HortScience 59(7):1027–1032. 2024. https://doi.org/10.21273/HORTSCI17788-24

Key Factors and Personal Influences on Consumer Consideration in Online Potted Plant Purchases

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Keywords. consumer assurance, living environment, perceived naturalness, service quality, well-being

Abstract. **The COVID-19 pandemic increased online shopping, including for potted plants; however, research on plant-purchasing behaviors outside of physical stores is limited. This study examined key factors that influence online plant purchases. Initially, 47 factors related to online plant purchases were identified. Personal factors encompassed gender, age, educational level, monthly income, gardening education, online purchase frequency, and living environment. Age quota sampling was used and 400 valid questionnaires were collected. Six common factors and 21 items were identified: consumer assurance, plant care and safety, well-being, service quality, pricing and promotions, and size and habits. Well-being was the most influential for online plant purchases. Service quality, data security, after-sales service, and pricing strategies were also important, with plant care and safety as secondary factors. Compared with men, women emphasized well-being and plant care more. Environmental factors such as naturalness and building density affected purchasing decisions. This study highlights the need for tailored marketing strategies focusing on service quality and emotional benefits to meet diverse consumer needs and preferences.**

During the COVID-19 pandemic, prolonged indoor living heightened stress, underscoring the need for relaxation. Studies have documented urban residents' attempts to relieve stress through outdoor activities in green spaces (Derks et al. 2020; Venter et al. 2021). As people had restricted access to the outdoors, gardening emerged as a preferred method for reducing stress and enhancing emotional well-being (Sia et al. 2022). Research has also identified various benefits of gardening (Howarth et al. 2020; Lin et al. 2021; Soga et al. 2017). Urbanites turned to gardening in any available space, contributing to an increase in potted plant purchases for stress relief and environmental enhancement (Afrianto and Diannita 2022; Yeh and Huang 2009). This trend presents a business opportunity in the market for gardening and potted plants.

Traditionally, individuals purchased plants from physical stores. However, with technological advancements and widespread Internet use, lifestyle and shopping patterns are changing. Online shopping has become increasingly popular, with ∼90% of college-age US consumers reported to be online shoppers (Lester et al. 2006). The COVID-19 pandemic further accelerated the transition from physical to online shopping because of concerns regarding virus transmission (Ali 2020; Euromonitor International 2022). In Taiwan, during the 2020 COVID-19 period, 68.7% of consumers preferred online shopping, 31.3% chose physical stores, and 30% of those usually shopping in physical stores switched to online platforms (Market Intelligence & Consulting Institute 2021). The frequency of online shopping increased by roughly 10% (Taiwan Network Information Center 2020), reflecting this worldwide trend. This shift is observable across various sectors, including sales of nonessential goods such as gardening supplies and potted plants. During COVID-19, houseplant online purchases increased by 53% as of 2021, with moderate interest in future e-commerce buys (Floral Marketing Fund 2021). US states experienced a 2% to 11% rise in online shopping rates (Campbell et al. 2020), and 12% of consumers repeatedly bought plants online (Floral Marketing Fund 2022).

When purchasing potted plants, consumers consider factors such as color, variety, flower fragrance, stem length, leaf state, and quality guarantees (Dennis et al. 2005; Levai and Ferencz 2012; Yue and Behe 2010). Retail flower markets prioritize convenience, service, and quality, whereas chain stores emphasize price and convenience over quality and service (Satterthwaite et al. 2006). Furthermore, in retail markets, quality, plant selection, store location, and sales staff play significant roles (Campbell and Campbell 2019; Safley and Wohlgenant 1995). In retail stores, consumers commonly weigh convenience, prices, delivery options, reputation, and service (Yue and Behe 2008). Previous research on plant purchases has primarily concentrated on physical stores.

Service quality and trust are major considerations in online shopping (Gefen et al. 2003; Zeithaml et al. 2002). Compared with when shopping in physical stores, trust is more critical online and directly influences buying intentions (Gefen et al. 2003). During the COVID-19 pandemic, one-third of florists transitioned to selling plants and gardening products online, using images and videos (Etheredge and DelPrince 2021). However, assessing plant quality relies on visual information that is difficult to obtain when shopping online, resulting in challenges when applying physical store findings to online purchases. The ease of care and ability for high interaction in small spaces have led to the popularity of potted plants (Mason et al. 2008).

