Consumer Behavior Analysis in Pangkalpinang: Perception as Intervening of Hydroponic Purchase Decision with STP Approach

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Abstract: The rapid rise in urban growth and health-conscious behavior in Pangkalpinang has spurred a demand for hydroponic vegetables. This study seeks to explore the factors shaping consumers' decision to purchase hydroponic vegetables in this area. By employing a quantitative research design, survey data were gathered from 170 respondents, focusing on demographic characteristics, variables related to socioeconomic status, perception as psychological influence, and marketing elements. Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to identify the key predictors of purchasing behavior, alongside the application of the STP (Segmentation, Targeting, Positioning) strategy to enhance sales. The results show that most consumers are women working in the private sector, with a bachelor's degree, earning between Rp 4,000,000 and Rp 6,000,000, aged 17-25 years, married, and residing in Gabek District. The factors directly and significantly influence the decision to purchase hydroponic vegetables are product, income and perception. Price, however, does not have a direct effect. Nonetheless, price has a significant indirect impact on purchasing decision through its influence on perception. The marketing strategy employs the STP model to create an appealing product image and attract potential consumers. This approach integrates excellent customer service, attractive packaging, promotional pricing, and product innovation.

Keyword: Consumer Behavior, Hydroponics, PLS-SEM, Purchasing Decision, STP

INTRODUCTION

The world's population exceeded 8 billion by the end of 2022, according to the United Nations Population Division. Projections from the National Development Planning Agency (Bappenas) indicate that Indonesia's population will continue to rise from 238.5 million in 2010 to 305.6 million by 2035. Although the total population increases, the growth rate is

declining, from 1.38% per year during 2010-2015 to 0.62% during 2030-2035, due to birth rates exceeding death rates.

An interesting phenomenon related to global population growth is the shift from rural to urban areas, influenced by modernization, industrialization, and social rationalization (Liu & Peng, 2023). Data from the Central Statistics Agency (BPS) and Worldometer show that in 2020, 56.7% of Indonesia's population lived in urban areas, and this figure is expected to continue rising. Urban dwellers, more aware of technology and the environment, tend to choose an efficient, dynamic, and sustainable lifestyle, including consuming healthy vegetables (Duda, 2024). Data from the National Food Agency also supports this finding, showing fluctuations in fruit and vegetable consumption between 2019-2023, with a 3-gram increase per capita per day in 2022-2023.

Hydroponic innovation offers a practical solution to urban land constraints, making it accessible to the public, including the participation of women's farmer groups (KWT) that empower local food security initiatives (Windiasih et al., 2023). It helps meet local demand and curb inflation by ensuring a consistent vegetable supply, supported by various Indonesian government agencies to promote food security and community empowerment. In Pangkalpinang, the capital of Bangka Belitung, hydroponic businesses have expanded, with 58 enterprises registered as of 2023 (Food Security Agency, Pangkalpinang). These hydroponic initiatives and the empowerment of KWT contribute to the President's stunting reduction program (Indonesian Ministry of Health, 2023).

Consumer behavior is influenced by societal, technological, and psychological factors, shaping motivations, perceptions, and attitudes that drive purchasing decision by process includes need recognition, information search, evaluation, purchase, and post-purchase evaluation (Vidal-Ayuso et al., 2023). Perception, influenced by both physical stimuli and social interactions, can lead consumers to rely on others' opinions when lacking product knowledge (Ali et al., 2021; Bhukya & Paul, 2023). Product and price elements in the marketing mix play a crucial role in consumer choice, with quality assessed through sensory factors and pricing influenced by costs, perceptions, and competition (Chen et al., 2020). Economic factors, such as income and price sensitivity, also affect purchasing decision, as seen in studies on hydroponic vegetable purchases in Indonesia (Tania, 2022).

Understanding the factors that shape consumer decision, particularly regarding hydroponic vegetables, is crucial for advancing the market. Studies indicate that consumer interest in hydroponic products often aligns with values such as environmental sustainability, health benefits, and extended shelf life (ȚĂLU, 2024). Consumer behavior theories, including those of Kotler and Keller (2022) and (Vidal-Ayuso et al., 2023), emphasize the influence of social, cultural, psychological, and personal factors on purchasing behavior. This research leverages these frameworks to assess how the marketing mix, psychological attributes, and socioeconomic factors influence hydroponic vegetable purchases, ultimately aiming to support hydroponic businesses in Pangkalpinang enhance consumer satisfaction and sales.

