# Is product customization always beneficial in the context of C2M platforms? A signaling theory perspective

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## ABSTRACT

As a new driver of the e-commerce economy, the customer-to-manufacturer (C2M) model has attracted increasing attention. Product customization is a crucial element in C2M businesses; however, given manufacturers' relatively limited ability to serve end customers, it can create uncertainties for consumers. Scholars have paid insufficient attention to product customization on C2M platforms. Therefore, we developed a theoretical framework and crawled secondary data from Biyao, one of China's largest C2M platforms, to examine the role of product customization, as well as when product customization can be most effective. We used ordinary least

(Hildebrand et al., 2014.; Kaiser et al., 2017; Klesse et al., 2019; Thirumalai and Sinha, 2011; Wang et al., 2017). However, little is known about how product customization affects consumer purchases on C2M platforms, where manufacturers need to ensure high-quality service by raising brand awareness, shortening lead time, and restructuring production processes to enhance operational ability to meet consumers' needs at a lower cost (e.g., group buying).

Previous studies on product customization on C2M platforms have mostly been qualitative investigations of manufacturers' strategic decisions. For example, Mak and Shen (2021) explored the implementation of C2M customization at JD.com, a well-known Chinese online retailer. Liu et al. (2020) conducted a case study to identify the primary challenges and success factors in the customization of apparel from manufacturer, consumer and supply chain perspectives. However, empirical studies on how best to leverage product customization on C2M platforms in China are lacking.

Based on the gaps in the literature, we propose the following two main research questions:

RQ1: Does product customization positively affect customer purchases on C2M platforms?

RQ2: Do brand awareness, lead time, or group buying moderate the positive effect of product customization on customer purchases?

To answer these questions, this study uses signaling theory to analyze the effect of product customization on customer purchases and investigate when product customization is most effective. This study makes substantial theoretical and practical contributions. First, based on signaling theory, this research contributes to the emerging literature on customization by empirically testing the role of product customization strategies on C2M platforms. Existing studies have mainly investigated the outcomes of customization in terms of customer perceptions (Franke et al., 2010), while only a few qualitative studies have explored the importance of product customization in the C2M context (Fan et al., 2022; Hu et al., 2016).

Second, this study adds to signaling theory literature by exploring various signals of manufacturer capability in the C2M context from both manufacturer and customer perspectives. Specifically, our findings show the moderating roles of brand awareness, lead time and group buying. Brand awareness has implications for the selection of collaborating manufacturers. Lead time signals the efforts invested in production, with longer lead time improving customer satisfaction. Group buying is associated with reduced personalization and increased coordination challenges, thus may weaken the positive effect of product customization on customer purchases.

The remainder of this paper is organized as follows: First, we discuss the background of C2M customization, the conclusions of our literature review, and the effectiveness of product customization. Second, we propose a theoretical framework that explains the effect of product customization on customer purchases, as well as the key factors that affect this relationship on C2M platforms. Finally, we test our hypotheses using data crawled from the Biyao platform and discuss the theoretical and practical implications of the findings.

## 2. Literature review

### 2.1. C2M customization

C2M is a new e-commerce model that involves direct connection and coproduction between manufacturers and customers (Liu et al., 2020; MacCarthy et al., 2016). Manufacturers can utilize digital platforms' information to learn about consumers and create products that meet their specific needs (Han et al., 2023; Mak and Shen, 2021). C2M customization not only meets the heterogeneous needs and preferences of customers, but also provides customers with high-quality products at a lower price (Moon et al., 2008).

In the C2M context, unlike with regular online retailers, customers are directly linked to manufacturers. To attract customers, manufacturers must improve their marketing capabilities and strive to build brand awareness of customized products (Dodds et al., 1991; Hsieh and Wu, 2019). Another unique feature of product customization in the C2M context is that the time from production to delivery is often longer than regular delivery times. The longer lead time for customized products reflects weaker production and service capabilities (Hegde et al., 2005). Further, manufacturers typically sell customized products to relatively large groups to reduce production costs.