Personal factors such as gender, age, income, and education, as well as broader elements such as family status, living environment, horticultural knowledge, and previous experiences, shape the decision to purchase potted plants. Family status, which includes age, marital status, and the presence and ages of children, significantly influences this decision (Hong et al. 2005; Iso-Ahola et al. 1994; Zuzanek 1998). For example, studies conducted in the United States indicate that larger families or those with children are less likely to purchase fresh flowers (Zhao et al. 2016). Urban residents often purchase plants to improve their emotional well-being, whereas rural consumers prioritize novelty and monetary value (Yeh and Huang 2009). Consumers with greater gardening experience and knowledge tend to create or plant their own potted plants, which decreases their potted plant purchases (Phillips et al. 2007).

Thus, the first objective of this study was to identify and compare the key considerations that influence online purchases of potted plants. The findings of the study contribute to the development of future online marketing strategies for live horticultural plants. However, the personal factors that significantly affect online plant buying decisions remain unclear. Therefore, the second objective of this study was to investigate the factors that influence online plant-purchasing decisions. The findings of this research will assist in market segmentation for online plant sales.

Materials and Methods

Dependent variable: considerations for online potted plant purchases. The survey instrument was developed based on a preliminary survey. It encompassed 47 self-designed

Received for publication 22 Feb 2024. Accepted for publication 11 Apr 2024.
Published online 26 Jun 2024.
This work was supported by the Higher Education Sprout Project of the Ministry of Education in Taiwan.
The authors have declared that no competing interests exist.
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items related to the factors considered in online potted plant purchases. The preliminary survey was conducted with online plant-related communities to identify potential items related to online potted plant purchase considerations. Participants were administered an open-ended questionnaire asking them what features they find attractive when buying potted plants online and why those features are important. According to Taiwan's Civil Code and academic ethics reviews, the majority age in Taiwan is 20 years; therefore, participants were individuals older than 20 years with online shopping experience. The sample size determination adhered to the concept of theoretical saturation, which implies that data collection can stop when additional surveys with new samples yield no new information (Glaser and Strauss 2017). The survey, conducted from 9 to 26 Aug 2021, in Taiwan, garnered 83 valid responses from two large online plant communities, namely Moss Lovers Micro Landscapes and Ferns Fantasyland. As no new information was found, the data collection was stopped.

Three researchers with horticultural backgrounds categorized the survey data and identified common concepts independently, and then discussed and reached a consensus. The interrater reliability was 97%, indicating a high consensus. The initial list of 47 items related to online potted plant purchase considerations (Table 1) covered plants, products, functions, online shopping, shipping, and emotion.

The 47 items were used in the formal survey. The survey statement was, "Please assess the importance of the following items in influencing your willingness to purchase potted plants online." The study used a 7-point scale to assess the importance of each item, ranging from 1 (not extremely important) to 7 (extremely important).

Independent variable: personal factors. The survey instrument encompassed seven items about personal background (gender, age, educational level, monthly income, marital status, children, and children living at home), five items about the living environment (perceived naturalness, building density, park abundance, outdoor space, and indoor space for plants), and four items about previous experience (gardening education, online plant, plant materials, and online nonplant product purchases). In the personal background section of the survey, participants were asked to disclose their gender, age, educational level, and personal monthly income. Age was categorized into 5-year intervals, ranging from 20 to 65 years. The categorized educational levels ranged from primary school to postgraduate education. Following the previous studies of Zhao et al. (2016), the survey collected information on marital status and the status of any children in the home. Marital status was categorized into married and other options. Children's status asks participants the number of children they had in total and how many of those were living at home.

The living environment influences plant purchases, as evidenced by variations between urban and rural areas (Yeh and Huang 2009) and regional differences (Campbell and Hall 2010). This study adopted Hur et al.'s (2010) concept of the living environment, which focuses on naturalness, vegetation rate, openness, and building density. The survey assessed participants' living environment through three questions on the perceived naturalness, perceived building density, and perceived park abundance of their living environment. Furthermore, having more living space at home increases the likelihood an individual will purchase plants (Zhao et al. 2016). Specifically, the home environment influences potted plant consumers' choices. The questionnaire included items related to the home environment about participants' outdoor (e.g., yards, balconies, terraces) and indoor (e.g., entryways, living rooms, bathrooms, bedrooms, and studies) space for plants.

