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Low-Code E-Catalogue Implementation for Improving Menu Information Accessibility in Café MSMEs

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Abstract: Many small cafés rely on conventional menus that provide limited information, making customers dependent on staff explanations. This study examines changes in customers' perceived accessibility of menu information following the implementation of a low-code e-catalogue at Tawa Cafe, Samarinda, Indonesia. Using Lewin's action research model and a one-group pretest–posttest design, data were collected from 35 customers through a 15-item questionnaire, interviews, an EPIC design assessment, document analysis, and Google Analytics 4. Data were analyzed using the Wilcoxon signed-rank test and normalized gain. Mean accessibility increased from 2.47 to 4.60, with 33 respondents reporting improvement ($Z = -5.072$, $p < .001$, $r = .61$). The mean individual N-Gain was 0.74. Analytics recorded 150 new users during the observation period, while interviews indicated fewer menu-related questions at the cashier. Despite these findings, the absence of a control group limits causal inference. The study offers a practical, replicable digital-menu approach for café MSMEs.

Keywords: information accessibility; e-catalogue; Google Sites; action research; culinary MSMEs.

Introduction

Digitalization has fundamentally transformed how consumers search for, process, and evaluate information before making purchasing decisions. Within the food and beverage industry, menus have evolved beyond their conventional function as price lists into strategic marketing communication tools that influence consumer perceptions,

expectations, and purchasing behaviour (Ozdemir & Caliskan, 2014). Previous hospitality research demonstrates that the visual presentation and completeness of online menu information are associated with consumers' purchase intentions. Similarly, the adoption of tablet-based menus and smartphone applications has been shown to enhance the food selection experience by providing consumers with more accessible and interactive information (F. Okumus et al., 2020). These developments indicate that accessible and informative menus are increasingly important in supporting consumer decision-making. Consequently, providing comprehensive product information at the point of purchase should be considered an essential component of contemporary food service delivery rather than merely an additional service feature.

This transformation is particularly relevant in Indonesia, where the expansion of internet connectivity has created substantial opportunities for businesses to engage with digitally connected consumers. According to the 2024 national survey conducted by the Indonesian Internet Service Providers Association, based on face-to-face interviews with 8,720 respondents across 38 provinces between 18 December 2023 and 19 January 2024, Indonesia had approximately 221.56 million internet users out of an estimated population of 278.70 million in 2023, representing an internet penetration rate of 79.5% (Asosiasi Penyelenggara Jasa Internet Indonesia, 2024). Furthermore, approximately 70% of internet users aged 16–64 reportedly search for brand-related information online before making purchases (Prayuti et al., 2024). This changing consumer behaviour highlights the growing importance of information availability, accuracy, and accessibility in purchasing decisions. Previous studies have established that complete product information can influence purchasing decisions, while clear and accurate information enables consumers to better understand product value (Komalasari et al., 2022). The widespread availability of mobile internet further facilitates consumers' access to information regardless of time and location. For micro, small, and medium enterprises (MSMEs), these developments offer opportunities to strengthen competitiveness and improve business performance through digital transformation. Nevertheless, the availability of digital technology does not automatically ensure that MSMEs have effectively integrated accessible and informative digital media into their customer service processes (Hutagalung et al., 2025; Marfuah et al., 2023).

This issue is evident at Tawa Cafe, a culinary MSME established in February 2025 in Samarinda City, Indonesia, with 12 employees. Despite operating in an increasingly digital consumer environment, the cafe initially relied on conventional menu displays at its checkout counter and social media platforms that presented only product names and prices, without photographs or descriptive information. Preliminary interviews with the owner on 22 May 2025 and two employees on 30 May 2025 revealed that customers, particularly first-time visitors, frequently requested additional information regarding product ingredients, spiciness levels, portion sizes, and differences between similarly named menu items, such as "Matcha Original" and "Happy Matcha." One employee reported that a single customer could ask questions about two or three different products before making a decision, potentially prolonging the ordering process and contributing to checkout queues during peak periods, particularly in the late afternoon after lectures and on Saturday nights. Although no systematic observations of inquiry frequency or

ordering duration had been conducted, preliminary questionnaire results indicated that customers' perceived accessibility of menu information was relatively low, with a mean score of 2.47 on a five-point scale and no individual item reaching 3.00. Such information deficiencies may complicate the purchasing process and potentially undermine customer satisfaction and loyalty over time (Nandawidani & Silitonga, 2024). Importantly, this case should not be interpreted as representative of all Indonesian café MSMEs; rather, Tawa Cafe provides an information-rich setting for examining how a targeted digital intervention may address a specific customer information-access problem.

