

Literature Review on Online Cart Management with QR-Based Payment

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Abstract

The literature review provides a comprehensive analysis of the integration of technology in the retail industry, focusing on in-store product scanning, online cart management, and QR-based payment systems, with a specific emphasis on the Indian market. In this paper review starts by highlighting the digital transformation of the retail sector and introduces the proposed project, aiming to enhance the shopping experience by enabling shoppers to scan products, update their online carts automatically, and make payments using QR codes. The review delves into key technological advancements, such as the widespread adoption of QR code scanning in India. It discusses how businesses utilize QR codes for marketing, payments, and product identification, linking scanned products to online carts. A crucial aspect of automatic cart update systems is real-time cart synchronization, ensuring transparency and preventing surprises at checkout. Insights from research papers and industry reports provide a deep understanding of the digital payment landscape in India, highlighting the changing preferences of consumers. Incorporating insights from a range of scholarly articles, research papers, and industry resources, the literature review provides a robust foundation for understanding the current technological landscape and user preferences. This knowledge will be instrumental in informing the development of the proposed automated shopping system.

Introduction

The rapid expansion of Information and Communication Technology has ushered in significant transformations in societal lifestyles. The advent of digital payment systems necessitated a fundamental shift in global payment methods, aligning them with the latest technological advancements. This transition has impacted individuals, organizations, businesses, governments, and other entities, prompting them to

embrace the new era of payment technology (Odi & Richard, 2013). The retail industry is witnessing a digital transformation, with the integration of technology into physical stores becoming increasingly prevalent. The proposed project aims to develop a system where shoppers can scan products in a store, automatically update their online cart, and complete the payment process via QR codes. This literature review examines key themes in this evolving retail landscape.

Discussion

A. QR Code Scanning

In the article "QR Codes: The New 'Digi-Tool' for Marketers," Niharika Soni discusses the adoption of QR codes in India. Businesses are utilizing QR codes for various purposes, including marketing and payments. The article provides insights into the practicality of integrating QR code scanning for product identification.

The ability to scan products using QR (Quick Response) codes has been a significant innovation in Indian retail. QR codes are widely used in product packaging to provide information about the item, including pricing and product details. These codes can be scanned using mobile applications, linking the product to the shopper's online cart.[19]

B. Mobile Applications

Numerous mobile applications have been developed for automatic cart update systems in India. These applications enable users to scan QR codes or barcodes on products and add them to their virtual carts, facilitating an efficient shopping experience.

C. Mobile Shopping Trends in India:

In the book "Indian Retail: Trends and Strategies," R. Rajagopal [20] highlights the growing trends in mobile shopping in India. Consumers are increasingly using smartphones for shopping, and retailers are adopting technology to enhance the shopping experience. This trend supports the relevance and potential success of your proposed project in the Indian market.

D. Real-time online Cart Updates

The core functionality of automatic cart update systems is the real-time synchronization of the virtual cart with physical product selections. When users scan products, the system instantly calculates the total price, updates the cart, and provides a running total. Such functionality ensures transparency in shopping and prevents surprises at checkout.

E. Payment Integration

One of the most critical aspects of automatic cart update systems is seamless payment integration. Indian retail environments have been actively working on incorporating multiple payment options, including digital wallets, UPI

(Unified Payments Interface), and card payments . Users can make payments through the application or by scanning a QR code at dedicated payment terminals.

Digital Payment Landscape: The research paper "Digital Payment Ecosystem in India" by Swayamprakash Patel examines the digital payment landscape in India[21]. It outlines the rapid growth of digital payment platforms and the changing preferences of Indian consumers. Understanding the digital payment ecosystem is crucial for the payment aspect of your project.

F. User Experience and Acceptance

"Designing for User Experience: Usability and Interactive Technologies" by Whitney Quesenbery and Kevin Brooks[22] emphasizes the importance of user-centered design in mobile applications. For your project, user experience and usability should be critical considerations to ensure customer satisfaction.

Several Indian studies have evaluated the user experience and acceptance of automatic cart update systems. The convenience, speed, and transparency of these systems have generally been well-received by shoppers . Users appreciate the reduced effort required in traditional shopping.