Marketing strategy begins with sales, focusing on meeting consumer needs rather than just selling products (Soeharso & SPsi, 2020). This leads to the Segmentation, Targeting, and Positioning (STP) model, introduced by Kotler, which helps businesses identify and target appropriate market segments. Market segmentation allows businesses to tailor their offerings based on factors such as geography, demographics, psychographics, and behavior (Harlon, 2024). Once segments are identified, businesses proceed with targeting the most promising ones, using criteria like measurability and accessibility (Soeharso & SPsi, 2020). Positioning, the next step, shapes consumer perceptions to create a distinct image of the product in the market (Kotler and Keller, 2022).

Based on the statements above, the research objectives are (1) identify the demographic characteristics of consumers purchasing hydroponic vegetables, (2) analyze the factors

influencing consumer purchase decision, and (3) propose strategies to improve purchase decision for hydroponic vegetables.

METHOD

To address the first research objective, this study uses descriptive analysis to examine consumer demographic characteristics for hydroponic vegetable purchases in Pangkalpinang. Data were collected via a questionnaire capturing respondent details such as gender, age, residence, education, marital status, occupation, and income. These demographic factors are analyzed to understand their potential influence on consumer perspectives and responses to questionnaire topics. Results are presented in numerical frequency tables to reflect field conditions.

To achieve the second research objective, Partial Least Squares Structural Equation Modeling (PLS-SEM) is used to analyze the relationships among latent variables with multiple indicators. Based (Hair Jr et al., 2021), the measurement model's validity is assessed through two criteria: Convergent Validity, using outer loadings (≥ 0.70), composite reliability (0.70-0.85), Cronbach's alpha (≥ 0.70), and Average Variance Extracted (AVE) (≥ 0.50); and Discriminant Validity, measured by the Heterotrait-Monotrait (HTMT) ratio (< 90). Then, the structural model is tested using bootstrapping to evaluate estimate stability and statistical significance through T-statistics (≥ 1.96) and P-values (≤ 0.05).

To answer the third research objective, the marketing strategy uses the Segmentation, Targeting, and Positioning (STP) model. This approach starts by segmenting the market based on characteristics such as geographic, demographic, psychographic, and behavioral (Hanlon, 2024). Then, businesses select the most relevant target segments that are measurable, accessible, and substantial (Soeharso & SPsi, 2020). Finally, positioning aims to create a unique image of the product in consumers' minds to enhance its appeal and differentiate it from competitors

RESULTS AND DISCUSSION

Demography Characteristic of Consumers

To understand the behavior of hydroponic vegetable consumers, this study first analyzes the demographic characteristics of the respondents. The collected data includes gender, age, residence, marital status, occupation, and monthly income. These demographic characteristics provide an overview of the consumer profile relevant to this study and help ensure that the research sample is representative of the target population. The following table presents a summary of the respondents' demographic data.

Table 1. Demographic Characteristics of Hydroponic Vegetable Consumers

No.	Category	Frequency (People)	Percentage (%)
Gender			
1.	Male	65	38,2
2.	Female	105	61,8
Age			
1.	Late Teen (17-25 Years)	66	38,8
2.	Young Adult (26-35 Years)	48	28,2
3.	Late Adult (36-45 Years)	35	20,6
4.	Early Elderly (46-55 Years)	21	12,4
Residence			
1.	Bukit Intan	17	10
2.	Gabek	36	21,2
3.	Gerunggang	26	15,3
4.	Girimaya	19	11,2
5.	Pangkalbalam	21	12,4

No.	Category	Frequency (People)	Percentage (%)
6.	Rangkui	35	20,6
7	Taman Sari	16	9,4
Education			
1.	Junior High School	1	0,6
2.	Senior High School	40	23,5
3.	Diploma 3	19	11,2
4.	Bachelor's Degree (S1)	108	63,5
5.	Master's Degree (S2)	2	1,2
Marital Status			
1.	Single	67	39,4
2.	Married	98	57,6
3.	Divorced	5	2,9
Occupation			
1.	Student	16	9,4
2.	Civil Servant	47	27,6
3.	Private Employee	72	42,4
4.	Healthcare Worker	9	5,3
5.	Merchant	4	2,4
6.	Laborer	4	2,4
7.	Farmer	7	4,1
8.	Unemployed	11	6,5
Income			
1.	Rp0 - Rp500.000	22	12,9
2.	Rp1.000.000 - Rp3.000.000	44	25,9
3.	Rp4.000.000 - Rp6.000.000	53	31,2
4.	Rp7.000.000 - Rp9.000.000	35	20,6
5.	> Rp10.000.000	16	9,4

