On the Strategic Use of Product Scarcity in Marketing

REBECCA W. HAMILTON

A. R. SHAHEEN HOSANY

Abstract

When does product scarcity create lasting value for consumers and firms? We propose a framework overlaying the dimensions of demand versus supply-driven scarcity and strategic versus non-strategic causes of product scarcity. This framework generates three insights for the strategic use of product scarcity in marketing. First, because value from product scarcity is co-created between firms and consumers, it varies significantly across consumer segments, even within the same brand and product category. Second, the value generated by product scarcity tends to be longer lasting when product scarcity is strategically driven by both demand and supply. Third, the allocation mechanism used to match demand and supply in response to product scarcity plays a critical role in shaping consumer responses.

Keywords: product scarcity, demand-driven scarcity, supply-driven scarcity, value creation, allocation mechanism.

Introduction

From diamonds to limited edition sneakers, consumers regularly encounter product scarcity in the marketplace. Product scarcity manifests in the form of limited quantities of brands, sizes, colors, varieties or entire product categories (Hamilton et al., 2019a). Product scarcity can be demand-driven, that is, occurring as a result of high consumer demand, and/or supply-driven, arising due to low production or other problems in the supply chain (Gierl & Huettl, 2010). Demand-based scarcity can be strategic, such as when prompted by product launch events or scarcity appeals in a firm's marketing communications, or non-strategic, induced by external factors, such as fads or panic buying. Similarly, supply-based scarcity can be strategic, stimulated by deliberate restrictions in availability, such as offering limited editions or choosing time consuming production techniques, or non-strategic, resulting from insufficient production, raw material shortages, or other supply chain disruptions.

Because product scarcity is generated by both demand and supply, the effectiveness of scarcity tactics relies on the co-creation of value between consumers and marketers. Under what conditions will the strategic use of product scarcity have positive consequences for marketers and consumers, such as increasing perceived exclusivity for consumers as well as their willingness to pay, versus negative consequences, such as prompting substitution and reducing brand loyalty? When can the strategic use of product scarcity be sustained in the long term, and what are the implications for firms and consumers?

We propose a framework based on two dimensions: demand-driven versus supply-driven product scarcity, and externally driven (non-strategic) versus strategic use of scarcity. This framework generates three important insights. First, scarcity tactics are more effective for some consumer segments than others, even within the same brand and product category. Second, the simultaneous use of strategic demand-driven and supply-driven scarcity tends to create more sustained value. Finally, the allocation mechanism used to match demand and supply has a critical effect on the value product scarcity creates in the marketplace. In the next sections, we describe how product scarcity can influence product valuation, introduce our framework, and discuss the three insights it generates. We conclude by highlighting areas for future research on the strategic use of product scarcity in marketing.

When and How Does Product Scarcity Increase Value?

Product scarcity attracts consumer attention (Mullainathan & Shafir, 2013) and can increase excitement and desire for products (Barton et al., 2022; Hamilton et al., 2019a; see Table 1). Product scarcity influences consumer preference (Parker & Lehmann, 2011), product and brand choice and willingness to pay (Robinson et al., 2016). Higher availability of prestige products can lower purchase intentions by reducing perceived scarcity (Rosendo-Rios & Shukla, 2023). Scarcity may increase perceived brand exclusivity (e.g., Barton et al., 2022), potentially increasing value to consumers after purchase and during consumption. Consumers even tend to satiate more slowly when they consume products that are limited in availability, compared with those that are more abundant (Sevilla & Redden, 2014).

On the other hand, consumers incur multiple forms of costs when they encounter product scarcity. Product scarcity reduces choice for consumers (Hamilton et al., 2019a). The restriction of diamond supply by De Beers yielded higher consumer prices for decades; queueing for the latest Apple phone or finding a retailer with stock of Prime energy drinks requires time; personally stockpiling Nike sneakers requires space. Products like diamonds are luxuries rather than necessities, and consumers can opt out of buying them. However, consumers who choose such products or require scarce necessities bear these additional costs.

From the firm's perspective, too, scarcity can impose costs. Product scarcity can erode brand loyalty by encouraging consumers to seek out substitutes for unavailable products (Hamilton, 2020). To the extent that scarcity reduces pre-purchase deliberation, it may induce regret (Gabler et al., 2017) and anger (Biraglia et al., 2021) after purchase. Although scarcity can generate excitement and anticipation, such as on the day of product launch, or on Black Friday or Boxing Day, it can sometimes increase arousal to the point of generating physical and verbal assaults, aggression and violence (see Kristofferson et al., 2017). Given these costs, firms should think carefully before strategically using scarcity as a marketing tactic.

Table 1: How does product scarcity influence perceived value?

Scarcity can increase perceived value	**Scarcity can reduce perceived value**
- Draws consumer attention (Mullainathan & Shafir, 2013), creates excitement and interest (Hamilton et al., 2019a) - Increases product desirability, perceived exclusivity, purchase intent and willingness to pay (Barton et al., 2022; see also Robinson et al. 2016) - Consumers satiate more slowly (Sevilla & Redden, 2014) - Eases consumer decision making by reducing choice overload (Iyengar & Lepper, 2000)	- Reduces sales and brand loyalty as consumers seek substitutes (Biraglia et al., 2021; Hamilton et al., 2019b) - Reduces choice (Hamilton et al., 2019a) - May induce regret after purchase (Gabler et al., 2017) - Can lead to assaults, aggression and violence (Kristofferson et al., 2017).

When is product scarcity more likely to generate value rather than subtract value? Prior work suggests that product characteristics moderate the effect of scarcity on consumer responses. Recent empirical studies (e.g., Gupta et al., 2023) and meta-analyses (e.g., Barton et al., 2022; Ladeira et al., 2023) indicate that supply-driven scarcity is more likely to generate positive consumer responses for experiential, hedonic, advertising-driven and high visibility products than demand-driven scarcity. For example, limited resort or theme park availability or scarcity of clothing, jewelry or accessories, motivates the pursuit of uniqueness. Conversely, for utilitarian, low involvement and low visibility products, demand-driven scarcity is more likely to induce favorable attitudes and accelerate consumer purchases (Gierl & Huettl, 2010).

