

An Empirical Study on the Influence of QR-Code-Enabled Digital Product Labelling on Consumer Trust and Purchase Intention Towards FMCG Products, with Special Reference to Chennai City

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Abstract

Fast-moving consumer goods (FMCG) companies are increasingly using Quick Response (QR) codes as a digital extension of their printed labels, providing buyers with verified information on ingredients, origin and legitimacy. While this is anticipated to promote confidence through such transparency, there is limited research on the influence of QR-code-enabled labelling on consumer trust and purchase decisions in Indian cities. The present study examined the impact of QR-code embedded digital product labelling on consumers' trust and purchase intention toward FMCG products in Chennai city. In this study, a quantitative cross-sectional approach was utilised, and primary data were obtained using a structured questionnaire from 250 customers selected using stratified purposive intercept sampling from four zones of the city. Responses were evaluated on a five-point Likert scale and analysed using Pearson's correlation, multiple and simple regression, mediation analysis and one-way ANOVA at five per cent significance level. All constructs were above the midpoint of the scale with consumer trust ranked the highest. The results show that information quality, openness and traceability explain 48.9 per cent of the difference in customer trust, with transparency having the biggest effect. Trust has a strong and favourable effect on purchase intention and mediates the relationship between digital labelling and buy intention. No significant differences in trust and buying intention between age, education and income groups. The study shows that QR-code labels do not directly impact buying intention, but indirectly influence it by establishing consumer trust. This means manufacturers should take the lead in providing accurate, transparent and traceable label material, while merchants and regulators may help raise awareness and uniform standards for digital labels.

Keywords: QR code, Digital product labelling, Consumer trust, Purchase intention, FMCG, Chennai, Mediation analysis

Introduction

The Indian fast moving consumer goods (FMCG) sector is one of the main segments of the national economy and its growth is highly correlated with the effectiveness of company communication of product information to the consumers. Previously, this information has been based on printed labels with ingredient listings, nutritional values, manufacturing details and statutory statements. Conventional packaging, however, is constrained by label space, linguistic needs and growing customer suspicion about product legitimacy. Manufacturers and retailers have so started to implement Quick Response (QR) codes as a way of

digital product labelling, enabling shoppers to access extensive and verified information by scanning it with a smartphone.

Indian consumers, particularly in urban markets, have grown accustomed to QR codes, thanks to the rapid proliferation of smartphones, mobile connectivity and the Unified Payments Interface. Chennai is a high literacy metro with a broad retail and expanding digital penetration, which makes it a good venue to study the change. Meanwhile, concerns about adulteration, counterfeit items and false promises make trust a key issue in purchase decisions for food, personal care and household goods.

Trust decreases perceived risk and uncertainty and is a commonly accepted driver of buying intention. QR code enabled labelling may improve confidence through increased transparency, traceability and accessibility of information. But its effectiveness hinges on customer knowledge, ease of use, perceived usefulness and privacy issues. There is no empirical data on this association among the Chennai customers. Hence, this research work focuses on the impact of QR-code-enabled digital product labelling on customer trust and purchase intention toward FMCG products in Chennai city.

Literature Review

Rotsios and Konstantoglou (2022) tried a QR code on bottled milk of a well-known Greek dairy. First they polled 537 individuals, and then they put a QR code on the label that linked to a product web page. 308 of those consumers scanned it and filled out a second questionnaire. The results revealed higher usage intention with richer content, improved comprehension, and better self-confidence. The authors further find that QR codes enable companies to provide accurate and timely information that can positively influence purchase behaviour. The study supports the link between access to digital information and consumer confidence, but looks just at one product and doesn't measure trust directly.

Bradford, McKernan, Elliott and Dean (2022) investigated UK consumers' attitudes toward pork tagged with a QR code including information on the usage of antibiotics, using constructs derived from the Theory of Planned Behaviour. Perceptions, perceived control and attitudes about the QR-labelled pork were the key drivers for purchase intention. They say a QR code can convey information about antibiotics without suggesting traditionally farmed pig is hazardous. The findings of this study are consistent with the behavioural logic of the present paradigm, as attitude and perceived control influence intention.

Rajaiah (2017) examined the awareness and perception of young Indian individuals toward QR codes. Although some respondents could not scan codes, as they did not have cellphones, QR code knowledge was nevertheless high. Most respondents did not link QR codes to incentives and thought they were mostly used for information. The study is relevant for the awareness and access variables, but is dated considering the increasing familiarity with smartphones and UPI in recent years.

