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An Empirical Analysis of Informational Relevance of Product QR Codes in Nepal

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Abstract

Background: QR code has been an important part of retail products. From food and beverages to electronics, we can find these square-shaped patterns printed on the product itself or packages. While this QR technology has been widely adopted, it is uncertain whether they successfully fulfill their purpose of providing product-specific relevant information or not.

Methods: A sample of 150 products across five categories (food, beverages, cosmetics, electronics, and household products) was collected from retail stores in Kathmandu Valley. I have used a standardized smartphone (iPhone 14 Pro) to scan the QR codes on the products. The outcomes of scans were classified into four different categories: Relevant, Partially relevant, Irrelevant and Failed. Data were then analyzed using descriptive statistics to determine percentage distribution over the categories.

Results: The study revealed that highest percentage (63%) of QR codes directed to irrelevant marketing or social media pages. Only 16% of QR codes provided product specific information.

Conclusion: Majority of QR codes fail to deliver product relevant information which creates a gap between consumer expectation and information delivery. This study suggests recommendations for brands, policy makers and future research directions based on empirical findings.

Novelty: This research contributes to the literature on information quality and consumer access to information by providing an empirical analysis on QR code informational relevance. These shifts focus from consumer perception and adoption to content auditing of QR codes.

Keywords: product specific information, consumer expectation, information delivery, information quality, content auditing

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1. Introduction

1.1 Background of the Study

The Quick Response code was invented in 1994 by Denso Wave Corporation. It was designed to track automotive parts during manufacturing. The inventors made this technology free which contributed in global usage and adoption in different industries (Denso Wave, n.d.).

In recent years, QR codes have become ubiquitous on consumer products. These black and white squares now appear on wide range of product surfaces and packages worldwide. QR codes theoretically offer convenient and instant access to product-specific information to the consumer that cannot fit on limited packaging space (Rotsios et al., 2022). For brands and manufacturers, QR codes offer several benefits. The QR technology is a cost effective tool to deliver dynamic content. This technology can be used for direct customer engagement and marketing. They can also serve as anti-counterfeiting measures when properly implemented (Wosu et al., 2025). However, there may arise conflict between brand benefits and consumer information needs.

After COVID-19, QR codes have been widely adopted in Nepal. The pandemic accelerated the use of contactless digital methods. QR codes are now widely used in payment systems, retail environments and service sectors since smartphones are easily available (Dhamala, 2024). In recent years, QR codes have appeared on a large number of products sold in Nepali retail stores. We can encounter QR codes in retail products of local manufacturers as well as international products. Simultaneously, QR payment systems have gained popularity and satisfaction in urban areas like Kathmandu Valley, (Gaudel, 2025; Maharjan et al.; 2024). The existing researches in Nepal are focused on QR code adoption and digital payment systems. The researchers have focused on the factors affecting QR acceptance in Nepal. They point out the determinants such as perceived usefulness, ease of use, convenience, security and accessibility as key drivers of QR usage (Adhikari, 2024; Sah, 2025). Although QR payments have received research attention; the use of QR codes for product information delivery remains largely unexamined in the Nepali context. This study investigates the availability of relevant information when consumers scan product QR codes.

1.2 Problem statement

While technology has drastically transformed consumer product and their delivery, the delivery of information through product QR remains uncertain. This is the result of a critical policy vacuum. Nepal has no legal framework specifying what information QR codes should deliver. Without such guidelines, it is difficult to clarify whether QR codes are meant to provide product specific information or simply serve as marketing tools. Consumers generally believe that scanning the product QR codes lead to product specific information like expiry date, manufacture date, user manual etc. However, preliminary observation suggests that many QR codes do not fulfill this promise. These QR codes frequently lead to brand homepages, marketing pages, social media or broken links in some cases.

Nepal Rastra Bank has issued regulations governing QR code usage which include the NepalQR Standardization Framework and Guidelines of 2077. These regulations mainly focus

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on financial transactions, security and interoperability (Nepal Rastra Bank, 2020). Similarly, E-commerce Act 2081 has rules that mention product information disclosure is compulsory (Nepal Law Commission, 2025). But this requirement applies only to electronic platform and online marketplaces, not to physical retail products. As a consequence, a regulatory gap exists. While QR codes used for payments and online product sales are regulated, QR codes printed on retail product packaging operate in a policy vacuum. Hence, scanning of product QR code does not guarantee that consumers will receive product-relevant information. This disparity between consumer expectation and actual QR code functionality creates several problems. By scanning the QR, consumers waste their time without getting proper information. Such repeated failures may cause the consumers to entirely ignore QR codes. Consumers being unable to access product relevant information may lead to bad experience and lose brand trust. Despite increasing adoption of QR technology in Nepal, there has been no empirical study that examines what these codes actually deliver. It is unknown what percentage of QR actually leads to relevant content. It is also unclear which category performs better or worse. In addition, it is necessary to reveal whether consumers are receiving any meaningful value from scanning product QR codes.