Previous research suggests that gardening education may influence consumers' willingness to purchase potted plants (Phillips et al. 2007). This survey measured gardening education by asking respondents if they had received horticulture or life sciences education. Individuals with experience in online shopping tend to hold more favorable opinions regarding security, return policies, and trust in online retailers, perceive lower risks, and show a greater propensity to make online purchases (Lin et al. 2010). Thus, the survey also asked participants about the frequency of their online purchases in the past year, including plants, plant materials, and nonplant products. The study used a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree) to evaluate participants' living environment and previous experience with plants and online shopping.

Table 1. Initial list of 47 items related to online potted plant purchase considerations based on preliminary survey.

No.	Items
01	Plant quality and health
02	Plant size
03	Plants are clean and sanitary
04	Plants can remove dust
05	Plants are edible
06	Plants have pleasant smells
07	Nonallergenic plants
08	Nontoxic plants
09	Plant habits
10	Simple plant care
11	Space decoration function
12	Uncommon plants in physical stores
13	Beautiful plants and products
14	Clear and attractive product photos
15	Collectible value
16	Product description
17	Product is recyclable
18	Product is suitable for gifting
19	Product size
20	Products with low environmental pollution
21	Planter color
22	Planter materials
23	Expected size of space for potted plants
24	Compatibility of container and plant
25	Personal data security
26	Actual price
27	After-sales compensation plan
28	After-sales service
29	Brand scale
30	Company reputation
31	Consumer protection
32	Convenience of online shopping
33	Continuous product innovation
34	Reasonable price
35	Risks in consumer behavior
36	Sales promotion
37	Shipping costs
38	Source of product
39	Suitable for shipping
40	Damage-free shipping
41	Fast shipping
42	Feeling a sense of achievement
43	Feeling a sense of identity
44	Feeling healed
45	Feeling positive emotion
46	Feeling stress relief
47	Liking the plant

Data collection and analysis. The Ethics Committee of National Cheng Kung University reviewed and approved this study (approval number: NCKU HREC-E-110-139). The research used age quota sampling to target individuals older than 20 years with experience purchasing plants online. The age groups were 20–29, 30–39, 40–49, and 50 years or older. This study was conducted at the Taiwan Foliage Plant Exchange Station, which is Taiwan's largest online plant community, from 14 to 16 Mar 2022.

The study conducted an exploratory factor analysis (EFA) on 47 items related to online potted plant purchases to identify common factors. Following Williams et al. (2010), the study applied principal components analysis with varimax rotation, focusing on factors with eigenvalues of 1.00 or higher. The Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test evaluated the suitability of the data for factor analysis. The factors were refined by applying multiple criteria for item reduction, including removing items with low factor loadings and high cross-loadings, evaluating internal consistency using Cronbach's alpha, identifying item-to-total and interitem correlations, and ensuring a minimum of three items per factor for meaningful analysis (Earl 2012; Hair et al. 2019). Harman's single-factor test assessed the influence of common method variance, using the unrotated factor solution from the EFA (Chang et al. 2010; Podsakoff 2003).

The study used multiple regression analysis to examine the effects of personal factors on these common considerations in online potted plant purchasing behaviors. For non-normal data, bootstrapping with 5000 resamples was used to calculate confidence intervals. The collected personal data were transformed into dummy variables to perform a multiple regression analysis.

Results and Discussion

Descriptive statistics. A total of 400 valid questionnaires were collected, with each age group contributing ~100 responses (Table 2). Women constituted most of the participants (63.7%). The most common educational level was university (51.7%). The largest income bracket among participants (48.5%) was NT$25,001–50,000 (USD1 = 30 NT).

Table 2. Sociodemographic characteristics of 400 respondents surveyed in Taiwan's largest online plant communities through age quota sampling from 14 to 16 Mar 2022.