Strategic Use of Product Scarcity by Marketers

Beyond product category and brand, we propose that whether product scarcity is used strategically influences the consequences for consumers and firms. In Table 2, we highlight the two dimensions of supply versus demand-driven scarcity and strategic versus non-strategic drivers of product scarcity.

Table 2: Supply vs. demand-driven and strategic vs. non-strategic drivers of product scarcity

		Supply-driven scarcity	
		Strategic	**Non-strategic**
Demand-driven scarcity	**Strategic**	**Relevant research** - Repeated limited editions appeal to consumers' need for uniqueness and self-expression (Chae et al., 2020) - Consumers use shelf display cues to infer product popularity, which increases purchase likelihood (Castro et al., 2013) - Consumers derive joy and excitement as they seek scarce products (Gupta & Gentry, 2019) **Practical examples** Nike releases limited edition sneakers and gamifies access using their SNKRS app. De Beers controlled the supply of diamonds and emphasized their rarity in its marketing campaigns.	**Relevant research** - Framing a product / brand as 'sold out' generates fewer negative reactions than 'out-of-stock' or 'unavailable' (Peterson et al., 2020) - Shelf-based scarcity impacts consumer demand (Parker & Lehmann 2011; Robinson et al., 2016) - Consumers unable to acquire brands linked to scarcity appeals may be angry and switch to competitors (Biraglia et al., 2021) - Consumers prefer substitutes from same brand when a stock out is unexpected (Khan & DePaoli, 2023) **Practical examples** Generating high demand for new products: e.g., Apple iPhone launches, viral launch of Prime on social media.
	Non-strategic	**Relevant research** - Use of dynamic pricing to control product accessibility for different consumer segments can increase profit (Gabler et al., 2017)	**Relevant research** - Supply disruptions and demand shocks due to consumer stockpiling during major externally driven events create scarcity (Das et al., 2021)

	- When scarcity is perceived to be strategically created by a retailer, consumers may exhibit deviant and competitive behaviors (Gupta & Gentry, 2019) **Practical examples** Sudden widespread popularity but limited supply, e.g., Hermes Birkin bags, tickets to popular theatre or concert productions.	- Consumers react, cope and adapt consumption in response to restricted supply and higher than expected demand (Kirk & Rifkin, 2020) **Practical examples** Unanticipated high demand and externally limited supply: e.g., stockouts of toilet paper during the Covid-19 pandemic.

Strategic use of both supply and demand-driven scarcity: Footwear brand Nike provides an excellent example of the strategic use of both supply and demand-driven scarcity. Nike serially launches limited editions designed to appeal to one segment of consumers, the "sneakerheads" (Elberse et al., 2019), for whom restricting supply helps Nike maintain a high level of brand loyalty. Limited editions create value for consumers seeking to use an exclusive product for self-expression (Bozkurt & Gligor, 2019; Chae et al., 2020). In fact, this segment lost interest when Nike produced too many of their "Panda Dunks" style of shoe: when the initially scarce shoes became more widely available, those who had invested in what they thought was a limited-edition shoe did not feel special anymore (Danforth, 2022; Pacheco, 2023). Repeat limited editions launched due to continuous, positive consumer feedback increase brand trust and purchase intentions (Chae et al., 2020). Even in the digital space, Nike has strategically limited supply via NFTs (non-fungible tokens). Working in conjunction with RTFKT, Nike matches digital tokens with physical purchases through unique codes (Marr, 2022; Mukhopadhyay & Ghosh, 2020). In cases of resale, digital tokens and physical products are passed along together, thus ensuring product authenticity.

Nike also leverages scarcity tactics on the demand side for this customer segment. Nike launched the SNKRS app, which uses gamification and tries to recreate the excitement and camaraderie of physically waiting in line for sneakers or concert tickets (Ringen, 2018), to attract this segment. These customers anxiously await new product drops and have a high level of engagement with the SNKRS app (Elberse et al., 2019). Nike also actively cultivates brand loyalty by partnering with celebrity endorsers for their limited editions. For example, Nike launched highly innovative marketing campaigns such as The Art of Champions and The Campaign for Kendrick Lamar, where available inventory was sold out within minutes of launch (Elberse, et al., 2019).

One consequence of limiting product supply, while generating high demand, is that not all consumers who want the product will be able to purchase it. Notably, Nike does not use price as an allocation mechanism, though avid sneaker collectors resell Nike shoes, bidding up their prices to multiples of the original list price (Elberse et al., 2019). Instead, Nike relies on queues and sells on a first come, first served basis, allowing resellers to profit from higher prices at resale. Some of the most brand loyal customers stock surplus for resale at higher prices (Elberse et al., 2019). As they shifted away from a retailer partner model to a direct-to-consumer model, Nike launched the SNKRS app to gamify access to its shoes for their most brand loyal customers (Ringen, 2018).

In contrast to their scarcity-focused tactics targeting avid collectors, Nike actively avoids product scarcity for other customer segments. A large proportion of Nike's athletic shoe sales come from lower involvement consumers, who also consider brands such as Adidas, UnderArmor and Saucony. For such consumers, restricting product availability will be more likely to reduce sales than increase brand loyalty. Scarcity appeals are much less frequently used to pursue runners on Nike Run Club, athletes on Nike Training Club, or mainstream consumers who benefit from free shipping on the Nike app (Elberse, et al., 2019). For these other segments, unexpected demand may still result in product scarcity. When Nike introduced its VaporFly running shoe in 2017, demand soared as runners wearing the shoes set new records (Roe, 2020). Even in 2023, a new version of the VaporFly instantly sold out (Mcheh, 2023). For this segment, scarcity of supply was not strategic, and Nike sacrificed sales when orders could not be fulfilled.