1.3 Research Objectives

The objectives of this study are given below:

1. To determine the percentage of product QR codes that provide product specific information
2. To determine the percentage of product QR codes that link to irrelevant pages with no product specific content
3. To determine the percentage of product QR codes that lead to broken pages or error pages
4. To compare informational relevance across the product categories (food, beverages, cosmetics, electronics, and household)
5. To suggest recommendations for brands, regulators and consumers based on empirical findings

1.4 Research Hypotheses

- H1: The majority of product QR codes in Nepal do not provide product specific information
- H2: Most of the QR codes redirect to brand homepages or social media pages
- H3: Informational relevance varies significantly across product categories

2. Literature Review

This section explores the growing impact of QR technology on consumer behavior and satisfaction.

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2.1 Global Evidence on QR Challenges and Acceptance

The QR code transformation has led to several global researches focusing on marketing and user psychology. This section reviews international findings regarding QR code influence factors and technical challenges that impact user satisfaction.

2.1.1 Consumer Acceptance and Behavioral Drivers

After COVID-19 pandemic, contactless QR technology accelerated globally due to hygiene concerns (Tu et al., 2022). Bradford et al. (2022) found that QR coded pork products containing antibiotic use information can increase consumer purchase intention. The consumers were more inclined towards QR labeled products in comparison to pork products with no labels. The studies applying the Technology Acceptance Model (TAM) consistently highlight that "Perceived Usefulness" is a significant determinant of consumers' intention to engage with technology (Abidin, 2024; Julianto and Daniawan, 2022). This indicates that the adoption of QR code is dependent on ease of use. Comparative research on traced food has revealed that there exist significant cross cultural differences in consumer behavior. Jin et al. (2023) compared UK and Chinese consumers' intentions towards traced food (apples, milk and beef). The researchers found that perceived affordability had higher impact on consumers in UK. Whereas ease of use was the main factors for Chinese consumers' purchase intention.

A systematic review revealed technology acceptance, impact on purchase decisions, usefulness, and code design as four main strands for a consumer (Jerzyk, 2024). Across 18 empirical studies, it was found that perceived usefulness, ease of use, social influence and enjoyment were key drivers of QR acceptance. The review highlighted that QR codes must provide novel and non-redundant information to generate value. Importantly, trust in the information source drives consumer willingness to scan (Jerzyk, 2024).

In a study of QR code impact in Indonesian food and beverage restaurants, ease of use was noted as dominant factor in customer satisfaction and repurchase intention (Prawirayudha et al., 2025). The authors used extended Technology Acceptance Model (TAM) to demonstrate that customer satisfaction is the mediator of perceived usefulness, ease of use, perceived flow and repurchase intention. Prawirayudha et al. (2025) demonstrate that frictionless flow in online shopping and restaurants ordering have significant impact on customer satisfaction. This enhances long term repurchase intensions.

2.1.2 Information Quality and Digital Labeling

Gaudeul and Krawczyk (2023) conducted an experiment in three European countries to determine the impact of QR code in providing product specific information. The study noted that there is low chance of scanning the QR codes in food packages by the consumers to access product information. The authors conclude that providing information through printed paper is superior to using QR technology since customers will likely save time of scanning the QR.

In contrast, global evidence suggests that QR codes are increasingly used for digital labeling to overcome the physical space constraints of packaging. Rotsios et al. (2022) conducted a study on QR codes on bottled milk in Greece and found that QR technology has advantage in providing more information than that of traditional printing on products. The study concluded QR codes on food packages that deliver entertaining and enriched content positively influence

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buying behavior. This finding aligns with Jerzyk (2024), who argued perceived usefulness and ease of use as main factors of QR acceptance.

In a study of QR codes on alcohol containers across 13 European countries, researchers found that almost half of QR codes direct to irrelevant pages instead of health or nutritional information (Kokole et. al., 2025). The authors concluded that QR codes currently serve as marketing tools rather than informative and effective tools.

2.1.3 Security and Technical Barriers

Despite the benefits, the use of QR codes faces challenges regarding security and data integrity. Alsuhibany (2025) identifies barcode substitution fraud and malicious URL redirection as growing concern. These frauds can diminish user trust in QR technology. As a counter measure, Alsuhibany (2025) proposed innovative solutions such as digital watermarking and neural network based verification system to ensure that information is authentic and tamper proof.

Challenges such as visibility, suboptimal code sizing, and blending into background creates resistance in global adoption (Paananen et al., 2023). The researchers found defective QR codes on retail products that can be technical glitches or compatibility issues. The study identifies lack of clear information on QR tags which demotivates the consumers. For a customer, guaranteed delivery of product related content upon scanning QR codes increases engagement and satisfaction (Paananen et al., 2023).

Wosu et al. (2025) proposed a novel scanning system developed through object oriented modeling and the Rapid Unified Process (RUP). Their study argues that technical barrier of purchasing counterfeit goods can be mitigated by a system binding digital code to physical product. The researchers demonstrated that by using a tamper proof QR system, customer-retail interaction increases significantly. Additionally, Wosu et al. (2025) identify that QR system must maintain high readability and fast response time.

