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# The Effects of B2C Interaction on Customer Loyalty

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**Abstract**

**Purpose:** This research attempts to examine the relationship between B2C interaction and customer loyalty in Business-to-Customer (B2C) context from a new perspective of the interactive tool.

**Design/methodology/approach:** The scale for B2C interactive tools is of seven dimensions: efficiency, security, fulfillment, mobility, community, cultivation, and customization. A model reflecting the influences of these attributes on customer loyalty is developed and empirically examined based on data collected from 265 B2C customers.

**Findings:** Results reveal that the fulfillment, mobility, community, and customization of B2C interactive tools can enhance customer loyalty directly and significantly. Efficiency and security, serving as the premise for possible purchase behavior, facilitate fulfillment. In addition, cultivation promotes the formation of customization, which directly strengthens customer loyalty.

**Research limitations:** Models considering individual-level indicators and combined with classic loyalty mechanisms in B2C context may lead to a deeper understanding of the tested effects of interaction on customer loyalty.

**Practical implications:** To strengthen B2C interaction and further cultivate loyal customers, making interactive tools more fundamental, flexible, and personalized is critical for B2C enterprises.

**Originality/value:** This study proposes a new perspective from interactive tools when measuring the relationship between B2C interaction and customer loyalty, and offers a useful theoretical lens and reasonable explanations for investigating customer loyalty in B2C e-commerce context.

**Keywords**   B2C e-commerce; Interaction; Interactive tool; Customer loyalty

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# 1 Introduction

Web 2.0 offers B2C enterprises unprecedented opportunities to understand their customers better. As the strongest trait of web 2.0, interaction has become increasingly prominent due to the more open Internet and widely-shared information and has tremendous potential for strengthening bonds with customers. McKnight et al.'s (2002) study of customer relationships in e-commerce found that interaction shows the positive attitude of online suppliers to consumers and customers' interaction with online sellers has significant effects on their trust in sellers. Wu and Hsing (2006) found that consumers' perceived interaction shapes their attitudes and purchase behavior. Levy et al. (2011) proved that the interaction with consumers promoted by enterprise could help to increase the satisfaction and enjoyment of consumers, thereby improving its relationship marketing performance. Koufaris et al. (2001) believe that the degree of online interaction positively affects the consumers' shopping pleasure and concentration of attention. This enjoyable experience helps to maintain a good relationship with consumers, and thus strengthen their loyalty.

Interaction serves as one of the most prominent features of the online shopping environment. Online enterprises provide consumers with interactive tools that are conducive to attracting consumers' attention and enable consumers to perceive and experience online shop interaction and enterprises (Wu and Hsing, 2006). For average customers, it is nearly impossible to talk with B2C enterprises face to face. It is the interactive tools provided by B2C enterprises that play the role of the direct communicator. In B2C interaction, users can quickly and accurately find the information they need through various interactive tools and can get answers timely when encountering problems. Good interactive tools bring more information to the customer while providing real-time feedback on customer demand. By promptly resolving the user's problems, B2C companies can narrow the distance with customers, improve customer service levels, enhance customer satisfaction and even stimulate customers' desire to purchase (Yang et al., 2012).

In this case, the features and attributes B2C interactive tools owned are perceived and evaluated by customers. According to Burgoon et al. (2000), structural characteristics are represented in certain communication tools and approaches, and the experience characteristics produce the perception of interaction process, during which the structural characteristics play a role. The structural features of interactive tools that can support interaction are the material basis for interaction. With such a foundation, users can use the medium (i.e. interactive tools) to interact and get experience and perception of B2C enterprises. If customers become interested in and attached to several interactive tools of one B2C enterprise, it is reasonable to

believe that this enterprise is highly appreciated and embraced by customers, which may result in high loyalty eventually. The analysis of B2C interactive tools is to serve for the process of user demand induction, information search, purchase decision, and online purchase, in order to ultimately improve the quality of interaction and customer loyalty (Yang et al., 2012). Therefore, we take a new approach, adopt the perspective of B2C interactive tools here and address the research questions: What are the attributes of B2C interactive tools? How do the influences of B2C interaction work on customer loyalty? Specifically, by studying the influence of the common attributes of interactive tools on customer loyalty, we have clarified the attributes that significantly influence customer loyalty, thus indicating the improvement trends of future B2C interactive tools and further promoting the development of B2C interaction.

## 2　Theoretical Background

### 2.1　Customer Loyalty

Early views of customer loyalty focus on customers' behavior, a unidimensional perspective, using observed data to measure brand or customer loyalty. Tucker (1964) viewed customer loyalty as consisting of three-time continuous repeated purchases toward one brand. Except for purchase frequency, Kuehn (1962) and Cunningham (1956) regarded customer loyalty as the probability of product repurchase and the proportion of purchase toward a favorable brand, respectively. More directly, there may be a linear functional relationship between purchase frequency toward a certain brand and customer loyalty (Ha, 1998). Although providing an early scientific understanding of customer loyalty, these studies equate continuous patronage of customers to customer loyalty and show only direct performances rather than underlying causes.

Noting that repeat purchases may reflect situational constraints such as perceived lack of alternatives (Storbacka et al., 1994) and strengthening loyalty is not a matter of simply cutting prices or adding product attributes (Reichheld, 1993), researchers turn to attitudinal perspective at the psychological level. Attitude orientation represents the degree of consumers' positive psychological tendency to the service providers (Jacoby & Chestnut, 1978). It could also manifest the commitment of customers' selecting the enterprise as the first choice to buy services and actively recommending it to people around (Gremler & Brown, 1996).

In response to both preference attitude and behavior performance, later studies constructed integrated frameworks to explore customer loyalty. Griffin (1995) cross-compared low and high relative attachment with high and low repeat purchase frequencies and divided customer loyalty into four types. Customer loyalty could

be considered as the degree to which a customer exhibits repeat purchase behavior, possesses a positive attitudinal disposition toward the provider, and considers using only this provider when a need for this service arises (Gremler & Brown, 1996). Following this trend, researchers nowadays generally refer customer loyalty to both preference attitude and behavior performance.

