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Limited-time scarcity and competitive arousal in E-commerce

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ABSTRACT
In their web stores, retailers are increasingly using scarcity as a strategy to influence customers’ perceptions and purchase behaviour. This study aims to investigate the effect of limited-time promotions on purchase intention while examining the mediating roles of perceived scarcity and competitive arousal as predictors as well as the moderating role of consumers’ cultural background. An experimental survey is carried out with two conditions for a product offer in a web store: an offer with a limited-time availability notice; and an offer with a non-limited (in-stock) notice. In total, 208 Europeans (originating from Italy, an individualistic-masculine society, and the Netherlands, an individualistic-feminine society) participated in the study. The results demonstrate that a limited-time notice does not directly generate higher purchase intention compared to a non-limited-time notice. Interestingly, another major finding pertains to the indirect effects on purchase intention. Specifically, a limited-time availability notice creates higher perceived scarcity and subsequently activates higher perceived competition, which, in turn, leads to higher purchase intention. However, this indirect effect on purchase intention emerged only for the Italian consumers, and not for the Dutch consumers, participating in this study.

Introduction

Online retailers try different marketing strategies to improve customers’ perception of their products (Goldsmith, Griskevicius, and Hamilton 2020). These strategies often target specific groups that receive an exclusive deal, whereas others cannot avail themselves of this opportunity. Broeder and Derksen (2018) defined this as the effect of scarcity. Scarcity refers to the inequality between the number of products that are demanded and those that are supplied (Kristofferson et al. 2017). Scarcity as a strategy accentuates this limited opportunity to purchase a product. When a product is scarce, consumers might develop a positive attitude towards it and assume that the product is more valuable. This positive attitude stimulates purchase intention and reduces the probability that consumers will look for better deals (Wu and Lee 2016).

There are multiple variations of scarcity that have an impact on consumers (see, Hamilton et al. 2019; Shi, Li, and Chumnumpan 2020 for recent systematic literature reviews). The first distinction can be made between scarcity in quantity and that related
to time. Scarcity in quantity can be subdivided into two categories, related to supply and demand. In the case of scarcity in quantity due to supply (e.g. ‘Limited Edition’), the seller predetermines the number of products available; once these products are gone, they are no longer available. In contrast, scarcity in quantity due to demand (e.g. ‘Only … Units in Stock’) means that a limited number of products are available due to high sales volumes. Finally, there is scarcity related to time due to supply (e.g. ‘Only Available until . . . ’), where consumers can benefit from a promotion for a predetermined time; after this period, the offer is no longer available (Gierl, Plantsch, and Schweidler 2008; Gupta and Gentry 2016).

In the present study, the focus is on scarcity in time due to supply, conveyed to the customers of a web store with messages indicating limited-time notices (such as, for example, ‘Only one hour and 14 minutes left’).

The relationship between scarcity and purchase intention can be explained by competitive arousal. This is a phenomenon in which competitive contexts can intensify the desire to achieve a certain goal (Nichols 2012). Scarcity is part of competition, as it can create a competitive context and generate desires that affect consumer behaviour. Obtaining a product that is scarce, therefore, corresponds to winning a competition. In this way, scarcity can generate higher purchase intention, since obtaining the product becomes a competition that consumers want to win (Roux, Goldsmith, and Bonezzi 2015). However, with a limited-time availability notice, this effect might not be substantial, as consumers are not competing against each other (Guo, Xin, and Wu 2017). This decreases the competitive arousal felt by consumers (Kristofferson et al. 2017).

Since businesses increasingly operate globally, they encounter more customers from different cultures. For this reason, it could be beneficial to adjust marketing strategies based on customers’ cultural characteristics. Consumers’ cultural background can influence the effects of the degree of product scarcity on purchase intention. Several cross-cultural studies have shown that the effect on consumer behaviour of exclusive deals related to product scarcity might not be universal. Consumers from diverse cultures might respond differently towards deal exclusivity, with some preferring it more than the others (see, for references, Broeder and Nguyen 2020; Shi, Li, and Chumnumpan 2020).

Hence, the research question guiding the present this study is as follows: What is the effect of a limited-time notice on consumers’ perceptions of scarcity and competition and, in turn, purchase intention, differentiated by their cultural background? The conceptual model of the present study is presented in Figure 1. The model represents a direct effect of the product availability notice. In addition, indirect effects are activated via the perceived scarcity and the perceived competition. The cultural background of consumers is presumed to moderate (strengthen or weaken) the relationships between the variables.