2.2 QR Code Research in Nepali Context

Nepal has been through a rapid transformation in adoption of QR codes. Dhamala (2024) found that current studies focus on cashless digital economy and behavioral aspects based on Nepali demographics. The study concluded with awareness and trust being a major factor affecting the acceptance of QR technology in Nepal.

Adhikari (2024) observed that perceived usefulness, perceived security, reliability and ease of use have positive impact in adopting QR technology in Kathmandu Valley. The research highlights self-efficacy as a major influencing factor in accepting QR payment method. Maharjan et al. (2024) used PLS-SEM modeling to show that stable internet connectivity and affordable smartphones act as fundamentals for QR technology usage. The researchers revealed that consumers consider QR technology as a convenient payment method in spite of some technical glitches and failed transactions. The study also pointed that some failed transactions still lead to debited funds.

Wagle (2024) found that trust and security has low influence in Nepali users. This suggests that Nepali consumers prioritize convenience over risk assessment. This argument is supported by Maharjan et al. (2024). However, Gaudel (2024) argues that trust and security are the highest priorities for consumer satisfaction in regional contexts like Parbat district. This study reveals

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a significant contradiction regarding the role of trust and security in local context. Sah (2025) conducted a study across all seven provinces and found that users have high sense of trust and security for QR codes in banking and financial sector. However, some empirical evidence suggests this trust is fragile. Sah et al. (2025) finds that customers frequently using QR code payment are highly satisfied whereas those who encounter bad experiences are dissatisfied. The study suggests the number of satisfied customers is statistically higher than disappointed users.

There are some technical barriers emerging as critical topics even after widespread QR code adoption in Nepal. Local issues such as unstable internet connectivity and funds deduction despite failed transaction may worsen technological fatigue (Maharjan et al., 2024). Furthermore, Dhamala (2024) notes that QR adoption is only high in urban areas like Kathmandu. Due to this, digital divide remains barrier to nationwide standardization. The studies suggest that providers must address reliability concerns, focus on user education, transparency and security to bridge the gap between convenience and actual system integrity (Adhikari, 2024; Sah, 2025; Wagle, 2024).

2.3 Research Gap and Contribution

There has been many studies on QR code technology regarding its acceptance (Adhikari, 2024; Prawirayudha et al., 2025), consumer satisfaction (Maharjan et al., 2024; Sah et al., 2025), and technical security (Alsuhibany, 2025; Wosu et al., 2025). However, there are several research gaps that this study aims to address.

Kokole et al. (2025) found that nearly half of QR codes on alcohol containers in Europe link to irrelevant marketing pages. While similar studies have been conducted in European context (Kokole et al., 2025), no study has applied this approach in Nepali context. Similarly, Jerzyk (2024) concluded that QR code must provide novel and non-redundant information to generate value. But there has been no comparable audit in retail industry in Nepal across multiple categories.

In Nepali context, researchers have focused on online payment, trust, security, and technical reliability (Dhamala, 2024; Gaudel, 2024; Maharjan et al., 2024). Sah et al. (2025) measured usefulness, usage rate and customer satisfaction in QR technology. They even acknowledged that volume of information and acceptability has been ignored. Sah et al. (2025) noted that their study solely relied on online responses and they called for future research to incorporate physical survey of QR codes. Despite of existing studies on QR code adoption, consumer perception and usage, there has been no empirical study on what consumer actually encounter while scanning QR codes on products.

In response to these gaps, the present study conducts an empirical analysis of informational relevance in QR codes. By focusing specifically on what information is delivered via QR codes in the Nepali retail context, this study extends beyond the existing literature's emphasis on perceived usefulness and ease of use to provide a descriptive audit of QR code content across product categories.

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3. Methodology

3.1 Research Design

We have implemented a quantitative and cross-sectional content audit design. We have selected this approach in order to fulfill our objective to describe what consumers actually encounter after scanning product QR codes, rather than measuring perception or attitude.

3.2 Sampling Procedure

We collected a total of 150 product QR codes across five categories: food, beverages, cosmetics, electronics, and household products. To balance our sample design, each category contributed 30 QR codes. The majority of QR codes were selected from Bhatbhateni Supermarket, a major retail store in Nepal. Others supplemented by smaller local retailers in Kathmandu Valley. A convenience sampling approach has been used. We have selected only those products having a visible QR code and belonging to one of the five predefined categories. We have recorded the unscannable QR codes as well and included in the dataset to reflect real world consumer experience. Pharmaceutical products were excluded from the study due to insufficient QR code availability. We conducted a preliminary investigation which revealed that QR codes were not present on many product packages across all categories. This created difficulty in searching products with QR codes to achieve the target sample size. This scarcity itself is an ancillary finding regarding QR adoption in Nepali retail industry.