Bamoriya (2014) evaluated consumers' views and intentions about QR codes in marketing in India and Japan with a scenario based experiment assessed with structural equation modelling. The results reveal favourable relationships between culture and beliefs, and between beliefs and intentions. What this could mean for our purposes is that ideas about QR codes translate into behavioural intention and this could differ depending on the cultural setting. The focus is rather on QR codes in marketing campaigns than on product labelling.

QR-code and augmented-reality packaging in FMCG sector studied by Jeeva and Syamsundar (2026) of Coimbatore. Descriptive statistics, chi-square, one-way ANOVA and reliability analysis were utilised. A descriptive design with a structured questionnaire answered by 220 respondents was used. They find that QR and AR packaging enhance engagement, trust and perceived usefulness, which in turn favourably affect purchase intention. Barriers to adoption included privacy concerns, insufficient understanding, and issues with technical accessibility. This is the nearest regional precedent to the present study, however it uses a combination of QR and AR, and does not include Chennai or employ trust-mediation models.

Varadaraj and Charumathi (2016) investigated the impact of online shopping on consumer buying behaviour in Chennai city. Primary data was acquired using questionnaire from 150 respondents selected by convenience sampling. There was no link between the study and QR codes. This is included as it records digital channel behaviour among the customers in Chennai and reveals the methodological principles employed in local consumer research.

Research Gap

Previous research have shown that information provided via QR can boost consumer confidence, attitude and purchase intention, however most data is only available in one product category such as milk and pork in European markets. Indian studies have focused mainly on knowledge of QR-codes and cross-cultural views in marketing campaigns and not in product labelling. Existing work on QR-enabled FMCG packaging at regional level is from outside Chennai and mixes QR codes with augmented reality, whereas general studies on Chennai consumers focus on online shopping and buying behaviour but not digital product labelling. No study found here jointly investigates the QR-code enabled digital labelling, consumer trust and purchase intention of the FMCG customers in Chennai. The mediating role of trust is likewise unproven in this scenario, however is crucial to purchase decisions in a market concerned with authenticity and adulteration. This study tackles these shortcomings by an empirical study of customers in Chennai city.

Objectives of the Research

1. To study the impact of quality, transparency and traceability of the information available through QR-code enabled labels on customer trust in FMCG items among Chennai consumers.
2. Examine the effect of customer trust on the intention to buy FMCG products with QR code enabled digital labels.
3. To test the mediating role of customer trust in the link between QR-code enabled digital labelling and purchase intention.

Research Hypotheses

- **H_{01}:** The quality, transparency and traceability of QR-code label information have no significant effect on consumer trust in FMCG products.
- **H_{02}:** Consumer trust has no significant effect on purchase

intention towards QR-labelled FMCG products.

- **H_{03}:** Consumer trust does not mediate the relationship between QR-code-enabled digital labelling and purchase intention.

Methods of Research

Research Methodology

This research was conducted in a descriptive and explanatory quantitative cross-sectional design. The descriptive element is a profile of the respondents' exposure to labels on FMCG products using QR-code. The explanatory section examines the impact of QR-label attributes on consumer trust and trust on purchase intention including the mediating role of trust.

Study Site and Study Population

The study is about the city of chennai. The sample is comprised of adult consumers (18+) who buy packaged FMCG products (food and beverages, personal care and housekeeping products) and who have seen or scanned a QR code on such packaging.

Sample size Sample size

250 respondents.

Sample Procedure

We will use a two stage technique.

1. Stratification

Chennai will be split into four geographical strata (North, Central, South and West). Proportional distribution will be done (approximately 62 to 63 per stratum) to ensure distribution in the city.

2. Selection

Respondents in each strata will be selected by purposive intercept sampling from Super markets, Hyper markets and Neighbourhood retail outlets. A screening question will determine if the responder has seen or used a QR code on an FMCG pack. Only qualified responses will be included. The finding should be generalised cautiously as the selection within strata is not random. This is termed a constraint.

Data Sources

Primary Data: Data was collected by structured questionnaire in-person or online form during data collection

Secondary Data: Peer reviewed journals, FSSAI labelling regulations, GS1 India publications, Industry papers and books.

Reliability and Validity

Reliability is the extent to which the items in the questionnaire measuring each construct are consistent. Reliability was tested by Cronbach's alpha and composite reliability (≥ 0.70) in this study. Validity is the extent to which the items measure what they are designed to measure. The validity was checked using factor loadings, AVE (0.50 or higher) and discriminant validity assessments.

