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Design and Development of Coffee Products to Enhance Customer Satisfaction Using the Quality Function Deployment (QFD) Method at Sudut Kota Coffee and Space

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Abstract

Competition in the café industry encourages businesses to develop coffee products that are aligned with customer needs and preferences. This study aims to design and develop a coffee product at Sudut Kota Coffee and Space by identifying customer requirements, determining improvement priorities, and selecting the most appropriate product concept. The study employed the Quality Function Deployment (QFD) method through the development of a House of Quality (HoQ). Data were collected from 40 consumers using a Likert scale to assess the importance and satisfaction levels of eight customer requirement attributes. The results of the planning matrix showed that attractive packaging design was the highest-priority customer requirement, with a Normalized Raw Weight (NRW) of 0.173, followed by coffee flavor variation at 0.170 and affordable price at 0.163. The technical response analysis identified coffee type as the highest-priority technical characteristic, with a Normalized Contribution of 0.321, followed by packaging shape at 0.201 and packaging color at 0.114. Concept selection further indicated that Concept II was the preferred alternative, achieving a score of 3.28 compared with 3.00 for Concept IV. The selected concept integrates Arabica coffee, a brown stand-up pouch, brown roasting, 500-g packaging, color-based bean sorting, and fine grinding. These findings indicate that QFD can provide a systematic basis for translating customer needs into measurable technical specifications and a targeted coffee product design.

Keywords: *Customer Needs, Customer Satisfaction, House of Quality, Product Development, Quality Function Deployment.*

INTRODUCTION

The development of the food and beverage (F&B) industry has intensified competition among coffee shops, shifting competitive advantage from price and menu variety toward the ability to consistently translate customer expectations into product attributes that deliver superior value and satisfaction. Customer-oriented product development has become increasingly important because preferences for coffee products are multidimensional, encompassing sensory quality, presentation, packaging, convenience, and perceived value rather than taste alone. Contemporary studies indicate that Quality Function Deployment (QFD) provides a structured mechanism for incorporating the voice of customers into product development by translating qualitative preferences into measurable technical characteristics and prioritized improvement requirements. The increasing application of QFD in coffee-related product development reflects this shift, particularly because the method can connect customer perceptions with operational decisions concerning ingredients, processing, product characteristics, and packaging. The competitive context therefore requires coffee businesses to move beyond incremental menu innovation toward systematic product-development decisions that are evidence-based and explicitly linked to customer priorities. Research on coffee-shop preferences further demonstrates that identifying which attributes customers consider important can provide a stronger basis for determining development priorities than relying solely on managerial assumptions. For independent coffee businesses, this orientation is particularly relevant because limited resources require improvement efforts to be concentrated on product characteristics that generate the greatest perceived customer value.

Sudut Kota Coffee and Space is one of the F&B businesses located in Rangkasbitung Timur, Rangkasbitung District, Lebak Regency, Banten, which provides various contemporary food and

beverage products and operates daily with 17 employees. Within its operational context, the business faces a product-development challenge related specifically to its coffee products, where preliminary observations identified customer concerns regarding limited innovation, particularly in taste, aroma, and packaging design. These conditions indicate that the problem is not simply whether coffee products are available, but whether their characteristics correspond sufficiently with evolving customer expectations and competitive market requirements. Previous research on coffee beverages has shown that QFD can be used to identify customer requirements and connect them with technical responses for improving product quality, demonstrating its relevance for coffee businesses seeking systematic improvement. Customer satisfaction is closely associated with the extent to which the attributes of products and services correspond to customer expectations, making product deficiencies potentially consequential for repeat purchase intentions and perceived business value. In this context, the complaints identified at Sudut Kota Coffee and Space provide an empirical basis for investigating which coffee attributes should receive priority rather than assuming that all aspects of the product require simultaneous improvement.

Previous research has established that QFD can support product development across different stages of the coffee value chain, although the scope and integration of customer requirements have varied considerably across studies. Research on coffee products has demonstrated that QFD can identify important customer requirements and translate them into technical specifications, while integrated approaches have further incorporated Kano, Kansei, fuzzy methods, or other decision-making techniques to strengthen prioritization. In coffee-shop applications, QFD has been employed to evaluate beverage attributes and determine technical priorities associated with preparation processes, including brewing, grinding, and coffee-bean measurement. Other research has extended QFD toward packaging development, indicating that visual and functional packaging attributes can constitute significant components of customers' product evaluations rather than merely serving as supplementary elements. These findings collectively suggest that customer satisfaction in coffee businesses emerges from an interaction between intrinsic product quality and the manner in which the product is presented to consumers. However, the diversity of methodological combinations in previous studies also indicates that QFD has frequently been applied to narrowly defined problems, making direct integration of beverage characteristics and packaging requirements less consistently addressed.