A second example of using both demand-driven and supply-driven scarcity strategically is provided by De Beers. By presenting diamonds as an extremely rare, precious stone and restricting their supply, De Beers strategically used supply-driven scarcity to generate high prices (Bergenstock & Maskulka, 2001). Because diamonds are a highly visible and conspicuous product, supply-based scarcity should lead to more favorable consumer responses (Gierl & Huettl, 2010; Barton et al., 2022). Simultaneously, De Beers stimulated consumer demand through the timeless advertising slogan 'A Diamond is Forever,' recognized by Ad Age as the greatest advertising slogan of the 20th century (https://www.debeers.co.uk/en-gb/our-story.html). Over the years, De Beers expertly crafted demand and supply to nurture perceptions of diamonds as an everlasting, luxurious and scarce product.

Strategic use of demand-driven scarcity. Turning to strategic demand-driven scarcity without strategic supply limitation, we consider Apple's highly anticipated new product launches. The Apple eco-system (phone, laptop, desktop, etc.) offers a highly conspicuous brand experience. Apple's executive and marketing team try to create a buzz of customer interest prior to each product launch (Steig, 2020). Due to the device's social signaling effects (Goldsmith et al., 2020; see also Ladeira et al., 2023) and to minimize fear of missing out, customers want to be among the first to acquire the latest mobile phone. By widely publicizing a specific launch date for new product introductions, Apple's marketing often generates higher demand than can be fulfilled through its supply chain and retail stores, resulting in scarcity.

Notably, Apple avoids using price to allocate scarce products, instead allowing long queues from a strong fan base to gather outside stores in anticipation of product launches. Research suggests that Apple may be able to prevent defections to other brands by offering close substitutes for desired but scarce products: consumers may prefer substitutes from the same brand when a stock out is unexpected (Khan & DePaoli, 2023).

Hydration drink Prime provides another example of strategic demand-driven scarcity that overwhelmed product supply (Bulbul & Morris, 2023). Social media influencers KSI and Logan Paul joined forces to launch the fruit flavored drink, and their posts went viral. Despite being an ingestible product, for which limited availability tends to reduce purchase likelihood (Castro et al., 2013), adolescents posted videos on YouTube and TikTok of their quests to procure the scarce Prime beverages at stores, online, or through the black market, and others followed suit. Like shelf-based scarcity, which increases consumers' willingness to pay (Robinson et al., 2016), this evidence of Prime's scarcity increased resale prices. As its popularity soared, the price of Prime Hydration rose to multiples of the suggested retail price. Over time, retailers entered deals with Prime and began rationing sales in their stores.

Strategic use of supply-driven scarcity. Marketers also may utilize supply-driven scarcity, such as limited editions or time limited offerings, without demand-driven tactics. For example, fast fashion retailers deliberately manipulate product availability to drive urgency in consumer actions (Gupta & Gentry, 2019). Time limited shopping events such as Black Friday give consumers a reason to buy now instead of later. When theatre productions like Hamilton, scheduled to run in venues with limited seating on limited dates, suddenly become popular, the number of seats available cannot be increased quickly. Once a venue sells out, ticket prices increase as resellers attempt to benefit from arbitrage. To try to capture more of the value generated by scarcity, concert managers may restrict supply dynamically to create excitement, initially offering a limited number of dates, and gradually adding more, as initial dates sell out.

Commitments to limiting supply may be more credible in some cases than others. For example, luxury products may require hard to find raw materials and necessitate a longer production lead-time. Hermes' Birkin bag (Lester, 2010) provides an example of strategic supply restriction combined with demand shocks generated by external factors. After being featured on an episode of the popular television series "Sex and the City" in the early 2000's, demand for the Birkin bag skyrocketed (Lester, 2010). In the series, one of the characters sought out the popular accessory, even placing her name on a waitlist to obtain the luxury handbag. Many viewers followed her lead, creating even more demand. Hermes claimed that, as a luxury product, they could not accelerate supply to meet the increase in demand and resale prices increased to tens of thousands of dollars. Notably, we are observing similar patterns in the digital space, where slow production methods cannot provide justification for limited supply. Recently, a digital version of Gucci's Dionysus Bag with Bee sold for $4,115 on Roblox as buyers bid each other out, when the actual, physical bag retailed for $3,400 (Kelly, 2021).

The allocation mechanisms chosen by firms in response to scarcity can be critical. In response to product scarcity, consumers may engage in deviant behaviors, such as hoarding and hiding (Gupta & Gentry, 2019). Research shows that consumers who do not acquire products due to scarcity may exhibit negative emotions such as anger and switch to competitors (Biraglia et al., 2021). Exposure to information about limited quantity may even provoke consumers to perceive other shoppers as competitive threats in obtaining a desired product, leading to aggressive behaviors (Kristofferson et al., 2017). Further, consumers who manage to secure scarce products are likely to be competitive and less willing to share with others, due to the sense of security, achievement and satisfaction they achieve in consuming the scarce product (Gupta & Gentry, 2019).

Non-Strategic Supply-Driven and Non-Strategic Demand-Driven Scarcity. Finally, product scarcity may occur due to non-strategic supply and/or demand shocks. Externally driven events such as pandemics provide relevant examples. During the early stages of the Covid-19 pandemic, consumers stockpiled essentials as they prepared for national lockdowns (Das et al., 2021), generating excessive, non-strategic demand. Simultaneously, supermarkets and big box stores experienced supply shocks due to bottlenecks in the supply chain.

Over time, consumers started to cope with the circumstances by being less reactive and more resilient, adopting substitutes and learning new skills, new recipes and new hobbies (Hamilton et al., 2019b; Kirk & Rifkin, 2020). Consistent with previous theory on scarcity, consumers reacted in the short-term but adapted in the long-term (Hamilton et al., 2019b), switching retailers, trying new products/brands, and engaging in home production. For example, consumers started investing their time to make bread when ready-made was not accessible.

When is the Strategic Use of Scarcity Most Effective?