The remainder of this paper is organised as follows. First, the core notions of scarcity and competitive arousal are clarified and related to online consumer behaviour, differentiated by cultural background. From this literature review, six hypotheses are derived. Subsequently, a detailed account of the methods and results of an experimental survey based on a fictitious smartwatch web store are presented. The findings are presented as they pertain to the perceptions and preferences of consumers from Europe (Italy and the Netherlands). The paper concludes by offering theoretical and managerial implications and suggestions for further research.
Literature review

Scarcity in time

Scarcity is most commonly visible property in online retail environments. Jha, Dutta, and Koksal (2019) stated that scarcity can act as an informational cue that products of high value are not endlessly available. Empirically, Peng et al. (2019) asked consumers in China to imagine a social e-commerce store with products discounted for sales promotion. These products (i.e. a laptop as a high-involvement product and a cup as a low-involvement product) were perceived as more valuable with a limited-time notice (i.e. '50% off, 1 day left until the end of the promotion'). In a similar vein, Hanna, Swain, and Berger (2016) found that short-limited-time notices can create a sense of urgency, where the consumer feels the need to complete an action immediately, thereby leading to higher purchase intentions. Meanwhile, Aggarwal, Jun, and Huh (2011) investigated the effect of print advertisements containing different scarcity messages for a fictitious sales event of Swatch watches and laptops. They noted that limited-quantity messages (i.e. restricted ['First 100 Customers Only'] or open-ended ['Limited Quantities Only']) had more impact in influencing purchase intention compared to limited-time notices (i.e. restricted ['For Six Days Only'] or open-ended ['For a Limited Time Only']).

Promotions that are short in time prioritise the promotion above other things in the context of consumers’ activities, whereas giving them more time leads to delay. Contrarily, too short a time limit can lead to a sense of inconvenience, as the consumer may not be able to complete the action in the given time. This leads to lower deal evaluations and, ultimately, lower purchase intentions. Similarly, Gierl, Plantsch, and Schweidler (2008) showed that limited-time notices have a positive effect on the desirability of the product when the period of availability is short (i.e. one week or less). However, the time restriction should be explicitly mentioned; merely stating ‘temporarily available’ is not sufficient. When the time limit is explicitly mentioned, it gives consumers no time to look for substitute products or a better deal, which enhances the purchase intention. Thus, when the time limit is a short, and explicitly mentioned, this enhances the purchase intention. Aggarwal and Vaidyanathan’s (2003) study supports this, demonstrating that the presence of a limited-time notice has a positive effect on participants’ enthusiasm to purchase and lessens their motivation to look for a better deal. Contrary to this result, Fenko, Keizer, and Pruyn (2017) showed a negative effect of scarcity notices on purchase intention; specifically, the limited quantity of remaining opera tickets was considered to be for ‘bad seats’. Prospective customers perceived that many people had already bought the product, and they no longer perceived the product as scarce and of the same quality as the product normally was.

In addition to a higher evaluation of the quality and desirability of the product, scarcity also functions as an indicator of profit (Wu and Hsing 2006; Wu et al. 2012). Profit is inferred by consumers due to their previous experiences with scarcity offers signalling an expected increase in financial value. Therefore, making a purchase that might disappoint is less financially crucial. Jha, Dutta, and Koksal (2019) highlighted that a limited-time notice can function as an indicator of price attractiveness and, therefore, increase purchase intention. These authors also observed that scarcity related to time (i.e. ‘Offer valid
for 3 days only!’) is more effective in signalling price attractiveness than scarcity in quantity (i.e. ‘Only 7 units left!’). This is due to the fact that time restrictions are unambiguous and are not impacted by the promotion’s focus on product- or price-related cues.

To conclude, previous research provides contradictory results regarding the effect of limited-time notices. However, more support can be found for the argument that limited-time notices create a sense of urgency (Hanna, Swain, and Berger 2016) and a higher desirability of the product (Gierl, Plantsch, and Schweidler 2008), leading to an increase in consumers’ purchase intention (Godinho, Prada, and Garrido 2016; Jha, Dutta, and Koksal 2019). In addition, the notion that scarcity notices can imply that many people have already bought the product has been highlighted in the context of limited-quantity notices (Fenko, Keizer, and Pruyn 2017). Accordingly, in the present study, the assumption is made that an availability message affects consumers’ purchase intention. Specifically, we assume that there is a direct effect whereby a product with a limited-time availability message generates higher purchase intention than a product with a non-limited-time (in-stock) message (Hypothesis 1 in Figure 1). In addition, we assume that there is a positive indirect effect of the availability message on purchase intention via the degree of perceived scarcity (Hypothesis 2 and Hypothesis 3 in Figure 1).