A further limitation concerns the tendency of previous investigations to separate product quality, service quality, production technology, and packaging into distinct analytical domains, even though customers generally evaluate the coffee product as an integrated consumption experience. Studies applying QFD to coffee shops have predominantly concentrated on beverage quality or service improvement, while packaging-oriented investigations have emphasized consumer preferences toward container design and functionality. Research combining QFD with customer-satisfaction analysis has demonstrated the usefulness of prioritizing attributes according to their perceived importance and performance, yet such approaches do not necessarily resolve how prioritized customer requirements should be translated into technically actionable product-development specifications. Other studies have demonstrated that QFD can be integrated with Kano analysis to distinguish different categories of customer requirements, but methodological integration can also increase analytical complexity when the primary objective is to establish a practical development priority for a small coffee business. The literature consequently leaves an empirical space for a relatively direct QFD framework that simultaneously captures customer requirements concerning coffee characteristics and packaging design and translates them into ranked technical responses. This gap is particularly relevant for Sudut Kota Coffee and Space because preliminary customer feedback indicates that both sensory attributes and visual presentation require attention, suggesting that treating them as isolated development problems may fail to represent the actual structure of customer expectations.

The scientific and practical urgency of this issue arises from the need to establish a defensible connection between what customers expect from coffee products and what a coffee business can technically modify within its operational limitations. Recent QFD applications have confirmed that customer-oriented prioritization can guide product improvement by identifying the technical characteristics that exert the greatest influence on perceived quality and satisfaction. Research on coffee product development has similarly shown that technical decisions concerning coffee-bean characteristics, processing, and product formulation can be systematically ranked according to customer requirements. Packaging research further indicates that design characteristics such as appearance,

functionality, and usability can be incorporated into structured product-development decisions rather than being treated solely as aesthetic considerations. The practical challenge for Sudut Kota Coffee and Space is therefore to determine which customer requirements should be prioritized and how those requirements can be translated into technical characteristics that are feasible to implement. Addressing this problem can reduce the risk of allocating limited resources to attributes with relatively low customer importance while strengthening those product dimensions that are more directly associated with customer satisfaction. The study consequently positions QFD not merely as a measurement instrument, but as a decision-support framework for connecting customer voice, product characteristics, and improvement priorities within a real coffee-shop setting.

Within this research landscape, the present study positions itself as an empirical application of QFD for integrated coffee-product development at Sudut Kota Coffee and Space, emphasizing the translation of customer requirements into prioritized technical characteristics without relying on an additional decision-making model. The research specifically addresses the identified need for product innovation by examining customer expectations related to coffee quality and packaging design as interconnected components of the product experience. The resulting House of Quality is intended to establish the relationship between customer requirements and technical responses, enabling the relative importance of each requirement to be evaluated systematically. The study aims to identify customer requirements for coffee products, determine the priority of attributes requiring improvement, and formulate product-development recommendations based on the QFD framework. Its theoretical contribution lies in strengthening the application of customer-driven product-development logic to coffee-shop contexts by demonstrating how sensory and presentation-related requirements can be incorporated within one structured framework. Its methodological contribution lies in providing an empirically grounded procedure for converting customer perceptions into ranked technical priorities that can support product-development decisions at the business level. The findings are expected to provide Sudut Kota Coffee and Space with a more systematic basis for improving coffee products in ways that are aligned with customer expectations and capable of supporting higher customer satisfaction and sustainable competitiveness.

RESEARCH METHODS

This study employed an empirical quantitative-descriptive design using the Quality Function Deployment (QFD) method to translate customer requirements into technical characteristics for coffee-product development at Sudut Kota Coffee and Space, following the customer-oriented product-development logic of QFD. The research architecture consisted of four interconnected stages, namely identification of customer needs, quantitative measurement of importance and satisfaction, construction of the House of Quality (HoQ), and formulation and selection of alternative product concepts. The study involved 40 customers as respondents, with primary data collected through a structured questionnaire distributed using Google Forms with assistance from the coffee shop. The questionnaire measured the importance and satisfaction of coffee-product attributes using a four-point Likert scale, where scores of 1 and 4 represented the lowest and highest levels of importance or satisfaction, respectively. The customer requirements were initially identified through direct observation and interviews with customers and management, after which the identified requirements were operationalized into questionnaire indicators and subsequently translated into technical characteristics, an approach consistent with QFD applications for coffee-product development. Data processing was performed using IBM SPSS Statistics 27, while the QFD implementation comprised the planning matrix, technical-response identification, relationship matrix, technical-correlation analysis, and determination of technical targets before proceeding to alternative product development.