G. Payment methods

1. Plastic Cards: These are payment cards issued by financial institutions to their customer's accounts, allowing them to withdraw money from ATMs using a personal password. These cards also serve the purpose of depositing money in banks, reducing paper waste. Banks issue two main types of cards: debit cards, available to all account holders, and credit cards, issued based on creditworthiness.

2. UPI : Unified Payment Interface: UPI is a mobile app-based payment method for transferring funds between accounts. To use UPI apps, one must have mobile banking enabled. This service is currently accessible to Android users. UPI apps like BHIM, SBI UPI, HDFC UPI, Mobile, PhonePe, and others are available, and it's not necessary to use an app specific to your bank.

3.Mobile Wallet: Mobile wallets provide an alternative for storing digital cash and conducting various transactions. Popular mobile wallets include Paytm, GPay, PhonePe, Sbi buddy, Jio money, among others. Users link their bank accounts or plastic card numbers to access funds, which can be used for payments and bill settlements.

4. Internet Banking: Internet banking encompasses various services such as NEFT (National Electronic Fund Transfer), RTGS (Real Time Gross Settlement), ECS (Electronic Clearing System), and IMPS (Immediate Payment Service). These electronic banking systems enable individuals and organizations to perform transfers through their bank's website.

Literature review

The adoption of barcode technology in inventory management offers several significant advantages. It leads to improved inventory control by allowing precise tracking, thereby reducing overhead costs and preventing the loss of equipment. Barcodes offer the benefit of efficient data management, with the ability to integrate inventory and pricing information on a single label, and they can be customized to accommodate additional relevant data. Ultimately, barcodes support better decision-making through rapid and accurate data retrieval, resulting in both time and cost savings. The overall impact of barcode technology is enhanced efficiency, reduced expenses, and more informed decision-making in various applications. [5]

QR (Quick Response) codes were previously utilized as a means of accessing information or websites, but in today's world, they have become a crucial tool for facilitating social distance payments. They have emerged as a highly convenient and secure payment option that customers are increasingly familiar with, particularly in establishments such as restaurants, cafes, bars, and other venues [3]. Initially introduced in China, QR code mobile payments have gained significant popularity not only in India but also in Southeast Asia, Europe, and America, especially due to the impact of the pandemic. [1] .

A barcode is a visual way to show information using bars and spaces on a surface. These bars and spaces have different sizes and can represent numbers, letters, and symbols like dots and colons. Various combinations of these characters convey different information. There are different types of barcodes, such as Code 128, Code 39, and EAN, used today. In retail stores, one big problem is the checkout queue. To solve this, contactless digital shopping carts can be used. People usually worry about the queues outside the store, but what really bothers customers is the checkout line inside. This inside queue can make shopping frustrating for many. [17]

To break it down, barcodes are like visual codes made of bars and spaces, representing information. Different types of barcodes, like Code 128 and EAN, are used to store various data. In stores, especially in retail, waiting in the checkout queue is a common issue. Using contactless digital shopping carts can help avoid this problem. While people often focus on queues outside, it's the inside queue that frustrates customers the most, making their shopping experience less enjoyable.

To avoid waiting in long checkout lines, stores like Walmart have introduced a convenient solution called "Scan & Go." With this feature, customers can use their smartphones to scan the barcodes of items they want to buy. These scanned items are added to a digital cart in an app. Once all items are in the digital cart, customers can pay for their purchases directly through the app. After payment, they can simply walk out of the store with the items they bought.

This method eliminates the need to stand in long queues at the checkout counters. Instead, customers scan the barcodes of products, which are like special codes on the items. By doing this on their smartphones, they create a virtual cart of things they want to buy. Once they've scanned everything they need, they pay for it within the app. This makes the whole process much faster and more convenient for shoppers.