Existing studies relevant to this issue can be categorized into three major research streams. The first stream focuses on digital and electronic menus within hospitality settings, examining their relationships with purchase intentions, dining experiences, and technology acceptance (Beldona et al., 2014; Brewer & Sebby, 2021; B. Okumus et al., 2018). Although these studies establish the importance of digital menu presentation and information provision, their primary emphasis is on consumer attitudes, intentions, or experiences, rather than measurable changes in customers' actual access to menu information within operational business environments. The second stream comprises information systems studies in Indonesia that develop web-based, Android-based, and social-media-based electronic catalogues using approaches such as waterfall, rapid application development, and user-centred design (Butarbutar et al., 2022; García-Suárez et al., 2020). Other research has explored digital catalogues as promotional instruments in coffee shops (Irshad et al., 2024), while studies in public institutions have examined their contribution to procurement efficiency (Ichsan et al., 2024). However, these studies predominantly emphasize system development, technical functionality, promotional applications, or institutional efficiency, leaving customer-level changes in information accessibility insufficiently examined. The third stream investigates the feasibility of no-code platforms, particularly Google Sites, as tools that can be developed and maintained without advanced programming skills (Zahoor et al., 2025). Nevertheless, existing applications have largely concentrated on educational media development (Prihatiningtyas et al., 2022) and MSME digital skills training rather than the provision of customer-facing product information in small food businesses.

Despite the contributions of these research streams, several important gaps remain. First, an empirical gap exists regarding the extent to which implementing a digital catalogue can improve customers' perceived accessibility of menu information in an operational Indonesian café MSME, particularly through measurements involving the same respondents before and after implementation. Second, a conceptual gap concerns the limited application of information accessibility as a customer-level construct in the context of digital product information. Previous studies have primarily examined accessibility in relation to physical locations, tourism destinations, and library collections (Ma'sum et al., 2023), whereas its application to the accessibility of menu information remains relatively underexplored. Third, a practical gap concerns the need for affordable, manageable, and adaptable digital solutions that MSMEs can independently maintain without relying on advanced programming expertise. Addressing these gaps, this study does not claim novelty merely from employing Google

Sites as a digital platform. Instead, its contribution lies in conceptualizing menu information accessibility as a multidimensional customer-level outcome grounded in information-access and information-quality perspectives; empirically examining changes in the same customers' perceived accessibility before and after a digital catalogue intervention; and integrating quantitative findings with stakeholder assessments, interviews, and behavioural usage data. This approach provides a more comprehensive understanding of the potential contribution of low-cost digital interventions to customer information accessibility in small-scale food businesses.

Accordingly, this study aims to examine the accessibility of menu information at Tawa Cafe before the implementation of an electronic catalogue, describe the development process of a low-code electronic catalogue as a customer-facing menu information medium, and evaluate the extent to which customers' perceived accessibility of menu information changes following its implementation. To achieve these objectives, the study adopts an action research approach incorporating paired pretest–posttest measurements and data triangulation. The investigation focuses on four dimensions of perceived menu information accessibility and examines changes among the same customers before and after the intervention. It is important to clarify that this study does not seek to test or extend the Technology Acceptance Model, as constructs such as perceived usefulness, attitudes, and behavioural intention to use technology are not directly measured. Rather, its theoretical contribution is to demonstrate how search-cost, information-quality, and dual-coding arguments can be operationalized into observable dimensions of menu information accessibility and evaluated through an applied digital intervention. From a practical perspective, the findings are expected to provide an adaptable implementation and maintenance reference for culinary MSMEs seeking to improve customer access to product information through affordable digital technologies.

Literature Review

Menu information accessibility can be understood through four complementary theoretical perspectives. First, the economics of information explains that consumers incur search costs when obtaining information before making purchasing decisions, while limited information increases uncertainty and delays decision-making (Stigler, 1961). Second, perceived accessibility encompasses physical access, interface usability, and the ability to retrieve relevant information, indicating that the availability of a menu does not necessarily ensure that customers can easily understand its contents (Culnan, 1985). Third, information-quality theory emphasizes that information must be accurate, accessible, and reliable to support effective use and customer satisfaction (DeLone & McLean, 2003; Wang & Strong, 1996). Fourth, dual coding theory suggests that combining verbal and visual information facilitates comprehension and retention (Paivio, 1991). Drawing on these perspectives and accessibility indicators in service settings (Sukmawati et al., 2025), this study defines menu information accessibility as customers' perceived ability to obtain, understand, trust, and use menu information independently when making purchasing decisions. The construct comprises four dimensions: ease of access, referring to the effort and time required to locate and

understand information (Culnan, 1985; Davis, 1989); convenience, concerning the comfort of reading information and selecting products (Paivio, 1991; Wang & Strong, 1996); security, referring to the accuracy, credibility, and consistency of information with actual products (DeLone & McLean, 2003; Wang & Strong, 1996); and fluency, describing the ability to navigate information and make decisions without unnecessary interruptions (Stigler, 1961). In this context, security concerns information reliability rather than physical safety or data protection, while the absence of login requirements and personal data collection represents a design feature rather than a measured construct.