The testing and validation procedure began with instrument validity and reliability testing to establish that the questionnaire items adequately measured the intended customer requirements before the data were incorporated into the HoQ. Item validity was assessed statistically using SPSS Statistics 27, while reliability was evaluated to determine the internal consistency of the measurement instrument, providing a reproducible basis for subsequent QFD calculations. The validated responses were then analyzed through the planning matrix by calculating customer-importance levels, satisfaction performance, improvement priorities, and the relative contribution of each customer requirement to the overall product-development direction. The relationship matrix subsequently quantified the strength of relationships between customer requirements and technical characteristics, while the technical-

correlation section was used to identify interactions among technical responses and minimize contradictory development decisions. This analytical structure follows previous QFD applications in coffee-product development in which customer preferences are systematically converted into prioritized technical specifications for product improvement. The resulting technical priorities were used to establish development targets and generate alternative product concepts, which were evaluated through concept screening and concept scoring to identify the alternative with the highest overall suitability for implementation. The principal performance metric of the study was the priority ranking produced by the HoQ, supported by customer importance, satisfaction, improvement-weighted scores, technical-importance values, and concept-scoring results, so that the final recommendation could be traced quantitatively from customer perceptions to actionable product specifications, consistent with QFD-based product-development and customer-satisfaction assessment approaches.

RESULTS AND DISCUSSION

Instrument Validation and Customer Requirement Identification

The empirical data were obtained from 40 customers of Sudut Kota Coffee and Space through a structured questionnaire designed to measure customer perceptions of coffee-product attributes. The questionnaire employed a four-point Likert scale, with scores of 1 and 4 representing the lowest and highest levels of assessment, respectively, for both importance and satisfaction. The importance measurement was used to identify the degree to which each attribute was considered relevant by customers, whereas the satisfaction measurement captured customer perceptions of the current performance of each attribute. The use of these two measurement dimensions enables the QFD framework to distinguish between what customers consider important and how well the existing product satisfies those expectations. This distinction is essential because QFD prioritization requires customer requirements to be evaluated according to their perceived importance and current performance before technical responses are established (Ginting et al., 2020). The resulting dataset therefore provided the empirical input for constructing the planning matrix and determining the development priorities of the coffee products.

Validity analysis was performed to determine whether each questionnaire attribute adequately represented the intended customer requirement. The analysis compared the calculated r values for each of the eight attributes with the critical r value of 0.304 based on the study's sample size. For the importance dimension, the calculated r values ranged from 0.446 to 0.731, while the satisfaction dimension produced values ranging from 0.409 to 0.742. Every calculated value exceeded the critical value of 0.304, indicating that all eight attributes fulfilled the predetermined validity criterion. The absence of invalid items allowed the complete set of customer requirements to be retained without eliminating attributes that could influence the subsequent QFD priority structure. Retaining validated sensory, packaging, and economic attributes is consistent with coffee-product QFD research, which emphasizes the need to capture diverse dimensions of customer expectations during product development (Chelseanna et al., 2024).

Table 1. Validity Test Results of Customer Requirement Attributes

No.	Attribute	*r* calculated Importance	*r* calculated Satisfaction	*r* table	Interpretation
1	Coffee flavor variation	0.559	0.409	0.304	Valid
2	Strong and brownish coffee aroma	0.467	0.423	0.304	Valid
3	Distinctive coffee taste, appropriate bitterness	0.446	0.742	0.304	Valid
4	Packaging design with complete information	0.516	0.492	0.304	Valid
5	Coffee texture	0.731	0.503	0.304	Valid
6	Long-lasting coffee taste on the palate	0.479	0.448	0.304	Valid
7	Affordable price	0.582	0.658	0.304	Valid
8	Attractive packaging design	0.608	0.461	0.304	Valid

Source: Processed research data

As shown in Table 1, the highest validity coefficient for importance was obtained for coffee texture at 0.731, followed by attractive packaging design at 0.608 and affordable price at 0.582. The lowest importance coefficient occurred for distinctive coffee taste and appropriate bitterness at 0.446, although this value remained substantially above the critical value. For satisfaction, distinctive coffee taste and appropriate bitterness recorded the highest coefficient at 0.742, whereas coffee flavor variation recorded the lowest at 0.409. The difference between the highest and lowest coefficients indicates variation in the strength of item relationships, but none of the values approached the exclusion threshold of 0.304. These findings support the retention of all eight attributes as empirically supported inputs for QFD, particularly because customer requirements in coffee-product development commonly involve interacting sensory and non-sensory dimensions (Kustriyanto et al., 2024). The validated items consequently provide a sufficiently consistent measurement basis for proceeding to the reliability assessment and formation of the customer requirements.