**Competitive arousal**

Scarcity signals that a product is demanded by various individuals, but that there is not enough supply to satisfy everyone. This entails competition and, hence, acquiring a product or service that is scarce can be seen as winning a competition. Consumer competitive arousal can be defined as the competitive feelings and thoughts experienced during a purchase and the assumption that one competes with other buyers to accomplish a goal (Nichols 2012). Common states of mind include the existence of rivals, perceived scarcity, anxiety, and a judgment of the result (i.e. a win or a loss).

When competitive arousal is triggered by scarcity, consumers are more likely to make their judgment based on heuristics (Nichols 2012). The scarcity heuristics increase consumers’ willingness to bid online and to purchase more promptly, while reducing their likelihood of trying to find the product elsewhere for fear of missing out. Similarly, Gupta and Gentry (2019) explored the effect of scarcity notices on competitive arousal in

![Figure 1. Conceptual model of the present study.](image-url)
physical stores. Their findings showed that consumers with high competitive arousal perceived scarce products as exclusive and as a way to fulfil their desire to win a competition. In order to satisfy this need, consumers hid products and did not share products with other potential buyers, thereby satisfying their need to distinguish themselves from others.

When a consumer experiences competitive arousal, it affects their decision-making process. For instance, Roux, Goldsmith, and Bonezzi (2015) noted that competitive arousal influences the relationship between scarcity and the willingness to donate. Scarcity was found to lead to higher feelings of competitive arousal, which increased the desire to improve the participants’ own well-being. This led to lower donations. In a similar vein, Aggarwal, Jun, and Huh (2011) revealed the mediating role of competitive arousal in the relationship between scarcity messages and purchase intention. Additionally, they found that limited-quantity notices created a greater sense of competition and higher purchase intention than limited-time notices.

Recently, Kristofferson et al. (2017) demonstrated that limited-time notices minimise the perceived competitive threat, as all consumers who want to purchase the product can do so as long as they acquire the product within the designated time. In addition, Guo, Xin, and Wu (2017) stated that although the consumer knows about the presence of others, there is no competitive arousal in consumers, as they are not competing against each other. Nevertheless, they also stated that, with a limited-time notice, the promotion becomes a bargain that consumers want to take advantage of and not miss out on.

Overall, it can be inferred that competitive arousal influences the relationship between limited-time notices, scarcity, and purchase intention. Although the level of competitive arousal in consumers who are exposed to limited-time notices is not pronounced (Kristofferson et al. 2017), it is expected that consumers will feel as though they are competing against time to take advantage of the scarcity bargain (Guo, Xin, and Wu 2017; Coskun, Gupt, and Burnaz 2020). Against this background, in the present study the assumption is made that the availability message indirectly, via competitive arousal, induces purchase intention (Hypothesis 4 and Hypothesis 5 in Figure 1), whereby perceived scarcity induces perceived competition (Hypothesis 6 in Figure 1).

### Cultural differentiations

Studies have shown that cultural background plays an essential role in consumer behaviour (see, for references, De Mooij 2021). Cultural common beliefs and attitudes disperse and reinforce, with varying effects on the behaviour of individual group members. In cross-cultural investigations, this cultural diversity among consumer groups is captured in a restricted and convenient set of cultural values (or dimensions). The most used dimensionalisation of culture was proposed by Hofstede (2001). In his framework, different cultures can be distinguished by studying what the members value. Cultures might differ in the relative importance of the individual’s interests versus those of the group. In this respect, individualistic cultures emphasise self-determination and independence (Schumpe and Erb 2015). Therefore, their members value brands and products that separate them from a group as an authentic individual (Aaker and Schmidt 2001). In
contrast, cultures that score high on collectivism value harmony and conformity. Therefore, members from collectivistic cultures are more positive towards brands and products that establish unity with others within the ‘own’ group (Aaker and Schmidt 2001). For instance, Broeder and Derksen (2018) found that Mexicans (collectivistic culture) are more prone to scarcity-exclusive offers (‘Sale by invitation only!!’) than non-exclusive offers (‘Sale for all Facebook users!!’), while an opposite trend was observed for Dutch consumers (individualistic culture). Mexican consumers reported a more favourable attitude to, and higher visiting intention for, online advertisements in general, although the effect found was especially strong in the case of scarcity-exclusive offers. In a similar vein, Jung and Kellaris (2004) found that differences in cultural uncertainty avoidance (of US vs French nationals) moderated the positive scarcity effect on purchase intention.

