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Is A Vending Machine My Best Bet? Understanding Key Factors Determining US Consumers' Preference and Loyalty to Fruit Vending Machines

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ABSTRACT

This study investigates the key factors influencing US consumer preference and loyalty to fruit vending machines compared to other distribution channels. It specifically examines the roles of experience, quality and value, COVID-19, convenience, freshness, and safety-related benefits of fruit vending machines. Data was collected through an online consumer survey and analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM). The findings reveal that the strongest predictors of consumer preference and loyalty are experience and perceived quality and value of the fruits. Convenience benefits appear significant only when comparing vending machines to other distribution channels while food safety does not emerge as a key factor. These findings add valuable insights for fruit growers and marketing managers in the US food retail sector.

KEYWORDS
Fruit Vending Machines
Fruit Preferences
COVID-19
PLS-SEM

INTRODUCTION

Since the onset of the coronavirus pandemic, contactless shopping has become an integral part of everyday food shopping (Stanca et al., 2023; Mitra et al., 2023; Wang et al., 2023). This shift awakens various online shopping opportunities and increases the availability of self-service options in gastronomy, food retail, educational institutions, travel hubs, and farm gates (Baba et al., 2023; Ryu et al., 2023; Heins, 2023; Jairoun et al., 2022). It is impossible to distinguish self-service options from the availability of vending machines. In the United States, vending machine revenue reached $10.3 billion in 2022, marking a 3.8% increase compared to the previous year. These profits were generated from 7 million vending machines serviced by 17,148 businesses and used by 100 million people daily to purchase various things, ranging from unhealthy items like chips, candy, and sodas to healthier options like salads, sandwiches, and fruits (Ibis, 2023; Samuel et al., 2023; Martinelli et al., 2023; Onufrak et al., 2019).

However, although educational institutions, public health departments, and policymakers have advocated for changes for over a decade and the demand has gotten higher, healthier food options in vending machines in the US remain somewhat limited (Pharis et al., 2018). Early initiatives in

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major cities such as New York, San Francisco, Boston, and Philadelphia revealed that consumers value healthy food-filled vending machines. Sales figures indicate a strong demand for nutritious, lower-energy food without a decline in overall sales volumes (Pharis et al., 2018). Though they are becoming more and more popular in Europe, Asia, and Africa (Kataike et al., 2019; Sabau et al., 2023; Levaj et al., 2022; Foodnavigator, 2018), vending machines that sell healthy products like milk and fruit are still not generally available in the US, despite public initiatives (Pharis et al., 2018).

The body of literature on marketing studies and vending machines is grouped into three categories. The first, often advocating for policy changes, examines food assortments offered in vending machines, including their nutritional impacts and choices for adults and children (Kubik et al., 2010; Baraldi et al., 2018; Grigsby-Duffy et al., 2022). The second focuses on consumer attitudes, perceptions, and purchasing behaviors regarding healthy food items and beverages (Kataike et al., 2019; Saba˘u et al., 2023; Labohm et al., 2021; Bebe et al., 2020; Ayuya et al., 2022; Lelea et al., 2023). Meanwhile, the third captures the farmers' perspective on using vending machines at the farm gate, discussing topics such as food safety, hygiene, accessibility, risk, and operational costs while providing recommendations on effective strategies for marketing healthy food and beverages (Labohm et al., 2021; Lelea et al., 2023; Knuck and Weber, 2021). The first category is more general while the second and third typically focus on raw milk (Kataike et al., 2019; Saba˘u et al., 2023; Labohm et al., 2021; Bebe et al., 2020; Ayuya et al., 2022; Lelea et al., 2023; Knuck and Weber, 2021).

Given that the interstate sale or distribution of raw milk is banned by the US FDA (Food and Drug Administration), the current study focuses on fruits that are permitted for sale in vending machines (Dias et al., 2022). Research on fruit vending machines based on a consumer viewpoint remains limited (Rombach et al., 2022a). To date, only one study has investigated US consumers' willingness to try, buy, and pay a price premium for fruits offered in vending machines (Rombach et al., 2022a). Hence, this study attempts to extend that work by identifying the driving factors of US consumers' preferences and loyalty to fruit vending machines.