3.3 Data collection

Data were collected between April and May 2026. We have used iPhone 14 Pro with the built-in camera QR scanner for all scans to ensure consistency. The information such as product name, brand, assigned category, explanatory text availability, scan success status, destination URL, outcome classification and any relevant observations (displaying error messages, tracking number) was recorded. We recoded all the data in a structured Google form template. We encountered several challenges during data collection. Some products featured multiple QR codes which may create ambiguity for consumers regarding which code consumers should scan. We found that QR codes labeled with explanatory text such as "Video QR" or "Scan for more product details" frequently linked to marketing or failed pages. Some QR codes were difficult to scan due to distortion or poor printing quality, while others did not scan at all. Some products' QR codes led to a different company's marketing page because the latter had imported the products. Even on products with multiple QR codes, they failed to deliver product specific information. Additionally, products from the same brand linked to different outcomes. Some redirected to relevant content while others led to brand marketing pages. This indicates inconsistent QR code implementation. Several QR codes displayed unspecified numbers or even company managers' contact numbers on scanning without any other product specific content.

3.4 Coding Framework

We have classified QR codes into one of the four outcome categories based on informational relevance. The relevant category included QR codes that provide product related content such as expiry date, ingredients, model number, manuals, verification, net quantity, voltage, power

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etc. The partially relevant category included QR codes providing product line information, not specific to the product such as recipes or product advantages. The third category is irrelevant which defined QR codes redirecting to brand homepages, marketing pages or social media with no product specific content. The fourth category is failed which included QR codes leading to error pages, expired pages or dead links.

A sample of 20 QR codes was independently coded by two coders. The independent coding results are presented in Appendix A. We calculated inter coder reliability using Cohen's kappa which yielded a value of k = 0.84. This implies strong agreement between the coders. Disagreements occurred for two QR codes (147 and 149) which we resolved through discussion. The remaining 130 QR codes were coded by first coder following the finalized framework. We have also classified QR codes that could not be scanned as failed category since they did not deliver any information, which reflects real world consumer experience.

3.5 Data Analysis

We analyzed data using Microsoft Excel and an online chi-square calculator (social science statistics). We calculated descriptive statistics for each outcome category across five product categories. A chi-square test of independence across product categories was conducted to examine whether informational relevance varied significantly across the categories. We verified the chi-square value using second online chi-square calculator (standarddeviationcalculator.io) and through manual calculation.

3.6 Ethical considerations

This study did not involve any human participants and did not collect any personal identifiable information. Ethical approval was not required for this study as it involved no human participants and collected no personal data. We scanned all QR codes from publicly available product packaging in retail environments. Brand and product names were recorded for analytical purposes only.

4. Results and Discussion

4.1 Descriptive Statistics

Across five categories (food, beverages, cosmetics, electronics, and household products), we analyzed a total of 150 QR codes (30 QR codes scanned each category). The overall distributions of informational relevance across all categories are presented in Table 1.

Table 1: Overall Informational Relevance across Five Categories

Classification	**Frequency (n)**	**Percentage (%)**
Relevant	24	16
Partially Relevant	10	7
Irrelevant	95	63
Failed	21	14
Total	**150**	**100**

As per the table above, the majority of QR codes (63%, n= 95) directed to irrelevant content, primarily brand home pages, social media pages, or marketing pages with no product specific

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information. We found that only 16% (n= 24) provided relevant content while 7% (n=10) linked to partially relevant product line information. 14% (n=21) of the scans were classified as failed which included unscannable codes, broken links or error pages. The total of non-relevant outcomes was 84% combining irrelevant, partially relevant and failed categories. Table 2 presents the frequency and percentage distribution of QR code outcome by product category.

Table 2: QR Code Outcomes by Product Category

Category	Relevant n (%)	Partially Relevant n (%)	Irrelevant n (%)	Failed n (%)	Total
Food	1 (3.3%)	3 (10.0%)	19 (63.3%)	7 (23.3%)	30
Beverage	1 (3.3%)	1 (3.3%)	25 (83.3%)	3 (10.0%)	30
Cosmetics	7 (23.3%)	0 (0%)	19 (63.3%)	4 (13.3%)	30
Electronics	11 (36.7%)	2 (6.7%)	13 (43.3%)	4 (13.3%)	30
Household	4 (13.3%)	4 (13.3%)	19 (63.3%)	3 (10.0%)	30

Note: χ^2 (12, N = 150) is 26.53, p = 0.009

We can see that food products has low informational relevance with only 3.3% (n = 1) of QR codes. 10% (n = 3) showed partial information while majority (63.3%, n = 19) led to irrelevant marketing or social media pages. In food category, failed outcome is 23.3% (n = 7) which is highest among the categories. There were three unscannable codes out of the 7 failed outcomes despite being visibly present. There were no unscannable codes in any other category. Beverages performed the worst among all categories. Only 3.3% (n = 1) of QR codes provided relevant information and 3.3% (n = 1) provided partial information. The highest proportion (83.3%, n = 25) redirected to irrelevant marketing pages. This is the highest percentage of irrelevant QR codes across all five categories. There were 10% (n = 3) failed outcomes. Cosmetics demonstrated moderate informational relevance. Relevant QR codes accounted for 23.3% (n = 7), which is the second highest among all categories. No QR codes were classified as partially relevant (0%). 63.3% (n = 19) was recorded as irrelevant and failed outcomes accounted for 13.3% (n = 4). We can see that electronics performed the best among all categories. 36.7% (n = 11) was classified as relevant category which is the highest proportion of any category. Partial information was found to be 6.7% (n = 2). Electronics displayed only 43.3% (n = 13) irrelevant redirects being the lowest among categories. And failed outcomes accounted for 13.3% (n = 4). Household products showed moderate performance. There were 13.3% (n = 4) relevant QR codes and another 13.3% (n = 4) partial information QR codes. The majority (63.3%, n = 19) redirected to irrelevant marketing pages, while failed outcomes were 10% (n = 3).