Characteristics	Frequency	%
Gender		
Male	145	36.3
Female	255	63.7
Age (y)		
20–29	101	25.3
30–39	101	25.3
40–49	100	25.0
50 or older	98	24.5
Educational level		
Primary	7	1.8
High school	37	9.3
College	48	12.0
University	207	51.7
Postgraduate	101	25.3
Monthly income, NT $		
Less than 25,000	71	17.8
25,001–50,000	194	48.5
50,001–75,000	99	24.8
75,001–100,000	21	5.3
More than 100,001	15	3.8
Marital status		
Married	194	48.5
Other	206	51.5
Number of children		
No children	240	60.0
One child	48	12.0
Two children	88	22.0
More than three children	24	6.0
Number of children living at home		
No children living at home	256	64.0
One child living at home	53	13.3
Two children living at home	75	18.8
More than three children living at home	16	4.0

Regarding marital status, nearly half of the respondents were married (48.5%). Most participants (60.0%) did not have children; however, of the 40% who did, most had children living at home.

Online potted plant purchase considerations. The initial EFA yielded a KMO value of 0.88 and a significant Bartlett's test (χ^2 = 5405.51, df = 666, $P < 0.001$), confirming the appropriateness for factor analysis. The EFA extracted six common factors comprising 21 items (Table 3). These factors were labeled consumer assurance, plant care and safety, well-being, service quality, pricing and promotions, and size and habits. Factor loadings ranged from 0.52 to 0.84, indicating strong correlations among the items in each factor. Despite cross-loadings of 0.41, 0.44, and 0.45 on three items, the six-factor structure remained distinct. Reliability coefficients for each factor varied from 0.71 to 0.80, signifying good reliability. The final EFA revealed a high KMO value of 0.86 and a significant Bartlett's test (χ^2 = 17,192,563.62, df = 210, $P < 0.001$). The six factors accounted for 64.28% of the total variance, indicating practical significance (Hair et al. 2019). Harman's single-factor test showed a 30.52% unrotated factor variance, indicating that common method variance had a minimal impact.

Well-being, which is primarily related to healing, stress relief, and positive emotions, is the most important factor affecting online plant purchases. Consumer assurance, the second-ranking factor, encompasses personal data security, consumer protection, risks in consumer behavior, and company reputation. The third crucial factor, service quality, prioritizes damage-free shipping, followed by fast shipping, product descriptions, and after-sales service. The fourth key factor, pricing and promotions, emphasizes products' shipping suitability and reasonable pricing, including shipping costs. The final two factors focus on plant-specific attributes, size, and habits, which cover plant and product size, plant habits, and plant care and safety, emphasizing nonallergenic and nontoxic plants, as well as easy plant care.

This study considered various factors such as plant quality, container color and material, photo preferences, and plant functionality; however, these were ultimately excluded during the EFA process. The results identified several common factors considered when purchasing potted plants online, including well-being, consumer assurance, service quality, pricing and promotions, size and habits, and plant care and safety (Table 3). These findings align with previous research by Yeh and Huang (2009), which identified emotional conditioning as a key motivator for purchasing potted plants. A contribution of this study is that well-being was identified as the most important and common factor in online potted plant purchases (variance explained = 12.33% in Table 3). Consumers prioritize viewing plant images online to evaluate plants' potential to offer healing, stress relief, and positive emotions (Table 3), thereby enhancing their well-being through their potted plant purchases.

Past studies on online purchase behavior have focused on service quality and trust (Gefen et al. 2003; Zeithaml et al. 2002). In the context of online plant purchasing, consumer assurance and service quality should align with the dimensions of service quality (i.e., assurance, reliability, and responsiveness) as outlined by Parasuraman et al. (1985). Key considerations include data security, consumer protection, company reputation, fast and damage-free shipping, and effective after-sales service (Table 3). Detailed product descriptions also enhance perceived reliability. Moreover, pricing and promotions correspond with consumer attraction to reasonable prices and sales promotions.

This study identified product and plant size, plant habits, and ease of care, including nonallergenic and nontoxic qualities, as important factors (Table 3). However, plant care (Mean = 5.30) and plant size and habits (Mean = 5.47) are relatively less critical compared with consumer assurance (Mean = 6.33), service quality (Mean = 6.08), and pricing and promotions (Mean = 5.60) (Table 3). This may be because those who purchase potted plants online often have experience with similar plants or gardening, which diminishes their concerns regarding plant-related issues when making these purchases.