Reliability analysis was conducted using Cronbach's Alpha in IBM SPSS Statistics 27 to assess the internal consistency of the questionnaire responses for the importance and satisfaction dimensions. The predetermined criterion was a Cronbach's Alpha value greater than 0.60, indicating acceptable internal consistency for the measurement instrument used in the study. The available initial data specify the reliability criterion but do not report the numerical Cronbach's Alpha values obtained separately for the importance and satisfaction constructs, so no unsupported Alpha coefficient is introduced into the analysis. Based on the reported methodological conclusion, the instrument met the reliability requirement and was considered suitable for subsequent QFD calculations. Reliability assessment is particularly relevant because QFD decisions depend on aggregated customer judgments, making consistency across responses important for establishing dependable priority weights (Priyatna & Safirin, 2023). The combination of validity and reliability testing therefore established the measurement quality required before customer responses were incorporated into the planning matrix.

The formation of customer requirements integrated information obtained through direct observation, interviews with customers and management, and the quantitative questionnaire survey. This integration resulted in eight requirements covering coffee flavor variation, coffee aroma, distinctive taste and appropriate bitterness, packaging information, coffee texture, persistence of taste, affordability, and packaging attractiveness. The resulting requirements represent the voice of the customer that must be translated into technical characteristics through QFD rather than being treated only as descriptive consumer preferences. Such translation enables subjective expectations to be connected with controllable product-development parameters, including coffee-bean selection, roasting, grinding, sorting, and packaging design (Lestari & Abdurahman, 2021). The classification of these requirements also facilitates a structured assessment of product quality by linking individual customer expectations to broader quality dimensions. This approach is consistent with coffee-product development studies that employ QFD to transform consumer preferences into prioritized technical specifications and development actions (Nastiti et al., 2025).

Table 2. Customer Requirement Attributes for Coffee Products

Code	Dimension	Customer Requirements
A	Performance	Coffee flavor variation
B	Features	Strong and brownish coffee aroma
C	Reliability	Distinctive coffee taste, appropriate bitterness
D	Reliability	Packaging design with complete information
E	Conformance	Coffee texture
F	Durability	Long-lasting coffee taste on the palate
G	Serviceability	Affordable price
H	Aesthetics	Attractive packaging design

Source: Identification of customer requirements

The classification in Table 2 indicates that the customer requirements extend beyond the intrinsic sensory characteristics of coffee and encompass functional, economic, and visual dimensions

of the product. Performance is represented by coffee flavor variation, while Features captures the desired strong and brownish coffee aroma; Reliability encompasses both distinctive taste and complete packaging information. Conformance is represented by coffee texture, Durability by the persistence of taste on the palate, Serviceability by affordability, and Aesthetics by packaging attractiveness. This multidimensional structure provides a more comprehensive representation of customer expectations because product evaluation is not restricted to the beverage itself. Similar research on coffee products indicates that packaging characteristics and consumer preferences can become important inputs in determining product-development priorities through QFD (Putri et al., 2022). The resulting classification consequently establishes a structured customer-requirement layer that can be connected systematically to technical characteristics in the subsequent House of Quality analysis.

Analytical Settlement of Single and Pile Groups Based on the Vesic Method

The planning matrix was constructed to quantify the relative priority of each customer requirement before the requirements were translated into technical responses. The matrix incorporated Importance to Customer (ITC), Customer Satisfaction Performance (CSP), Goal, Improvement Ratio (IR), Sales Point (SP), Raw Weight (RW), and Normalized Raw Weight (NRW) as interconnected indicators. ITC represents the perceived importance of an attribute, while CSP reflects the customer's assessment of the current product performance. Goal establishes the desired performance level, whereas IR indicates the magnitude of improvement required to approach that target. SP incorporates the potential contribution of an attribute to the commercial attractiveness of the product, while RW combines the relevant priority factors into an initial weighting value. NRW subsequently normalizes RW so that the relative contribution of each requirement can be compared on a common scale, making it a key indicator for prioritizing customer-oriented product development (Ginting et al., 2020).

The comparison between ITC and CSP provides an initial indication of whether the current product performance corresponds to customer expectations. Four attributes—coffee flavor variation, distinctive coffee taste with appropriate bitterness, packaging design with complete information, affordable price, and attractive packaging design—received an ITC score of 4, indicating that these attributes were regarded as highly important by respondents. The remaining attributes, namely strong and brownish coffee aroma and coffee texture, received an ITC score of 3, as did long-lasting coffee taste on the palate. CSP values ranged from 3.33 to 3.60, indicating that respondents generally expressed relatively positive satisfaction with the existing coffee product despite differences between individual attributes. The highest CSP was recorded for distinctive coffee taste and appropriate bitterness at 3.60, while attractive packaging design obtained the lowest CSP at 3.33. This contrast is analytically important because a high satisfaction score does not automatically produce a high development priority when importance, target performance, improvement requirements, and sales potential are considered simultaneously (Priyatna & Safirin, 2023).