4.2 Observational Findings

We found that QR codes were notably absent from the majority of product packages across all categories, particularly for household products. It was a challenge collecting 30 QR sample over this category. Pharmaceutical products rarely contained QR codes. This may be due to smaller packaging, regulatory constraints, or security concerns. As a result, after confirming

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the scarcity through preliminary investigation (only 5 to 6 QR codes found across multiple products), this category was excluded from the main analysis to maintain balanced category sizes. Even when QR codes were present, implementation was inconsistent. Some products from a brand featured QR codes while others from the same brand did not. We found multiple QR codes appearing on a single product which may create ambiguity for consumers. And despite multiple codes in a single product, it did not guarantee product specific information. The study revealed that some QR codes were labeled as "for more product details" or "Video QR". Even these QR codes led to marketing pages or broken links. This actually creates a gap between consumer expectation and content delivery. We encountered that products of same brand redirected to different outcomes. This indicates that there is inconsistency in QR code implementation even within a single brand's products. We also encountered several QR codes leading to pages displaying random unspecified numbers. We classified them as "Irrelevant" because the data provided no practical value to consumers. In some cases, a product's QR code redirected to a different company's marketing page because the latter had imported the product. This illustrates a complexity in QR code supply chain. Our study revealed that among the 24 relevant QR codes, the type of product specific information varied. The most common information provided are manufacturer, country of origin, product number and model number, followed by user manuals and authentication features.

Table 3: Presence of explanatory text on QR codes by category

Category	**Has Explanatory Text**	**No Explanatory Text**	**Total**
Food	12	18	30
Beverage	9	21	30
Cosmetics	16	14	30
Electronics	9	21	30
Household	9	21	30
Total	**55 (36.67%)**	**95 (63.33%)**	**150**

An additional observational finding was the presence of explanatory text on QR codes (e.g., "scan for more details", "Video QR", "Product information"). Across all categories, only 36.67% of QR codes featured such explanatory text as shown in Table 3. This finding aligns with the research of Paananen et al. (2023) which revealed lack of guidance to consumers regarding the scanning of QR codes. Our study demonstrated that the majority (63.33%) of QR had no explanatory text at all.

Table 4: Explanatory Text vs. Content Relevance

	Has Explanatory Text	**No Explanatory Text**	**Total**
Relevant Content	11 (20.0%)	13 (13.7%)	24 (16.0%)
Non-Relevant	44 (80.0%)	82 (86.3%)	126 (84.0%)
Total	55 (100%)	95 (100%)	150 (100%)

From Table 4, we can see that 20% of QR codes with explanatory text delivered product specific information. 80% redirected to irrelevant marketing pages, failed or partially relevant

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content. Importantly, 13.7% of QR codes without any explanatory text still provided relevant information. This indicates that companies missed opportunities to guide their consumers.

4.3 Hypothesis Testing

H_1: The majority of product QR codes in Nepal do not provide product specific information.

From Table 1, we can see that across all 150 QR codes, only 16% (n = 24) provided relevant, product specific information. The combined proportion of partially relevant (7%), irrelevant (63%) and failed (14%) outcomes was 84%. This confirms that the majority of QR codes do not deliver product specific content to consumers. This supports H_1.

H_2: Most of the QR codes redirect to brand homepages or social media pages

The result shows that irrelevant redirects to brand homepages or marketing pages is 63% (n = 95) of all outcomes. This proves our hypothesis H_2.

H_3: Informational relevance varies significantly across product categories

We conducted a chi-square test of independence to examine whether informational relevance varied significantly across product categories or not. The results revealed that there exists a statistically significant association between product category and QR code outcome. i.e., χ^2 (12, N = 150) is 26.53, p = 0.009. Therefore, H_3 is supported.

From the results in Table 2, we can clarify that electronics demonstrated the highest level of informational relevance (36.7%). In contrast, beverages showed the lowest level in relevancy (3.3%) and highest 83.3% irrelevant outcomes. We found these differences across categories to be statistically significant.

4.4 Discussion

The findings of this study provide empirical evidence regarding the current state of QR code informational relevance on product packaging in Nepal.

4.4.1 Low Prevalence of Product Relevant QR codes

Our study finds that only 16% of QR codes successfully delivered the expected product relevant information. The maximum number of product QR codes link to promotional content. This finding aligns with global evidence identified by Kokole et al. (2025). It suggests that the gap between perceived convenience and actual system integrity observed by Adhikari (2024) and Sah (2025) is not only matter of technical glitches but also a content problem.