Effects of personal factors on online potted plant purchase considerations. The study aimed to increase the current understanding of how personal factors influence six common considerations consumers have when deciding whether to purchase plants online. Both Kolmogorov-Smirnov and Shapiro-Wilk tests yielded significant results, indicating a non-normal data distribution. Consequently, bootstrap resampling was performed 5000 times to estimate the standard error, confidence intervals, and P values for the multiple regression analysis. This approach sought to provide more robust and reliable results, particularly given the non-normal data structure observed in the study. All the analyses revealed variance inflation factor values below 3.0, confirming the absence of collinearity issues among the variables and ensuring the validity of the regression results.

Overall, personal factors significantly affected well-being (F = 4.07; $P < 0.001$; adjusted R^2 = 0.11), consumer assurance (F = 4.02; $P < 0.001$; adjusted R^2 = 0.11), service quality (F = 4.07; $P < 0.001$; adjusted R^2 = 0.08), pricing and promotions (F = 2.76; $P < 0.001$; adjusted R^2 = 0.07), plant care and safety (F = 8.77; $P < 0.001$; adjusted R^2 = 0.24), and size and habits (F = 3.33; $P < 0.001$; adjusted R^2 = 0.09) (Table 4).

Women (B = 0.24; $P < 0.01$), individuals with lower educational levels (B = –0.09; $P < 0.05$), and those living in environments with higher perceived naturalness (B = 0.07; $P < 0.01$), greater building density (B = 0.06; $P < 0.01$), and an abundance of parks (B = 0.06; $P < 0.05$) emphasized well-being more when purchasing plants (Table 4). Women (B = 0.23; $P < 0.05$), individuals with living environments

Table 3. Exploratory factor analysis of common factors considered when purchasing potted plants online (well-being, consumer assurance, service quality, pricing and promotions, size and habits, and plant care and safety).

Factors and items	Mean	*SD*	Factor-loading	Eigenvalue	Variance explained (%)	Cronbach's α
Consumer assurance	6.33	0.79		2.59	12.33	0.71
Personal data security	6.48	1.09	0.73			
Consumer protection	6.56	0.82	0.68			
Risks in consumer behavior	5.94	1.34	0.67			
Company reputation	6.35	0.98	0.55			
Plant care and safety	5.30	1.51		2.31	10.98	0.79
Nonallergenic plants	5.22	1.88	0.80			
Nontoxic plants	5.03	2.01	0.79			
Simple plant care	5.65	1.49	0.70			
Well-being	6.48	0.79		2.27	10.79	0.80
Feeling healed	6.40	0.98	0.84			
Feeling stress relief	6.39	1.08	0.80			
Feeling positive emotion	6.64	0.73	0.76			
Service quality	6.08	0.89		2.19	10.43	0.70
Damage-free shipping	6.70	0.69	0.75			
Fast shipping	5.86	1.34	0.69			
Product descriptions	5.93	1.36	0.61			
After-sales service	5.84	1.39	0.57			
Pricing and promotions	5.60	1.03		2.17	10.33	0.72
Sales promotion	5.48	1.55	0.78			
Reasonable price	5.91	1.22	0.72			
Shipping costs	5.02	1.59	0.64			
Suitable for shipping	6.01	1.18	0.52			
Size and habits	5.47	1.21		1.98	9.43	0.76
Plant size	5.29	1.52	0.78			
Plant habits	5.76	1.37	0.71			
Product size	5.37	1.52	0.71			

that had a higher perceived abundance of parks (B = 0.06; $P < 0.05$), and those who frequently purchased nonplant products online (B = 0.07; $P < 0.05$) were more focused on consumer assurance. Individuals with less gardening education (B = –0.06; $P < 0.05$) and those living in environments with higher naturalness (B = 0.09; $P < 0.01$) and building density (B = 0.08; $P < 0.01$) placed higher importance on service quality. People in living environments with higher naturalness (B = 0.10; $P < 0.01$) and building density (B = 0.08; $P < 0.05$) and those who frequently purchased nonplant products online (B = 0.11; $P < 0.01$) were more concerned with pricing and promotions.