The rapid development of e-commerce deepens the concept of customer loyalty into e-loyalty, a term specific to e-commerce context. E-loyalty is related to customers' repeat visiting rates to e-commerce sites, representing the level of interaction between online sellers and customers (Smith, 2000). Although e-loyalty is unique in its manifestation with regard to customer behavior (Gommans et al., 2001), the theoretical basis of classic customer loyalty and e-loyalty is similar. If consumers like one e-commerce site very much and often go shopping on this site, the consumers are e-loyalty to the e-commerce site (Srinivasan et al., 2002). Loyalty in e-commerce context can also be divided into attitudinal loyalty, represented by customer's positive word of mouth, and behavioral loyalty, represented by customer repurchase intention (Stokes, 2014). For research purpose, customer loyalty in this research could be defined as the combination of customer's favorable attitudes toward one B2C enterprise and repeat purchasing behaviors through various kinds of interactive tools.

## 2.2   B2C Interaction and Interactive Tools

The concept of interaction could be traced back to interactivity, a virtue related to communication and interaction. It reflects the degree to which participants in an interaction process could exchange roles and have control over their mutual discourse (Rogers, 1995), as well as the extent to which the communicator and the audience respond to each other's communication need (Ha & James, 1998). The Internet has given new meanings to interactivity, covering the comprehensive and systematic interaction between communication participants, communication medium, and information elements. Liu and Shrum (2002) summarized studies on the interactivity of different scholars, and proposed that "interactivity is the degree to which two or more communication parties can act on each other, on the communication medium, and on the messages and also the degree to which these influences are synchronized during interaction." This process-related variable relies on web interaction and shows the quality or condition of interaction (Liang et al., 2010).

Web interaction, involved with interactive tools, tools or devices, allows various entities to engage in mediated communication (Varadarajan et al., 2010). Bauer et al. (2002) suggested that Internet-related technologies, especially interaction, could be used as tools to build relationships with customers. The enterprise and consumer are the main participants of interaction, the interactive tool is the medium,

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and the information exchanged by participants is the purpose of the interaction. In online commerce, interaction represents the high level of engagement and communication between the buyers and the sellers and emphasizes immediate and mutual communication (Bao et al., 2016). Increased interaction improves the perception of social presence and empowerment, thus leading to higher satisfaction and probability of revisits (Dholakia et al., 2000). The level of customers' overall satisfaction is partially determined by user perceived interactivity during communication (Lee, 2017). Merrilees and Fry (2003) also pointed out that a more general and comprehensive role of interaction is to create a complete online shopping experience.

It is of high strategic relevance in dynamic and competitive environments to build strong customer relationships (Aquilani et al., 2016), therefore B2C enterprises like Amazon and JD.com have developed various kinds of interactive methods, tools, and strategies, trying hard to get in touch with their consumers effectively and present idealized images of themselves. The interactive performance of interactive tools has a positive effect on the perception of interaction and the improvement of the customer relationship. For example, interactive websites lead to customers' higher favorability toward the websites and greater flow state intensity (Sicilia, Ruiz, & Munuera, 2005). Common interactive tools and their features are summarized in Table 1. By adopting and developing all kinds of interactive tools, B2C enterprises change and improve the interactive experience of consumers, thus improving customer loyalty.

Table 1.   Several common interactive tools.

| Interactive tool | Features |
| --- | --- |
| Websites | The most common and well-established interactive tool, with abundant information and various functions, crucial to e-commerce survival, and success (Homsud & Chaveesuk, 2014) |
| Mobile applications | New tools to implement business penetration and conduct mobile electronic commerce |
| Communities (sponsored by the enterprise) | Visual places where customers can exchange information about products and service with each other, and believed to reap the benefits of both peerless customer loyalty and impressive economic returns (Hagel, 1999) |
| The enterprise's blog and social media accounts | Good platforms for displaying the information of enterprises and products |
| Instant messaging, mailbox, and service hotline | Integration of the interactive features of the Internet and customer communication and common ways to provide customers with desirable information and cross-selling offers regularly |

Interactive tools (i.e. the medium or the role of the machine in human-machine interaction) play a key role in the interaction. Interactivity is embodied in the various functions of interactive tools and cannot be separated from the use of specific interactive tools (Mcmillan, 2000; Straubhaar & Larose, 1997). The popularity of

various tools reflects the innovation of e-commerce interaction compared to traditional business interaction. Interpersonal interaction cannot happen face to face and therefore it is inseparable from the use of interactive tools (Levy et al., 2011; Liu & Shrum, 2002; Mcknight et al., 2002; Wu & Hsing, 2006). In a series of interactive processes such as searching for needs, exchanging information, and conducting transactions in interactive tools, consumers will form a certain degree of perception and judgment on these tools and online suppliers based on the process, and further develop their attitudes towards online suppliers. Whether exploring the evaluation of online B2C interaction or studying purchase behavior and trust tendency based on B2C interaction (Arnould & Price, 1993; Koufaris et al., 2001), researchers generally measure certain characteristics of interactive tools (especially websites and virtual communities) to address interaction-related problems.

Since B2C interaction is a multidimensional and complex concept (Liu & Shrum, 2002; Rafaeli & Sudweeks, 1997), B2C interaction in this study is considered as the process of information acquisition, exchange, and transfer between B2C companies and consumers, using interactive tools as a medium and for the purpose of trading goods or services. Its manifestation is embodied in various kinds of interactive tools, the instruments adopted, provided and developed by B2C enterprises and mainly used for buyer-seller interaction and customer relationship improvement. Some of the interactive tools also allow communication among customers, such as virtual community and instant messaging. Previous researchers have developed quality evaluation models of single and specific interactive tools (mainly websites) when measuring customer loyalty (Parasuraman et al., 2005; Yoo & Donthu, 2001). Interactive tools adopted by different B2C enterprises also have been empirically compared (Cova & Pace, 2006). However, little research explores how to measure interactive tools as a whole in B2C context, which is one of the research objects of this research.

## 3　Research Model and Hypothesis

Given the fact that different interactive tools share some common attributes (Cyr, 2008), seven significant attributes of B2C interaction are extracted and constructed in the theoretical model (shown in Figure 1).

