim et al. [13] (deleted)
	2. I can generate satisfactory profits using this e-marketplace	New item (financial)
	3. I can increase sales volume using this e-marketplace	New item (financial)
	4. I can pursue proprietary brand development using this e-marketplace	New item (product)
	5. Selling my products through this e-marketplace is a future trend	New item (strategic)
	6. There is less competitive pressure in this e-marketplace	New item (management)
Perceived cost (PC)	1. Selling products through this e-marketplace may cause me to incur a monetary loss (e.g., chargeback, costly rent, sales return)	New item (financial)
	2. Logistics costs (e.g., long duration of shipping, costly logistics, packet loss, customer clearance) in this e-marketplace create problems for me	New item (logistic)
	3. I cannot predict foreign market trends that can cause inventory control difficulty	New item (market trends) (deleted)
	4. Patent infringement creates problems for me in this e-marketplace	New item (product)
	5. How would you rate your overall perception of risk from this e-marketplace website?	Kim et al. [13]
Trust (Tr)	1. This e-marketplace website is trustworthy	Adapted from Kim et al. [13]
	2. This e-marketplace website appears to keep its promises and commitments	
	3. I believe that this e-marketplace website has my best interests in mind	
Intention (Int)	1. I would like to sell products on this e-marketplace website	Adapted from Kim et al. [13]
	2. I would like to recommend this e-marketplace website to other sellers	Kim et al. [13]
	3. I would like to continually use this e-marketplace website rather than use alternatives	Wang et al. [36]

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