Our framework enables us to draw out three insights from the comparison between supply-driven versus demand-driven scarcity and strategic versus non-strategic drivers of scarcity (see Tables 2 and 3). First, because firms and consumers co-create the value from scarcity, the strategic use of scarcity will not be equally effective across customer segments, even for the same brand within the same product category. Second, the strategic use of scarcity tends to be most effective in the long term when firms strategically use scarcity on both the supply and demand sides. Finally, the allocation methods chosen to match supply with demand are critical in shaping consumers' responses to scarcity tactics.

Effects of Scarcity Differ Across Consumer Segments: Clearly, as prior research has demonstrated, the nature of the product/brand (for reviews, see Barton et al., 2022 and Ladeira et al., 2023) and factors like the competitive landscape and organizational resources influence the effectiveness of the strategic use of scarcity in marketing. Beyond these factors, because value from scarcity is co-created by firms and consumers, we suggest that the effects of scarcity are likely to differ across consumer segments, even in the same product category. As we have discussed, Nike strategically uses scarcity to market to the "sneakerheads," but uses a different strategy for runners and casual users, understanding that scarcity will not be as effective with these other segments. Nike's use of scarcity to attract these consumers via its SNKRS app is only successful due to their active interest in buying limited editions for personal use or resale. Though limited editions represent only about 5% of the sneaker industry, avid sneaker collectors represent a highly valued segment of the market due to their influence on other consumers (Ringen, 2018).

For which consumer segments should marketers consider a scarcity-driven strategy? Consumer traits and characteristics, such as need for uniqueness and competitiveness, are relevant because consumers must be willing to be of part of the strategic game (Gupta & Gentry, 2019). By obtaining scarce products, consumers secure benefits of exclusivity, positive attitudes, and favorable emotions such as pleasure and satisfaction, but they also incur costs. To the extent that consumers derive joy and excitement as they seek scarce products (Gupta & Gentry 2019), they are a good target for a scarcity strategy.

Beyond individual consumer characteristics, however, it is important to note that the co-creation of value due to product scarcity often occurs in a highly social context. Part of the joy in obtaining and using scarce products is the recognition of their value by other consumers. As Nike's experience marketing to avid sneaker collectors illustrates (Ringen, 2018), communities of consumers collectively create value from scarcity, developing expertise to recognize limited editions and the nuanced references incorporated into these products. Thus, the effectiveness of scarcity tactics depends on social interactions among consumers within a targeted segment in addition to interactions between marketers and consumers.

Scarcity Tactics on the Supply and Demand Sides are Synergistic: A second insight is that the strategic use of scarcity tends to be most effective in the long term when firms strategically use scarcity on both the supply and demand sides. Prior research has investigated the effects of demand-driven and/or supply-driven scarcity on consumer responses (e.g., Gierl & Huettl, 2010; Gupta et al., 2023). Beyond these factors, we suggest that there is synergy in coordinating supply-driven and demand-driven scarcity.

As Table 2 highlights, marketers do not always manage scarcity; sometimes they must respond to scarcity created by external factors. When demand soars due to external factors, or supply is restricted due to external factors, we observe many of the same responses among consumers. Consumer attention and willingness to pay increase across the stages of the consumer decision journey, from initial consideration to consumption (see also Hamilton et al., 2019a). However, these responses may be short-lived and firms may struggle to match supply with increased demand or manage allocation to consumers when demand outstrips reduced supply. In contrast, when the firm strategically restricts supply and simultaneously attempts to boost demand using scarcity appeals, they can adjust their production and delivery schedules to be consistent. By using scarcity appeals to generate demand, marketers also set appropriate expectations for consumers about price and the ease and convenience of obtaining the product. Consumers who have been encouraged to think about scarcity as an added value will be much more tolerant of the potential costs associated with scarcity, and may even share these expectations with other consumers via word of mouth.

Allocation Mechanisms to Manage Product Scarcity: Marketers can use multiple techniques to match demand with constrained supply (Pantano et al., 2020). Choosing an allocation mechanism to match supply with demand is critical for marketers to consider because allocation mechanisms determine who benefits from scarcity and how they feel about it. Higher prices at peak periods can be used to allocate products and services to consumers with higher ability and willingness to pay (Mardon & Belk, 2018). However, higher prices can erode longer term loyalty. Physical queues gratify consumers who sacrifice time in exchange for scarce products, but they reduce convenience. Analogously, computer games may use short, unannounced periods of virtual product availability to drive scarcity. Using time rather than money to allocate digital objects and collectibles creates a "time aristocracy" (Mardon & Belk, 2018), which may favor younger, rather than older, consumers who have more discretionary time available. Allocating products based on loyalty (e.g., first priority for tickets to playoff events to season ticket holders) or group membership (e.g., free tickets to university athletic events to students) benefits those in these groups to the exclusion of others. Table 3 summarizes the mechanisms businesses tend to use within each quadrant of our framework, including dynamic supply release, maximum quantity allocations, queueing, gamification and lottery-based allocation.

Consumers' perceptions of the fairness of various allocation mechanisms depends on the goods and services to which they are applied (Shaddy & Shah 2018, 2022). Thus, choosing the right mechanism depends on the firm's objectives and product category (Shaddy & Shah, 2018, 2022) as well as its ability to match demand and supply. Further, we propose that firms should consider the match between their scarcity strategy and their allocation methods.