### 3.1　Fundamental Interaction Attributes

Efficiency, security, and fulfillment are fundamental attributes of B2C interaction. Efficiency, one of the most traditional and functional attributes for almost all kinds of applications and systems, represents the extent to which users can easily use technical systems without too much effort (Davis, 1989). It influences the user's
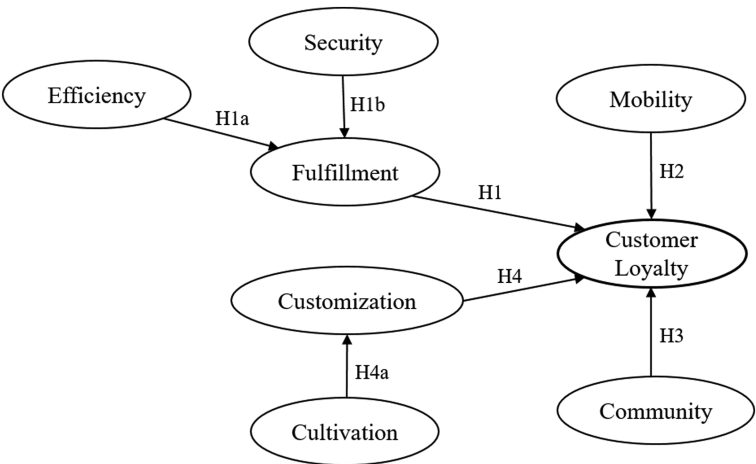
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Figure 1.    Theoretical Model.

attitude towards the technology system and is also seen as the user's desire to use the technology system. To be more specific in B2C context, efficiency refers to the consumer's assessment of how easy it is to use it or how much effort is required when using an interactive tool (Koufaris & Hampton-Sosa, 2004), and can be measured with ease of finding a product, easy learning, and ease of use.

Increasingly fast-paced life leads to customers' more attention to the convenience of shopping and communicating, making it a basis for B2C enterprises to attract and retain customers. Since B2C transactions are complex and daunting, customers could experience considerable difficulty in navigating pages and might be unlikely to complete desired transactions without efficiency (Jiang et al., 2016). Efficient interactive tools make it easy and quick for customers to find and buy the products they want. It is believed to have a direct impact on shopping attitudes and, in turn, on possible purchasing behavior (Ruyter, Dellaert, & Monsuwé, 2004). When consumers visit websites or virtual communities, open apps or other communication tools, what they need to learn first is how to use these interactive tools. They may not have the patience to explore, because the purpose of consumers is not to investigate technology and mechanism but to obtain more efficient and more useful information, facilitate purchase decision and implement purchase behavior. In addition, since the service provided by suppliers represent the corresponding suppliers in B2C e-commerce, when consumers use its interactive tools, we can infer that consumers' evaluation of the efficiency of interactive tools will affect their acceptance of suppliers.

Besides efficiency, security has also drawn considerable attention in the e-retailing literature. Security influences customers' sense of safety and trust towards online

sellers (Wolfinbarger & Gilly, 2003) and serves as the technical function and defaulted feature embedded in almost every type of interactive tools. It indicates the degree to which customers believe what they are using is safe from intrusion and personal information is protected (Parasuraman et al., 2005). This concept can be divided into privacy (the protection of personal information) and so-called security (the protection of users from the risk of fraud and financial loss), and has been empirically proven to exert strong impact on customers' attitudes toward the use of online financial services (Montoya-Weiss et al., 2003). For interactive tools especially websites, security has been found one of the key dimensions of success and the best predictor of transactional intent (Ranganathan & Ganapathy, 2002). Other interactive tools are also supposed to protect customer's personal information and the security of the transaction process (Alzola & Robaina, 2005) Security, along with efficiency can be seen the reflection of system quality when measuring the interactivity of interactive tools from the quality factors (Ahn, Ryu, & Han, 2004). Related to trust in completing e-transactions, security is considered the little direct effect on customer loyalty (Jiang et al., 2016), but leads to reliable e-commerce transaction completion.

Fulfillment is the interactive attribute which transaction completion directly relies on. It has something common with reliability and features the technical function of interactive tools and the accuracy of service promises, billing, and product information (Zeithaml et al., 2002). Referring to the ability to make promises about order delivery and fulfill item availability, fulfillment has been proven one of the important dimensions of increasing customer loyalty (Parasuraman et al., 2005). Since users can use interactive tools to complete the transaction, get the experience of fulfillment, and form their perception of B2C enterprises, fulfillment promises the purchasing behavior and serves as one of the fundamental features of B2C interaction. Interactive tools with the attribute of fulfillment can perform the promised service dependably and accurately and offer the provision of reliable information and reliable service (Barnes & Vidgen, 2008). It reflects the system quality and information quality of interactive tools, ensuring customers' vivid experience as well as facilitating purchasing decision (Ahn et al., 2004). Websites with the attribute of fulfillment are found to strongly predict customer loyalty and attitudes toward online sellers (Wolfinbarger & Gilly, 2003; Parasuraman et al., 2005). To achieve successful transaction, most of the interactive tools should have the ability to make promises about products and related matters, whether they are mobile applications (which can be seen as mobile "websites") or purchase links embedded in virtual communities and instant messaging.

Before the fulfillment of B2C interaction, efficiency and security make sense. When customers feel interaction efficient and security, they are likely to use

interactive tools to complete a purchase. Then there will be the chance for B2C enterprises to make continuing communications with customers and implement other advanced or personalized interactive functions. All of these reasons lead us to propose that:

H1. The fulfillment (FU) of B2C interaction has a positive influence on consumer loyalty (CL).

H1a. The efficiency (EF) of B2C interaction positively affects the fulfillment (FU) of B2C interaction.

H1b. The security (SE) of B2C interaction positively affects the fulfillment (FU) of B2C interaction.

## 3.2 Flexible Interaction Attributes

Nowadays, the call for B2C interaction is accessible at any time, any place and on any device. New types of e-commerce transactions could be conducted through mobile interactive tools, using wireless networks and other wired e-commerce technologies, such as phones and laptops. Using mobile interactive tools, business activities could be implemented without the limitation of time and space, thus increasing possible transactions. Clarke (2001) stresses the importance of mobility and suggests that mobile devices offer users the ability to perform transactions from virtually any location on a real-time basis, independent of the users' location. The proliferation of mobile interaction is creating an unparalleled opportunity for B2C enterprises to leverage the benefits of mobility since users could conduct business in real time via mobile devices (Ngai & Gunasekaran, 2007). It is necessary to not only improve mobile applications but also make other interactive ways compatible with the mobile environment, such as full-established web pages and virtual communities shown on mobile terminals. Interactive tools with the attribute of mobility are promising since mobility allows more chances to cultivate customer loyalty. Hence, we propose the hypothesis as follow:

H2. The mobility (MO) of B2C interaction positively and directly influences consumer loyalty (CL).