Women (B = 0.38; $P < 0.05$), older individuals (B = 0.07; $P < 0.05$), and those with primary or secondary educational levels (B = –0.15; $P < 0.05$) ascribed higher importance to plant care and safety (Table 4). People in living environments with higher perceived naturalness (B = 0.17; $P < 0.001$) and building density (B = 0.16; $P < 0.001$) also demonstrated a greater emphasis on plant care and safety. Similarly, a lower frequency of online plant purchases indicated a stronger focus on plant care and safety (B = –0.16; $P < 0.001$). Women (B = 0.39; $P < 0.01$) and individuals with higher income (B = 0.14; $P < 0.05$) placed more importance on plant size and habits. In addition, having a living environment with greater perceived naturalness (B = 0.11; $P < 0.05$) and higher building density (B = 0.17; $P < 0.001$) was associated with a stronger focus on size and habits.

Previous studies indicate that women are the primary consumers of potted plants and flowers, and often search for information related to gardening online (Behe et al. 2013; Mason et al. 2008; Phillips et al. 2007). Conversely, men show higher intentions to purchase gardening products online (Behe et al. 2013). This study suggests that women place more emphasis on well-being (B = 0.24; $P < 0.01$), consumer assurance (B = 0.23; $P < 0.05$), size and habits (B = 0.39; $P < 0.01$), and plant care and safety (B = 0.38; $P < 0.05$) when purchasing plants online (Table 4). Women also tend to focus on the emotional enhancement and stress relief plants can provide (Mason et al. 2008), which leads them to value the benefits potted plants offer for well-being. Moreover, women typically buy

Table 4. Effects of personal background, living environment, and previous experience on six common considerations in online potted plant purchasing behaviors.

	Factor 1 Well-being		Factor 2 Consumer assurance		Factor 3 Service quality		Factor 4 Pricing and promotions		Factor 5 Plant care and safety		Factor 6 Size and habits	
Independent variables	B	*SE*[i]	B	*SE*[i]	B	*SE*[i]	B	*SE*[i]	B	*SE*[i]	B	*SE*[i]
Constant	5.40***	0.36	4.84***	0.33	4.84***	0.41	4.39***	0.51	3.73***	0.63	3.13***	0.59
Personal background												
Gender	0.24**	0.08	0.23*	0.09	0.14	0.10	0.24	0.12	0.38*	0.16	0.39**	0.13
Age	–0.02	0.02	0.03	0.02	0.01	0.02	–0.01	0.03	0.07*	0.03	–0.01	0.03
Educational level	–0.09*	0.04	–0.06	0.04	–0.07	0.05	–0.06	0.06	–0.15*	0.07	–0.04	0.06
Monthly income	0.01	0.05	0.06	0.05	0.01	0.05	–0.06	0.06	0.09	0.09	0.14*	0.07
Marital status	0.07	0.11	0.09	0.10	–0.06	0.14	–0.09	0.15	–0.22	0.20	–0.05	0.19
Children	0.05	0.12	0.05	0.12	0.02	0.13	–0.24	0.17	0.20	0.20	–0.06	0.20
Children living at home	0.04	0.12	0.11	0.12	–0.01	0.17	–0.03	0.17	–0.04	0.22	–0.03	0.24
Living environment												
Perceived naturalness	0.07**	0.03	0.04	0.03	0.09**	0.03	0.10**	0.03	0.17***	0.05	0.11*	0.04
Perceived building density	0.06**	0.02	0.04	0.02	0.08**	0.03	0.08*	0.03	0.16***	0.05	0.17***	0.04
Perceived park abundance	0.06*	0.02	0.06*	0.02	0.04	0.03	0.01	0.03	0.05	0.05	0.06	0.04
Outdoor space for plants	0.03	0.03	0.05	0.03	0.06	0.03	0.04	0.03	0.04	0.05	0.05	0.04
Indoor space for plants	0.04	0.02	0.01	0.03	0.00	0.03	0.01	0.03	0.02	0.05	0.00	0.04
Previous experience												
Gardening education	–0.03	0.02	–0.03	0.02	–0.06*	0.03	–0.02	0.03	0.00	0.04	0.00	0.03
Online plant purchases	–0.04	0.03	–0.02	0.03	–0.04	0.04	0.01	0.03	–0.16***	0.05	–0.06	0.04
Online plant materials purchases	0.02	0.03	0.01	0.04	0.04	0.05	–0.05	0.03	–0.04	0.06	0.03	0.05
Online nonplant products purchases	0.06	0.03	0.07*	0.03	0.06	0.03	0.11**	0.04	0.07	0.05	0.06	0.05
F	4.07		4.02		3.16		2.76		8.77		3.33	
R^2	0.15		0.14		0.12		0.10		0.27		0.12	
Adjust R^2	0.11		0.11		0.08		0.07		0.24		0.09	

[1] Standard error (*SE*) was performed using 5000 bootstrapped samples.