One of the indicators on the individualism–collectivism dimension is uniqueness seeking (Wu and Lee 2016). The need for uniqueness is defined as the desire for individuals to differentiate themselves from other people. Scarcity is preferred more by consumers with high needs for uniqueness (Tian, Bearden, and Hunter 2001). Profiting from exclusive promotions makes consumers feel unique as others are unable to benefit from the same promotion. This means that scarcity will be particularly effective in individualistic cultures with a high need for uniqueness, compared to collectivistic cultures (Roy and Sharma 2015; Stathopoulou and Balabanis 2019). Gierl and Huettl (2010) argued that the product should be limited due to supply to satisfy the need for uniqueness. As a result, limited-time messages are expected to affect consumers with high levels of uniqueness seeking more than consumers with low levels (Barone and Roy 2010). Conversely, the ability to obtain personal credit is lower with limited-time messages than for other types of scarcity messages (i.e. limited edition or limited quantity) as it tells the consumer that an unlimited number of people can benefit from the promotion (Aggarwal, Jun, and Huh 2011).

The present study focuses on scarcity effects on consumer behaviour in two highly individualistic cultural societies (a comparison is made between Dutch and Italian consumers). According to Hofstede’s (2022) individualism dimension, their cultures are almost the same, with a relatively high scores of 76 for the Netherlands and 80 for Italy (on a 0–100 scale). In addition to the degree of individualism, another cultural difference that is closely related to scarcity and competition is the dimension of masculinity-femininity. According to Hofstede (2022), a masculine society is ‘driven by competition, achievement and success, with success being defined by the winner/best in field’. Notably, the Dutch and Italian cultures differ in the degree masculinity-femininity. Italy has a masculine culture (a score of 70 on a 0–100 scale), while the Netherlands has a feminine culture (a score of 14 on the same 0–100 scale). Their cultural background might imply that Italian consumers are influenced more by limited-time notices (with higher scarcity and higher competition perceptions) compared to Dutch consumers. Therefore, in the conceptual model of this study (see Figure 1), cultural background was assumed to moderate the relationships between the availability notice, perceived scarcity and competition, and purchase intention.
Methodology

Experimental design

The study adopted a two (product availability: in-stock vs limited-time) by two (culture: Dutch vs Italian) between-subjects design. The dependent variable was purchase intention. Perceived competitive arousal was positioned as the mediator between the type of availability notice and purchase intention. Cultural background was assumed to moderate the relationships between the availability notice, perceived scarcity, competitive arousal, and purchase intention.

Sample

In total, 231 participants completed the online survey. The final sample used in the analyses consisted of 208 participants. In total, 116 participants (38 men and 78 women) were from the Netherlands (mostly the Eastern and Southern parts) and 92 participants (63 men and 29 women) were from Italy (mostly the Northern region). Their country of birth and their country of residence were checked by asking the question ‘To what ethnic group do you belong?’. This means that data were not used from, for example, a self-identified Italian person born and living in the Netherlands. The mean age was 34 years (age range: 18–66) and the education level of most participants was higher education (university).

Stimulus material

The participants were shown a picture of a black smartwatch on a web store page. A popup message in English was displayed. There were two variations of the product availability message. In one, there was an ‘In stock’ notice displayed in green (see Figure 2). In the other, the following limited-time notice was added in green: ‘Only
1 hour and 14 minutes left’ (see Figure 3). The amount of time that was displayed in the message was based on previous research by Guo, Xin, and Wu (2017). The type of smartwatch and the (blurred) background were designed to be neutral in order to reduce any distraction. Distinctive features (logo, navigation options, colour, etc.) of the original web store were rendered unidentifiable. A smartwatch is a conspicuous product that is both functional and fashionable and can thus be used by the owner to distinguish himself/herself. Smartwatches are worn by men and women of varying ages in multiple cultures. The selected smartwatch did not show the brand. To ensure a realistic online retail environment, an add-to-cart button was added. Finally, an exit cross was added to the top right-hand side.

In a pilot study, 10 Dutch and 4 Italian individuals were consulted in qualitative interviews (conducted via Skype). Compared with the product images of a backpack and a water bottle, the smartwatch was selected as the most appropriate one for the experiment. They agreed that the black smartwatch product and the design and background of the web store page were realistic and were neutral in terms of gender, brand, age, and Dutch/Italian culture. In addition, there was consensus that the intended manipulation was adequately expressed through the specific display and formulation of the in-stock notice and the limited-time notice.

**Procedure and measures**

Through snowball sampling, the respondents were contacted via social media (WhatsApp, Instagram, Facebook) of acquaintances in Italy and the Netherlands. With an online Qualtrics link, they gave their informed consent and could quit at any moment. First, they answered questions (in English) that included the demographic variables age, gender, birth-country, country-of-living, and self-identification ('To what ethnic group do
you belong?’). Then, the participants were randomly assigned to one of the two conditions in which the two web store images of the smartwatch were shown. They were asked to imagine that ‘you are searching for a new smartwatch’. The items of the questionnaire are available in the Appendix. The answers were given on a 5-point Likert-type scale (from 1 = ‘Completely disagree’ to 5 = ‘Completely agree’).