LITERATURE REVIEW

The existing literature outlines the relevant variables to fruit vending machine purchasing (Rombach et al., 2022a). These variables pertain to both the internal and external qualities of fruits, as well as the benefits that vending machines offer to consumers. The following section, therefore, discusses contactless buying and other benefits that became prominent during the COVID-19 pandemic, along with convenience and experience-related benefits (Rombach et al., 2022a). In addition to freshness and safety factors, quality and value are also discussed as significant indicators of US consumers' preferences to choose vending machines over other distribution channels and their loyalty towards fruit vending machine purchasing (See Figure 1).

Convenience

The existing literature on consumers and vending machine purchasing justifies that convenience is a crucial advantage and a significant reason for paying a price premium when buying food and beverages from vending machines (Rombach et al., 2022a). In this regard, convenience is seen as a multidimensional construct that comprises vending machine access, consumer choices, transactions, and post-purchase convenience (Hehle et al., 2012). Access is essential for vending and selling healthy options such as milk or fruit (Kataike et al., 2019; Labohm et al., 2021). Recent studies affirm that vending machines that are situated far from clients or have limited operating hours may not offer as much convenience (Labohm et al., 2021). However, convenience benefits often mitigate many

customers' price sensitivity, leading to satisfaction and repeated purchases (Hehle et al., 2012). Thus, the following hypotheses are proposed:

H_1. The convenience benefits of fruit vending machines positively impact U.S. consumers' preference for fruit vending machines over other distribution channels.
H_2. The convenience benefits of fruit vending machines positively impact U.S. consumers' loyalty toward fruit vending machines.

COVID-19-Related Benefits

COVID-19 has drastically altered how US consumers shop for food on a daily basis in terms of social distancing, safety precautions, and buying patterns (Truong and Truong, 2022; Leone et al., 2020; Kim and Im, 2022). The existing literature highlights that the pandemic and associated safety concerns have increased consumer preferences for contactless payment and buying options that minimize personal exposure to other consumers and retail employees (Truong and Truong, 2022). While online shopping is widely appreciated by most US consumers (Prentice et al., 2021), some find lengthy waits or potential delivery disruptions to be significant drawbacks (Truong and Truong, 2022). Research on buying behavior during the pandemic also emphasizes consumer irritation and stress due to shopping restrictions, panic buying, and stock-outs in US food retail (Im et al., 2022; Messner and Payson, 2022). Given that purchasing fruits from vending machines circumvents many of these drawbacks and allows visual inspection of fresh products, the following hypotheses are proposed:

H_3. The COVID-19-related benefits of fruit vending machines positively impact U.S. consumers' preference for fruit vending machines over other distribution channels.
H_4. The COVID-19-related benefits of fruit vending machines positively impact U.S. consumers' loyalty toward fruit vending machines.

Experience

The experiential benefits of fruit vending machine purchases require more in-depth exploration (Kataike et al., 2019). These benefits are closely tied to the latest smart technologies. In addition to guaranteeing product freshness, smart vending machines allow consumers to observe and engage in the buying process (Smith et al., 2017; Kurniawan et al., 2022; Sivasubramanian et al., 2022; Yang and Xu, 2022). According to recent research, US consumers find purchasing from vending machines to be emotionally and amusingly engaging (Kataike et al., 2019). Features like digital touch screens, videos, mobile app payment options, and identification technologies make the experience fun, exciting, and stimulating for consumers (Kataike et al., 2019). Against this background, the following hypotheses are proposed:

H_5. The experience benefits of fruit vending machines positively impact U.S. consumers' preference for fruit vending machines over other distribution channels.
H_6. The experience benefits of fruit vending machines positively impact U.S. consumers' loyalty toward fruit vending machines.