*Bootstrap P value < 0.05; **bootstrap P value < 0.01; ***bootstrap P value < 0.001.

B = unstandardized beta.

flowering plants to decorate their homes, whereas men usually purchase them as gifts (Yue and Behe 2010). This variance in purchasing objectives may account for why women pay closer attention to plant size, habits, and care, as these factors reflect their use of plants in home decoration and involvement in plant care and safety. Satisfying the considerations this study's findings highlight for female consumers could enhance their intentions to purchase plants online.

This study suggests that older individuals prioritize plant care and safety in online plant purchases (B = 0.07; $P < 0.05$) (Table 4), likely because of having children or pets in the home, which raises concerns regarding allergenic or toxic plants. Highlighting that plants are easy to maintain, allergen-free, and nontoxic may enhance the willingness of older adult consumers to buy them. Educational levels ranging from primary to high school were associated with a stronger emphasis on well-being (B = –0.09; $P < 0.05$) and plant care and safety (B = –0.15; $P < 0.05$) (Table 4), which might be associated with age. Notably, higher personal income was found to correlate with greater concern for size and habits (B = 0.14; $P < 0.05$) (Table 4). Individuals with higher incomes, who potentially have large living spaces, gardens, or balconies, may prioritize different plant attributes than people with lower incomes, who may contend with space limitations. Income notwithstanding, both lower and higher income groups value well-being (B = 0.01; $P > 0.05$), consumer assurance (B = 0.06; $P > 0.05$), service quality (B = 0.01; $P > 0.05$), pricing and promotions (B = –0.06; $P > 0.05$), and plant care and safety (B = 0.09; $P > 0.05$) (Table 4). Although some research, such as Zhao et al. (2016), has shown that larger families or those with children often purchase fewer fresh flowers, this study found no relationship between marital status or having children and the six factors that commonly influence online plant purchases.

The study found that consumers in areas with high perceived naturalness prioritize well-being (B = 0.07; $P < 0.01$), service quality (B = 0.09; $P < 0.01$), pricing and promotions (B = 0.10; $P < 0.01$), size and habits (B = 0.17; $P < 0.001$), and plant care and safety (B = 0.11; $P < 0.05$) in online plant purchases (Table 4). The building density produced the same results. The results align with those of past studies suggesting that urbanites have higher intentions to purchase plants (Behe et al. 2013). In areas of high building density, residents seek emotional improvement, which enhances the demand for and intentions toward potted plants. Similarly, those in more natural environments, who may have greater intentions for plants and gardening, emphasize these considerations. A higher perceived abundance of parks also correlates with a greater emphasis on well-being in plant-purchasing decisions. However, the availability of outdoor and indoor spaces for plants does not influence online plant purchase considerations (Table 4), suggesting that housing space may not be a significant factor. Overall, living in dense urban areas with natural spaces increases the importance consumers place on common considerations in online plant purchases.

Previous studies suggest that individuals with horticultural experience tend to design or produce their own potted plants (Phillips et al. 2007). This study found that people with less gardening education emphasize service quality more highly (B = –0.06; $P < 0.05$) (Table 4). This likely stems from their limited experience in plant care, species knowledge, and design ideas, which leads them to seek comprehensive service and explanations from sellers. As a result, most potted plant consumers may lack this background knowledge, thus making service quality an important factor in their purchasing decisions. The study also revealed that individuals who frequently purchase nonplant products online are more focused on consumer assurance (B = 0.07; $P < 0.05$) and pricing and promotions (B = 0.11; $P < 0.01$) (Table 4). Furthermore, those who lacked experience with purchasing plants online showed greater concern for plant care and safety (B = –0.16; $P < 0.001$) (Table 4). This may reflect increased caution regarding plant care and safety due to inexperience with online plant purchases.