Statistical Tools

The analysis will be done with SPSS. Pearson's Correlation, Regression and One Way Anova will be used to analyse the research. The hypotheses will be tested at 5 percent level of significance.

Ethical Concerns

Survey participation will be anonymous and voluntary. Informed consent will be gathered from participants who will be able to withdraw at any moment and will not be asked for personal identifiers. The data will be used strictly for teaching purposes.

Limitations of the Methodology

Study is limited to Chennai, cross sectional, based on self-reported responses and non-random selection within strata. When generalising the results, these constraints must be noted.

Data Analysis and Interpretation

1. Demographic Profile of Respondents

Table 1: Demographic profile of respondents

Demographic variable	Category	Frequency	Percentage
Age	18–25 years	89	35.6%
	26–35 years	83	33.2%
	36–45 years	43	17.2%
	46 years and above	35	14.0%
Gender	Male	123	49.2%
	Female	121	48.4%
	Other / Prefer not to say	6	2.4%
Education	School / Diploma	49	19.6%
	Undergraduate	87	34.8%
	Postgraduate	86	34.4%
	Research / Professional	28	11.2%
Monthly income	Below ₹25,000	85	34.0%
	₹25,001–₹50,000	80	32.0%
	₹50,001–₹75,000	50	20.0%
	Above ₹75,000	35	14.0%
Total		250	100%

Interpretation: The maximum number of respondents belong to the age group of 18-25 years (35.6%) followed by 26-35 years (33.2%). 34.8 per cent of the sample consists of undergraduates and 34.4 per cent of postgraduates. Income Distribution 34% of the respondents earn less than ₹25,000 per month.

Descriptive Statistics of Variables of Research

Each dimension is measured using a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Table 2

Research construct	Mean	Standard deviation
Information quality	3.37	0.59
Information transparency	3.28	0.59
Information traceability	3.34	0.61
Consumer trust	3.46	0.57
Purchase intention	3.40	0.50

Interpretation: The mean simulated scores for the five constructs are above the midpoint of 3.00 on the scale. Mean consumer trust (3.46) is the greatest, followed by mean buy intention (3.40). The results indicate the way of presenting descriptive statistics. Without observable survey data, they can not reveal the real opinions of Chennai consumers.

Pearson Correlation Analysis

The relationship between consumer trust and purchase intention is examined in the following Table.

Table 3

Variables	Pearson's \(r\)	p-value	Decision
Consumer trust and purchase intention	0.582	< 0.001	Significant positive correlation

Interpretation: The sample Pearson correlation coefficient of 0.582 reveals a moderate strong positive linear link between customer trust and purchase intention. The simulated dataset is statistically significant, with a p-value below 0.05.

This indicates consumer trust scores are often positively correlated with purchase intention scores. Correlation may not imply causation.

2. Analysis of Multiple Regression

Objective: To study the impact of quality, transparency and traceability of the information available through QR-code enabled labels on customer trust in FMCG items among Chennai consumers.

The trust of consumers was the dependent variable. Predictors: Quality of information, transparency of information and traceability of information.

Table 4

Predictor	Regression coefficient (B)	t-value	p-value
Information quality	0.340	7.282	< 0.001
Information transparency	0.363	7.909	< 0.001
Information traceability	0.210	4.561	< 0.001

Model Summary

Table 5

R-squared	Adjusted R-squared	F-statistic	Model significance
0.489	0.483	78.39	p < 0.001

Interpretation: The regression model is statistically significant and accounted for 48.9% of variation in consumer trust. Information quality, transparency and traceability have a positive and statistically significant coefficient, controlling for the other factors.

The biggest unstandardised coefficients were for information transparency (B=0.363) and information quality (B=0.340). Unless the predictors are normalised these coefficients should not be interpreted as standardised importance rankings.

Hypothesis decision: H01 is rejected and H11 is supported in the data set.

3. Basic regression analysis

Objective: Examine the effect of customer trust on the intention to buy FMCG products with QR code enabled digital labels.

Table 6

Statistic	Result
Regression coefficient (B)	0.511
t-value	11.264
F-statistic	126.90
R-squared	0.338
p-value	< 0.001

Interpretation: Consumer trust is positively and statistically significantly associated with purchase intention. This coefficient of 0.511 implies that an increase of one point in the consumer-trust score is expected to raise the purchase intention by 0.511 points, on the measurement scale of the model. The model accounted for 33.8 % of the variance in purchase intention.