Quality and Value

Customers demand excellent product quality and fair price when purchasing fresh fruit (Liu et al., 2023; Harker et al., 2003). Thus, they will use both intrinsic and extrinsic product attributes to estimate the quality of the fruit (Ceschi et al., 2018; Ahmadi Kaliji, 2022). Intrinsic features are inherent to the product, such as appearance, scent, texture, and flavor, while extrinsic qualities relate to product production and commercialization (Ceschi et al., 2018), which may involve the country of origin, labeling, or price (Ceschi et al., 2018). Price is emphasized as a crucial product characteristic. In addition to a willingness to pay for a broad variety of fruits, cross-price elasticities for different fruits are discussed. Accordingly, the following hypotheses are proposed:

$H_{7.}$ The quality and value benefits of fruit vending machines positively impact U.S. consumers' preference for fruit vending machines over other distribution channels.
$H_{8.}$ The quality and value benefits of fruit vending machines positively impact U.S. consumers' loyalty toward fruit vending machines.

Freshness and Safety

Research on technology and consumer behavior regarding fruit vending machines has emphasized the importance of freshness and safety as product characteristics, as well as the advantages of using modern technological operations in vending machines (Rombach et al., 2022a; Smith et al., 2017; Kurniawan et al., 2022; Sivasubramanian et al., 2022; Yang and Xu, 2022). Product safety and quality are reflected through the shelf-life and sensory appearance of the fruit, which influence consumers' intention to make initial or repeat purchases (Smith et al., 2017). Thus, fruit vending machines are designed to allow consumers to visually inspect the items they wish to purchase. The appearance of the fruit—such as shape, color, and absence of blemishes—is essential for vending machine consumers since other forms of sensory inspection are not possible (Rombach et al., 2022c). In fruit purchasing scenarios, appearance plays a crucial role as it gives an indication of the fruit's freshness and cleanliness that can attract customers to buy (Rombach et al., 2022a). Also, fruit vending machines must be regularly inspected and checked for their freshness and safety as this is essential for the success of perishable item sales (Saba˘u et al., 2023). Within this context, the following hypotheses are proposed:

H_{9}. The freshness and safety benefits of fruit vending machines positively impact U.S. consumers' preference for fruit vending machines over other distribution channels.
H_{10}. The freshness and safety benefits of fruit vending machines positively impact U.S. consumers' loyalty toward fruit vending machines.

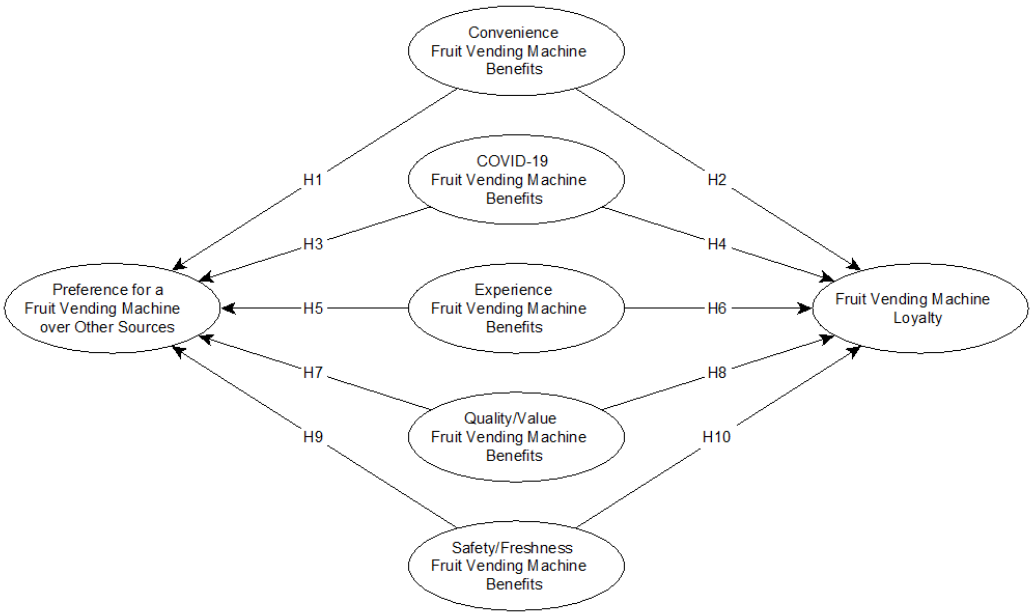


Figure 1. The conceptual model for fruit vending machine customers' preference, purchase intention, and loyalty