- Purchase intention was measured with one statement (‘I would like to buy this product’).
- Perceived scarcity was measured with eight items, partly based on Gupta and Gentry (2016), e.g. ‘This web shop creates a sense of urgency’.
- Perceived competition was measured with six items, adapted from Nichols (2012), e.g. ‘I will have to compete with others to buy the product’.
- Need-for-uniqueness was reported with five items adapted from the Desire for Unique Consumer Products (DUCP) scale developed by Lynn and Snyder (2002), e.g. ‘I like to distinguish myself from others’.
- For the conditional manipulation, questions were asked to check whether the respondents saw the notice ‘In stock’ or the notice ‘Only 1 hour and 14 minutes left’. Finally, they had to indicate with a ‘Yes’ or ‘No’ whether they thought the web store page was realistic and whether the price was missing.

For the scales, the internal consistency of the items was checked using Cronbach’s $\alpha$. For the perceived scarcity scale $\alpha = 0.78$, for the perceived competition scale $\alpha = 0.85$, and for the need-for-uniqueness scale $\alpha = 0.79$. These scales have a good reliability as all Cronbach’s $\alpha$ values are higher than 0.70.

**Results**

**Manipulation check**

To check the validity of the experimental manipulation with the cultural subsamples in the two conditions, some preliminary analyses were performed. The first manipulation check for the Dutch and Italian subsamples in the two conditions revealed that in the in-stock condition, 100 of the 115 participants (87%) correctly reported that they saw the notice ‘Only 1 hour and 14 minutes left’. In addition, in the limited-time condition, 108 of the 116 participants (93%) correctly reported that they saw the notice ‘In stock’. The answers of those participants who did not correctly remember the in-stock/limited-time notice of the condition in which they participated ($n = 23$) were not analysed further. The final sample for further analyses was therefore 208 participants.

Second, the web store page with the in-stock notice was perceived as being more realistic ($M_{\text{In-Stock}} = 3.60$, $SD_{\text{In-Stock}} = 0.75$) than the one with the limited-time notice ($M_{\text{Limited-Time}} = 3.21$, $SD_{\text{Limited-Time}} = 0.99$). A chi-square test for independence indicated a significant association between the condition and perceived realism: $\chi^2 (1, n = 208) = 11.953$, $p = 0.018$, with a medium effect of $\phi = 0.24$. It is noteworthy that, in both conditions,
a high number of participants reported that they thought the price of the product was missing: \( M_{\text{In-Stock}} = 3.93 \) and \( SD_{\text{In-Stock}} = 0.84 \) in the in-stock condition, versus \( M_{\text{Limited-Time}} = 4.08 \) and \( SD_{\text{Limited-Time}} = 0.71 \), in the limited-time condition.

Finally, an independent-samples t-test was conducted to compare the need for uniqueness scores of the two culturally different samples. On average, there was no significant difference in scores for the Dutch participants (\( M_{\text{Dutch}} = 2.97 \), \( SD_{\text{Dutch}} = 0.83 \)) and Italian participants (\( M_{\text{Italian}} = 3.12 \), \( SD_{\text{Italian}} = 0.67 \)), with \( t(206) = 1.364 \) and \( p = 0.174 \). The magnitude of the difference in the means (mean difference = 0.15, 95% CI [-0.006 to 0.35]) was small (Cohen’s \( d = 0.01 \)). These findings provide empirical evidence for the successful scarcity manipulation by adding the limited-time availability message.

**The direct effect of the availability notice**

The assumption was made that, with an in-stock notice, consumers would have higher purchase intentions, differentiated by cultural background. The average levels of purchase intention for the in-stock notice condition and the limited-time condition are plotted in Figure 4 for the Dutch and Italian subsamples.

As shown in Figure 4, the Italian group had slightly higher purchase intentions than the Dutch group. However, there was no direct effect of the type of availability notice on the average purchase intentions. These were about the same with the in-stock notice (for the Dutch group \( M_{\text{In-Stock}} = 2.71 \), \( SD_{\text{In-Stock}} = 1.07 \) and for the Italian group \( M_{\text{In-Stock}} = 2.87 \), \( SD_{\text{In-Stock}} = 0.94 \)) and the limited-time notice (for the Dutch group \( M_{\text{Limited-Time}} = 2.69 \), \( SD_{\text{Limited-Time}} = 0.92 \) and for the Italian group \( M_{\text{Limited-Time}} = 3.02 \), \( SD_{\text{Limited-Time}} = 1.07 \)).