The demographic characteristics of hydroponic vegetable consumers in Pangkalpinang reveal that the majority are female (61.8%), aged between 17 and 25 years (38,8%), hold a bachelor's degree (63.5%), are married (57.6%), work as private employees (42.4%), and have a monthly income ranging from Rp4,000,000 to Rp6,000,000 (31.2%), with residents distributed across various areas such as Gabek (21.2%) and Rangkui (20.6%).

The majority of respondents were female, primarily housewives, as they are typically responsible for cooking and preparing food at home. Women were more conscious of food quality and safety, which led them to choose hydroponic vegetables for their health benefits. This supports the notion that women tend to be more selective in their purchasing decision (Bao et al., 2022). The questionnaire was also distributed to male respondents, who usually purchase vegetables for personal or family use. These male consumers indicated that environmental factors influenced their decision, as they tend to be more pragmatic. The majority of the consumer profile consists of young adults (17-25 years), often university students or entry-level workers, who are becoming more health-conscious, influenced by social media and health trends (Sumarwati et al., 2022).

Higher education levels also play a significant role in consumer decision-making, with more educated individuals being better able to evaluate product information, including health attributes, thus increasing their likelihood of choosing hydroponic vegetables (Awhinarto & Suyadi, 2020; Wibowo et al., 2022). Additionally, married consumers, who are generally more responsible for family food choices, make up 57.6% of respondents, reflecting their focus on healthy eating, though marital status alone does not significantly impact purchasing decision (Iqbal et al., 2021). Employment also influences purchasing behavior, with professionals showing a preference for certain products based on their occupation (Eklund et al., 2024; Rodrigues et al., 2021). Lastly, higher-income consumers are more likely to purchase

hydroponic vegetables due to their ability to access markets and prioritize health, underscoring the role of income in consumer choices.

Factor Influencing to Purchasing Decision

The evaluation of individual item variables is a step to assess the extent of variance in indicators explained by the latent variable, also known as indicator validity (Kline, 2023). The loading factor should be ≥ 0.708, as squaring this value results in 0.50, indicating a practical guideline where measurement error variance is capped at 50% (Hair Jr et al., 2021). In simple terms, a loading factor ≥ 0.70 is considered ideal, as it confirms the indicator's validity with its construct.

Table 2. Outer Loading Value

No.	Laten Variable	Indicator	Loading Factor	Conclusion
1.	Price	Price Level by Quality	0.858	Ideal
2.		Suitable of Treatment	0.817	Ideal
3.		Willing Payment	0.754	Ideal
4.	Product	Health and Hygiene	0.873	Ideal
5.		Premium Quality	0.844	Ideal
6.		Taste	0.787	Ideal
7.	Income	Monthly Income	0.826	Ideal
8.		Purchase Driver	0.782	Ideal
9.		Repeat Purchases	0.837	Ideal
10.	Perception	Closest Person's Encourage	0.848	Ideal
11.		Lovely Person's Encourage	0.855	Ideal
12.		Seller's Encourage	0.896	Ideal
14.	Purchasing Decision	Consumer Loyalty	0.878	Ideal
15.		Consumer Satisfaction	0.865	Ideal
16.		Purchase Action	0.906	Ideal

In convergent validity, Construct Reliability (CR) is assessed to evaluate internal consistency reliability (Mohd Dzin & Lay, 2021). Consistency reliability is measured by examining the extent to which indicators measuring the construct are interrelated, using Reliability Coefficient rho A, Composite Reliability, and Cronbach's Alpha (Hair Jr et al., 2021). Validity assessment is based on the Average Variance Extracted (AVE). Although reliability can be assessed through Cronbach's Alpha, it is recommended to consider additional CR metrics to enhance accuracy and mitigate interpretation limitations (Hair Jr et al., 2021).