Out of the common interest and need, people gather to communicate and exchange information, which highlights the importance of communities online. Interaction with community provides B2C enterprises chances to know customers much better than before. Enterprises' success lies in such understanding of customer preferences and habits, which comes from the comprehensive grasp of user consumption information, and in the ways of gathering information (Kaplan & Haenlein, 2012). Online providers often offer user interactive forums and comment sections on their sites to allow readers to express their opinions and perspectives and to interact with other users (Rowe, 2015). In addition, the enterprise-sponsored virtual community

is a good place where consumers get help in knowledge and experience from other consumers. Different users can publish their views on certain goods and services, their own consumption experience and evaluation of online suppliers, seek opinions and suggestions from other consumers and online sellers. The impact of web communities has been tested to show a significantly positive influence on consumers' purchase intentions (Brengman & Karimov, 2012). It is consistent with the finding that customer satisfaction and loyalty could be affected by community integration (McAlexander et al., 2003). Therefore, we hypothesize that:

H3. The community (CO) of B2C interaction is positively associated with consumer loyalty (CL).

## 3.3 Customer Personalization Attributes

Cultivation is the extent to which relevant information and incentives are embedded in interactive tools by B2C enterprises to its customers, for extending the breadth and depth of their purchases over time (Srinivasan et al., 2002). Taking full advantage of cultivation-related technologies like databases and market surveys, B2C enterprises could analyze the behaviors and features of customer consumption, thus increasing customers' repeat purchase frequency. Mulvenna et al. (2000) emphasized the importance of the appropriate and relevant responses to the customer's behavior during interaction with customers. Desired information and cross-selling offers are provided and spread through B2C interaction to strengthen user stickiness and cultivate loyal customers. Amazon.com, a case in point, uses questionnaires or collaborative filtering to recommend books, videos, music, and toys (Dholakia et al., 2000). If interactive tools can provide consumers with recommendations and information that suits them, such as business recommendations, product suggestions, online responses to their questions and other intimate services, the quality of interaction and visitor volume will be increased (Ghose & Dou, 1998). In the meantime, such a cultivation cycle continuously enhances the retailer's knowledge base regarding the customer, lessening the customer's incentive to defect to another e-retailer who has to build such knowledge base from scratch.

With the deepening cultivation toward customers, B2C enterprises enter into the customization stage, which is about how much and how easily interactive tools could be tailored to individual customers' preferences, histories, and ways of shopping (Zeithaml et al., 2002). The purpose of personalization is to provide customers with what they want to avoid a needle-in-a-haystack problem. Customized interactive tools give customers personal attention and do a pretty good guessing what kinds of things customers might want and make suggestions (Wolfinbarger & Gilly, 2003). By personalizing their shopping experience (Alba, 1997) or allowing customers' change about the appearance look of interactive tools, interactive

tools can provide them with more customized services. Customization requires "understanding the individual" and stresses enterprises' empathy with customers to provide the right products, prices, and content (Barnes & Vidgen, 2008). It is the ultimate goal of cultivation and can be seen as the function of interaction (Straubhaar & Larose, 1997). In other words, enterprises conduct effective cultivation to analyze customers, while customization requires recognizing customers. Enterprises provide personalized products and services to customers and provide customers with customized trading platforms and decision-making platforms to further meet the individual needs of customers, enhance the customer's sense of identity and preferences of the enterprise, and further enhance customer loyalty (Wu, 2000). Customized interactive tools are an effective instrument for achieving not only higher customer satisfaction, but also higher customer loyalty (Coelho & Henseler, 2012).

Based on these reasons, we propose that:

H4a. The cultivation (CUL) of B2C interaction has direct and positive effects on the customization (CUS) of B2C interaction.

H4. The customization (CUS) of B2C interaction positively influences consumer loyalty (CL).

## 4 Methodology

### 4.1 Sample

An online questionnaire survey was carried out to collect data. The respondents were actual online shoppers and questionnaire links were sent via SNS websites, e-mails, and instant messengers. We received 343 detailed questionnaires from 450 questionnaires sent. According to Comrey (1988), a sample of at least 200 subjects is sufficient when numbers of items in the questionnaire are less than 40. After dropping those with missing values and obvious regularity, we finally found 265 questionnaires valid and yielded a valid response rate of 77.3 percent, fulfilling the expected requirements.

Table 2 shows the demographic information of the respondents. The main figure of respondents consists of some obvious labels, such as young adult (80.8%) and high education level (94.7%). It is consistent with common sense that young college students are the most active e-retailing consumer groups and conduct many personal online businesses using websites and mobile applications. Besides, 63.4% of respondents reported normal purchase frequency monthly and 8.3% of respondents purchased more than eight times a month. Since the reliability test on collected data is also well acceptable (shown in Table 3), we believe that the sample is representative and qualified.

Table 2.    Descriptive Statistics.

| Measure | Item | Percentage |
|---|---|---|
| Age | <20 | 13.2% |
| | 20–26 | 80.8% |
| | >26 | 6.0% |
| Education | Senior high or associate degree | 5.3% |
| | Bachelor degree | 83.0% |
| | Master degree or higher | 11.7% |
| Average monthly B2C purchase frequency | 1–3 times | 63.4% |
| | 4–8 times | 28.3% |
| | >8 times | 8.3% |

## 4.2    Instrument Construction

Eight constructs are measured in this research, including efficiency (EF), security (SE), fulfillment (FU), mobility (MO), community (CO), cultivation (CUL), customization (CUS) and customer loyalty (CL). All constructs are adapted from previous researchers and modified according to B2C context. Each construct consists of at least three items in order to control the possible common-method bias of respondents and filter out untrustworthy replies. The item questionnaire is measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Appendix A depicts the detailed scale items.

Items of constructs capture respondents' perceptions of B2C interactive tools as a whole. The construct of overall customer loyalty includes following five dimensions: general assessment, a rough attitude towards a B2C enterprise; preference and priority, deep emotional love for and attachment to one enterprise (Reichheld & Sasser, 1990); switching cost, the degree to which customers do not want to give up paid time, money and energy to develop a new transaction relationship; word-of-mouth promotion, the extent to which a customer says positive things about the B2C enterprise to other people (Dick & Basu, 1994); repeat purchase intention, the most common behavioral performance of loyal customers.

## 5    Statistical Analysis and Model Evaluation

In this study, partial least squares structural equation modeling (PLS-SEM) is chosen as the analytical approach. It is a structural path estimation approach that has the capability of working with unobservable latent variables and can account for measurement error in the development of latent variable (Aibinu & Al-Lawati, 2010). PLS-SEM is used in this study for three reasons: it does not presume any distributional form of measured variables hence it is suitable for data from unknown distributions; it is more appropriate for exploration than confirmation (S. Yang, Liu,

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& Wei, 2016); it is suitable when the sample size is relatively small. The theoretical model (shown in Figure 1) was analyzed using SmartPLS 3.0.