4.4.2 Why Electronics Performed Best

Electronics demonstrated the highest percentage of product-specific information (36.7%), followed by cosmetics (23.3%) and household products (13.3%). The reason behind electronics performing best is they are considered higher value products. The manufacturers have greater intent to provide detailed product information, user manuals, warranty registration, and authentication mechanisms to combat counterfeiting (Wosu et al., 2025). Apart from that, electronics consumers often require technical specifications, safety certifications and setup instructions. Electronics products face higher counterfeiting risks where QR codes serve as authentication tools (Wosu et al., 2025).

4.4.3 Why Beverages and Food Performed Worst

The result shows that beverages and food categories performed worst having 3.3% product specific information each. Beverages and many food products are generally low profit and high

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volume products. This may have discouraged manufacturers to invest in informational QR codes. Additionally, these categories often have smaller, curved or flexible surface that make QR code printing and scanning more difficult. We observed that food products have high failed rate (23.3%). This finding lines up with technical barriers (small QR size and camouflage) identified by Paananen et al. (2023). Food and beverage packages may be particularly vulnerable to distortion and damage due to exposure to moisture or handling in retail environments.

4.4.4 The Product Specific Information Gap

As discussed in earlier sections, we can say that the scarcity of product specific information raises important questions about QR code utility. If consumers cannot reliably obtain product specific information by scanning QR codes, the value of technology reduces significantly.

Furthermore, we have found some QR codes having misleading labels. This creates a gap between consumer expectation and actual content delivered which may diminish brand trust and consumer confidence in QR technology. As Sah (2025) noted that users have high trust in QR codes but this trust is fragile. Our study provides empirical support for this fragility. When consumers repeatedly encounter marketing content instead of expected product related information, trust is likely to erode.

4.4.5 Technical Failures

We found that three unscannable QR codes out of 150 QR sample all occurred in the food category. Paananen et al. (2023) also recorded non-working codes during their work. This suggests that QR code implementation is challenging especially in food products. Additionally, we found seven QR codes that redirected to pages displaying unspecified random numbers or contact numbers. This raises questions about QR code standards. We observed that these QR codes were technically functional but practically useless to consumers since they do not provide any necessary information. Hence, we can argue that some brands may be implementing QR codes merely as a formality without considering consumer needs. The prevalence and purpose of such QR codes should be investigated in future research.

We noticed the absence of QR codes in products across all categories. This implies QR code adoption for informational purposes is still in early stages in Nepal. The finding contrasts with global trends where QR codes for digital labeling are increasingly common (Kokole et al., 2025; Rotsios et al., 2022). Moreover, we have excluded pharmaceutical products due to insufficient QR codes which further support this observation. We observed inconsistent implementation within brands (some products have QR codes and some do not, same brand leads to different outcomes) which suggests lack of coordinated digital labeling strategy. This inconsistency may confuse consumers and reduce the likelihood of scanning QR codes in the future.

4.5 Practical Implications

We recommend brands to ensure that QR code content matches consumer expectations. Explanatory labels on QR scans such as "Scan for product details" should not redirect to a brand homepage or social media profile. Such mismatch may increase consumer deception and reduce brand trust. Brands should maintain and improve informational relevance for electronics

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and cosmetics. If brands cannot provide meaningful information for food and beverages, they should reconsider using QR codes at all. Brands should strictly use QR codes only when they can deliver genuine product related information. We suggest that the user experiences can be enhanced by adopting a "relevant information only" standard. This will help build consumer trust and differentiate responsible brands from those using QR codes for formality. Additionally, brands should address technical quality issues. The finding that unscannable QR codes occurred in the food category only suggests that food manufacturers need to improve QR code printing quality, placement and durability. We suggest random serial numbers be replaced with meaningful product information.

The findings reveal an important policy vacuum in Nepal regarding QR code labeling on consumer products. Currently, there are no regulatory frameworks to govern what QR code should deliver. There are no guidelines to follow in order to determine whether explanatory text must match destination content or how misleading QR codes should be addressed. The absence of policy allows brands to use QR codes as marketing tools without accountability. The policy makers in Nepal should consider developing guidelines for QR code labeling. Misleading explanatory text on QR codes should be addressed and regulated as consumer protection enforcement. By addressing this policy vacuum, consumers can be protected from misleading practices and enhance the trust in QR technology in Nepal.

Consumers should scan product QR codes with realistic expectations. Only electronics and cosmetics currently provide reasonable level of product specific information. QR codes on beverages and food are more likely to lead to marketing content than useful information.

4.6 Limitations and Future recommendations

We acknowledge several limitations in present study. Since we have used convenience sampling findings may not be generalizable to all products in Nepal. The sample size consisting of 30 per category yields a margin of error of approximately ±18% at 95% confidence level. This limits the statistical precision. We collected data only from Kathmandu Valley which may not represent rural or remote areas of Nepal. We excluded pharmaceutical products due to low QR code availability. This limits the scope of the study. The difficulty in locating products with QR codes may have created selection bias. Therefore, the sample we collected may over represent particular brands that actively use QR technology. The QR codes classified as "Failed" may partially reflect the limitation of scanner rather than quality of the code. However, we used a single device to ensure consistency. Additionally, the unscannable codes were tested multiple times before we classified them as failed. Our research implemented the cross-sectional design which captures QR code content at a single point of time. And we admit that content may change over time. Despite these limitations, we believe this study provides the first empirical audit of QR code informational relevance in context of Nepali retail.