Table 3. Construct Reliability and Validity

Factors	Cronbach's Alpha	rho A	Composite Reliability	AVE	Conclusion
Price	0.739	0.746	0.851	0.657	Reliable and Valid
Product	0.783	0.785	0.874	0.698	Reliable and Valid
Income	0.748	0.749	0.856	0.665	Reliable and Valid
Perception	0.834	0.836	0.900	0.751	Reliable and Valid
Purchasing Decision	0.859	0.859	0.914	0.780	Reliable and Valid

Discriminant validity is assessed to measure the extent to which a construct or latent variable in the model does not have high correlations with other constructs (Hair Jr et al., 2021). High Heterotrait-Monotrait (HTMT) values indicate insufficient discriminant validity. (Henseler et al., 2015) recommend a threshold of 0.90 for constructs that are conceptually similar, such as cognitive satisfaction, affective satisfaction, and loyalty. The HTMT value

above 0.90 signals a lack of discriminant validity, while a more conservative threshold of 0.85 is suggested for conceptually distinct constructs (Hair Jr et al., 2021).

Table 4. High Heterotrait-Monotrait (HTMT) Value

Factors	Income	Perception	Price	Product	Conclusion
Income					Validity Achieved
Perception	0.379				Validity Achieved
Price	0.382	0.503			Validity Achieved
Product	0.584	0.517	0.577		Validity Achieved
Purchasing Decision	0.715	0.587	0.531	0.843	Validity Achieved

To identify the factors influencing hydroponic vegetable purchasing decision in Pangkalpinang, statistical analysis is essential for interpreting findings within this research study through structural model evaluation (inner model). The data is presented in terms of direct and indirect effects to assess the strength of relationships between constructs. Path coefficient significance is tested through bootstrapping, with T-statistics ≥ 1.96 indicating significance at a 95% confidence level. At this level, the P-value must be less than 0.05. Thus, paths with a P-value ≤ 0.05 are considered to have a significant influence.

Table 5. The Factors Influencing Hydroponic Vegetable Purchasing Decision

| Influencing Factors	Original Sample (O)	Standard Deviation (STDEV)	T Statistics	P Values	Conclusion
Direct Effect					
Price → Purchasing Decision	0.068	0.071	0.954	**0.341**	Insignificant
Product → Purchasing Decision	0.451	0.059	7.622	**0.000**	Significant
Income → Purchasing Decision	0.296	0.065	4.591	**0.000**	Significant
Perception → Purchasing Decision	0.192	0.053	3.607	**0.000**	Significant
Price → Perception	0.255	0.068	3.783	**0.000**	Significant
Product → Perception	0.258	0.080	3.220	**0.001**	Significant
Income → Perception	0.113	0.080	1.406	**0.160**	Insignificant
Indirect Effect					
Price → Perception → Purchasing Decision	0.049	0.021	2.373	**0.018**	Significant
Product → Perception → Purchasing Decision	0.050	0.020	2.530	**0.012**	Significant
Income → Perception → Purchasing Decision	0.022	0.018	1.190	**0.235**	Insignificant
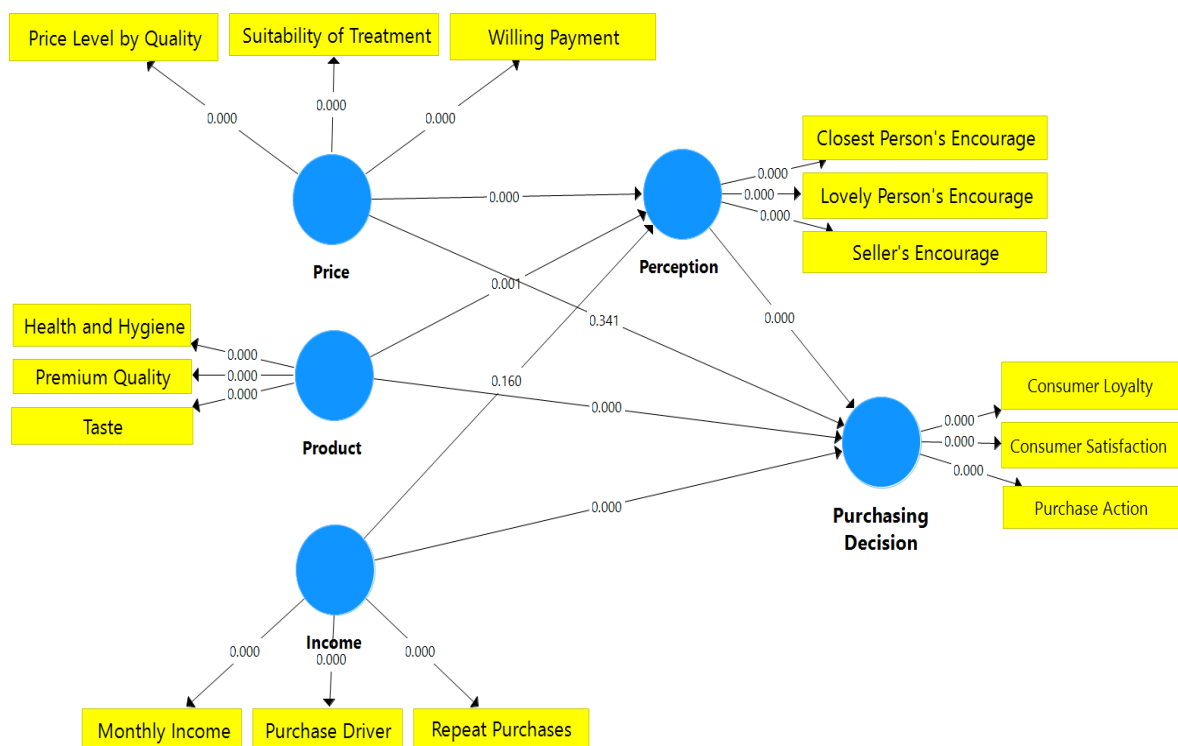
Figure 1. Structural Model of Factors Influencing Hydroponic Vegetable Purchase Decision