### 5.1   Outer Reflective Model Evaluation

Consideration of formative and reflective outer model modes is important when using PLS-SEM because two approaches to measurement are based on different principles and therefore require different evaluation measures. In this study, the latent variables represent the common factor of several specific observable variables (Lohmöller, 1989), suggesting that the indicators are caused by the construct and the arrows point from the construct to the indicators (Hair et al., 2014). Therefore, we use a reflective model here and reflective indicators are regressed on the latent variable scores when estimating outer weights (Hair et al., 2012). Assessment of reflective outer models involves reliability and validity suggested by prior research (Henseler et al., 2009).

First, Cronbach's alpha and composite reliability were calculated to assess the reliability. The benchmark for composite reliability score and Cronbach's Alpha is the same, requiring a value of 0.7 or higher. As shown in Table 3, the composite reliability and Cronbach's α coefficients of the constructs are all significant, indicating that the measurement scales used in this study are reliable.

Second, the convergent validity was evaluated with standard loadings and average variance extracted (AVE) values. Based on the output (shown in Table 3) from SmartPLS 3.0, all items have standard loadings above 0.70 (with t-value more than 1.96 and significant p-value) except observed variable CL3 (i.e. "I may not consider switching to another B2C enterprise.") whose load value is 0.627. Since low loadings might bias the estimates of the parameters linking the latent variables, items with low loadings should be reviewed and perhaps dropped (Nunnally, 1967). Due to statistics inferring and reasonable consideration, we removed CL3 from the CL dimension. Support was provided for convergent validity since each item had outer loadings above 0.70 (Hair et al., 2014). We retested the reliability and convergent validity, the updated result showed that C.R. for CL dimension increased to 0.870 and AVE increased to 0.626. For all latent variables, estimates of AVEs are above 50%, thus indicating good convergent validity and internal consistency in the measurement model. Besides, the significant standardized loadings together with Cronbach's alpha strongly prove the appropriate convergent validity of model instrument (Raines-Eudy, 2000).

Third, the discriminant validity was accessed by comparing the square root of the AVEs for each construct and its correlation coefficients with other constructs. Table 4 shows that there is no correlation between any two latent variables larger

Table 3.  Construct reliability and convergent validity.

| Constructs | Items | Standard loading | T Statistics | P Value | C.R. | Cronbach's α | AVE |
|---|---|---|---|---|---|---|---|
| Efficiency (EF) | EF1 | 0.864 | 35.822 | *** | 0.869 | 0.775 | 0.691 |
| | EF2 | 0.908 | 71.943 | *** | | | |
| | EF3 | 0.708 | 11.960 | *** | | | |
| Security (SE) | SE1 | 0.938 | 99.097 | *** | 0.940 | 0.904 | 0.839 |
| | SE2 | 0.921 | 75.449 | *** | | | |
| | SE3 | 0.889 | 62.403 | *** | | | |
| Fulfillment (FU) | FU1 | 0.834 | 29.320 | *** | 0.885 | 0.804 | 0.719 |
| | FU2 | 0.872 | 64.421 | *** | | | |
| | FU3 | 0.837 | 35.979 | *** | | | |
| Mobility (MO) | MO1 | 0.888 | 54.117 | *** | 0.909 | 0.850 | 0.770 |
| | MO2 | 0.853 | 28.249 | *** | | | |
| | MO3 | 0.890 | 45.400 | *** | | | |
| Community (CO) | CO1 | 0.839 | 30.136 | *** | 0.905 | 0.841 | 0.760 |
| | CO2 | 0.893 | 57.397 | *** | | | |
| | CO3 | 0.881 | 53.777 | *** | | | |
| Cultivation (CUL) | CUL1 | 0.822 | 24.012 | *** | 0.863 | 0.773 | 0.677 |
| | CUL2 | 0.802 | 21.427 | *** | | | |
| | CUL3 | 0.844 | 37.660 | *** | | | |
| Customization (CUS) | CUS1 | 0.840 | 42.002 | *** | 0.889 | 0.814 | 0.727 |
| | CUS2 | 0.856 | 35.310 | *** | | | |
| | CUS3 | 0.862 | 39.470 | *** | | | |
| Customer Loyalty (CL) | CL1 | 0.792 | 27.921 | *** | 0.864 | 0.802 | 0.561 |
| | CL2 | 0.722 | 15.925 | *** | | | |
| | CL3 | 0.627 | 13.428 | *** | | | |
| | CL4 | 0.779 | 25.175 | *** | | | |
| | CL5 | 0.810 | 32.035 | *** | | | |

*Notes*. ***$p<0.001$.

Table 4.  AVE & Construct Correlations.

| Constructs | AVE | CL | CO | CUL | CUS | EF | FU | MO | SE |
|---|---|---|---|---|---|---|---|---|---|
| CL | 0.626 | 0.791 | | | | | | | |
| CO | 0.759 | 0.465 | 0.871 | | | | | | |
| CUL | 0.677 | 0.536 | 0.465 | 0.823 | | | | | |
| CUS | 0.726 | 0.432 | 0.576 | 0.517 | 0.852 | | | | |
| EF | 0.691 | 0.540 | 0.311 | 0.466 | 0.318 | 0.831 | | | |
| FU | 0.719 | 0.537 | 0.396 | 0.485 | 0.407 | 0.664 | 0.848 | | |
| MO | 0.770 | 0.510 | 0.286 | 0.445 | 0.276 | 0.608 | 0.617 | 0.877 | |
| SE | 0.839 | 0.482 | 0.415 | 0.352 | 0.464 | 0.486 | 0.631 | 0.343 | 0.916 |

than the square root AVEs of the two latent variables, supporting that items belonging to different dimensions are hardly correlated with each other. Furthermore, Table B1 in Appendix B lists the cross-loading matrix, a criterion generally considered more liberal in terms of discriminant validity (Henseler et al., 2009). The requirement

that internal loadings of each construct should be higher than the cross-loadings on other constructs is met. Hence, discriminant validity was verified.

## 5.2   Inner Model Testing

Common criterions for inner model assessment are the coefficient of determination ($R^2$), cross-validated redundancy ($Q^2$) and path coefficients. First, $R^2$ represents the amount of explained variance of each endogenous latent variable (Hair et al., 2012). In this research, $R^2$ for construct CL, CUS and FU are respectively 0.432, 0.267 and 0.565. The acceptable level of $R^2$ depends on specific research contexts and $R^2$ more than 0.33 is acceptable, thus describing moderate and even higher levels of predictive accuracy.