The e-catalogue is introduced as a digital intervention designed to improve menu information accessibility through Google Sites, incorporating product names, prices, descriptions, photographs, categorized menus, QR-code access, and a WhatsApp contact link. Its contribution operates through three mechanisms: information completeness, which reduces ambiguity and customers' dependence on staff explanations through visual and descriptive content (Brewer & Sebby, 2021; Clark & Paivio, 1991); ease of access, which reduces physical and interface barriers by enabling customers to retrieve information directly through their smartphones (Culnan, 1985; Davis, 1989; Prihatiningtyas et al., 2022); and service fluency, which facilitates navigation and communication through categorized products and integrated contact features (Diandra & W.S, 2022). Previous studies indicate that informative online menus are associated with purchase intention (Brewer & Sebby, 2021), electronic menus can enrich customer experiences (Beldona et al., 2014), and digital catalogues support consumer understanding of business identities and product offerings, particularly among Indonesian MSMEs (Amir & Muhammad, 2024; Butarbutar et al., 2022; Qisthiano & Imron, 2024). Nevertheless, existing research has predominantly emphasized descriptive evaluations and digital catalogue development, leaving limited empirical evidence concerning changes in customers' perceived menu information accessibility before and after implementation in small café settings. Although the Technology Acceptance Model (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003) provide relevant interpretive perspectives, this study distinguishes perceived ease of use from menu information accessibility, which focuses on obtaining, understanding, trusting, and utilizing information rather than adopting technology.

Theoretically, implementing an e-catalogue is expected to reduce information search costs, improve information retrieval, strengthen perceived information reliability, and facilitate customer decision-making (Stigler, 1961; Culnan, 1985; DeLone & McLean, 2003; Wang & Strong, 1996; Paivio, 1991). By integrating visual and textual information with accessible digital navigation, customers are expected to obtain more complete menu information with less effort and greater confidence. This expectation is consistent with previous findings concerning the benefits of informative online menus and digital catalogues in consumer and business contexts (Brewer & Sebby, 2021; Beldona et al., 2014; Amir & Muhammad, 2024; Butarbutar et al., 2022; Qisthiano & Imron, 2024). However, because empirical evidence on pre–post changes in menu information accessibility remains limited, this study examines whether the implementation of an e-catalogue is associated with measurable improvements in customers' perceptions.

Accordingly, the following hypothesis is proposed: H1: Customers' perceived accessibility of menu information is higher after the e-catalogue implementation than before it. Given the one-group pretest–posttest design, this hypothesis examines differences between the two measurement periods and does not independently establish a causal effect.

Research Methodology

This study employed Lewin's action research model, comprising four stages: planning, action, observation, and reflection (Kemmis et al., 2014; Lewin, 1946). The research was conducted at Tawa Cafe, Samarinda City, from March 2025 to January 2026, involving collaboration between researchers, the café owner, and two employees. During the planning stage, preliminary observations, document reviews, and interviews were conducted to identify menu information problems and determine the appropriate intervention. The action stage involved developing and implementing a web-based e-catalogue using Google Sites, integrating product descriptions, photographs, prices, categorized menus, QR-code access, and a WhatsApp contact link, followed by employee training and design feasibility assessment. During observation, customer responses were collected through pretest and posttest questionnaires, while website usage was monitored through Google Analytics 4 (GA4) from 20 October to 22 November 2025. The reflection stage evaluated the intervention through statistical results, website analytics, observations, and interviews, leading to the completion of one action research cycle. The intervention was evaluated using a one-group pretest–posttest design, in which the same respondents were assessed before (O_1) and after (O_2) implementation (X) (Al Muhandis & Riyadi, 2023; Sugiyono, 2022). Although this design cannot eliminate internal validity threats, including history, maturation, testing effects, novelty, and response bias (Shadish et al., 2002), triangulation with website analytics and interviews was employed to strengthen the interpretation of findings. Participants consisted of the café owner, two employees, one external digital media expert, and 35 customers recruited through convenience sampling. All customers completed both measurements and were included in the analysis. Sensitivity analysis indicated that 35 paired observations were adequate to detect a medium effect ($d_z \approx 0.50$) at $\alpha = .05$ and power = .80 (Faul et al., 2007).