RESEARCH METHOD

Survey Design and Data Collection

This study adopted an exploratory and quantitative research approach. Targeting citizens of the United States, a consumer survey was used to gather the data using the Qualtrics platform. Eligibility criteria required that participants be at least 18 years old, reside in the U.S., have a history of purchasing healthy food options like fresh fruit, and have previous experience of buying food from vending machines. Those not meeting the criteria were excluded from the study. Due to the challenges in precisely defining the target population, a purposive sampling method was employed.

The survey link was distributed to members of Amazon Mechanical Turk (MTurk), a crowdsourcing platform, for five days starting July 6, 2022 (Goodman and Paolacci, 2017; Litman and Robinson, 2021). Questions examining attitudes, preferences, and loyalty toward fruit purchases and vending machines were posed, and the respondents were required to evaluate the significance of various fruit qualities and the advantages of buying goods from vending machines. Additionally, sociodemographic data was gathered, including age, gender, income, state of residence, and educational background. The survey was designed following Kataike et al. (2019) and the authors' research on U.S. consumer buying behavior before and during the coronavirus pandemic (Rombach et al., 2022a, b, c). These studies served as a basis for developing items that highlight the benefits of vending machines and fruit qualities (Kataike et al., 2019; Rombach et al., 2022b, c). A seven-point Likert scale was employed to measure the agreement and the significance of the surveyed items.

The survey instruments and study design were approved by the Lincoln University Human Ethics Committee (HEC2022-28). Obtaining informed consent from research participants was necessary to adhere to acceptable data collection practices and ethical approval procedures. The researchers

followed optimal guidelines for data collection and participant interaction as suggested by Goodman and Paolacci (2017) and Litman and Robinson (2021).

A total of 401 survey responses were gathered. Ten responses were completed in a significantly shorter timeframe than the average duration of 15 minutes and were thus deemed unsuitable for analysis (Greszki et al., 2015), resulting in 391 eligible responses. The sample size was considered adequate for examining the key factors influencing U.S. residents' willingness to try, buy, and pay a premium price for fruits sold in vending machines. According to Hair et al. (2022) '10-times rule,' the minimum sample size should be 10 times the maximum number of (inner or outer) links pointing at any latent variable within the conceptual model. This study would require a minimum sample size of 50 (Hair et al., 2022); therefore, the sample size of 391 was deemed adequate. The data was then analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2019).

Research Approach and Analysis

This study employed SPSS and SmartPLS commercial software packages for statistical analysis. SPSS was used to generate descriptive statistics while SmartPLS facilitated the model evaluation using Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2019). PLS-SEM was chosen due to its suitability for exploratory studies involving complex models aimed at identifying key determinants of behaviors or intentions. This method offers advantages such as accommodating non-normally distributed data and scales with varying numbers of items and conducting measurement and structural model evaluations in two distinct steps.

The measurement model analysis involved reliability and validity checks, as recommended by Hair et al. (2022). These observations examined factor loadings, Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) for multi-item scales to ensure construct reliability and convergent validity. Furthermore, discriminant validity was assessed using the Fornell–Larcker criterion and the Heterotrait-Monotrait ratio of correlations (HTMT). The analysis also incorporated evaluations for multicollinearity and common method bias using the Variance Inflation Factor (VIF). Subsequently, the structural model was assessed by testing proposed hypotheses through bootstrapping with 5,000 iterations to determine the significant relationships between variables. The overall model evaluation depended on criteria like Goodness of Fit (GoF), explanatory power, and predictive relevance.