When making purchasing decisions about customized products, customers prefer to pay attention to the choices of others, service quality, and brand. C2M platforms include brand logos, delivery times, and group buying options, and customers can use these signals to reduce purchase uncertainties and risks (MacCarthy et al., 2016).

### 2.2. Signaling theory

Signaling theory has been widely applied in marketing (Chase and Murtha, 2019; Kotha et al., 2018), management (Vasudeva et al., 2018), and international business (Reuer et al., 2012). In marketing research, signaling theory is used to examine information asymmetry between buyers and sellers before transactions (Spence, 1973; Lu and Chen, 2021). Customers can learn hidden information about product quality by using signals (Kirmani and Rao, 2000). Signals can be utilized to reduce information asymmetry and help customers accurately evaluate product quality (Mavlanova et al., 2016; Wells et al., 2011), reducing uncertainty (Luo et al., 2021). Signals on digital e-commerce platforms can take the form of advertisements, branding, promotional policies, word of mouth, product descriptions, and ratings (Cheung et al., 2014; Dimoka et al., 2012).

According to signaling theory, brand awareness and lead time are signals of a firm's marketing and service capabilities, while group buying is theoretically a signal of a firm's coordination challenges. From the perspective of signaling theory, these factors are crucial in moderating the relationship between product customization and customer purchases.

### 2.3. Product customization

Customization refers to the degree to which a firm produces unique products or services to meet customers' preferences and needs (Hildebrand et al., 2014; Kasiri et al., 2017). Customization may generate coordination issues between customers and suppliers, including the orderly coordination and adjustment of partners' actions to achieve jointly defined goals (Gulati and Singh, 1998; Wang et al., 2017). We conceptualize product customization as the degree to which a manufacturer adjusts a product's attributes, functions, and appearance to meet a customer's individual needs.

Prior scholars have conducted research on the antecedents of product customization from both consumer and product perspectives. From the consumer perspective, these include innovativeness, customer attitude, social norms, and perceived control (Lee and Chang, 2011; Pallant et al., 2020; Tang et al., 2011). From the product perspective, antecedents include perceived usefulness and product involvement (the personal relevance or importance of the product to the customers) (Franke et al., 2009; Lee and Chang, 2011).

Product customization can be classified into functional, aesthetic, and self-expressive customization (Randall et al., 2007; Moreau et al., 2011). Its outcomes include consumer purchase behaviors, product innovation capability, and firm performance (Chen et al., 2010; Duray et al., 2000; Hunt et al., 2013; Kaiser et al., 2017; Qi et al., 2020; Thirumalai and Sinha, 2011; Wang et al., 2017).

Despite the rich studies on product customization, it has mainly been studied at the consumer or supplier level; however, product customization in the C2M context is under-researched (Kasiri et al., 2017; Wang

et al., 2017). Customization has a positive effect on customers' purchase intentions, but empirical studies on the key moderators of this effect in the C2M context are limited. Product customization is associated with uncertainties because manufacturers have limited ability to satisfy end consumers. Thus, examining how manufacturers overcome the challenges of product customization is imperative.

## 3. Conceptual model and hypotheses

Manufacturers can realize product customization through digital technologies, but they still face challenges to produce and deliver the products to serve customers' personalized needs (Bogers et al., 2016). In the C2M context, product customization is associated with a high degree of customer uncertainty, which can be reduced by providing a signal of the manufacturer's ability to satisfy the customer's unique needs. Key signals include brand awareness, lead time, and group buying. We propose that the positive effect of product customization on customer purchases is increased when brand awareness is higher, lead time is shorter, and products are not sold through group buying (see Fig. 1).

### 3.1. The role of product customization on customer purchases

Product customization is defined as the degree to which products are adjusted to fulfill customers' functional, aesthetic, or self-expressive expectations (Hildebrand et al., 2014). Product customization has been widely applied in retail industries such as clothing and apparel. It can provide customers with a better consumer experience on C2M platforms. A high level of product customization signals a firm's strong willingness to invest substantial effort into modifying a product's functional or aesthetic form to express a customer's unique identity, in turn boosting customer satisfaction and repurchase intentions (Kim et al., 2015; Moon et al., 2008).