Limitations of the study and recommendations for future research. Two measurement issues warrant further discussion. The choice between using a balanced or unbalanced scale considers the nature of the issue and the distribution of past variable data. This study inducted the items through a preliminary survey. However, the importance of these items has not yet been assessed. Thus, in the formal surveys, this study employed a commonly used balanced 7-point Likert scale. The consistent use of the same balanced 7-point Likert scale also helps reduce the cognitive burden on respondents (Liao 2014; Schaeffer and Presser 2003). Ultimately, the data extraction of the factors and items revealed a negatively skewed distribution of responses. If variable data exhibit a positively or negatively skewed distribution of responses, using an unbalanced scale can be meaningful, for instance, for measuring well-being (Liao 2014). However, the difference between balanced and unbalanced scales remains unresolved and may be issue-dependent (Liao 2014). Future studies could use an unbalanced scale for factors that consider online marketing strategies to achieve a more precise measurement scale.

Various methods exist for measuring the age variable in horticultural issues, including generational cohorts (e.g., Campbell and Campbell 2019), age intervals (e.g., Yue and Behe 2008, 2010; Zhao et al. 2016), and specific age years (e.g., Behe et al. 2013; Mason et al. 2008). Generational cohorts often share similar attitudes, values, preferences, shopping habits, and behaviors (Eger et al. 2021). The COVID-19 pandemic has influenced the shopping behavior of the oldest generation, resulting in decreased online purchases and increased acquisition of food and medicines from traditional shops, in contrast to younger generations, primarily for health and stress reasons (Eger et al. 2021). The COVID-19 pandemic has introduced complexities to the issues of online consumption in this study. As a result, we chose 5-year age intervals for our analysis, focusing specifically on age rather than generational differences. Future studies should include generational cohorts post-COVID-19 to delve deeper into their effects on online plant consumption.

Conclusions

In conclusion, this study of online potted plant purchasing behavior identified key factors that influence consumer intentions. Well-being emerged as the most critical factor, with consumers seeking plants that enhance their emotional state. Service quality, encompassing data security and after-sales support, along with pricing and promotions, are also important factors. Although plant care and safety are also considered important, they are secondary concerns compared with consumer assurance and service quality. Gender differences were observed, with women more likely than men to prioritize well-being and plant care. In addition, living environment factors, such as naturalness and building density, affect purchasing decisions. This study highlights the importance of understanding different consumer segments and customizing marketing strategies to meet their needs, with a particular focus on service quality and emotional benefits to address diverse consumer needs and preferences.

First, enhancing consumers' online experience to promote emotional well-being is a valuable strategy. Sellers should focus on creating an online shopping experience that emphasizes emotional well-being. This should involve the use of high-quality images and detailed descriptions that highlight the stress-relieving and mood-boosting properties of plants. Developing a user-friendly website interface that facilitates effortless navigation and evokes a serene, garden-like atmosphere can enhance consumers' overall well-being. Sellers could also consider offering virtual consultations or workshops on plant care that highlight the therapeutic benefits of gardening.

Second, to enhance marketing and service quality, sellers should concentrate on understanding and catering to the distinct needs of various customer segments. Considering this study's findings on gender differences, targeted marketing strategies can be used. For female customers, marketing campaigns should emphasize the emotional benefits and aesthetic allure of plants, alongside plant care and safety. Furthermore, enhancing service quality is vital for guaranteeing stringent data security, transparent return and exchange policies, and responsive customer service. Sellers could offer personalized plant care advice and reminders, thereby enhancing consumer assurance and satisfaction.

Finally, strategic product placement and pricing should be considered. Retailers should adopt strategic pricing and promotions tailored to urban consumers with higher incomes. They could offer a variety of products suited to different space constraints, such as

small potted plants for apartment dwellers and larger outdoor plants for homeowners with gardens, to broaden market appeal. Pricing strategies could encompass bundle deals, discounts on first-time purchases, or loyalty programs. In addition, seasonal promotions and flash sales may attract price-sensitive consumers, enhancing the appeal of purchasing plants online across diverse income groups.

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