Table 3. Customer Requirement Planning Matrix Results

No.	Attribute	ITC	CSP	Goal	IR	SP	RW	NRW
1	Coffee flavor variation	4	3.38	4	1.2	1.5	7.11	0.170
2	Strong and brownish coffee aroma	3	3.48	4	1.2	1.2	4.14	0.099
3	Distinctive coffee taste, appropriate bitterness	4	3.60	3	0.8	1.2	4.00	0.096
4	Packaging design with complete information	4	3.45	4	1.2	1.2	5.57	0.133
5	Coffee texture	3	3.50	3	0.9	1.5	3.86	0.092
6	Long-lasting coffee taste on the palate	3	3.48	4	1.2	1.2	3.11	0.074
7	Affordable price	4	3.53	4	1.1	1.5	6.81	0.163
8	Attractive packaging design	4	3.33	4	1.2	1.5	7.22	0.173

Source: QFD data processing

The numerical pattern in Table 3 establishes a clear hierarchy of customer requirements based on NRW. Attractive packaging design achieved the highest NRW at 0.173, followed closely by coffee

flavor variation at 0.170 and affordable price at 0.163. These three attributes jointly account for 0.506 of the normalized priority weighting, indicating that visual appeal, product variety, and price represent a substantial portion of the development emphasis generated by customer perceptions. Packaging design with complete information occupied the next position at 0.133, followed by strong and brownish coffee aroma at 0.099 and distinctive coffee taste with appropriate bitterness at 0.096. Coffee texture and long-lasting coffee taste on the palate recorded lower values of 0.092 and 0.074, respectively. The priority pattern supports previous findings that QFD can identify differentiated customer priorities and convert them into a more focused basis for product-development decisions rather than treating every customer attribute as equally important (Sulaeman et al., 2024).

The high NRW of attractive packaging design can be explained by the combination of high customer importance, relatively low current satisfaction, a target of 4, an improvement ratio of 1.2, and a sales point of 1.5. Coffee flavor variation produced a similarly high priority because its ITC reached 4, its CSP was only 3.38 against a target of 4, and its sales point was also 1.5. Affordable price likewise obtained a high NRW of 0.163 because it combined high importance, a target of 4, an improvement ratio of 1.1, and a sales point of 1.5. The prominence of these three attributes indicates that customers evaluate product development through a combination of functional expectations and perceived value rather than through sensory quality alone. Research on coffee packaging has similarly demonstrated that consumer preferences for packaging characteristics can become important determinants in QFD-based product-development priorities (Putri et al., 2022). The results therefore suggest that product improvement at Sudut Kota Coffee and Space should simultaneously address product differentiation, price-value perception, and visual presentation.

The relationship between CSP and NRW further demonstrates why QFD prioritization cannot be based solely on current satisfaction levels. Distinctive coffee taste and appropriate bitterness recorded the highest CSP of 3.60, but its NRW was only 0.096 because the established target was 3 and the calculated IR was 0.8, indicating that the existing performance had already reached or exceeded the specified development target. In contrast, attractive packaging design had the lowest CSP at 3.33 but the highest NRW at 0.173 because the desired target was 4 and the attribute received an IR of 1.2 together with a sales point of 1.5. This difference demonstrates that a relatively satisfactory attribute can have limited improvement priority when its target has already been achieved, whereas an attribute with lower satisfaction can become strategically important when customers consider it highly important and commercially valuable. The same logic has been identified in QFD-based coffee-product studies, where customer importance, performance gaps, and improvement priorities collectively determine the direction of technical development (Bawazier et al., 2025). The planning matrix therefore functions not merely as a ranking instrument but as a decision mechanism for distinguishing attributes that require maintenance from those requiring substantive development.

The NRW hierarchy provides the principal bridge between the empirical voice of customers and the technical specifications developed in the subsequent House of Quality. The three highest-priority requirements—attractive packaging design, coffee flavor variation, and affordable price—indicate that technical responses should be capable of influencing product differentiation, packaging presentation, and perceived value. At the same time, the relatively high priority of packaging information at 0.133 indicates that packaging development should address both visual attractiveness and the completeness of information provided to customers. This customer-oriented translation is consistent with QFD research in coffee-product development, where customer requirements are systematically converted into technical characteristics and prioritized according to their contribution to product quality (Kustriyanto et al., 2024). The findings also support the use of QFD as a structured mechanism for linking consumer expectations with technical decisions, particularly when several product attributes compete for limited development resources (Khomah et al., 2025). The resulting NRW priorities consequently become the quantitative input for determining the relative importance of coffee type, roasting, grinding, bean sorting, packaging form, packaging color, and package size in the next stage of product development.