Product customization is a paradox-breaking manufacturing strategy in which customers are provided with unique products manufactured through cost-efficient mass production (Duray et al., 2000). Big data from C2M platforms enable manufacturing firms to directly connect to large numbers of individual customers rather than relying on intermediaries and efficiently fine-tune product function and aesthetics according to customer needs. Customers are more likely to express satisfaction with the substantial efforts of manufacturing firms (Chernev et al., 2011; Kaiser et al., 2017; Tweneboah-Koduah et al., 2020). Thus, we hypothesize that a high level of product customization signals a greater effort by manufacturing firms to create personalized benefits and value for customers, thus increasing customer purchases.

**H1.** Product customization is positively associated with customer purchases.

### 3.2. Moderating roles of brand awareness, lead time, and group buying

The process of product customization is associated with various uncertainties, including asymmetrical information between the supply and demand sides (Ha and Tong, 2008; Shen et al., 2019), relatively long delivery cycles (Feitzinger and Lee, 1997; Salvador et al., 2009), and high customization costs (Syam et al., 2005). Because customers cannot see or experience customized products in advance, they must rely on signals to evaluate product quality and reduce transaction uncertainties (De Treville et al., 2004; Lengnick-Hall, 1996; Poppo et al., 2016).

### 3.2.1. Moderating role of brand awareness

Brand awareness refers to the degree to which consumers recognize and recall a manufacturer's brand (Aaker, 1996; Dabbous and Barakat, 2020; Keller, 2003). In the C2M context, brand awareness offers an important clue to represent multiple product and supplier characteristics (Homburg et al., 2010). Brand awareness is a strong signal of product quality and supplier commitment because it often involves high levels of supplier investment (Cretu and Brodie, 2007; MacDonald and Sharp, 2000), potentially reducing customer uncertainty (Dawar and Parker, 1994; Erdem et al., 2006; Erdem and Swait, 2001; Rao and Monroe, 1989; Yoo et al., 2000). High brand awareness is associated with reduced operational risk, further facilitating customer brand choice.

Because individual customers are not directly linked to manufacturing firms, they have limited knowledge about a firm's capabilities. Brand awareness can be informative signals of a firm's production and service quality (Cretu and Brodie, 2007; Ghodeswar, 2008). Manufacturers with high brand awareness

coproduced products at a lower price once a set number of people agree to buy them (Romero and Molina, 2011). Platform signals take different forms, including group buying and other promotional policies (Lo et al., 2016). According to signaling theory, group buying is an important signal that indicates that products are not being individually produced for one customer and that firms need to make additional efforts to coordinate a large number of customers.

Customers who make online purchases, especially in the C2M context, face various uncertainties (Dimoka et al., 2012). Because they cannot experience the product in advance, they rely on signals for product quality (Dimoka et al., 2012). A group buying policy signifies to customers that they will receive a customized product that is similar to which others will receive. In other words, the product is not unique to the customer, reducing customer identity or personalization (Cheng and Huang, 2013; Hossain et al., 2022). Further, if customized products are sold as a group rather than individually on the C2M platform, a higher and more complex level of coordination is needed, which may hamper firm financial performance (Ma et al., 2022; Wang et al., 2017). Thus, we postulate that group buying weakens the effect of product customization on customer purchases:

**H4.** All else being equal, group buying weakens the positive effect of product customization on customer purchases.

## 4. Methodology

### 4.1. Data collection and sample

We crawled data from China's largest C2M customization platform, Biyao, in November 2021. Biyao was the first C2M e-commerce platform in China and is the most prominent platform providing consumers with customized products (Hsieh and Wu, 2019). It connects the resources of >500 top manufacturers. The production cycle is typically 3 to 7 days, with eyeglasses, coffee, furniture, and other product categories having unique customized characteristics. Through the Biyao platform, manufacturers can offer customized products with different functions and forms, and customers can choose their preferred product. We used Python to crawl products that may be customized, including coffee, gifts, household furniture, and eyeglasses.