Table 3: Allocation mechanisms and practical considerations

		Supply-driven scarcity	
		Strategic	**Non-strategic**
Demand-driven scarcity	**Strategic**	**Allocation Mechanisms** - High prices, e.g., DeBeers - Queuing/wait lists - Gamification, e.g., Nike SNKRS app - Time bound promotions **Practical considerations** - Does the business have a truly differentiated product? - How will the allocation mechanism influence consumer perceptions? - How will negative customer emotions be handled in cases when consumers cannot obtain the product?	**Allocation Mechanisms** - Queuing/wait lists, e.g., Apple - Maximum quantity purchase restrictions e.g., Prime energy drinks - Shift demand to substitutes from same brand **Practical considerations** - Does the business have a truly differentiated product? - How will the allocation mechanism influence consumer perceptions? - How will other business activities such as production and distribution be coordinated to cope with demand? - How will negative customer emotions be handled in cases when consumers cannot obtain the product? - Which substitutes will be suggested? - How can brand loyalty be maintained when consumers try substitutes?
	Non-strategic	**Allocation Mechanisms** - Queuing/wait lists, e.g., concert tickets, Hermes' Birkin bag - Segmentation based on loyalty - Lottery based allocation - Dynamic pricing, e.g., hotels and airlines during peak holiday periods - Dynamic release of availability, e.g., concert tickets **Practical considerations**	**Allocation Mechanisms** - Maximum purchase quantity restrictions e.g., necessities during Covid-19 - Queuing - Dynamic pricing **Practical considerations**

	- How will the allocation mechanism influence consumer perceptions? - How will negative customer emotions be handled in cases when consumers cannot obtain the product? - Which substitutes will customers consider?	- What can be done to ensure that all targeted customers can access the product? - How can brand loyalty be maintained when consumers try substitutes? - How will consumers respond if higher prices are used to allocation scarce products?

When supply-driven scarcity is strategic, price is often used as an allocation mechanism. High prices communicate exclusivity for luxury products. Service businesses such as hotels, airlines, theme parks often use dynamic pricing as an allocation mechanism to balance demand with supply during peak periods. Dynamic pricing can be utilized to strategically control supply and demand based on varying prices/discount levels and stock availability (Gabler et al., 2017). Marketers also may use a dynamic release strategy, trying to match supply with consumer demand. For instance, a limited number of concert tickets may be released initially. As these tickets sell out, more may be made available for purchase. Notably, this practice may be more effective for services, given that being the first to see an event allows consumers to capture exclusive value, than for products, for which additional supply may reduce perceived value more dramatically. For instance, if NBA Top Shots releases more NFTs of Lebron James breaking the NBA all-time scoring record, the owners of the first "limited edition" NFTs release are likely to be upset.

In selecting allocation mechanisms to cope with unexpected scarcity, the marketer's objectives are critical. During Covid-19, supermarkets like Target and Kroger, who were interested in maintaining customer relationships, used quantity limits (maximum purchase restrictions) to allocate scarce toilet paper and cleaning products rather than increasing their price (Hamilton, 2020). In contrast, third party resellers on Amazon.com, which were more interested in generating short-term profit, increased the price of products like toilet paper and hand sanitizer. Product type is also an important factor in choosing the allocation mechanism. Maximum quantity restrictions are a better fit for utilitarian products and necessities, while high prices may be more effective for conspicuous products such as diamonds.

When demand-driven scarcity is strategic, price is less often used as an allocation mechanism. For example, rather than raising its own prices, Nike allows consumers to profit by obtaining sneakers at its retail prices and reselling higher to those who valued them more. With the SNKRS app, Nike applies gamification to sustain consumer interests and allocate limited editions (Elberse et al., 2019). In using gamification, rather than price, to match scarce products to demand, Nike is sustaining more excitement among fans, making its shoes seem more widely accessible and creating stronger brand loyalty.

Marketers also may use customer segmentation to allocate scarce products. US universities and professional teams use a consumer segment-based approach to allocate their restricted ticket supply for athletic events, giving students and season ticket holders preferred access. By favoring season-ticket holders, athletic teams generate higher loyalty among already-loyal fans.

When is the Strategic Use of Product Scarcity Viable as a Long-Term Strategy?

Is the strategic use of scarcity a viable long-term strategy for marketers? Some brands, like Nike, use product scarcity in a serial fashion, repeatedly generating demand for and releasing limited editions. A critical factor in whether brands can strategically use product scarcity in the long term is the degree to which their products are perceived to be differentiated. Historically, De Beers expertly managed demand and supply to generate perceived scarcity and exclusivity. For many years, De Beers controlled the supply of diamonds, without good substitutes. However, more recently, lab-made diamonds that are being marketed as “conflict-free” leverage green benefits for an initially reticent, but growing, customer base (Danziger, 2021). Lower perceived differentiation is likely to reduce De Beers' ability to use scarcity strategically.

Whether long-term, strategic use of product scarcity will be possible for digital products, such as NFTs, also warrants discussion. As digital objects that represent works of art, videos or tweets, NFTs have generated high market value. The digital environment gives artists new opportunities to sell their works as speculator "collectors" buy for future resale, in anticipation of profits as well as showing off (Belk et al., 2022). Celebrities may engage in strategic demand and supply activities, described as "pump and dump." For example, Lebron James actively hyped as well as invested in NBA Top Shots NFTs. Such strategies are unlikely to be successful in generating sustained value. An NFT showing James breaking an NBA scoring record peaked at $208,000 in 2021, but a year later, the number of visitors to the platform and the price came down (Lopatto, 2022). The famous digital Gucci Dionysus Bag is now worth less than its peak price of $4115 on Roblox. Research on physical (non-digital) products suggests that purchase intentions are likely to be higher in response to supply-driven (vs. demand-driven) scarcity (Gupta et al., 2023), and it will be interesting to see if the same is true for digital products.

Given that consumers and firms co-create value in response to scarcity, another critical factor in the long-term viability of leveraging scarcity tactics is their perceived fairness. The brands and products for which a scarcity strategy can be applied most effectively are highly visible and conspicuous, with powerful social signaling effects and high brand familiarity. To the extent that these brands and products are luxuries, rather than necessities, consumers can opt out of purchasing. For luxuries, consumers must balance the exclusivity value generated by scarcity with the costs they incur via higher prices charged by the producers (De Beers) or resellers (Prime), the time they spend waiting in queues (Apple), and the extra space they invest in storing multiple pairs of sneakers (Nike). More concerning to policy makers are necessities, such as cleaning products and toilet paper, for which consumers encountered scarcity during the Covid-19 pandemic (Hamilton, 2020). As we have noted, allocation mechanisms such as maximum quantity restrictions are likely to generate stronger long-term customer relationships than increasing prices in response to non-strategic scarcity.