Second, $Q^2$ combines cross-validation and function fitting and is used to assess an individual construct's predictive relevance for the model by omitting selected inner model relationships and computing changes in the criterion's estimates (Hair et al., 2012). $Q^2$ for construct CL, CUS and FU are respectively 0.246, 0.187 and 0.405, larger than zero, indicating the path model's predictive relevance for these constructs (Henseler et al., 2009).

Third, bootstrapping in SmartPLS 3.0 was used to test the significance of path coefficients, which could provide evidence of the inner model's quality with t-value statistics and corresponding p-values (Chin et al., 2003). As bootstrapping results (shown in Table 3) indicated, all dimensions exhibit a relatively high t-value statistic level, ranging from 2.521 for CUS→CL to 11.736 for CUL→CUS. T-value greater than 1.96 indicates that p-value is less than 0.05 (Chin et al., 2003), and thus the parameter estimation gets significant support at the probability of 95%.

Test results of the research model are displayed in Figure 2. Efficiency and security explain a relatively significant amount (56.5 percent) of variation in fulfillment, and the proposed model explains 43.2 percent of the variation in customer loyalty. Most of the paths proposed are highly significant, with p-values less than 0.05. As expected, fulfillment is positively influenced by efficiency (β=0.468, p<0.001), security (β=0.403, p<0.001), supporting H1a and H1b, respectively. The direct effect of fulfillment on customer loyalty is also significant (β=0.229, p<0.001), supporting hypothesis H1. The positive effects of community (β=0.269, p<0.001) and mobility (β=0.217, p<0.01) on customer loyalty are also confirmed (H2 and H3 supported). As for customer personalization, cultivation (β=0.517, p<0.05) is positively associated with customization and hypothesis H4a is supported. Finally, customization has a significantly positive direct effect on customer loyalty (β=0.140, p<0.001, H4 supported).
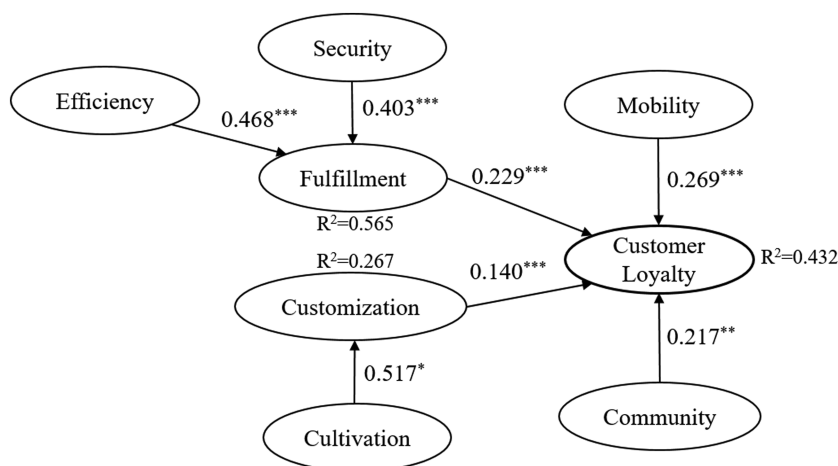
Figure 2.    Research Model Results.

*Notes.* *p<0.05; **p<0.01; ***p<0.001.

## 6    Results and Discussion

### 6.1    Interactive Antecedents of Customer Loyalty

Research results indicate that the interactive tool is truly a new and appropriate perspective on explaining interaction and customer loyalty in B2C context, with all hypotheses found to be supported. For online shopping, the interactive features of interactive tools provide consumers with effective purchase decision-making assistance, which greatly eases the traditional problems and conflicts that consumers face in information acquisition and information processing during purchase decision-making process. In other words, in the manipulation and interaction with interactive tools, consumers quickly obtain rich information about suppliers and their products and services, thereby reducing the reliance of purchase decision on memory and inferred information, helping consumers improve the quality and efficiency of their shopping decisions and at the same time forming customers' loyalty towards online suppliers.

We removed CL3 (i.e. "I may not consider switching to another B2C enterprise.") from CL dimension due to two reasons. First, new B2C enterprises spring up endlessly, whose attractive discounts for first-time users are worth trying, even the loyalist may be distracted by these big publicity stunts for a while. Second, customers tend to use several B2C enterprises at the same time, with one favorite and others needed for specific needs (e.g. Customers using JD.com may turn to Amazon for purchasing e-books). Hence, we believe that CL3 cannot precisely reflect customer

loyalty in our context. Although CL3 was deleted, another four observed variables could reflect customer loyalty with well-performed standard loadings, composite reliability, and Cronbach's alpha.

The confirmed relationship between B2C interaction and customer loyalty leads to a further question: under what mechanisms does B2C interaction affect customer loyalty? It is obvious that there exists a significant difference between classic mechanisms (i.e. customer satisfaction, customer trust and switching costs have impacts on customer loyalty) and interaction effects. Interaction effects focus on the attributes embedded in B2C interactive tools, while classic mechanisms feature abstraction and universality. Attributes extracted from B2C interactive tools may exert an impact on customer loyalty through customer satisfaction, customer trust, and switching costs. Fundamental interaction attributes, such as efficiency, aim at meeting customers' functional needs and making them satisfied, as the premise of possible purchases. The security of information provided by the website is proven as an important determinant of the trust dimension (Choi & Mai, 2018). It is consistent with Jiang et al.'s (2016) finding that the lack of confidence motivated by the perceived absence of security in the online business environment is a stumbling block to the growth of e-commerce. Fulfillment enables reliable transactions with customers and mobility makes sure they keep up with the same B2C enterprise, further strengthening transaction bonds. Increased switching costs attribute partially to the active community, frequent cultivation, and precise customization, that could make customers far attached to a specific B2C enterprise.

In our interaction-to-loyalty model, four factors directly affecting customer loyalty are fulfillment, mobility, community, and customization. Among them, the path coefficients of mobility explained the highest variance of customer loyalty ($p \leq 0.001$). It corresponds with the promising future of mobile electronic commerce. The proliferation of wireless capability has created an emerging opportunity for e-commerce businesses to expand beyond the traditional limitations of the fixed-line personal computer (Clarke, 2001). Enterprises who seize this business opportunity can easily get a head start in keeping the attention of mobile customers. As for the community, customers have enjoyed the benefits from others' comments and advice when looking through the "find" or "share" sections displayed in the interactive tools offered by B2C enterprises. Therefore, the importance of community should be emphasized especially in website interface design (Rayport & Jaworski, 2003). However, the enterprise-based virtual community is in its infancy, B2C enterprises are supposed to build more active virtual communities, strengthen community interaction mechanisms, and encourage consumers to communicate with others.