The direct relationship between price and purchase decision, based on the structural model (P-value 0.341), shows no significant effect. However, price can influence decision through the intervening factor of perception psychology (P-value 0.018). This data suggests that the price element of the marketing mix does not directly affect hydroponic vegetable purchase decision in Pangkalpinang City, in line with Papilaya (2022) findings. However, this contradicts the studies by (Cholis, 2022; Widodo et al., 2022), and (Kurniastuti & Sari, 2023), which indicate that price significantly influences purchase decision due to consumer price sensitivity.

The direct relationship between product and purchase decision, based on the structural model (P-value 0.000), shows a significant effect. It also shown in the indirect effect (P-value 0.012). This finding aligns with previous research by (Jusuf, 2021; Papilaya et al., 2022; Wibowo et al., 2022), which highlighted product quality as a key factor. However, it contrasts with Tania's (2022) study, which found that product quality did not significantly affect purchase decision. In Pangkalpinang, consumers prioritize product characteristics like freshness, cleanliness, and health benefits when deciding to purchase hydroponic vegetables.

The direct relationship between income and purchase decision, based on the structural model (P-value 0.000), shows a significant effect. In this study, consumers' monthly income directly influences their decision to buy hydroponic vegetables. However, income does not affect purchase decision through perception (P-value 0.235). This finding is consistent with previous studies by (Cholis, 2022) and Tania (2022), which found that income plays an important role in purchasing more expensive products like hydroponic vegetables. In Pangkalpinang, consumers with higher incomes are better able to afford these products, and income is seen as a key factor in their purchasing decision, increasing their purchasing power.

The direct relationship between perception and purchase decision, based on the structural model (P-value 0.000), shows a significant effect. Consumer perception, influenced by the opinions of others and loved ones, affects their decision to purchase hydroponic vegetables.

Additionally, the indirect relationship between price and product through perception also shows a significant impact, indicating that perception acts as an effective mediator between the marketing mix and purchase decision.

This finding aligns with the previous studies by (Kurniastuti & Sari, 2023), who stated that psychological factors, such as perception, influence the purchase decision of hydroponic vegetables. Similarly, (Adriani et al., 2021) emphasized that perception is a key determinant, shifting its role from a psychological factor to the main factor in purchase decision. However, income, through perception, does not show a significant relationship, meaning the economic status of consumers does not significantly influence their perception or decision to buy hydroponic vegetables in Pangkalpinang.