Figure 4 also shows that the limited-time notice directly affected the scarcity perceived by the Dutch group (from \( M_{\text{In-Stock}} = 2.52 \), \( SD_{\text{In-Stock}} = 0.56 \) to \( M_{\text{Limited-Time}} = 3.42 \), \( SD_{\text{Limited-Time}} = 0.55 \)) and the Italian group (from \( M_{\text{In-Stock}} = 2.69 \), \( SD_{\text{In-Stock}} = 0.51 \) to \( M_{\text{Limited-Time}} = 3.51 \), \( SD_{\text{Limited-Time}} = 0.37 \)).

Finally, as can be seen in Figure 4, the limited-time notice directly affected the competition perceived by the Dutch group (from \( M_{\text{In-Stock}} = 2.09 \), \( SD_{\text{In-Stock}} = 0.75 \) to \( M_{\text{Limited-Time}} = 2.55 \), \( SD_{\text{Limited-Time}} = 0.83 \)) and the Italian group (from \( M_{\text{In-Stock}} = 2.27 \), \( SD_{\text{In-Stock}} = 0.70 \) to \( M_{\text{Limited-Time}} = 2.54 \), \( SD_{\text{Limited-Time}} = 0.88 \)).

To further explore the effects on purchase intention, a regression analysis was performed using PROCESS procedures (Model 92 with two mediators and one moderator; see the Appendix) developed by Hayes (2018). In this analysis, the availability message (in-stock/limited-time) was entered as the predictor for purchase intention. The first mediator was perceived scarcity, which was assumed to have a causal effect on perceived competition, which was the second mediator. Culture was inserted as the moderator. The significance of the effects was tested with 95% confidence intervals (CI) based on 5,000 bootstrap samples. The outcomes of this analysis are presented in Table 1 based on the limited-time scarcity serial multiple moderated mediator model presented in Figure 5.
Figure 4. Average levels of purchase intention, perceived scarcity, and perceived competition per condition and cultural group (mean scores on a five-point Likert-type scale, from 1 = ‘Completely disagree’ to 5 = ‘Completely agree’).
Table 1. Regression coefficients, standard errors (SE), and model summary information (based on 5,000 bootstrap samples) for the limited-time scarcity serial multiple moderator mediator model depicted in Figure 5.

<table>
<thead>
<tr>
<th>Independent</th>
<th>M1 (Scarcity)</th>
<th>M2 (Competition)</th>
<th>Y (Purchase intention)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff.</td>
<td>SE</td>
<td>p</td>
</tr>
<tr>
<td>X (Condition)</td>
<td>a₁ = 0.859</td>
<td>0.071</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>M₁ (Scarcity)</td>
<td>− − −</td>
<td>d₂₁ = 0.766</td>
<td>0.097</td>
</tr>
<tr>
<td>M₂ (Competition)</td>
<td>− − −</td>
<td>− − −</td>
<td>b₂ = 0.379</td>
</tr>
<tr>
<td>W (Culture)</td>
<td>−0.127</td>
<td>0.071</td>
<td>0.077</td>
</tr>
<tr>
<td>W x X</td>
<td>0.077</td>
<td>0.143</td>
<td>0.591</td>
</tr>
<tr>
<td>W x M₁</td>
<td>− − −</td>
<td>− − −</td>
<td>0.193</td>
</tr>
<tr>
<td>W x M₂</td>
<td>− − −</td>
<td>− − −</td>
<td>− − −</td>
</tr>
<tr>
<td>Constant</td>
<td>iₘ₁ = 0.006</td>
<td>0.035</td>
<td>&lt; 0.994</td>
</tr>
<tr>
<td>R² = 0.424</td>
<td>R² = 0.299</td>
<td>R² = 0.133</td>
<td></td>
</tr>
<tr>
<td>F(3,204) = 49,950, p &lt; 0.001*</td>
<td>F(5,202) = 17,252, p &lt; 0.001*</td>
<td>F(7,200) = 4,367, p &lt; 0.001*</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. A statistical diagram of the serial multiple mediator model of the in-stock/limited-time scarcity notices with predictors of purchase intention.

Table 1. Regression coefficients, standard errors (SE), and model summary information (based on 5,000 bootstrap samples) for the limited-time scarcity serial multiple moderated mediator model depicted in Figure 5.

The data in Table 1 indicate that in the statistical model (depicted in Figure 5), adding a limited-time notice to the product had no significant direct positive main effect on the purchase intention (c’), compared to an in-stock notice (rejecting Hypothesis 1). As shown in Figure 5, this absence of a direct scarcity message effect on purchase intention was found for the Dutch as well as the Italian samples. Exploring the data for the three indirect effects on consumers’ purchase intention also provided valuable insights.