We recommend future research to expand geographic coverage outside Kathmandu Valley to rural areas. Research should examine whether QR code content changes over time. The researchers can conduct qualitative study with brand managers to clarify why brands choose marketing content over product relevant information. A study regarding consumer trust in retail products through relevant information delivery could be examined.

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4.7 Conclusion

In Nepali retail industry, majority of product QR codes fail to deliver relevant content. Across five predefined categories, electronics displayed highest percentage (36.7%) of informational relevancy. Beverages and food products performed worst indicating only 3.3% relevancy. 23.3% of QR codes in food category led to failed links. With chi-square value 26.53 for degree of freedom value 12, the p value is 0.009 which confirmed that there is association between category and informational relevance.

We observed that there is overall low QR code adoption in retail. Inconsistent QR implementation, misleading labels and failure to provide relevant information despite multiple QR codes were found. Technical failures were particularly recorded in food products.

This study shifts QR code research from consumer perception to content auditing in Nepali context. We have responded to Sah et al.'s (2025) call for physical data collection. We present empirical evidence that most product QR codes fail to deliver the product specific information that consumers highly expect. As QR codes continue to spread on product packaging in Nepal, the gap between perceived convenience and actual content delivery should be addressed.

4.8 Declaration Regarding AI Tools

I have used Quillbot to assist in language refinement. GPTzero was used to check manuscript for unintentional AI generated patterns. No AI tools were used for data collection, data analysis, interpretation of findings, and generation of intellectual content. We take full responsibility for accuracy, integrity, and originality of the research.

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DOI: 10.3126/nprcjmr.v3i6.95192

References

Abidin, Z. (2024). The effect of perceived usefulness, perceived ease of use, and lifestyle on purchase intention. *Journal of Management and Business Insight*, 2(1), 62–70. https://doi.org/10.12928/jombi.v2i1.935

Adhikari, K. (2024). Consumer's Perception towards Quick Response (QR) Payment in Kathmandu Valley. *Nepalese Journal of Management*, 11(4), 127–144. https://doi.org/10.3126/njm.v11i4.79788

Alsuhibany, S. A. (2025). Innovative QR Code System for Tamper-Proof Generation and Fraud-Resistant Verification. *Sensors*, 25(13), 3855–3855. https://doi.org/10.3390/s25133855

Bradford, H., McKernan, C., Elliott, C., & Dean, M. (2022). Consumer purchase intention towards a quick response (QR) code for antibiotic information: an exploratory study. *npj Science of Food*, 6(1). https://doi.org/10.1038/s41538-022-00136-4

DENSO WAVE. (n.d.). *History of QR code*. Retrieved April 22, 2026, from https://www.qrcode.com/en/history/

Dhamala, M. (2024). Adoption and Trust in QR Code Technology: Insights from Kathmandu. *NPRC Journal of Multidisciplinary Research*, 1(8), 94–105. https://doi.org/10.3126/nprcjmr.v1i8.73040

Gaudel, D. (2025), The Influence of Service Quality Dimensions on Customer Satisfaction in QR Payment Systems: Evidence from Nepal [Preprint]. Available at SSRN: https://ssrn.com/abstract=5289647 or http://dx.doi.org/10.2139/ssrn.5289647

Gaudeul, A., & Krawczyk, M. (2023). Using QR codes to access food information: a behavioural study with European consumers. *Social Science Research Network*. https://doi.org/10.2139/ssrn.4642522

Jerzyk, E. (2024). Exploring literature on the acceptance and applications of QR codes from marketing and consumers perspective: a systematic analysis. *Zeszyty Naukowe - Politechnika Śląska. Organizacja I Zarządzanie*, 2024(195). https://doi.org/10.29119/1641-3466.2024.195.14

Jin, S., Cao, Y., Jones, G., Li, W., & Frewer, L. J. (2023). Consumers' purchase intentions towards traced foods: A comparative analysis between the United Kingdom and China. *Food Control*, 152, 109828. https://doi.org/10.1016/j.foodcont.2023.109828

Julianto, M. R., & Daniawan, B. (2022). E-Commerce Information System Using Technology Acceptance Model Approach. *Jurnal TAM (Technology Acceptance Model)*, 13(1), 1. https://doi.org/10.56327/jurnaltam.v13i1.1106

Kokole, D., Neufeld, M., Correia, D., Rehm, J., Pettigrew, S., Paradis, C., Ferreira-Borges, C., Sawaya, M., Causio, F. A., Nunez Fernandez-Shaw, A., Clemente Bermúdez, L., Senica, P., Plešnar, L., Lenaers, B., de Veld, J., Savvidou, E., Pinho, A. P., Vasconcelos, R., Pereira, C., ... Tietz, S. (2025). Beyond the label: Analyzing the presence and information behind the QR codes on alcohol containers in 13 European countries. *International Journal of Drug Policy*, 142, 104862. https://doi.org/10.1016/j.drugpo.2025.104862