Menu information accessibility was measured using 15 statements adapted from Sukmawati et al. (2025), covering ease of access, convenience, security, and fluency on a five-point Likert scale. The same instrument was administered before and after implementation, referring respectively to the conventional menu and e-catalogue. Design feasibility was assessed using the 18-item EPIC Rate instrument, covering empathy, persuasion, impact, and communication (Chandra et al., 2022; Supardianto & Octaviany, 2023). Four raters evaluated the e-catalogue, and the overall score was calculated as the mean of the four dimensions. Website performance was evaluated using GA4 metrics, including new users, event count, views, active users, average engagement time, and bounce rate, defined according to GA4 engagement criteria (Google, n.d.). Quantitative analysis included Pearson product–moment item validity testing, using a critical correlation value of 0.334 ($df = 33$, $\alpha = .05$) (Utami, 2023), and

Cronbach's alpha reliability testing with a minimum threshold of 0.70, while values above 0.95 indicated potential item redundancy (Amalia et al., 2022; Mahkotawati et al., 2025; Ningsih et al., 2021; Tavakol & Dennick, 2011). Accessibility scores were calculated using item averages and interpreted through five descriptive categories (Kurnia & Mayesti, 2019). Pretest and posttest differences were examined using the Wilcoxon signed-rank test at $\alpha = .05$ (Elsa et al., 2023; Wilcoxon, 1945), with effect size calculated as $r = |Z|/\sqrt{N}$ and reported using both paired and total observation counts (Fritz et al., 2012; Pallant, 2020). Improvement was additionally evaluated using normalized gain (N-Gain), categorized as high ($g > 0.70$), medium ($0.30 \leq g \leq 0.70$), and low ($g < 0.30$) (Fatmi et al., 2021; Hake, 1998; Rahmi et al., 2021). Statistical analyses were performed using IBM SPSS Statistics 26, while qualitative data credibility was strengthened through triangulation of sources and data collection techniques (Romdona et al., 2025; Susanto et al., 2023).

Results

Characteristics of Respondents and Instrument Quality

The customer respondents comprised 20 men (57.1%) and 15 women (42.9%); 33 (94.3%) were aged 17–25 years and 2 (5.7%) were aged 26–35 years. All 35 respondents completed both the pretest and the posttest, and the SPSS output showed no missing values for any item, so no imputation was required. The café is located opposite a university campus, which may explain the predominance of young respondents; however, because no data on the café's overall clientele were available, this profile cannot be assumed to represent all of its customers. The design raters consisted of the owner (25%), two employees (50%), and one external digital media expert (25%).

All 15 items had uncorrected item–total correlations of 0.848–0.953, exceeding the critical value of 0.334 ($p < .001$). Corrected item–total correlations, recomputed from the item-level data, ranged from 0.829 to 0.944, and Cronbach's alpha if item deleted ranged from 0.981 to 0.983 (Appendix Table A1); deleting any single item would therefore not have increased reliability. Cronbach's alpha for the 15 items was 0.983. This value meets the reliability criterion, but because it exceeds 0.95 it also suggests that some items may be redundant (Tavakol & Dennick, 2011); this is considered in the interpretation of the dimension scores and in the limitations. Because no items were revised or deleted, the responses collected for the instrument test were used as the pretest data.

Accessibility of Menu Information Before the Action

In the pre-action condition, mean accessibility of menu information was 2.47 (SD = 0.964), which falls in the low category. Item means ranged from 2.31 to 2.66; the lowest was for "Menu information can be easily viewed through the menu information medium" (2.31), and the highest for "The information displayed on the menu information medium is clear and easy to understand" (item 2; 2.66). No item reached 3.00. Low scores were found across all four dimensions (Table 6), indicating that the problem was not confined to a single aspect of access. Interviews with the owner and employees were consistent with this result: customers often asked about the ingredients, spiciness, and portions of less familiar items such as "Nasi Gila", which lengthened the queue at the cashier during peak hours.

E-Catalogue Development Steps and Design Feasibility

The e-catalogue was developed with Google Sites because the platform requires no programming, is free to use, and produces pages that adapt automatically to phone, tablet, and desktop screens. The development comprised 19 steps grouped into six stages: (1) creating the site and its identity (title, logo, and a background photograph of the café); (2) building the information architecture, consisting of About Us, Menu, and Contact Us pages, with Food Menu (Snack, Main Course), Drink Menu (eight drink categories), and Best Seller sub-pages; (3) entering the content for each item (name, price, short description, photograph, and a hot or cold serving marker); (4) adding navigation between categories, the contact page, social media links, and a Google Maps location; (5) integrating Google Analytics; and (6) publishing the site and producing a QR code with Canva, which was placed on printed media in the café. Table 4 specifies the components of the implementation and the maintenance procedure in a form that can be replicated.