In part, perceived fairness will depend on the degree to which consumers experience costs due to scarcity. When scarcity increases the thrill of the chase for consumers (Gupta & Gentry, 2019), scarcity creates value, but when consumers are required to pay more, or are inconvenienced or frustrated, seller-driven scarcity is more likely to be perceived as unfair. When third-party sellers on Amazon.com charged prices that were multiples of the expected retail prices for scarce hand sanitizer during the early days of the Covid-19 pandemic, they were sued for price gouging (Palmer, 2020). Ticketmaster is facing controversy due to its website failure when they released tickets for Taylor Swift's much anticipated concert. Extremely disappointed fans, unsuccessful in buying tickets despite waits of over eight hours, have led to investigations by the US Department of Justice and House of Representatives over Ticketmaster's monopoly status (Mark, 2022).

Perceived fairness is likely to be higher when scarcity results from more justifiable factors, such as time-consuming production methods or naturally scarce raw materials, rather than opportunism on the part of sellers. Further, to the extent that the costs of product scarcity for consumers can be minimized by ensuring that other parts of the business, including external partners, work together to mitigate supply-driven scarcity, such challenges based on perceived unfairness are likely to be reduced.

Directions for Future Research

Our framework overlays the dimensions of demand versus supply-driven scarcity, and strategic versus non-strategic drivers of scarcity, to provide a new perspective for research on product scarcity. Table 4 offers suggestions for future research to enhance researcher and practitioner understanding of product scarcity.

Table 4: Areas for Future Research

		Supply-driven scarcity	
		Strategic	**Non-strategic**
Demand-driven scarcity	**Strategic**	**Future research questions** - How do firms and consumers innovate and mutually co-create value from scarcity? - What are the characteristics of consumer segments that respond most favorably to scarcity? - Which allocation mechanisms should be used to increase perceived fairness when firms are creating scarcity strategically?	**Future research questions** - How can business functions such as production and distribution be coordinated to better cope with demand-driven scarcity?
	Non-strategic	**Future research questions** - What forms of pricing (e.g., dynamic, premium, peak/off-peak) work best in matching supply with demand?	**Future research questions** - Which allocation mechanisms should be used to increase perceived fairness when firms are not deliberately creating scarcity? - How does chronic resource scarcity influence consumers' responses to demand-based vs. supply-driven scarcity?

One important area for future research is to define the characteristics of consumer segments that respond most favorably to scarcity. While some research has been initiated on the effects of personality traits such as competitiveness (Gupta & Gentry, 2019), responses to scarcity often take place in a social context, especially for conspicuous products. Future studies might examine characteristics of both products and consumer segments that predict more favorable responses to strategic drivers of scarcity. Because consumers interact with one another in meaningful ways as they respond to scarcity, we will need to develop ways of studying consumers' responses that take the social nature of consumption into account.

Much of the research on product scarcity has been carried out in Western cultures (e.g., United States, Canada) with university students (e.g., Sevilla & Redden, 2014; Kristofferson et al., 2017) or participants from online research databases such as M-Turk (Wu & Lee, 2016) or Prolific (e.g., Arango et al., 2023). Only a few studies have focused on respondents from non-Western cultures (e.g., Korea and Taiwan; Barton et al., 2022). In contrast, research on resource scarcity has covered a wider range of consumers and consumption contexts (Blocker et al., 2023). Qualitative techniques such as ethnography and participant observations may be useful for studying consumer responses to product scarcity. Such research techniques provide researchers with direct, first-hand access to consumer responses to product scarcity at different points in their consumer journey, as they navigate regular day-to-day activities or encounter important milestones and life transitions (see Hosany & Hamilton, 2022).

Our analysis suggests that firms and consumers will derive more value when they work together as co-producers to mutually create value under scarcity. Further research could develop a deeper understanding of the processes through which consumers co-produce value and identify boundary conditions. Using new media outlets like TikTok and YouTube, consumers who highlight the exclusivity of products to their followers may be able to enhance the value derived via scarcity among a much wider audience with much greater speed than in the past.

Given that the perceived fairness of a scarcity strategy depends on the value derived by consumers from scarcity and the costs imposed on them, understanding how consumers respond to allocation mechanisms is critical. If consumers understand that firms are strategically managing scarcity, how should firms choose pricing strategies, allocation mechanisms and marketing tactics to maximize perceived fairness in the short and long-term? When firms are strategically restricting supply, but demand is better predicted by external factors, what forms of pricing (e.g., dynamic, premium, peak/off-peak) work best in matching supply with demand? How should business functions such as production and distribution be coordinated to better cope with demand-driven scarcity?

Finally, researchers can examine the interaction between product scarcity and long-term resource scarcity (see Hamilton et al., 2019a). Do consumers facing high chronic state scarcity respond in similar way to those on the lower end of the spectrum across the four scarcity scenarios? How do chronic and state scarcity interact? Will research in alternative contexts such as subsistence economies or in other cultures reveal different mechanisms?

Conclusion

Product scarcity systematically influences consumer choices. Given recent, major, external drivers of scarcity, including demand shocks as consumers stockpiled goods and supply shocks as supply chain bottlenecks prevented distribution during the Covid-19 pandemic, we have witnessed a surge in interest in product scarcity from both practical and theoretical perspectives. In this article, we distinguish these external drivers of scarcity from the strategic use of scarcity in a marketing context. We develop a framework overlaying two dimensions, supply versus demand-driven scarcity and strategic versus non-strategic drivers of scarcity, to review relevant research and practical examples.

Our work generates three key insights. First, even within the same brand and product category, the effects of scarcity vary based on the value co-created between the firm and its distinct consumer segments. Nike uses scarcity strategically to maintain brand loyalty among avid sneaker collectors, but actively avoids stockouts for other segments of the market for athletic shoes.