## 6.2    Fundamental Interaction Attributes

It is notable that the effect of fulfillment cannot do without the fundamental role of efficiency and security, which serve as the basis for establishing and developing interactive tools such as websites. These two attributes explain a relatively significant amount (56.5 percent) of variation in fulfillment.

Though previous researches link efficiency and security with customer loyalty (Chiou, 2004; Wolfinbarger & Gilly, 2003), this study argues that efficiency and security have more direct effects on fulfillment, a basic indicator of loyalty development. Efficiency determines whether customers will use and continue to use the interaction of one enterprise. An interactive tool should be easy to use on the technical level, and effectively display what customers want, ensuring consumers can understand how to handle it and enjoy the convenience and speed of the shopping process. Future developers should pay attention to the design and construction of the of interactive tools and design a clear navigation and positioning system to help customers understand where they are and how to obtain accurate and timely information about what they need. Good efficiency is key to attracting customers and provides guarantees for possible purchase behavior, namely fulfillment. The more efficient interaction is, the more engaging experience customers get, and the more satisfied they feel with the B2C enterprise (Alkhouli, 2017). High satisfaction leads to the fulfillment of purchase behavior and the probability of revisits to interactive tools.

As for security, we argue that it relates to customer loyalty more closely at the early development stage of E-retailing when most B2C interactive tools are not fully developed. It is natural and necessary that previous researchers took security in research scale when evaluating some kinds of interactive tools and online loyalty (Parasuraman et al., 2005). When B2C interactive tools gradually meet or exceed certain security standard, higher security did not mean higher loyalty, because customers paid less attention to this already solved problem. Besides, customers have developed familiarity with B2C e-retailing. For example, the security of websites may not be critical for more frequent users and experience may indeed mitigate concerns about security (Wolfinbarger & Gilly, 2003). Nowadays, it is recognizable that basic security requirements are embedded in the design and development process of every type of B2C interactive tools, helping interactive tools to run smoothly and reliably.

## 6.3    Customer Cultivation and Customization

The positive and direct effect of cultivation on customization (H4a) is as great as expected. Various cultivation approaches of B2C interaction make it possible to

build a more comprehensive understanding of customers. Extensive cultivation provides a pre-condition for advanced customization.

On the other hand, the potential problems caused by cultivation require specialized and efficient customization for customers. Almost all B2C enterprises require customers' e-mail account for registration. It is undoubtedly convenient and customers will get timely information about product discount and special offers, but notification emails will gradually add up to the mailbox. Most customers feel inundated with meaningless and junk notifications when using B2C interactive tools. In addition, although links to relevant pages and information do offer something interesting, it costs time and energy to locate truly useful information and hence consumers are likely to ignore such messages. All these troubles point to the importance and necessity of customization. It allows customers to choose products and service they are truly interested in, set notification options and push frequency, and even change the look and style of interactive tools. Since customization focuses on what the customer really wants, it would be reasonable for customers whose different needs and preferences have been fully met to be "locked in" certain B2C enterprise.

## 7   Implications and Future Research

### 7.1   Implications for Theory and Practice

First, interaction is an appropriate research perspective in B2C e-commerce context, confirmed with our finding that interaction attributes have positive effects on customer loyalty. In order to raise customer loyalty, B2C enterprises are supposed to improve the efficiency, fulfillment, security, mobility, community, cultivation and customization of interactive tools. Through improved interactive tools, B2C enterprises increase the interaction between consumers and information, making consumers feel tools more controllable and convenient, and on the other hand increase their interaction with consumers and interaction among consumers themselves, making consumers feel stronger personalization and community. Enterprises should not only meet certain needs but also make the interactive tools pleasurable, making customers more inclined to stay loyal (Pullman & Gross, 2004).

Second, though the effects of efficiency and security are not considered as direct predictors of customer loyalty in this study, they play an important role in fulfillment, which premises possible repeat purchase behavior. Added attention should be paid to these fundamental interaction attributes because B2C enterprises who cannot reach the foundational standards will be eliminated easily in the fierce competition.

Third, the positive effects of mobility and community on customer loyalty correspond to the development of modern communication technology and social

networks. Mobility and community should be carefully taken into consideration in the subsequent phases of B2C interaction design and implementation processes.

Finally, the significance of cultivation and customization raises a new concern. The nature of cultivation provides fertile ground for customization, while annoying ads, banners, and other webpage junk raise requirements for customization. B2C enterprises are encouraged to optimize personalized content and improve push settings, making customers attached to interactive tools they are using frequently.

In a word, more fundamental, flexible and personalized interaction may probably create huge returns.

### 7.2 Limitation and Future Research

Our work is subject to a number of limitations. First, it is difficult to assess customers' actual loyalty behavior when using B2C interactive tools. However, there has been well-established attitude theories supporting the fact that the stronger the behavior intention is, the more likely the behavior tends to happen (Ajzen, 1991).

Second, based on our findings, a comprehensive framework involved with B2C interaction and customer loyalty is developed and tested. Future study may seek to integrate the interaction model with classic mechanisms, such as customer satisfaction, customer trust, and switching in B2C context.

Third, individual-level variables related to the use of B2C interactive tools may have impacts. Out of the control of the B2C retailer, certain individual-level variables (such as customer inertia) may also influence customer loyalty. Future work that involves individual-level factors in the setting of B2C interaction is wanted.

Finally, larger and more diverse samples may offer a clearer analysis of research goals. However, prior studies have proven that the use of PLS-SEM approach is able to alleviate the problem with small sample size. Additionally, although young college students conduct numerous personal online business, the diverse sample might reexamine the significant effects.

### 8 Conclusion

This study introduced a new interactive perspective on understanding determinants of customer loyalty in B2C context. As the popularity of interaction rises, increasing numbers of B2C enterprises are utilizing various kinds of interactive tools to improve communication with customers and cultivate customer loyalty. However, empirical research exploring interactive tools as a whole is rare, and this study aims at filling this void. Based on previous research, seven significant attributes of B2C interactive tools have been extracted to construct the model. PLS-SEM analytical

method is adopted and data is collected from 265 online B2C customers with the experience of adopting interactive tools to purchase online. As analysis results demonstrate, the interaction can explain loyalty properly in B2C context, using the perspective of analyzing the attributes of the interactive approach. Customer loyalty is predicted directly by fulfillment, mobility, community, and customization. Fulfillment, in turn, is based on the precondition of efficiency and security, which may lead directly to possible purchase behavior. Successful cultivation contributes to customization. By providing more fundamental, flexible and personalized interactive tools, B2C enterprises can enhance interaction with customers, and eventually strengthen customer loyalty significantly.