The indirect effect on purchase intention via perceived scarcity

For the mediation, the first specific indirect effect of the availability notice on purchase intention via perceived scarcity was not significant for the Italian sample (effect = −0.367, SE = 0.20 with 95% CI [−0.77, 0.04]) or for the Dutch sample.
The index of moderated mediation for the difference between the conditional indirect effects was insignificant ($index = 0.500, SE = 0.29, 95% CI [−0.08, 1.06])

For the whole sample, participants who saw the limited-time notice perceived more scarcity ($a_1$) (confirming Hypothesis 2), with no cultural moderation. However, this increased scarcity was not associated with an increased intention to purchase the smartwatch ($b_1$) independent of perceived competition (rejecting Hypothesis 3), with no cultural moderation.

**The indirect effect on purchase intention via perceived competition**

The second specific indirect effect of the availability notice on purchase intention through perceived competition was also not significant, for both the Italian sample ($effect = −0.164, SE = 0.15$ with 95% CI [−0.50, 0.11]) and for the Dutch sample ($effect = −0.061, SE = 0.06$ with 95% CI [−0.20, 0.03]). The index of moderated mediation was insignificant ($index = 0.103, SE = 0.16, 95% CI [−0.20, 0.45]$).

For the whole sample, the effect of the type of availability notice on the perceived competition was significant and negative ($a_2$). In addition, increased competition was positively associated with increased purchase intention ($b_2$), independent of perceived scarcity. Therefore, whereas competitive feelings were negatively aroused by a limited-time notice (rejecting Hypothesis 4), perceived competition directly induced the purchase intention (confirming Hypothesis 5). For $a_2$ and $b_2$, no cultural moderators were found.

**The indirect effect on purchase intention via perceived scarcity and competition**

The third hypothesised indirect effect of the availability notice on purchase intention was through perceived scarcity and perceived competition in serial, with scarcity modelled as affecting competition, which, in turn, influenced intention to purchase the smartwatch. Notably, this indirect effect was only significant for the Italian group ($effect = 0.324, SE = 0.13$ with 95% CI [0.10, 0.59]). This indirect effect on purchase intention (via perceived scarcity and competition) was not found for the Dutch group ($effect = −0.153, SE = 0.13$ with 95% CI [−0.08, 0.42]). The index of moderated mediation was insignificant ($index = −0.170, SE = 0.18, 95% CI [−0.51, 0.18]$).

For the whole sample, relative to the participants assigned to the in-stock notice condition, those who saw the limited-time notice perceived more scarcity ($a_{11}$), which was subsequently associated with more perceived competition ($d_{21}$), and this greater competition generated a greater intention to purchase the smartwatch ($b_2$) (confirming Hypothesis 6). For $d_{21}$, no cultural moderation was found.

**Discussion**

This study has investigated the effects of limited-time promotions in a web store, differentiated according to European (Dutch and Italian) consumers.
First, the findings showed that adding a limited-time availability notice on a product offer can, more or less successfully, affect consumers. Specifically, the limited-time product promotions increased the degree of perceived scarcity and decreased the degree of perceived competitive arousal. In addition, the scarcity message had no direct positive effect on purchase intentions.

Second, exploring the indirect effects on customers’ purchase intentions revealed an insightful pattern. The limited-time notice had no indirect effect on purchases via scarcity. Although scarcity perception was induced by a limited-time notice, perceived scarcity did not subsequently induce purchase intentions. Additionally, there was no indirect effect on purchases via competition. Although competitive feelings were induced by a limited-time notice, perceived competition did directly induce purchase intentions.

Notably, for the Italian cultural group, there was a positive indirect effect of the limited-time availability notice on purchase intentions, through the perceived scarcity and perceived competition in serial, with scarcity modelled as affecting competition. This effect was not found for the Dutch cultural group. In line with Hofstede’s cultural dimension, this group difference was assumed to be related to the Italian more masculine culture versus the Dutch more feminine culture.

**Implications**

This study provides some interesting findings that contribute to existing research. From the theory of competitive arousal, it was inferred that limited-time availability scarcity would cause greater competition among consumers. In contrast with this assumption, it was determined that a scarcity message negatively affected competitive arousal. In addition, it was found that competition between consumers did not mediate the effect of the limited-time notice on purchase intention. In the context of achieving a competitive advantage, the value of competitor analysis among firms in their marketplace has been investigated frequently (see Hofer et al. 2022] for references). The findings of the current study point to the importance of unravelling the value of competition among customers, an area that has received less attention. Specifically, the culture-related differences found in this study indicate that it is critical to investigate the role of consumer competition between societies with similar and different degrees of individualistic/collectivistic culture.