Table 4. E-Catalogue Specification and Maintenance Protocol

Component	Specification as implemented
Platform and cost	Google Sites with a free Google account; no hosting or programming costs. Published URL: https://sites.google.com/view/tawacafe/ (visible to anyone, no sign-in required)
Page structure	Home; About Us; Menu (Food: Snack, Main Course; Drinks: eight categories; Best Seller); Contact Us
Content per item	Name, price, short description (ingredients/taste, and portion where relevant), one photograph, and a hot/cold serving marker
Mobile optimization	Responsive layout generated automatically by Google Sites; the site was checked after construction and tried out with customers on their own phones, and the owner reported that pages displayed properly on phones and laptops
QR code and links	QR code generated with the Gen QR app in Canva, linking to the published URL and carrying the café logo; printed on A6 (10.5 × 14.8 cm) portrait cards with short instructions and placed in the café; all components and links were tested before publication
WhatsApp contact	"Order via WhatsApp" link on each item detail page (wa.me click-to-chat) that opens a pre-filled message, "Hello, is [menu name] available?", added after the EPIC assessment at the owner's suggestion

Navigation and location	Category menu on every page; links to social media; embedded Google Maps location
Analytics	GA4 measurement ID entered in the Google Sites settings; aggregated, anonymous usage reports
Accessibility of content	Each photograph is accompanied by text (name, price, description), so the information does not depend on images alone
Privacy	No login, form, or personal data collection on the site; WhatsApp messages are initiated by customers from their own devices
Content updating	Employees were trained, through hands-on practice with the café's Google account, to add items (photo, name, price, short description, WhatsApp link), update prices, descriptions, and item order, delete unavailable items, and save and republish; recommended rule: changes in price, availability, or serving containers are updated on the day they occur

Source: Development documentation of the authors (2025). Screenshots of the home, About Us, menu, item-detail, and Contact Us pages are available from the authors.

The EPIC assessment produced mean scores of 4.65 for empathy, 4.75 for persuasion, 4.63 for impact, and 4.70 for communication, giving an overall EPIC Rate of 4.68, in the very effective category (Table 5). Persuasion received the highest score and impact the lowest. Individual raters' EPIC Rates ranged from 3.90 to 5.00: three raters scored the design between 4.88 and 5.00, while one rater gave lower scores on all four dimensions (3.60–4.00). Because three of the four raters were internal stakeholders, these values indicate that the people who will operate and present the e-catalogue judged it suitable for use; they should not be read as an independent judgment that the design is very effective. In the open suggestion field, the owner noted that customers still had to type their WhatsApp message manually; an automatic message ("Hello, is [menu name] available?") was therefore added to the link on each item page. Employees were then trained to add, update, and delete menu items so that the e-catalogue could be managed independently.

Table 5. Results of the E-Catalogue Design Feasibility Assessment Based on the EPIC Rate

Dimension	Mean	Category
Empathy	4.65	Very effective
Persuasion	4.75	Very effective
Impact	4.63	Very effective

Communication	4.70	Very effective
EPIC Rate	4.68	Very effective

Source: Primary data processed (2025); n = 4 raters (owner, two employees, one external expert). Categories reflect stakeholder-perceived feasibility.

Accessibility of Menu Information After the Action

After the e-catalogue was implemented, mean accessibility was 4.60 (SD = 0.274), in the very high category, with item means ranging from 4.43 to 4.83. The highest item scores were for choosing a menu item without an employee's explanation (item 15; 4.83) and for seeing menu information easily (item 1; 4.80). The lowest was for the consistency of the information with the actual products (item 10; 4.43). Posttest scores were concentrated near the maximum of the scale: the median was 4.60 (IQR 4.40–4.80), compared with a pretest median of 2.13 (IQR 1.93–3.00), and 4 of 35 respondents obtained the maximum composite score of 5.00. The smaller posttest standard deviation therefore partly reflects this ceiling on the scale and should not be interpreted, on its own, as evidence that perceptions became homogeneous. Dimension scores are compared in Table 6 and Figure 1.