Scarcity is a more effective strategy when both the firm and consumers derive value and benefit from scarcity. Second, the strategic use of scarcity is more effective in the long term when it is used on both demand and supply sides, building a shared understanding that scarcity and exclusivity generate value. Third, the right allocation mechanism is critical in balancing demand and supply. High prices are only one allocation mechanisms to match demand with supply. Alternative mechanisms may be more effective in sustaining long-term loyalty. We hope that our article provides guidance to marketers debating whether and how to implement a scarcity strategy and useful suggestions to researchers continuing to improve our understanding of the strategic use of scarcity in a marketing context.

References

Arango, L., Chaudhury, S.H., & Septianto, F. (2023). The role of demand-based scarcity appeals in promoting cultured meat. *Psychology & Marketing*, *40*, 1501–1520.

Barton, B., Zlatevska, N., & Oppewal, H. (2022). Scarcity tactics in marketing: a meta-analysis of product scarcity effects on consumer purchase intentions. *Journal of Retailing*, *98*(4), 741-758.

Belk, R., Humayun, M., & Brouard, M. (2022). Money, possessions, and ownership in the metaverse: NFTs, cryptocurrencies, Web3 and Wild Markets. *Journal of Business Research*, *153*, 198-205.

Bergenstock, D.J., & Maskulka, J.M. (2001). The De beers diamond story: are diamonds forever? *Business Horizons*, *44*(3), 37-44.

Biraglia, A., Usrey, B., & Ulqinaku, A. (2021). The downside of scarcity: scarcity appeals can trigger consumer anger and brand switching intentions. *Psychology & Marketing*, *38*(8), 1314-1322.

Blocker, C., Zhang, J., Hill, R. P., Roux, C., Corus, C., Hutton, M., Dorsey, J., & Minton, E. (2023), Rethinking scarcity and poverty: Building bridges for shared insight and impact. *Journal of Consumer Psychology*, *33*(3), 489-509.

Bozkurt, S., & Gligor, D. (2019). Scarcity (versus popularity) cues for rejected customers: the impact of social exclusion on cue types through need for uniqueness. *Journal of Business Research*, *99*, 275-281.

Bulbul, N. & Morris. S. (2023). What is Prime and why is Logan Paul and KSI's drink so expensive? Available at: https://www.standard.co.uk/news/uk/prime-energy-drink-asda-aldi-expensive-wakey-wines-logan-paul-ksi-b1050816.html Accessed 30 Aug 2023.

Castro, I.A., Morales, A.C., & Nowlis, S.M. (2013). The influence of disorganized shelf displays and limited product quantity on consumer purchase. *Journal of Marketing*, *77*(4), 118-133.

Chae, H., Kim, S., Lee, J., & Park, K. (2020). Impact of product characteristics of limited-edition shoes on perceived value, brand trust, and purchase intention; focused on the scarcity message frequency. *Journal of Business Research*, *120*, 398-406.

Danforth, C. (2022). Nike's 'Panda' dunk had a wild 2022, but why has this shoe been everywhere? Available at: https://www.sneakerfreaker.com/features/panda-dunk-popularity-explained?page=0 Accessed 27 Aug 2023.

Danziger, P. M. (2021). Lab grown or natural diamonds? The choice is getting clearer for consumers and retailers. Available at: https://www.forbes.com/sites/pamdanziger/2021/02/14/lab-grown-or-natural-diamonds-the-choice-is-getting-clearer-for-consumers-and-retailers/?sh=3dad7fed62f9 Accessed 15 Aug 2023.

Das, G., Jain, S.P., Maheswaran, D., Slotegraaf, R.J., & Srinivasan, R. (2021). Pandemics and marketing: insights, impacts, and research opportunities. *Journal of the Academy of Marketing Science*, *49*(5), 835-854.

Elberse, A., Aiken, B., & Johnson, H. (2019). Nike: changing the sneakers game. *Harvard Business School*, No 519-039

Gabler, C.B., Landers, V.M., & Reynolds, K.E. (2017). Purchase decision regret: negative consequences of the steadily increasing discount strategy. *Journal of Business Research*, *76*, 201-208.

Gierl, H., & Huettl, V. (2010). Are scarce products always more attractive? the interaction of different types of scarcity signals with products' suitability for conspicuous consumption. *International Journal of Research in Marketing*, *27*(3), 225-235.

Goldsmith, K., Griskevicius, V., & Hamilton, R. (2020). Scarcity and consumer decision making: is scarcity a mindset, a threat, a reference point, or a journey? *Journal of the Association for Consumer Research*, *5*(4), 358-364.

Gupta, M., Das, G., Septianto, F., & Hagtvedt, H. (2023). The impact of scarcity cues on purchase likelihood of art-infused products. *Journal of the Academy of Marketing Science*, 1-19.

Gupta, S., & Gentry, J.W. (2019). 'Should I buy, hoard, or hide?' consumers' responses to perceived scarcity. *The International Review of Retail, Distribution and Consumer Research*, *29*(2), 178-197.

Hamilton, R. (2020). Scarcity and Coronavirus. *Journal of Public Policy & Marketing*, *40*(1), 99-100.

Hamilton, R., Thompson, D., Bone, S., Chaplin, L. N., Griskevicius, V., Goldsmith, K., Hill, R., John, D. R., Mittal, C., O'Guinn, T., Piff, P., Roux, C., Shah, A., & Zhu, M. (2019a). The effects of scarcity on consumer decision journeys. *Journal of the Academy of Marketing Science*, *47*, 532–550.

Hamilton, R., Mittal, C., Shah, A., Thompson, D. V., & Griskevicius, V. (2019b). How financial constraints influence consumer behavior: an integrative framework. *Journal of Consumer Psychology*, *28*(2), 285–305.