RESULTS & DISCUSSION

Descriptive Statistics

The description of the survey participants' background is presented in Table 1. The sample consisted of 49.6% men and 50.4% women. Most of the survey participants were young (25-44 years old), educated (had obtained a university qualification like a bachelor's or master's degree), and in the low to mid-income range (earned an annual pre-tax income of $25,000 to $75,000).

Measurement Model

Table 2 reveals that all values for Cronbach's Alpha and Composite Reliability exceeded the prescribed minimum threshold of 0.6, as suggested by Hair et al. (2022). This result signifies the attainment of robust construct reliability. Similarly, the Average Variance Extracted (AVE) surpassed 0.64, and the factor loadings for all items were greater than 0.75 (Hair et al., 2022). All these values

uphold that the considered latent variables not only exhibit high internal consistency but also meet the requisite criteria for convergent validity.

Table 1. Demographic profile of the survey respondents

Age	Freq	%	US Census (%)
25-34	111	28.4	18
35-44	83	21.2	16
45-54	80	20.5	16
18-24	55	14.1	12
55-64	42	10.7	17
65 +	20	5.1	21
Total	391	100	100
Highest Education Achieved			
Bachelor's Degree	222	56.8	29
Postgraduate Degree	67	17.1	13
Finished high school	57	14.6	27
Attended University	37	9.5	20
Not finished high school	8	2.0	11
Total	391	100	100
Annual Income (Household)			
$25,000 to $49,999	133	34.0	20
$50,000 to $74,999	123	31.5	18
$75,000 to $99.999	68	17.4	13
$0 to $24,999	42	10.7	18
$100,000 or higher	25	6.4	31
Total	391	100	100
Gender			
Female	197	50.4	51
Male	194	49.6	49
Total	391	100	100
US Region			
South	213	55.2	38
Northeast	69	17.9	17
Midwest	67	17.4	21
West	37	9.6	24
Total	386	100	100

Furthermore, table 3 displays the results from discriminant validity tests. As suggested by Hair (2022), the HTMT ratios were satisfactory being less than 0.90, and the Fornell–Larcker criterion was satisfied with cross-loadings less than the diagonal values (Hair et al., 2022). The tests confirmed that for all constructs, the discriminant validity requirements were met. VIF scores ranged from 1.99

to 2.65, averaging 2.38, indicating that the model was not affected by multicollinearity and there is no evidence of common method bias (Hair et al., 2022).

Table 2. Scale loadings, reliabilities, and convergent validities for measurement items

Scales and Items	Factor Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Covid 19: Fruit Vending Machine Benefits: A fruit vending machine is beneficial in Covidian times because ...		0.863	0.9	0.643
... there is no human interaction	0.833			
... the payment is contactless	0.814			
... I can still visually inspect the product	0.756			
... I do not have to rely on delivery	0.851			
... I am not exposed to panic-buying	0.751			
Fresh and Safe: Fruit Vending Machine Benefits I think ...		0.767	0.895	0.740
... buying fruit from a vending machine would be safe	0.857			
... the fruit offered in vending machines would be fresh	0.828			
... it would be useful to have fruit available in vending machines	0.895			
Quality and Value: Fruit Vending Machine Benefits Fruit sold from a vending machine ...		0.849	0.930	0.869
... would be affordable	0.932			
... would be good value for money	0.932			
Experience: Fruit Vending Machine Benefits I think buying fruit from vending machines ...		0.869	0.917	0.786
... would be fun	0.886			
... would be exciting	0.87			
... would be a sensory-stimulating experience	0.904			
Convenience: Fruit Vending Machine Benefits I think buying fruit from a vending machine ...		0.767	0.860	0.672
... would save time	0.768			
... would be convenient	0.851			
... would be easy	0.839			
Preference for Fruit Vending Machine over Other Sources		0.925	0.952	0.870
A vending machine would be my first choice to buy fruit	0.937			
I would prefer buying from a vending machine over being in a supermarket	0.939			
I would prefer buying from a vending machine over a farmers' market	0.922			
Fruit Vending Machine Loyalty		0.861	0.915	0.782
I think buying fr f uitrom a vending machine will be popular in the medium-term future (next 10 years)	0.889			
I am willing to pay a price premium for fruit from a vending machine	0.915			
I consider myself a loyal customer	0.848			