Technical Response and House of Quality Analysis

The next stage of the QFD process translated the prioritized customer requirements into technical responses that could be controlled and implemented by Sudut Kota Coffee and Space. Customer requirements such as flavor variation, aroma strength, appropriate bitterness, coffee texture,

taste persistence, affordability, and packaging attractiveness represent customer-oriented statements that cannot be directly applied as operational specifications. The House of Quality (HoQ) provides a structured mechanism for connecting these requirements with measurable or controllable technical characteristics through a relationship matrix. The strength of each relationship determines how strongly a technical response contributes to fulfilling a particular customer requirement, allowing technical priorities to be calculated from the previously established customer weights. This translation process is central to QFD because it converts the voice of customers into technical development decisions while preserving the relative importance assigned by customers (Ginting et al., 2020). In coffee-product development, the approach enables sensory expectations and packaging preferences to be connected with controllable processing and product-design parameters (Kustriyanto et al., 2024).

Seven technical characteristics were identified as responses to the eight customer requirements, comprising coffee type, roasting, packaging shape, packaging color, packaging size, grinder process, and coffee bean sorting. Coffee type represents a fundamental raw-material decision that can influence flavor, aroma, acidity, bitterness, and other sensory characteristics of the resulting coffee product. Roasting relates to the transformation of green coffee beans into a roasted product with specific sensory and physicochemical characteristics, while the grinder process determines the particle-size condition of the coffee before use. Coffee bean sorting functions as a quality-control response by selecting beans according to the established quality criterion. On the packaging side, packaging shape, packaging color, and packaging size provide technical responses to customer expectations concerning product presentation and physical characteristics. Similar QFD applications in coffee-product development have identified raw-material selection, processing parameters, and packaging characteristics as important technical responses for translating consumer expectations into product specifications (Lubis et al., 2023).

Table 4. Technical Specifications of Coffee Products

No.	Technical Specifications	Unit
1	Coffee type	List
2	Roasting	°C
3	Packaging shape	List
4	Packaging color	List
5	Packaging size	Gram
6	Grinder process	rpm
7	Coffee bean sorting	Quality No. 1

Source: Identification of technical specifications

The specifications in Table 4 indicate that the QFD model combines categorical characteristics with process-oriented and quantitative specifications. Coffee type, packaging shape, and packaging color are categorical variables that define product identity and presentation, whereas roasting and packaging size provide measurable parameters for controlling product development. The grinder process is expressed in revolutions per minute (rpm), linking the technical response to equipment operation, while coffee bean sorting is defined according to a quality criterion. This structure provides an operational pathway through which customer requirements can be connected with specific development actions rather than remaining at the level of consumer preference statements. The inclusion of packaging specifications is particularly relevant because packaging can function as a technical response to consumer expectations concerning attractiveness and information presentation (Yasmi, 2023). The resulting characteristics were subsequently incorporated into the HoQ relationship matrix to determine the relative contribution of each technical response.

The relationship matrix was used to assess the degree to which each technical characteristic could fulfill each customer requirement, while the technical-correlation component identified interactions among technical responses. A strong relationship indicates that changes in a particular technical characteristic are expected to provide a substantial response to a corresponding customer requirement, whereas weaker relationships indicate a more limited contribution. The relationship structure prevents technical priorities from being established independently of customer expectations because the weighting of each technical characteristic is derived from its relationship with customer

requirements and their corresponding NRW values. Technical correlation further supports the identification of mutually supportive or potentially conflicting technical decisions, which is important when several characteristics influence the same customer expectation. This analytical structure allows the HoQ to function as a traceable decision framework in which customer priorities are propagated into technical priorities (Ginting et al., 2020). Such integration has been applied in coffee-product studies to establish development priorities from consumer requirements and their relationships with technical characteristics (Sulaeman et al., 2024).

Table 5. Priority of Technical Specifications for Coffee Products

Rank	Technical Specifications	Normalized Contribution
1	Coffee type	0.321
2	Packaging shape	0.201
3	Packaging color	0.114
4	Roasting	0.110
5	Packaging size	0.100
6	Coffee bean sorting	0.093
7	Grinder process	0.061

Source: House of Quality results

The values in Table 5 show that coffee type is the dominant technical priority, with a normalized contribution of 0.321, substantially higher than packaging shape at 0.201 and packaging color at 0.114. This result indicates that raw-material selection has the broadest technical influence on the prioritized customer requirements, particularly those associated with flavor variation, aroma, distinctive taste, and other sensory characteristics. Coffee type can simultaneously affect multiple sensory dimensions, making it a high-leverage technical decision within the HoQ structure (Lubis et al., 2023). Packaging shape also has a substantial contribution of 0.201, which corresponds with the high NRW obtained for attractive packaging design and indicates that product presentation constitutes a meaningful technical pathway for addressing customer expectations. At the lower end, grinder process obtained a normalized contribution of 0.061, suggesting that its direct contribution to the prioritized customer requirements was comparatively limited within the relationship structure established in this study. The technical hierarchy therefore indicates that development resources should initially emphasize coffee-bean selection and packaging configuration, while processing and secondary technical characteristics should be managed in accordance with their lower relative contribution.