Lester, T. L. (2010). The wait(list) is over: now anyone with $5000 can get their hands on a Birkin. Available at: https://www.glamour.com/story/the-wait-list-is-over-now-anyo Accessed 29 Aug 2023.

Hosany, A. R. S., & Hamilton, R. W. (2022). Family responses to resource scarcity. *Journal of the Academy of Marketing Science*. 1-31.

Iyengar, S. S., & Lepper, M. R. (2000). When choice is demotivating: can one desire too much of a good thing? *Journal of Personality and Social Psychology*, *79*(6), 995–1006.

Kelly, D. (2021). A virtual Gucci bag sold for more money on Roblox than the actual bag. Available at: https://hypebeast.com/2021/5/virtual-gucci-bag-roblox-resale Accessed 05 Sept 2023

Khan, U., & DePaoli, A. (2023). Brand loyalty in the face of stockouts. *Journal of the Academy of Marketing Science*, 1-31.

Kirk, C. P., & Rifkin, L. S. (2020). I'll trade you diamonds for toilet paper: consumer reacting, coping and adapting behaviors in the COVID-19 pandemic. *Journal of Business Research*, *117*, 124-131.

Kristofferson, K., McFerran, B., Morales, A.C., & Dahl, D.W. (2017). The dark side of scarcity promotions: how exposure to limited-quantity promotions can induce aggression. *Journal of Consumer Research*, *43*(5), 683-706.

Ladeira, W. J., Lim, W. M., de Oliveira Santini, F., Rasul, T., Perin, M.G., & Altinay, L. (2023). A meta-analysis on the effects of product scarcity. *Psychology & Marketing*, *40*, 1267-1279.

Lopatto, E. (2022). NBA Top shot seemed like a slam dunk – so why are some collectors crying foul? What happens when the hype wears off? Available at: https://www.theverge.com/23153620/nba-top-shot-nft-bored-ape-yacht-club Accessed 05 Sept 2023

Mardon, R., & Belk, R. (2018). Materializing digital collecting: An extended view of digital materiality. *Marketing Theory*, *18*(4), 543-570.

Mark, J. (2022). Taylor Swift's Ticketmaster meltdown: what happened? whos' to blame? Available at: https://www.washingtonpost.com/business/2022/11/18/ticketmaster-taylor-swift-faq/. Accessed 24 Aug 2023.

Marr, B. (2022) The Amazing Ways Nike is Using the Metaverse, Web3 and NFTs, Available at: https://www.forbes.com/sites/bernardmarr/2022/06/01/the-amazing-ways-nike-is-using-the-metaverse-web3-and-nfts/?sh=4359459256e9 Accessed 05 Sept 2023.

Mcheh. (2023). Vaporfly 3 protoype: instantly sold out. Available at: https://www.reddit.com/r/RunningShoeGeeks/comments/128nk7b/vaporfly_3_prototype_instantly_sold_out/. Accessed 24 Aug 2023.

Mukhopadhyay, M., & Ghosh, K. (2020). A curious case of Cryptokick. *Five Shades of Emerging Business Cases, Eliva Press)* Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3656147 Accessed 05 Sept 2023

Pacheco, I. (2023). Nike's panda dunks were a collector's dream, until everyone started wearing them. Available at: https://www.wsj.com/articles/sneakerheads-nightmare-limited-edition-nike-panda-dunks-11675713466 Accessed 24 Aug 2023.

Pantano, E., Pizzi, G., Scarpi, D., & Dennis, C. (2020). Competing during a pandemic? retailers' ups and downs during the COVID-19 outbreak. *Journal of Business Research*, *116*, 209-213.

Palmer, M. (2020). Amazon sellers fined for price gouging hand sanitizer amid coronavirus pandemic. Available at: https://www.cnbc.com/2020/11/17/amazon-sellers-fined-for-coronavirus-price-gouging-hand-sanitizer.html. Accessed 30 Aug 2023

Parker, J. R., & Lehmann, D. R. (2011). When shelf-based scarcity impacts consumer preferences. *Journal of Retailing*, *87*(2), 142-155.

Peterson, R. A., Kim, Y., & Jeong, J. (2020). Out-of-stock, sold out, or unavailable? framing a product outage in online retailing. *Psychology & Marketing*, *37*(3), 428-440.

Ringen, J. (2018). Nike has a new digital playbook—and it starts with sneakerheads. *Fast Company*, May, 21-24.

Robinson, S. G., Brady, M. K., Lemon, K. N., & Giebelhausen, M. (2016). Less of this one? I'll take it: new insights on the influence of shelf-based scarcity. *International Journal of Research in Marketing*, *33*(4), 961-965.

Roe, D. (2020). Inside the Nike Vaporfly: the shoe so good it almost got banned, Available at: https://www.runnersworld.com/gear/a30730107/nike-vaporfly-tech/. Accessed 27 Aug 2023

Rosendo-Rios, V., & Shukla, P. (2023). The effects of masstige on loss of scarcity and behavioral intentions for traditional luxury consumers. *Journal of Business Research*, *156*, p.113490.

Sevilla, J., & Redden, J. P. (2014). Limited availability reduces the rate of satiation. *Journal of Marketing Research*, *51*(2), 205-217.

Shaddy, F., & Shah, A. K. (2018). Deciding who gets what, fairly. *Journal of Consumer Research*, *45*(4), 833-848.

Shaddy, F., & Shah, A. K. (2022). When to use markets, lines, and lotteries: How beliefs about preferences shape beliefs about allocation. *Journal of Marketing*, *86*(3), 140-156.

Steig, C. (2020). The psychology behind a new iPhone release—and why it's so hard to resist. CNBC Make It. Available at: https://www.cnbc.com/2020/12/08/the-psychology-of-new-iphone-releases-apple-marketing.html. Accessed 30 Aug 2023

Wu, L., & Lee, C. (2016). Limited edition for me and best seller for you: the impact of scarcity versus popularity cues on self-versus other-purchase behavior. *Journal of Retailing*, *92*(4), 486-499.