Table 3. Fornell–larcker criterion, and heterotrait–monotrait ratio

Fornell-Larcker Criterion	A	B	C	D	E	F	G
A) Convenience FVM Benefits	0.820						
B) Covid-19 FVM Benefits	0.586	0.802					
C) Experience FVM Benefits	0.625	0.609	0.887				
D) FVM Preferred Over Other Sources	0.421	0.575	0.702	0.933			
E) Loyalty	0.528	0.678	0.730	0.792	0.885		
F) Quality/Value FVM Benefits	0.599	0.617	0.724	0.692	0.768	0.932	
G) Safe and Fresh FVM Benefits	0.627	0.651	0.681	0.579	0.655	0.700	0.860
Heterotrait-Monotrait Ratio	A	B	C	D	E	F	G
A) Convenience FVM Benefits							
B) Covid-19 FVM Benefits	0.725						
C) Experience FVM Benefits	0.739	0.695					
D) FVM Preferred Over Other Sources	0.457	0.630	0.782				
E) Loyalty	0.632	0.767	0.844	0.884			
F) Quality/Value FVM Benefits	0.717	0.709	0.843	0.780	0.897		
G) Safe and Fresh FVM Benefits	0.786	0.776	0.792	0.638	0.761	0.822	

Note: Fruit vending machine is abbreviated as FV

Structural Model

The evaluation of the proposed structural model revealed a Goodness of Fit value of 0.729, a Normed Fit Index (NFI) score of 0.796, and a Standardized Root Mean Square Residual (SRMR) measurement of 0.068. These assessment criteria indicate a robust model fit. It is noteworthy, as per the findings of Hair et al. (2022), that a satisfactory model fit is typically characterized by an SRMR below the established threshold of 0.08, while values exceeding 0.10 are considered indicative of a lack of fit.

The model's constructs demonstrated moderate explanatory power with an R-squared (R2) value of 0.594 for "Fruit Vending Machines Preferred Over Other Sources" and 0.695 for "Loyalty". These R^2 values accounted for 59.4% of the variance in the preference for fruit vending machines over other sources and 69.5% of the variance in loyalty. Such high R^2 values indicate that the model is well-suited for explaining consumer behavior related to preference levels. Additionally, the model demonstrated strong predictive relevance, with an average Q^2 value of 0.627. Hair et al. (2022) suggested that Q^2 values exceeding 0.50 indicate strong predictive relevance.

Hypothesis Testing Results

The hypothesis testing results are displayed in Table 4. The table reveals that convenience benefits negatively impact U.S. consumers' preference for vending machines over other distribution channels. This finding contradicts what was hypothesized. In contrast to H1, no support was found for H2, indicating that the relationship between convenience benefits with fruit vending machine buying intention and loyalty is not significant. The finding for H1 may be explained by some factors that potentially contribute to this negative relationship, such as limited access and restricted operating hours at farm gates. The result aligns with previous studies; for instance, Labohm et al. (2021), highlighting the importance of location and how it impacts farm gate vending machine use. The authors cautioned that community density and access are essential to success, and driving to

recreational or tourist locations may not appeal to consumers seeking convenience benefits (Labohm et al., 2021).