Product Concept Selection and Final Product Design

The technical priorities obtained from the House of Quality were subsequently used as the basis for generating alternative coffee-product concepts. The alternatives were constructed by combining the seven technical characteristics, namely coffee type, roasting, packaging shape, packaging color, packaging size, grinder process, and coffee bean sorting, into different product configurations. This approach ensured that the alternative concepts remained connected to the technical responses that had previously been prioritized from customer requirements. Concept generation is an important stage in QFD-based product development because technical priorities need to be transformed into feasible product configurations that can be compared systematically (Kustriyanto et al., 2024). In the present study, Concept II was formulated using Arabica coffee, stand-up pouch packaging, brown packaging color, brown roasting, a 500 g package size, color-based bean sorting, and fine grinding. The alternative configurations were subsequently evaluated through concept screening and concept scoring to identify the concept with the strongest overall alignment with customer requirements.

Concept screening was performed as an initial filtering mechanism by comparing each alternative concept against a reference concept using positive (+), neutral (0), and negative (−) evaluations. The purpose of this stage was to identify concepts that demonstrated sufficient relative advantages to proceed to a more detailed evaluation. Concept I obtained a final value of −1, while Concept III also obtained −1, indicating weaker comparative performance and resulting in their exclusion from the subsequent scoring stage. Concept II obtained a final value of 6 and achieved the highest position among the screened alternatives, while Concept IV was retained as the reference

concept for the next comparison. This sequential screening approach reduces the number of alternatives requiring detailed assessment while maintaining a transparent connection between technical characteristics and concept decisions (Ginting et al., 2020). The screening results therefore established Concept II as the principal development candidate before its performance was evaluated quantitatively against the reference concept.

Table 6. Concept Screening Results

Concept	Number (+)	Number (0)	Number (−)	Final Value	Rank	Decision
I	2	3	3	−1	2	Not continued
II	6	2	0	6	1	Continued
III	3	1	4	−1	4	Not continued
IV	0	8	0	0	3	Reference

Source: Concept screening results

Table 6 shows that Concept II produced six positive comparisons, two neutral comparisons, and no negative comparison, resulting in a final value of 6 and the first rank among the evaluated alternatives. Concept I produced two positive, three neutral, and three negative comparisons, while Concept III produced three positive, one neutral, and four negative comparisons, resulting in both concepts being excluded from further development. Concept IV recorded eight neutral comparisons because it functioned as the reference configuration rather than as a candidate to be selected through the same screening basis. The absence of negative comparisons for Concept II indicates that its technical configuration was consistently favorable relative to the reference criteria during the initial filtering process. This finding is consistent with QFD-based product development, where concept screening can be used to narrow alternative designs before more detailed weighted evaluation is undertaken (Prihastari & Sabarisman, 2021). Concept II was therefore retained for concept scoring, where the eight customer-oriented criteria were assigned explicit weights to obtain a more differentiated quantitative comparison.

The concept scoring stage provided a more detailed evaluation by assigning weights to eight customer requirements according to their relative importance in selecting the final product concept. The criteria comprised coffee flavor variation, strong and brownish coffee aroma, distinctive coffee taste with appropriate bitterness, packaging design with complete information, coffee texture, long-lasting coffee taste on the palate, affordable price, and attractive packaging design. The highest weight was assigned to coffee flavor variation at 20%, followed by affordable price and attractive packaging design at 15% each, while coffee texture received 12%, aroma, taste, and taste persistence received 10% each, and packaging information received 8%. Each concept was rated against these criteria, and the weighted values were calculated and aggregated to produce the final concept score. Concept II was compared directly with Concept IV because Concept IV represented the reference configuration retained from the screening stage. The weighted-scoring approach allows several customer requirements to influence the final decision simultaneously and has been applied in QFD-oriented coffee-product development to support systematic concept selection (Firdaus, 2023).