Segmentation, Targeting, and Positioning Strategy

Given that many factors influence consumers' purchase decision regarding hydroponic vegetables, business owners need to implement optimal marketing strategies. Applying strategies that enhance customer loyalty is key to the sustainability of hydroponic businesses. One effective marketing strategy is the Segmentation, Targeting, Positioning (STP) model. This model is suitable as it helps hydroponic vegetable producers target a broader market segment, especially in Pangkalpinang.

Table 6. Segmentation, Targeting, and Positioning Strategy

Marketing Strategy	Explanation	Details
Market Segmentation	Grouping consumer segments based on research findings regarding hydroponic consumer characteristics.	**Geographic:** Rangkui District in Pangkalpinang City, with the highest population density and the largest percentage of consumers (20.6%).
		Demographic: Married women, ages 26-35, employed in private or public sectors.
		Psychographic: Middle-to-upper income (Rp4,000,000-Rp9,000,000), bachelor's degree (S1) education.
		Behavioral: Uses social media for online ordering, loyal to hydroponic products.
Target Market	Focusing on the most potential segment according to segmentation results.	**Primary Target:** Working women, ages 26-35, middle-to-upper income, online purchasers, residing in Rangkui District.
Market Positioning	Strategy to build a positive perception in the consumer's mind through service and product advantages.	**Customer Service:** Delivery service with flexible order sizes (half kilo, one kilo, etc.), competitive pricing, special discounts.
		Product Innovation: Ready-to-eat vegetable salads to meet the needs of consumers seeking convenience and practicality.

The target market consists of working women aged 26-35 with middle-to-high incomes (Rp4,000,000 - Rp9,000,000), who shop online and live in Rangkui District. To reach this market, the marketing strategy focuses on customer service, which aims to build a strong product image and compete with other businesses. This is combined with attractive offers such as competitive pricing, packaging design, and product innovations.

One key service strategy is offering flexible delivery options, such as half-kilo or one-kilo quantities, to meet customer needs. Competitive pricing can include promotions, such as discounts on specific days or orders over 5 kilos. Additionally, product innovation like ready-to-eat vegetable salads provides a convenient solution for busy women who want to maintain a healthy diet. This innovation not only meets the target market's needs but also helps expand hydroponic vegetable sales in Pangkalpinang.

CONCLUSION AND SUGGESTION

The demographic profile of hydroponic vegetable consumers shows that the majority are female, aged between 17 and 25 years, hold a bachelor's degree, married and work as private employees. Most consumers have a monthly income ranging from Rp4,000,000 to Rp6,000,000 and concentrated in areas such as Gabek. The key factors identified include product quality, customer perception, and income level, with perception playing a crucial mediating role in the relationship between marketing factors and purchase decision. While price does not directly affect consumer decision, it influences them through perception. The marketing strategy based on STP proved to be effective in reaching this demographic, particularly through customer service, flexible delivery options, and product innovations like ready-to-eat vegetable salads. These strategies have helped attract and retain customers, highlighting the importance of combining effective marketing with product quality to ensure long-term sustainability in the hydroponic vegetable market.

This research provides valuable insights into the factors influencing hydroponic vegetable purchase decision in Pangkalpinang. However, it has certain limitations. First, the sample is limited to consumers in a specific geographical area, which may not fully represent the broader consumer base across other cities or regions. The research also focuses primarily on demographic and psychological factors, without considering other potential influences such as environmental or cultural factors. Furthermore, while the study used a robust statistical method (PLS-SEM) to analyze the data, it did not explore deeper into the long-term effects of marketing strategies on consumer behavior, limiting the ability to assess the sustainability of the results over time. Additionally, the study's scope was constrained to the hydroponic vegetable market, and the findings might not be directly applicable to other agricultural or food product categories.

Future research could address these limitations by expanding the sample size to include consumers from other cities or regions, enabling a broader understanding of consumer behavior. Exploring additional factors such as environmental consciousness, cultural preferences, and the impact of local agricultural policies could provide more comprehensive insights into purchase decision. A longitudinal study could also be valuable to assess how marketing strategies and consumer perceptions evolve over time, offering a better understanding of long-term trends in hydroponic vegetable purchasing. Additionally, integrating qualitative methods such as in-depth interviews or focus groups could uncover more nuanced consumer motivations

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