We crawled a total of 708 products from the Biyao platform, and the data was filtered according to whether products were customized. After removing non-customized products (36.58 %), we were left with a sample of 449 products. There was an average of 65.17 purchases for each product. Product customization level was rated from 1 to 7 (1 = lowest customization level, such as a child seat in different colors; 7 = highest customization level, such as eyeglasses for myopia), and the average product customization rating was 3.594. Brand awareness was also rated from 1 (lowest) to 7 (highest) and had an average of 4.235.

### 4.2. Measures

Data from the Biyao platform were collected in November 2021. The measures are shown in Table 1. We recorded information on product customization, customer purchases, brand awareness, lead time, and group buying. Control variables were premium products, product rating, picture ratio, and price, all of which may influence customer purchases.

The independent variable was product customization, rated from 1 to 7. We invited two professors to independently assess the degree of customization of products in our sample. Cohen's kappa was 0.681, indicating substantial agreement between the two coders (Viera and Garrett, 2005). We took the average of the two scores as the final product customization score. The dependent variable was customer purchases, which was equal to the total sales of the product by the end of November 2021.

The moderator variables were brand awareness, lead time, and group buying. Brand awareness, which refers to the degree that a consumer

**Table 1**
Measurements.

| Variables | Operationalization | Source |
|---|---|---|
| *Main variables* | | |
| Product customization | Degree of product customization; average score (from 1 to 7) of product customization | Manually coded by two professors |
| Brand awareness | Average score (from 1 to 7) of brand awareness | Manually coded by two professors |
| Lead time | Length of time from order to delivery, log transformed to reduce skewness | Biyao |
| Group buying | Group buying = 1; non-group buying = 0 | Biyao |
| Customer purchases | Total product sales, log transformed to reduce skewness | Biyao |
| *Control variables* | | |
| Premium product | Products labeled by the platform as high quality | Biyao |
| Product rating | Customer product ratings based on their purchase experiences | Biyao |
| Picture ratio | Number of customer reviews with photographs divided by the total number of customer reviews | Biyao |
| Price | Amount of money that a customer will spend to meet their demands, log transformed to reduce skewness | Biyao |

recognizes and recalls a manufacturing brand (Aaker, 1996; Barreda et al., 2015; Keller, 2003), was coded by the two professors. Cohen's kappa was 0.670, indicating substantial agreement (Viera and Garrett, 2005); thus, we adopted the mean value of the two scores. Lead time represents the number of days from product order to product delivery. In this study, this measure was log transformed. Group buying refers to products that are customized and sold in groups rather than singly.

Our control variables were product price, product rating, premium products, and picture ratio. Premium products are those certified as high quality by the platform. Product rating refers to the scores of products that customers post based on their purchase experience. Picture ratio is measured by the number of customer reviews with photographs divided by the total number of customer reviews. These variables (price, premium product, product rating, and picture ratio) are likely to influence customer purchase behaviors.

The measurements and definitions of all variables are shown in Table 1, and the descriptive statistics and correlations can be seen in Tables 2 and 3.

## 5. Results

We used ordinary least squares regression to test the direct effect of product customization on customer purchases (see Table 4). Model 1 included the control and independent variables. The results show that product customization positively influences customer purchases ($\beta$ = 0.260, $p < 0.01$), supporting H1.

We also investigated the moderating roles of brand awareness, lead time, and group buying. We mean centered the main variables before

**Table 2**
Descriptive statistics.

| Variable | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Log customer purchases | 449 | 4.177 | 1.832 | 2.398 | 9.204 |
| Product customization | 449 | 3.594 | 2.344 | 1.000 | 7.000 |
| Brand awareness | 449 | 4.235 | 1.913 | 2.000 | 7.000 |
| Log lead time | 449 | 2.469 | 0.962 | 0.690 | 3.400 |
| Group buying | 449 | 0.976 | 0.155 | 0.000 | 1.000 |
| Premium product | 449 | 0.134 | 0.341 | 0.000 | 1.000 |
| Product rating | 449 | 4.941 | 0.049 | 4.900 | 5.000 |
| Picture ratio | 449 | 0.095 | 0.150 | 0.000 | 1.286 |
| Log price | 449 | 6.995 | 1.310 | 3.660 | 9.100 |