Maharjan, A., Danuwar, R. K., Kayestha, M., Maharjan, M., Baral, D. K., Koirala, A., & Timalsina, D. P. (2024). Analysing Customers' Perception on QR Payment in Kathmandu Valley: An

NPRC Journal of Multidisciplinary Research
Volume 3, Issue 6, June, 2026 Pages: 12-28
ISSN: 3059-9148 (Online)
DOI: 10.3126/nprcjmr.v3i6.95192

Empirical Study using UTAUT and PLS-SEM. *Quest Journal of Management and Social Sciences*, 6(1), 57–73. https://doi.org/10.3126/qjmss.v6i1.67216/

Nepal Law Commission. (2025). E-commerce Act, 2081. Retrieved April 21, 2026, from https://lawcommission.gov.np/content/13517/electricity-trade--e-workers--act--2081/

Nepal Rastra Bank, Payment Systems Department (2020). NepalQR Standardization Framework and Guidelines of 2077. Retrieved April 21, 2026, from https://www.nrb.org.np/contents/uploads/2021/01/QR-Code-Guidelines-and-Framework-and-Specifications.pdf

Paananen, T., Holkkola, M., Makkonen, M., Frank, L., & Kemppainen, T. (2023). Customers' QR Code Usage Barriers in a Brick-and-Mortar Store: A Qualitative Study. *Jyväskylä University Digital Archive (University of Jyväskylä)*, 85, 171–188. https://doi.org/10.18690/um.fov.6.2023.11

Prawirayudha, A. G., Syahputera, M. A., Adisaputra, R. P., & Rahim, R. K. (2025). The Impact of QR Codes on Customer Satisfaction For Repurchase Intention on the Basis of Perceived Usefulness, Perceived Ease of Use and Perceived Flow in Food and Beverage Restaurant. *Jurnal Impresi Indonesia*, 4(10), 3823–3835. https://doi.org/10.58344/jii.v4i10.7026

Rotsios, K., Konstantoglou, A., Folinas, D., Fotiadis, T., Hatzithomas, L., & Boutsouki, C. (2022). Evaluating the Use of QR Codes on Food Products. *Sustainability*, 14(8), 4437. https://doi.org/10.3390/su14084437

Sah, G. K. (2025). Utilization of QR Codes on Trust and Security in Nepalese Context. *INTELLIGENCE Journal of Multidisciplinary Research*, 4(1), 31–48. https://doi.org/10.3126/ijmr.v4i1.76930

Sah, G. K., Shah, A., & Raj, R. K. (2025). Effectiveness of QR codes in enhancing customer satisfaction, *Rajarshi Janak University Research Journal*. 3(1), 95–103. https://doi.org/10.3126/rjurj.v3i1.80718

Tu, M., Wu, L., Wan, H., Ding, Z., Guo, Z., & Chen, J. (2022). The Adoption of QR Code Mobile Payment Technology During COVID-19: A Social Learning Perspective. *Frontiers in Psychology*, 12, 798199. https://doi.org/10.3389/fpsyg.2021.798199

Wagle, S. (2024). Customer Perception on Adoption of Quick Response (QR) Code Payment in Nepal. *Journal of Economics and Management*, 4(1), 156–164. https://doi.org/10.3126/jem.v4i1.72996

Wosu, J. T., Chukwudebe, G. A., Agubor, C. K., Ezema, L. S., & Nwanga, M. E. (2025). A Novel Quick Response Code Generator and Scanning System for Counterfeit Product Detection Using Product Inherent Features. *Indian Journal of Science and Technology*, 18(7), 539–549. https://doi.org/10.17485/ijst/v18i7.2455

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Appendix A

Table A1 presents the independent coding results for the pilot sample of 20 QR codes. The QR codes were randomly selected among 150 codes using a random number generator.

Table A1: Independent coding result for pilot sampling (n=20)

QR Code	First Coder	Second Coder	Agreements
71	Partially Relevant	Partially Relevant	Yes
147	Partially Relevant	Irrelevant	No
12	Irrelevant	Irrelevant	Yes
118	Irrelevant	Irrelevant	Yes
125	Irrelevant	Irrelevant	Yes
24	Failed	Failed	Yes
90	Irrelevant	Irrelevant	Yes
122	Irrelevant	Irrelevant	Yes
101	Relevant	Relevant	Yes
96	Failed	Failed	Yes
21	Irrelevant	Irrelevant	Yes
112	Irrelevant	Irrelevant	Yes
8	Failed	Failed	Yes
107	Irrelevant	Irrelevant	Yes
14	Irrelevant	Irrelevant	Yes
86	Relevant	Relevant	Yes
62	Failed	Failed	Yes
128	Irrelevant	Irrelevant	Yes
149	Partially Relevant	Irrelevant	No
146	Failed	Failed	Yes