The findings of this study also have implications for future practices. First, as limited-time scarcity had no direct influence on purchase intention, businesses should be cautious in implementing limited-time messages on their web stores. From a managerial perspective, marketers should pay attention to the amount of time that is given to consumers. In the present study, the degree of time pressure might explain the finding that perceived scarcity was higher when a limited time message was shown while purchase intention did not increase. Thus, it might be that the participants felt pressured, had a sense of urgency that caused them to act quickly, and therefore perceived the web store as inconvenient.

A second practical implication concerns the time-specifics of the availability message. Following the findings of prior investigations (Gierl, Plantsch, and Schweidler 2008), it is advisable to mention explicitly the time limit of the promotion. Previous research investigating scarcity messages indicating limited time has varied in the
amount of time given, ranging from an hour to multiple days. Too short a time limit and feelings of competitive time pressure can lead to lower evaluations of the product quality and desirability, and ultimately to a lower probability that customers will perform the intended behaviour (Hanna, Swain, and Berger 2016; Fenko, Keizer, and Pruyn 2017). Similar to Guo, Xin, and Wu (2017), in the present study, the time of the promotion was limited to ‘Only 1 hour and 14 minutes left’. This time limit seems to be ‘appropriate’ for creating an advantageous context of competitive awareness among customers. However, it remains unclear where the critical point of time falls between higher desirability of the product and inconvenience for the customer. In this respect, Teubner and Graul (2020) highlighted the misuse of scarcity marketing as an old trick seen through by the customer.

Finally, it is germane for the marketeer that the impact of scarcity marketing on consumers’ attitude and behaviour will depend on the type of product (Gierl, Plantsch, and Schweidler 2008). In this study, the smartwatch offered in the web store can be seen as a conspicuous product that satisfies social hedonic needs. A non-conspicuous product, such as shampoo or a refrigerator, is attractive due to its intrinsic utilitarian characteristics (Okada 2005). Customers might anticipate the achievement of status on being admired for owning a conspicuous product (Gierl and Huettl 2010). In a similar vein, Tian, Bearden, and Hunter (2001) stated that scarce continuous products can satisfy consumers’ need for uniqueness. A suggestion for follow-up studies is to look at other web store products, both in the conspicuous as well as the non-conspicuous category.

Limitations and future research

Of course, this study has limitations that give rise to suggestions for further investigations. In the experimental survey, the product availability notices were part of screenshots of the web store pages. The stimuli in both conditions were identified by the participants as being realistic, despite their perception that the price label for the product was missing. In this respect, the laboratory-based eye-tracking analyses conducted by Mou and Shin (2018) revealed for the South Korean participants in their study that time scarcity and price cues were important fixation attention points for product-display web stores. Further research could focus on other specific persuasive cues that might affect prospective customers in web stores, such as background colour (Broeder and Snijder 2019) and navigation style (Broeder and Gkogka 2020).

Conclusion

In summary, and by way of conclusion, customers’ psychological reasoning would go as follows: noting that the limited-time promotion is scarce influences the purchase intentions of customers who are more competitively aroused compared to those less competitively aroused. Carefully controlling for the dynamics of culture-related differences in the arousal of competitive feelings via promotional offers is thus beneficial in fine-tuning the scarcity marketing strategy of firms operating both locally and globally.
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Data availability statement

Data are available via Dataverse NL, see https://doi.org/10.34894/WI0YBC, a repository for storing research data.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References


Appendix: Operationalisation of the constructs

*Cultural background*
What country were you born in?
In what country do you live at the moment?
To what ethnic group do you belong?

*Purchase intention*
I would like to buy this product

*Perceived scarcity*
This web shop is exclusive
This web shop creates a sense of urgency
I need to act quickly on this web shop
This web shop is inconvenient
I feel pressured by this web shop

*Based on Gupta and Gentry (2016):*
I think this product sells out fast
I think the retailer intentionally limits this product’s selling time
I think the limitation of this product was strategically created by the web shop

*Perceived competition*

*Based on Nichols (2012):*
I will have to compete with others to buy the product
For this product, other potential buyers are ‘rivals’ of mine
I will feel like a winner if I am able to buy this product
Trying to buy this product feels like a competition
I will feel successful if I am able to buy this product
I will feel nervous trying to purchase this product

*Control questions*
I think the web shop is realistic
I think the price was missing
I noticed that the web shop showed the message ‘In stock’
I noticed that the web shop showed the message ‘Only 1 hour and 14 minutes left’
The participants responded to the questionnaire items using a 5-point Likert-type scale (from 1 = ‘Strongly disagree’ to 5 = ‘Strongly agree’). The control questions were answered with a ‘Yes’ or ‘No’.

Appendix: Moderation and mediation in PROCESS Model 92 based on Hayes (2018: 612)