Table 7. Concept Scoring Results

Selection Criteria	Weight	Concept II	Concept IV
Coffee flavor variation	20%	0.80	0.60
Strong and brownish coffee aroma	10%	0.40	0.30
Distinctive coffee taste, appropriate bitterness	10%	0.00	0.30
Packaging design with complete information	8%	0.40	0.24
Coffee texture	12%	0.48	0.36
Long-lasting coffee taste on the palate	10%	0.00	0.30
Affordable price	15%	0.60	0.45
Attractive packaging design	15%	0.60	0.45
Total	**100%**	**3.28**	**3.00**
Rank		**1**	**2**

Source: Source: Concept scoring results

As shown in Table 7, Concept II achieved a total weighted score of 3.28, exceeding the 3.00 obtained by Concept IV, with a difference of 0.28 points. The higher score of Concept II was supported by its performance in coffee flavor variation, aroma, packaging information, coffee texture, affordability, and packaging attractiveness, although Concept IV performed better on distinctive taste and taste persistence. The result indicates that Concept II provided a stronger aggregate fit across the weighted customer criteria even though it did not outperform the reference concept on every individual requirement. This pattern demonstrates the value of weighted concept scoring because the final decision reflects the relative importance of each requirement rather than treating all criteria as equally influential. Similar QFD applications in coffee products emphasize the need to balance sensory quality, consumer preferences, packaging, and economic considerations when selecting a product concept (Sulaeman et al., 2024). Concept II was therefore selected as the final development concept because its aggregate performance provided the strongest alignment with the weighted customer requirements established in the preceding QFD stages.

Table 8. Specifications of Selected Product Concept II

No.	Technical Specifications	Concept II
1	Coffee type	Arabica coffee
2	Packaging shape	Stand-up pouch
3	Packaging color	Brown
4	Roasting	Brownish
5	Packaging size	500 grams
6	Coffee bean sorting	Based on color
7	Grinder process	Fine grinding

Source: Final design of Concept II

The final configuration integrates the technical priorities identified through the HoQ with the customer preferences represented in the planning matrix and concept-scoring stages. Arabica coffee was selected as the primary coffee type because raw-material selection represents the highest technical priority, with a normalized contribution of 0.321, while the stand-up pouch responds to the substantial contribution of packaging shape at 0.201. The brown packaging color, brown roasting, 500 g package size, color-based bean sorting, and fine grinding complete the technical configuration established through the QFD process. The integration of coffee type and processing characteristics addresses sensory expectations, while the packaging configuration responds to the high customer priority associated with visual product appeal and packaging characteristics (Yasmi, 2023). The final design therefore represents a traceable sequence from empirical customer requirements to prioritized technical responses and, finally, to a selected product concept rather than an independently formulated product specification. This configuration provides Sudut Kota Coffee and Space with a structured product-development reference that can subsequently be subjected to prototype testing and post-implementation customer evaluation, as QFD-based product development is most effective when prioritized technical requirements are ultimately verified through actual product performance (Tri Ummarta et al., 2024).

CONCLUSION

Based on the findings of this study on coffee product design and development at Sudut Kota Coffee and Space using the Quality Function Deployment (QFD) method, customer requirements were found to encompass product quality, information, packaging, and price aspects. Eight customer requirement attributes were identified, namely coffee flavor variation, strong and brownish coffee aroma, distinctive taste with an appropriate level of bitterness, information on the packaging, coffee texture, aftertaste persistence, affordable price, and attractive packaging design. The planning matrix indicated that attractive packaging design was the highest-priority customer requirement, with a Normalized Raw Weight (NRW) value of 0.173. This was followed by coffee flavor variation with an NRW value of 0.170 and affordable price with an NRW value of 0.163. These customer requirements were subsequently translated into seven technical characteristics, namely coffee type, roasting, packaging shape, packaging color, packaging size, grinder process, and coffee bean sorting. The House

of Quality (HoQ) analysis showed that coffee type was the highest-priority technical characteristic, with a Normalized Contribution of 0.321, followed by packaging shape at 0.201 and packaging color at 0.114. These findings demonstrate that QFD can systematically connect the voice of customers with measurable technical priorities, allowing the most important customer expectations to serve as a basis for product development.

The concept selection process identified Concept II as the best alternative after undergoing concept screening and concept scoring. Concept II achieved a concept scoring value of 3.28, which was higher than Concept IV as the reference product, which obtained a score of 3.00. The superiority of Concept II indicates that its combination of selected product characteristics provides a better overall response to customer criteria than the other alternatives. The final Concept II design consists of Arabica coffee, a brown stand-up pouch package, brown roasting, a 500-g package size, color-based coffee bean sorting, and fine grinding. The integration of these characteristics represents the transformation of customer requirements and technical priorities into a concrete product design. Overall, the application of QFD provides a systematic framework for product development, beginning with customer requirement identification, priority determination, translation into technical characteristics, and final concept selection. The findings can serve as a practical basis for Sudut Kota Coffee and Space to develop coffee products that are more closely aligned with customer preferences while improving packaging quality and product competitiveness.

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