Table 6. Mean Menu Information Accessibility by Dimension Before and After the E-Catalogue Implementation

Dimension (items)	Pretest	Category	Post test	Category	Difference
Ease of access (1–5)	2.45	Low	4.63	Very high	+2.18
Convenience (6–9)	2.44	Low	4.56	Very high	+2.12
Security (10–12)	2.44	Low	4.52	Very high	+2.09
Fluency (13–15)	2.55	Low	4.66	Very high	+2.11
Total accessibility (1–15)	2.47	Low	4.60	Very high	+2.13

Source: Primary data processed (2025); n = 35. Dimension means are the means of the item means; differences were computed from unrounded values, so some differ by 0.01 from the difference of the rounded means.

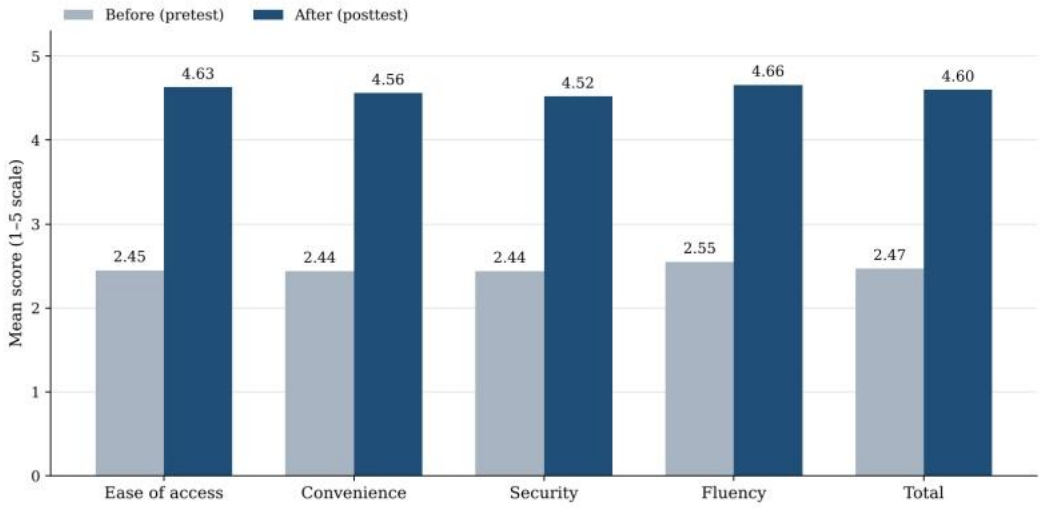


Figure 1. Comparison of Mean Accessibility by Dimension Before and After the E-Catalogue Implementation. *Source: Primary data processed (2025).*

Hypothesis Testing

The Wilcoxon signed-rank test showed 33 positive ranks, 2 negative ranks, and no ties (Table 7). The test yielded $Z = -5.072$, $p < .001$ (two-tailed; asymptotic $p \approx 3.9 \times 10^{-7}$). The two negative differences were small relative to the positive ones, as reflected in the sum of negative ranks (5.50; mean rank 2.75) compared with the sum of positive ranks (624.50; mean rank 18.92). With N defined as the number of pairs (35), the effect size was $r = 5.072/\sqrt{35} = .86$; with N defined as the total number of observations (70), it was $r = .61$. Both values exceed the conventional threshold for a large effect ($r \geq .50$) (Fritz et al., 2012). The mean individual N-Gain was 0.74 (SD = 0.39), in the high category, or 73.75% when expressed as a percentage (fairly effective). The class-average gain calculated from the group means was $(4.60 - 2.47)/(5 - 2.47) = 0.84$. The two respondents whose scores decreased both had the highest pretest score in the sample (4.60); their posttest scores were 4.53 and 4.20. Because their room for improvement was only 0.40 on the mean scale, the larger of these decreases produced the minimum individual N-Gain of −1.00. Negative gains are scaled by this small room for improvement, so a modest decrease can yield a large negative N-Gain; this is one reason why both the individual and the class-average gains are reported.

These results support H1: customers' perceived accessibility of menu information was substantially higher after the e-catalogue was implemented than before. Given the one-group design, this result establishes a large pre–post change, but it does not by itself establish that the e-catalogue was the only cause of that change.

Table 7. Results of the Wilcoxon Signed-Rank Test and N-Gain Analysis

Statistic	Value	Remark

Pretest median (IQR)	2.13 (1.93–3.00)	Low
Posttest median (IQR)	4.60 (4.40–4.80)	Very high; 4 respondents at 5.00
Negative / positive ranks / ties	2 / 33 / 0	Most respondents improved
Sum of negative / positive ranks	5.50 / 624.50	Mean ranks 2.75 / 18.92
Z	−5.072	—
Asymp. Sig. (2-tailed)	< .001	Significant; H1 supported
Effect size r = |Z| / √N (N = 35 pairs)	.86	Large
Effect size r = |Z| / √N (N = 70 observations)	.61	Large
Mean individual N-Gain	0.74 (SD = 0.39)	High
Mean individual N-Gain (%)	73.75%	Fairly effective
Class-average N-Gain (from group means)	0.84	High

Source: Primary data processed with IBM SPSS Statistics 26 (2025); n = 35. Effect sizes and class-average gain were calculated by the authors.