**Table 3**

Descriptive statistics and correlations.

| | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Log customer purchases | 4.177 | 1.832 | 1.000 | | | | | | | | |
| 2. Product customization | 3.594 | 2.344 | 0.562 | 1.000 | | | | | | | |
| 3. Brand awareness | 4.235 | 1.913 | 0.574 | 0.527 | 1.000 | | | | | | |
| 4. Log lead time | 2.469 | 0.962 | −0.614 | −0.475 | −0.710 | 1.000 | | | | | |
| 5. Group buying | 0.976 | 0.155 | 0.053 | 0.151 | 0.110 | −0.103 | 1.000 | | | | |
| 6. Premium product | 0.134 | 0.341 | 0.543 | 0.489 | 0.479 | −0.534 | 0.062 | 1.000 | | | |
| 7. Product rating | 4.941 | 0.049 | 0.036 | 0.252 | −0.143 | 0.127 | 0.103 | −0.034 | 1.000 | | |
| 8. Picture ratio | 0.095 | 0.150 | −0.086 | −0.195 | −0.114 | 0.199 | −0.312 | −0.137 | −0.130 | 1.000 | |
| 9. Log price | 6.995 | 1.310 | −0.583 | −0.346 | −0.592 | 0.747 | 0.020 | −0.475 | 0.166 | 0.207 | 1.000 |

Note: Significant at the 0.05 level (two-tailed test) when the correlation is $>0.11$ or $<-0.11$. Customer purchases, lead time and price are Log transformed.

**Table 4**

Regression results on customer purchases.

| Variables | Log customer purchases | | |
|---|---|---|---|
| | Model 1 | Model 2 | Model 3 |
| **Main effects** | | | |
| Product customization (PC) | 0.260*** | 0.199*** | 0.831* |
| | (0.032) | (0.035) | (0.487) |
| **Moderating variables** | | | |
| Brand awareness (BA) | | 0.111** | −0.018 |
| | | (0.048) | (0.083) |
| Log lead time (Log LT) | | −0.282** | −0.628*** |
| | | (0.110) | (0.159) |
| Group buying (GB) | | −0.001 | 1.546** |
| | | (0.412) | (0.738) |
| **Interaction effects** | | | |
| PC * BA | | | 0.044* |
| | | | (0.024) |
| PC * Log LT | | | 0.122*** |
| | | | (0.043) |
| PC * GB | | | −1.111** |
| | | | (0.434) |
| **Control variables** | | | |
| Premium product | 1.105*** | 0.927*** | 1.061*** |
| | (0.220) | (0.220) | (0.227) |
| Product rating | 1.332 | 2.524* | 2.524* |
| | (1.334) | (1.344) | (1.411) |
| Picture ratio | 0.998** | 0.997** | 1.164*** |
| | (0.417) | (0.432) | (0.430) |
| Log price | −0.551*** | −0.367*** | −0.389*** |
| | (0.055) | (0.071) | (0.072) |
| Constant | 0.299 | −6.404 | −6.445 |
| | (6.482) | (6.599) | (6.828) |
| Observations | 449 | 449 | 449 |
| R-squared | 0.521 | 0.541 | 0.557 |

Note: Standard errors in parentheses.
*** $p < 0.01$.
** $p < 0.05$.
* $p < 0.1$.

running the moderation tests. Model 2 included all main effects, while Model 3 included all interaction effects. A comparison of Models 2 and 3 demonstrated that the F-statistic for $\triangle R^2$ was significant ($p < 0.05$), indicating the existence of a moderating effect. First, we tested the interaction effect of brand awareness and product customization using Model 3. We found that brand awareness only slightly strengthened the relationship between product customization and customer purchases ($\beta = 0.044$, $p < 0.10$), marginally supporting H2. Next, we tested the interaction effect of lead time and product customization using Model 3. A higher lead time strengthened the positive effect of product customization on customer purchases ($\beta = 0.122$, $p < 0.01$), rejecting H3. This indicates that a one-day delay in the delivery of highly customized products may increase sales by 12.2 %. Finally, we tested the interaction effect of group buying and product customization using Model 3. Group buying weakened the effect of product customization on customer purchases ($\beta = -1.111$, $p < 0.05$), supporting H4.