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## Author Contributions

X.Y. Yang (commonaslight@outlook.com, corresponding author) proposed the research question, designed the methods, and wrote the manuscript. Q.J. Yuan (yuanqj@nju.edu.cn) designed the methods and revised the manuscript.

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## Appendix A: The Detailed Scale Items

| Construct | Measurement item | Source |
|---|---|---|
| Efficiency (EF) | EF1: This interactive tool is simple to use.<br>EF2: The instructions and descriptions about it is easy to learn.<br>EF3: It is easy to find what I need when using it. | Koufaris & Hampton-Sosa (2004) |
| Security (SE) | SE1: I feel safe and trust of the interactive tool.<br>SE2: I am confident of security with it.<br>SE3: It has a security system for my information. | Yoo & Donthu (2001)<br>Zeithaml et al. (2002) |
| Fulfillment (FU) | FU1: The interactive tool delivers orders when promised.<br>FU2: It makes accurate promises about the delivery of products.<br>FU3: It is truthful about its offerings. | Parasuraman et al. (2005) |
| Mobility (MO) | MO1: Wherever I get access to the Internet, I can enjoy the services provided by the interactive tool.<br>MO2: It can be opened and used in several kinds of terminals.<br>MO3: I can use this interactive tool for shopping at any moment. | Clarke (2001)<br>Ngai & Gunasekaran (2007) |
| Community (CO) | CO1: I get some nice advice and helps from the interactive tool.<br>CO2: I am willing to share information and experiences, and answer questions through it with other customers online.<br>CO3: It makes me share a common bond with other members, and we become strongly affiliated with one another. | Frank (1997)<br>Srinivasan et al. (2002) |
| Cultivation (CUL) | CUL1: The interactive tool sends me information that is relevant to my purchases.<br>CUL2: It pushes some discount information increase its share of my business.<br>CUL3: I receive some links to relevant pages about making a purchase from it. | Srinivasan et al. (2002) |
| Customization (CUS) | CUS1: The interactive tool understands my specific needs and makes personal purchase recommendations.<br>CUS2: It stores all my preferences and offers me extra services or information tailored to my preferences.<br>CUS3: It makes me feel that I am a unique customer. | Wolfinbarger & Gilly (2003) |
| Customer Loyalty (CL) | CL1: It is a wise decision for me to go shopping there, using various interactive tools.<br>CL2: When I need to make a purchase, this B2C enterprise will be my first choice<br>CL3: I may not consider switching to another B2C enterprise.<br>(Legend: CL3 were removed due to insignificant loadings)<br>CL4: After shopping on it, I will introduce it to others.<br>CL5: I would like to go back to it if I want to make next purchase. | Yoo & Donthu (2001) |

## Appendix B: Cross-loadings

| Factor | CL | CO | CUL | CUS | EF | FU | MO | SE |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| CL1 | 0.816 | 0.401 | 0.415 | 0.401 | 0.463 | 0.500 | 0.446 | 0.425 |
| CL2 | 0.745 | 0.272 | 0.365 | 0.298 | 0.416 | 0.426 | 0.382 | 0.396 |
| CL4 | 0.781 | 0.408 | 0.416 | 0.354 | 0.368 | 0.363 | 0.367 | 0.369 |
| CL5 | 0.821 | 0.381 | 0.499 | 0.304 | 0.456 | 0.402 | 0.414 | 0.334 |
| CO1 | 0.429 | 0.848 | 0.474 | 0.532 | 0.337 | 0.383 | 0.301 | 0.399 |
| CO2 | 0.415 | 0.890 | 0.344 | 0.445 | 0.241 | 0.317 | 0.246 | 0.342 |
| CO3 | 0.366 | 0.875 | 0.393 | 0.530 | 0.226 | 0.331 | 0.191 | 0.339 |
| CUL1 | 0.477 | 0.340 | 0.822 | 0.360 | 0.473 | 0.457 | 0.475 | 0.257 |
| CUL2 | 0.429 | 0.264 | 0.802 | 0.315 | 0.381 | 0.331 | 0.426 | 0.135 |
| CUL3 | 0.428 | 0.485 | 0.844 | 0.538 | 0.328 | 0.404 | 0.262 | 0.405 |
| CUS1 | 0.431 | 0.435 | 0.500 | 0.842 | 0.370 | 0.349 | 0.288 | 0.354 |
| CUS2 | 0.302 | 0.494 | 0.397 | 0.856 | 0.223 | 0.335 | 0.232 | 0.417 |
| CUS3 | 0.350 | 0.555 | 0.407 | 0.860 | 0.192 | 0.354 | 0.171 | 0.427 |
| EF1 | 0.510 | 0.289 | 0.432 | 0.331 | 0.864 | 0.597 | 0.530 | 0.448 |
| EF2 | 0.490 | 0.246 | 0.380 | 0.240 | 0.908 | 0.623 | 0.545 | 0.420 |
| EF3 | 0.318 | 0.245 | 0.353 | 0.217 | 0.708 | 0.405 | 0.435 | 0.336 |
| FU1 | 0.510 | 0.309 | 0.470 | 0.277 | 0.606 | 0.836 | 0.636 | 0.426 |
| FU2 | 0.430 | 0.329 | 0.326 | 0.372 | 0.572 | 0.872 | 0.446 | 0.635 |
| FU3 | 0.425 | 0.371 | 0.442 | 0.388 | 0.508 | 0.835 | 0.489 | 0.540 |
| MO1 | 0.475 | 0.215 | 0.372 | 0.223 | 0.586 | 0.564 | 0.889 | 0.313 |
| MO2 | 0.412 | 0.249 | 0.399 | 0.188 | 0.485 | 0.491 | 0.851 | 0.284 |
| MO3 | 0.452 | 0.290 | 0.403 | 0.311 | 0.523 | 0.566 | 0.891 | 0.304 |
| SE1 | 0.415 | 0.336 | 0.289 | 0.457 | 0.433 | 0.577 | 0.285 | 0.937 |
| SE2 | 0.403 | 0.395 | 0.303 | 0.425 | 0.395 | 0.566 | 0.260 | 0.921 |
| SE3 | 0.505 | 0.408 | 0.373 | 0.395 | 0.504 | 0.589 | 0.394 | 0.889 |