Actual Usage Data and Owner Feedback

Between 20 October and 22 November 2025, GA4 recorded 150 new users, about 5,300 events, and an average engagement time of 2 minutes 15 seconds per active user (Table 8). The "TAWA CAFE – MENU" page was the most viewed (about 661 views; 130 active users), followed by the home page (about 359 views; 145 active users). The Food, Drink, and Main Course category pages each received hundreds of views, with bounce rates of 2.3%–13.4%; that is, fewer than one in seven sessions on these pages ended without engagement. These figures describe all visitors to the site, including customers who did not take part in the survey, and may include visits by staff or researchers during testing. They show that the e-catalogue was used during the observation period, but they cannot show that the questionnaire respondents themselves used it or how often they did so. Post-action interviews indicated that customers commonly opened the e-catalogue after sitting down and then ordered by naming an item, which shortened interactions at the cashier. The owner stated, "Many people immediately sit down to open the e-catalogue, so when they sit down, they just mention the menu and don't ask

as many questions as before." The automatic WhatsApp message did not change the main ordering flow; it was used mainly to ask about item availability.

Table 8. Summary of Google Analytics 4 Data for the Tawa Cafe E-Catalogue

Metric	Value
New users	150
Event count	≈ 5,300
Average engagement time per active user	2 min 15 s
Menu page (views; active users)	≈ 661; 130
Home page (views; active users)	≈ 359; 145
Bounce rate, category pages (Food, Drink, Main Course)	2.3%–13.4%

Source: Google Analytics 4, Tawa Cafe e-catalogue, 20 October–22 November 2025. Bounce rate = percentage of sessions that were not engaged (Google, n.d.).

Discussion

Interpretation of the Main Findings

The findings indicate a substantial improvement in customers' perceived accessibility of menu information following the implementation of the low-code e-catalogue at Tawa Cafe. The mean score increased from 2.47 before implementation to 4.60 after implementation, while 33 of the 35 respondents reported higher post-intervention scores. The Wilcoxon signed-rank test confirmed that the difference was statistically significant ($Z = -5.072$, $p < .001$), with an effect size of $r = .61$. The mean individual N-Gain of 0.74 also indicates a considerable improvement in perceived accessibility. These results suggest that the digital menu provided customers with a more accessible source of product information than the conventional menu. However, because the study employed a one-group pretest–posttest design without a comparison group, the observed improvement should be interpreted as a change following implementation rather than definitive evidence that the e-catalogue alone caused the improvement.

Underlying Mechanisms of Improved Menu Information Accessibility

The improvement can be interpreted through the economics of information, particularly the concept of search costs proposed by Stigler (1961). Before the intervention, customers had to ask employees about ingredients, spiciness, portion sizes, and differences between menu items because the conventional menu provided only names and prices. The e-catalogue made these details available through a QR-code-accessible platform, potentially reducing the effort required to obtain relevant information. This interpretation is consistent with the owner's post-intervention observation that

customers increasingly accessed the digital menu after sitting down and then ordered by mentioning the selected items, with fewer questions directed to the cashier.

The inclusion of photographs and descriptions may also have contributed to better information comprehension. According to dual coding theory, verbal and visual information can complement one another in the process of understanding and remembering information (Paivio, 1991). In the context of Tawa Cafe, photographs helped customers visualize menu items, while descriptions provided additional details that could not be conveyed through product names alone. Nevertheless, the security dimension received comparatively lower post-intervention scores because some photographs did not fully correspond to the actual serving containers. This finding highlights that visual presentation must be supported by accuracy and consistency; otherwise, the digital menu may create expectations that differ from the actual product.

Theoretical Interpretation of Menu Information Accessibility

The findings support the conceptualization of menu information accessibility as a multidimensional construct rather than simply the availability of information. Drawing on Culnan (1985), accessibility involves the ability to reach and retrieve relevant information through an accessible medium. Similarly, Wang and Strong (1996) emphasize that information quality includes accessibility and the extent to which information can be trusted and used. In this study, the four dimensions—ease of access, convenience, security, and fluency—provide a practical way to examine how customers experience menu information in a café setting.