To further examine the moderating effects of brand awareness, lead time, and group buying, we graphed different levels of the three moderators. Fig. 2 shows that product customization had a stronger positive effect on customer purchases at higher levels of brand awareness. Fig. 3 shows that product customization had a stronger positive effect on customer purchases with longer lead time. Fig. 4 shows that product customization had a stronger positive effect on customer purchases when products are not sold via group buying.

## 6. Conclusion and discussion

The digital economy has demonstrated an increasing shift toward product customization. Hence, it is crucial to understand the effect of product customization on the market and the characteristics that can improve the welfare of market participants. We explored the role of product customization on C2M platforms, which offer direct and cost-effective channels between customers and manufacturers. Additionally, we investigated the moderating roles of brand awareness, lead time, and group buying on the effect of product customization on customer purchases.

Customers typically consider lead time in their purchasing decisions. However, interestingly, we found that customized products with a longer lead time outperformed those with a shorter lead time by being of higher quality and achieving better performance on C2M platforms. A longer lead time indicates that the manufacturer has sufficient time to design and produce customized products of higher quality with better coordination and operational efficiency (Beverland, 2005; Bortolotti et al., 2013; Hayes and Pisano, 1994; Kaplan and Norton, 2005). Thus, a higher lead time means manufacturers can have a higher production capacity to customize quality products (Tu et al., 2001). This confirms that a longer lead time does not hinder the sale of customized products on C2M platforms, as is the case with retail firms. Unsurprisingly, we found that non-group buying has a positive effect on the relationship



**Fig. 2.** The moderating effect of brand awareness on the role of product customization.
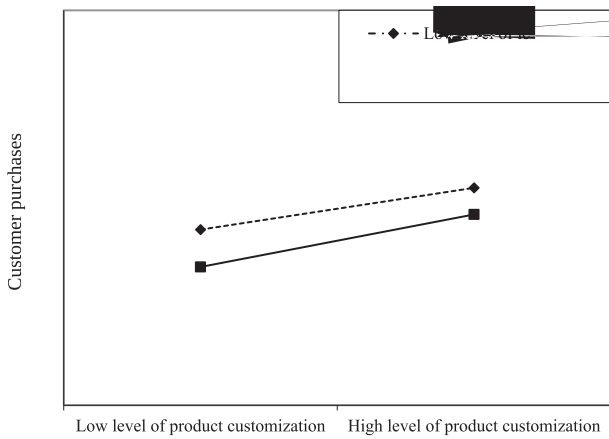
**Fig. 3.** The moderating effect of lead time on the role of product customization.
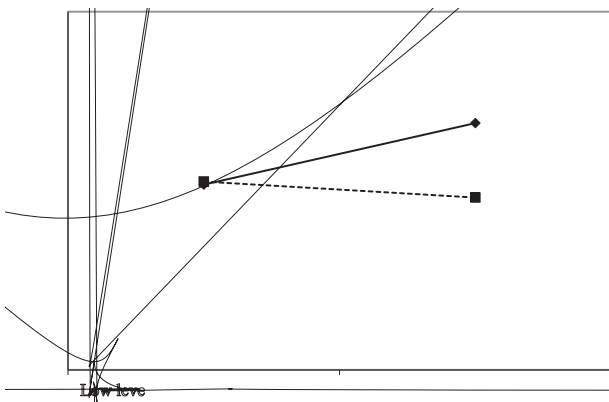


**Fig. 4.** The moderating effect of group buying on the role of product customization.

between product customization and customer purchase.