The COVID-19 benefits positively impact both U.S. consumers' preference for vending machines over other distribution channels and their loyalty toward fruit vending machines, providing support for H3 and H4. U.S. marketing studies have discussed consumers' fear of getting infected and spreading COVID-19. Through limited contact and contactless payment, vending machines can mitigate the risk of infection (Truong and Truong, 2022; Leone et al., 2020; Kim and Im, 2022). Also, the machines allow consumers to shield themselves from stressful retail experiences (Prentice et al., 2021; Im et al., 2022; Messner and Payson, 2022) as being involved in or witnessing panic buying has been linked to fight-or-flight responses, anxiety, and aggression among consumers (Omar et al., 2021). These findings are consistent with the extant literature presenting smart vending machines as secure, contactless substitutes for traditional distribution channels that are more difficult to control when it comes to distance and physical contact (Yang and Xu, 2022; Rollston and Galea, 2020). The findings related to loyalty are well-aligned with those regarding online food delivery studies (Suhartanto et al., 2019; Saha and Mukherjee; Wu et al., 2022). Apart from food quality and service provision, ensuring consumer safety through contactless payment and limited human interaction has become one of the greatest loyalty determinants since the onset of the coronavirus pandemic (Suhartanto et al., 2019).

Experiential factors regarding fruit vending machines, such as the perception that purchasing fruit from the machines is fun, exciting, and sensory stimulating, positively impact consumer preference for fruit vending machines over other distribution channels, supporting H5. These experiential aspects also positively influence future-oriented purchase intentions and loyalty among U.S. consumers; therefore, supporting H6. Studies on milk vending machines, smart vending machines, and consumer preferences affirmed that functionality and pleasure are key predictors of consumer preferences and intentions toward vending machine purchasing (Labohm et al., 2021; Wu et al., 2022). Smart technology enhances customer experiences by providing a pleasurable shopping journey and the satisfaction of having immediate access to products. High-definition touchscreens, animations, and the ability to purchase multiple items in a single transaction are the main contributors to experiential benefits (Wu et al., 2022). Numerous consumer studies demonstrated that buying experiences predict preferences, repeat purchases, and loyalty (Suhartanto et al., 2019).

Perceived quality and value benefits of fruit vending machines are also positively associated with consumer preferences, intentions, and loyalty, supporting H7 and H8. Fruits sold through vending machines are thought to offer affordability and good value for money, compared to other food sources like supermarkets and farmers' markets, supporting H7. The factors of affordability and value are also instrumental in shaping U.S. consumers' positive attitudes toward future-oriented purchase intentions and loyalty, as indicated by H8. The extant literature outlined cross-price elasticities for different kinds of fruits and emphasized consumer switching behavior (Harker et al., 2003). Other consumer studies indicated that fruits, such as apples, are often bought out of habit, making consumers less prone to switching behavior (Harker et al., 2003). This is likely because consumers expect value and quality from any fruit they buy, which explains why they prefer vending machines over other distribution channels and why they are loyal to them.

In contrast, the perceived freshness and safety benefits of fruit vending machines do not show a significant association with U.S. consumers' preference for these machines over other sources (H9). Also, the freshness and safety factors do not influence loyalty, indicating a lack of support for H10. Food safety and freshness are requirements for any purchase and consumption situation (Wongprawmas and Canavari, 2017). The fact that American consumers reside in a nation with strict regulations on the safety of fruits and vegetables may explain these non-significant results

(Wongprawmas and Canavari, 2017) since consumers may view freshness and safety as minimum requirements rather than as benefits.

Table 4. Coefficients for hypothesized paths

Hypothesized Relationship	Coefficient	T-Stat	P-Value
H1 Convenience FVM Benefits → FVM Preferred Over Other Sources	-0.191	3.22	0.001
H2 Convenience FVM Benefits → FVM Loyalty	-0.087	1.58	0.114
H3 Covid-19 FVM Benefits → FVM Preferred Over Other Sources	0.181	3.16	0.002
H4 Covid-19 FVM Benefits → FVM Loyalty	0.265	3.85	0.000
H5 Experience FVM Benefits → FVM Preferred over other sources	0.423	6.97	0.000
H6 Experience FVM Benefits → FVM Loyalty	0.293	4.35	0.000
H7 Quality/Value FVM Benefits → FVM Preferred Over Other Sources	0.360	5.34	0.000
H8 Quality/Value FVM Benefits → FVM Loyalty	0.408	6.25	0.000
H9 Safe and Fresh FVM Benefits → FVM Preferred Over Other Sources	0.041	0.67	0.506
H10 Safe and Fresh FVM Benefits → FVM Loyalty	0.053	0.61	0.539