The results also relate to the information systems success perspective of DeLone and McLean (2003), particularly the importance of information quality in shaping users' experiences with an information system. However, the findings should not be interpreted as a direct test of the Technology Acceptance Model (Davis, 1989), because the study did not measure perceived usefulness, attitudes, or intention to adopt the technology. Rather, the results provide empirical support for examining information accessibility as a customer-level outcome of a digital information medium.

Comparison with Previous Empirical Studies

The findings extend previous hospitality research that has examined digital menus in relation to customer experience, purchase intention, and technology acceptance (Beldona et al., 2014; Brewer & Sebby, 2021; Okumus et al., 2018). While these studies establish the relevance of digital menus in restaurant settings, the present study focuses specifically on changes in customers' perceived accessibility of menu information through paired pretest–posttest measurements in an operating café. It therefore adds a different perspective by treating information accessibility as an outcome that can be evaluated before and after a digital intervention.

The study also extends previous research on e-catalogue development, which has largely emphasized system design, technical functionality, and promotional applications (Amir & Muhammad, 2024; Butarbutar et al., 2022; Qisthiano & Imron, 2024). By examining customer perceptions alongside website usage records and stakeholder interviews, this study provides an applied account of how a low-code e-catalogue can

function as a customer-facing information medium in a small café. Nevertheless, the findings represent a single-site case and should not be generalized to all café MSMEs without further investigation.

Research Implications

The findings have practical implications for café owners and other culinary MSMEs with limited technological and financial resources. A low-code platform such as Google Sites offers a relatively accessible way to organize menu information without requiring specialized programming skills. The implementation at Tawa Cafe demonstrates the potential value of combining product names, prices, descriptions, photographs, and menu categories within a platform that customers can access through a QR code. However, the lower score on the security dimension indicates that digital menu development should not focus solely on visual attractiveness or ease of access. Owners should also ensure that photographs accurately represent the products served and update menu information whenever product specifications change.

The study also suggests that digital menu implementation should be accompanied by basic employee training and a clear content-maintenance process. Although website analytics recorded 150 new users and approximately 5,300 events during the observation period, these figures represent all website visitors and cannot be directly linked to the 35 questionnaire respondents. Similarly, the owner's observation of fewer menu-related questions provides contextual support but does not establish a measured reduction in service time or an increase in sales. Accordingly, the practical value of the platform should be understood primarily in terms of improved access to menu information.

Conclusion

This study indicates that implementing a low-code e-catalogue at Tawa Cafe was followed by a substantial improvement in customers' perceived accessibility of menu information, with the mean score increasing from 2.47 to 4.60 and a statistically significant pretest–posttest difference. The findings suggest that presenting menu items through photographs, descriptions, prices, and categorized information accessible via QR code can help customers obtain and understand menu information more independently. The study contributes an applied operationalization of menu information accessibility through four dimensions and demonstrates a practical digital solution that café MSMEs can adapt using low-code technology. However, because the research was conducted at a single café using a one-group design and a relatively small, demographically concentrated sample, the findings should be interpreted cautiously. Further studies using stronger research designs, larger and more diverse samples, and objective business-performance indicators are needed to establish the broader effectiveness of low-code e-catalogues in improving customer information access and service performance.

Limitations and Future Research Directions

Several limitations should be considered when interpreting the findings. First, the study involved only one café and 35 respondents, 94.3% of whom were aged 17–25, limiting the generalizability of the results to other customer groups and business

settings. Second, the one-group pretest–posttest design cannot rule out alternative explanations, including history, maturation, testing, and novelty effects. Third, accessibility was measured through self-reported responses, which may be affected by respondents' awareness of the intervention. The questionnaire also demonstrated very high internal consistency (α = .983), which may indicate item redundancy; its content was not reviewed by an external expert panel or piloted with customers outside the sample, and its dimensional structure could not be examined through factor analysis because of the limited sample size. Fourth, the EPIC assessment involved four raters, three of whom were internal stakeholders, potentially introducing favourable evaluation bias. Finally, the Google Analytics data covered approximately five weeks, could not be linked to individual respondents, and did not measure business outcomes such as transaction time, sales, or customer loyalty.

Future research should employ quasi-experimental designs with comparison groups or repeated measurements to strengthen causal inference. Studies involving multiple MSMEs and more diverse customer groups would also help establish whether the findings apply across different business contexts and age groups. In addition, future research should incorporate objective performance indicators, including ordering time, the frequency of menu-related inquiries, average transaction value, and customer return intention. Larger samples would allow researchers to validate the dimensional structure of the accessibility instrument and examine its relationship with technology acceptance and customer behaviour. Further investigation into the accuracy of product photographs and its relationship with customer trust would also be valuable.

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