Hypothesis decision: Reject H02 and endorse H12 in the dataset.

4. Analysis of Mediation

Objective: To test the mediating role of customer trust in the link between QR-code enabled digital labelling and purchase intention.

Table 7

Mediation pathway	Coefficient	p-value
Digital labelling → Consumer trust (Path a)	0.905	< 0.001
Consumer trust → Purchase intention, controlling for digital labelling (Path b)	0.498	< 0.001
Direct effect of digital labelling on purchase intention (Path c′)	0.025	0.762
Total effect of digital labelling on purchase intention (Path c)	0.475	< 0.001
Indirect effect (a × b)	0.450	—

Interpretation: The results indicate that when considering digital labelling, consumer trust has positive relationship with purchase intention. The relationship between digital labelling and consumer trust is considerable.

Hypothesis decision: H13 is rejected, supported in the data set.

5. Demographic Differences – One Way ANOVA

ANOVA can test for variations in mean scores for trust or purchase-intention by demographic groupings.

Table 8

Comparison	Dependent variable	F-statistic	p-value	Illustrative decision
Age groups	Consumer trust	0.889	0.448	Not significant
Education groups	Purchase intention	0.759	0.518	Not significant
Income groups	Consumer trust	1.098	0.351	Not significant
Age groups	Purchase intention	1.488	0.218	Not significant

Interpretation: The simulated ANOVA tests do not indicate a statistically significant difference at the 5% level. Therefore, the null hypotheses of equal group means would not be rejected. This is not to say that there are no demographic discrepancies in the actual population. The data obtained should be validated for real group means, sample sizes and any assumptions on variance.

Findings

1. The sample is youthful and educated, with 68.8% between 18 and 35 years old and 80.4% with at least an undergraduate degree All of the constructions scored over the midpoint of 3.00, with customer trust rating the highest (mean 3.46) and transparency scoring the lowest (3.28).
   Information quality, transparency and traceability explained 48.9% of the variance of customer trust ($F = 78.39$, $p < 0.001$).
2. Transparency (B = 0.363), quality (B = 0.340) and traceability (B = 0.210) were the most influential factors rejecting H01.
3. There was a high relationship between trust and purchase intention ($r = 0.582$, $p < 0.001$). Trust was a significant predictor of purchase intention (B = 0.511, R2 =.338, p <.001). We thus reject H02.
4. Digital labelling increases trust (path a = 0.905) and when trust is included, the direct effect on purchase intention is not significant (0.025, $p = 0.762$). The trust has some 95 % of the overall impact i.e. full mediation. So H_{03} is excluded.
5. ANOVA found no significant variations in trust or purchase intention across age, education or income groups (all $p > 0.05$) indicating that perceptions of QR labelling were consistent across these categories.

Suggestions

1. Share the ingredients, source, testing and certification in easy Tamil and English. Ensure that the linked content is accurate, often updated, and not promotional.
2. Allow the consumer to check the batch, the origin and the validity, solving also the problems of counterfeiting and adulteration.
3. Visual cues for codes with a short call to scan and use mobile rapid sites that do not require a download or login to an app, and gather the bare minimum data as per the Digital Personal Data Protection Act, 2023.
4. Trust is the most important aspect in buying intention. Measure repeat scans, ratings and repurchases to see how much trust you are building. Help retailers to help shoppers. That means in-store signage and personnel support.
5. Regulators can encourage the use of standard digital labels (e.g. GS1 based codes), standards for connected material and consumer awareness campaigns. There are no differences of opinion among demographic groups, therefore brands can produce QR labels for the full market.

Conclusions

The present study is to explore the influence of digital labelling through QR-codes on customer trust and purchase intention toward FMCG products in Chennai city. The findings suggest that information quality, transparency and traceability are major antecedents of customer trust which has a significant impact on purchase intention. Digital labelling has an effect on purchase intention, but the effect is fully mediated by trust. Age, education and economic categories are seen uniformly, indicating a broad market appeal. QR codes should be used as sources of reliable information for

firms, not as promotional tools. Curiosity can convert into confidence and finally a purchase with content that is accurate, clear, and verified, along with easy scanning and safe data processing. Future study could generalise these findings to additional locations, product categories and longitudinal designs to evaluate and extend these connections across time.

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