Note: Fruit vending machine is abbreviated as FVM

CONCLUSION

The primary focus of the study is to analyze the key factors that drive U.S. consumers' preference for fruit vending machines over other distribution channels and to determine their loyalty toward these machines. The study discovers that experience, quality, value, and COVID-19-related benefits significantly influence consumer preferences and loyalty. Experience, quality, and value are found to be the most powerful predictors. Convenience benefits are found to negatively impact consumers' preference for vending machines. Meanwhile, freshness and safety benefits do not exhibit any significant importance in the analysis.

MANAGERIAL IMPLICATION

To address the negative influence of convenience benefits on consumer preferences, fruit growers and marketing managers should strategically place vending machines in high-traffic, easily accessible areas. Urban centers, workplaces, schools, and public transport hubs are ideal locations as they provide the convenience that consumers look for. They should avoid placing the machines in remote or recreational locations, which may not appeal to consumers looking for quick and convenient access to fresh fruit. Additionally, extending the operating hours of these vending machines or ensuring they are available 24/7 can cater to varying consumer schedules. By improving the accessibility and convenience factors, vending machines can better align with consumer expectations and preferences, thereby enhancing their appeal.

The positive impact of COVID-19-related benefits on consumer preferences and loyalty highlights a key marketing opportunity. Fruit growers and marketing managers should prominently feature the health and safety benefits of vending machines in their marketing campaigns. Also, they need to emphasize the contactless nature of transactions and the limited exposure to other consumers and retail employees. Providers can modernize vending machines with contactless payment options and mobile app integrations to further reduce the risk of virus infection. Highlighting these benefits in advertising—such as through social media campaigns, promotional materials, and on-site signage—

can attract health-conscious consumers and reinforce their loyalty. Regularly showcasing hygiene practices and machine maintenance will also build consumer trust and preference.

Experiential factors play a crucial role in shaping consumer preferences and loyalty toward fruit vending machines. Investing in smart technologies that enhance the buying experience, such as high-definition touchscreens, interactive animations, and the ability to make multiple purchases in a single transaction may boost consumers' fondness for fruit vending machines. Marketing these features can attract consumers seeking an engaging, fun, and sensory-rich shopping experience. Additionally, marketers need to ensure that fruits sold via vending machines are of high quality and competitively priced. They should also clearly communicate the value proposition, emphasizing affordability and good value for money compared to traditional retail options like supermarkets and farmers' markets. By focusing on a superior user experience and a strong value proposition, growers and marketing managers can foster positive consumer perceptions, encourage repeat purchases, and build long-term loyalty.

FUTURE RESEARCH AND LIMITATION

Future research endeavors could delve into exploring consumer behavior when purchasing from vending machines, farm gates, and traditional retail outlets. By adopting a framework that considers the lifestyle choices of fruit consumers as suggested by Kaliji et al. (2022), growers and marketers can enhance overall consumers' consumption and purchasing experiences. Furthermore, investigating the consumption patterns of various generational cohorts could yield valuable insights.

Transitioning to the discussion of limitations, the current study acknowledges certain constraints that warrant attention. The study was based on a purposive sample of U.S. fruit consumers recruited through a crowd-sourcing platform. Consequently, the generalizability of the findings necessitates careful consideration. While samples from platforms like MTurk are often considered representative or quota samples reflective of the U.S. population, they are generally deemed more reliable than other forms of convenience sampling. Given the lack of representative data on fruit vending machine buyers, a purposive approach was deemed suitable for this study.

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