### 6.1. Theoretical implications

This study makes the following two theoretical implications. First, it contributes to the existing literature on product customization, which has significantly boosted customer purchases. The vast majority of literature in the C2M customization context has been qualitative, with few studies empirically exploring the mechanisms and conditions of product customization. To the best of our knowledge, this is the first study to systematically examine the moderating roles of brand awareness, lead time, and group buying on the effect of product customization on customer purchases on C2M platforms.

Second, this study adds to the signaling theory literature by exploring the role of different signals of manufacturer capability from both manufacturer and customer perspectives. Prior studies have mainly adopted signaling theory to investigate signals from the firm side to examine issues caused by information asymmetry in retail and social media contexts (Cheung et al., 2014; Mavlanova et al., 2012; Mitra and Fay, 2010). In prior studies, lead time and group buying in the retail context are seen as signals of service quality and product popularity. However, in the C2M context, manufacturing firms differ from retail firms in that they involve a production process, and lead time signals the efforts invested in production to ensure product quality. We found that lead time reflects manufacturing firms' investing effort and can positively influence customer satisfaction (Bortolotti et al., 2013; Hogreve and Gremler, 2009). Group buying also plays a different role in the product customization context because it indicates that personalized

products are similar to others, which may weaken the effect of product customization on customer purchases.

### 6.2. Practical implications

This study provides practical implications for manufacturers and C2M platform managers. First, C2M platform managers should improve the level of product customization in terms of aesthetics, function, and self-expression. On the Xiaomi platform, for instance, consumers participate in product design, choosing their preferred features, functions, and aesthetics, then customized products are manufactured precisely according to the consumer's preference. Moreover, customized products are much more appealing to consumers. Therefore, improving product customization is an effective means of boosting firm performance.

Second, C2M platform managers should leverage signals that represent a manufacturer's operational capabilities and invested efforts. For example, managers should choose manufacturers with well-established reputations and high brand awareness and prominently display their brands and logos on the C2M platform to improve customers' brand awareness. Moreover, platform managers should be aware that a shorter lead time will not necessarily attract customers because it may create uncertainty about the quality of customized products. According to our findings, platform managers should set an appropriate lead time according to a manufacturer's production capabilities. Further, offering group buying of customized products on C2M platforms may signal that products are less personalized and create coordination challenges for companies. Thus, the group buying logo should be minimized on C2M platforms such as Biyao.

Finally, product customization can meet the needs of customers and stimulate personalized product consumption; therefore, companies should implement and capitalize on product customization strategies (Beier et al., 2020; Choi et al., 2022). This study provides insights for C2M platform managers into the mechanisms underlying consumer responses to product customization to increase customer purchases. Through digital empowerment, platforms can integrate customization into mass production and use large-scale manufacturing capabilities to meet the individual needs of many users, providing a new reference model for digital transformation in commerce.

### 7. Limitations and future research

Although this study makes several contributions to the literature, it also has some limitations. First, we only tested the relationship between product customization and customer purchases. However, product customization can be categorized into functional customization, aesthetic customization, and self-expression customization (Kaiser et al., 2017; Kim et al., 2015). Future research can investigate the effects of different types of product customization on customer purchases.

Second, our focal variables were proxy measures from Biyao platform. Future studies could combine with a questionnaire survey to reduce the subjectivity of focal variables and test potential mediating mechanisms (e.g., customer identification with manufacturers' efforts). Our sample included only coffee, furniture, eyeglasses, and gifts in the category of customized products; future studies could consider other customized products such as computers and clothing. Future research could investigate larger platforms in different countries to confirm the robustness.

Third, we identified only three variables potentially moderating the effect of product customization on customer purchases. There may be other moderating or mediating variables in this relationship, which can be tested in future research. Other factors could also be explored from the perspectives of consumers, platforms, and even cross-country cultures in future studies.

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## CRediT authorship contribution statement

Shuai Wang (first author): Conceptualization, Methodology, Data Analysis, Writing - Original Draft, Writing - Review and Editing. Shuang Ma (corresponding author): Methodology, Data Analysis, Writing - Original draft, Writing - Review and editing.

## Data availability

Data will be made available on request.

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