Walmart, a popular retail store, has implemented this Scan & Go feature in their stores. It's a helpful way for their customers to shop efficiently. When shoppers are in the store, they can pick up an item, scan its barcode using the app, and then move on to the next product. This way, they don't have to wait in line at the checkout counter when they're done shopping.[4]

Customers love this new way of shopping because it saves them time. Instead of waiting in line for a cashier to scan each item, they do it themselves with their smartphones. It's like having a personal shopping assistant right in their hands. This modern method of shopping is becoming more popular, not just at Walmart but also in many other stores. In summary, Scan & Go is a fantastic solution for the problem of long checkout lines. It uses technology to make shopping faster and more enjoyable for customers. By scanning items and paying through an app, shoppers can breeze through their shopping trip without the frustration of waiting in queues. This innovation in shopping has made the whole experience much smoother and more customer-friendly. [2]

In their 2012 study, Oladejo, Morufu, and colleagues explored the enhancement of the e-payment system in Nigeria, investigating the factors driving its adoption. They used structured questionnaires and financial data for analysis. The current research delves into the innovative technology known as "Amazon Go." Shopping experiences have evolved from traditional supermarkets to barcode scanners, self-checkout lines, and online shopping. Amazon introduces a groundbreaking shopping style with its Walk-out technology. The current study focuses on exploring the technology utilized in Amazon Go stores, examining its implementation and providing detailed insights into its operational mechanism. This paper further discusses about the challenges that can be faced on implementing this new technology and suggestions to overcome these challenges.[6]

one key priority for retailers in 2021 and beyond was reducing labour costs in stores [8]. To achieve this, many retailers embraced self-service checkouts. While effective for some, concerns about checkout theft and the need for staff assistance with items like security tags remained challenges. Retailers had to balance cost-cutting measures with ensuring a positive customer experience and preventing potential sales loss due to long queues. Finding innovative solutions to address these concerns became essential for retailers navigating the 'new normal.'

Order history benefits customers by offering easy reference for past purchases, aiding budgeting and personalized shopping.[9] It enables quick reorders, provides product details, and aids customer support, enhancing convenience and satisfaction. For retailers, it allows tailored services, personalized recommendations, and efficient issue resolution, ensuring a seamless customer experience.

The adoption and design of smartphone-based Scan&Go systems, as opposed to traditional stationary self-checkout, have been less explored in research.[10] This study combines online surveys and qualitative research to better understand the factors influencing Scan&Go adoption. It sheds light on both technology and infrastructure-related considerations and provides insights for improving the design and implementation of Scan&Go solutions in retail settings.

Implementing good practices in Android app development, such as prioritizing user-centric design, optimizing performance, ensuring security measures, and providing offline functionality, enhances the overall user experience. Regular testing, responsive layouts, efficient resource usage, and proper documentation are essential. Keeping the app updated, maintaining version control, and focusing on accessibility ensure a high-quality, user-friendly app, addressing challenges and providing essential features for users in their daily lives.[12]

The integration of e-wallets can noticeably enhance the efficiency of financial institutions and offer comparatively more advanced services for customers. The youth of the nation, in particular, has openly accepted these modified payment apps, finding satisfaction in the smooth working of transactions and other payments. [18]

In 2020, Mr. Cherukur studied how happy people are with using mobile wallets. He looked at what makes customers satisfied when they use these digital wallets on their smartphones for daily transactions. Nowadays, almost everyone uses their smartphones to pay for things using these mobile wallets. These digital wallets have become really popular. Mr. Cherukur did a survey with people who use mobile wallets to find out how happy they are with it..[16]

In 2020, Singh explained how various mobile phones getting better has made more people use mobile payments. Now, you can buy things online using your phone, which saves time and is easy. Mobile payments involve people using their phones to pay for things, and this happens a lot. Many studies looked at how people first started using mobile payments, but not many looked at how people keep using them after they start.[15]

In 2018, Vinitha and S. Vasantha talked about how the digital revolution changed how we live our lives. The internet and digital payments have constantly played a big role in connecting people across the globe which allows them to make payments anytime, anywhere. This makes users happy and loyal customers base.[14]

In 2020, Kaur and her team found that mobile wallet apps are gaining popularity these days. They are helpful for customers because they make transactions easy and safe. Surprisingly, these apps are not widely available in all markets yet. Smartphones have changed how we pay for things using QR codes. By 2025, 30% of smartphone users will use QR codes to make payments. To do this, they scan the code, which takes them to a payment page. There, they can enter

their payment information or use mobile payment apps like Apple or Google Pay to finish the payment.[7]

Payzapp is an easy payment app where you can pay with just one click. It helps you buy things from other apps, book movie tickets, and pay bills. Phonepe is an Indian app where you can send and get money, recharge your phone, and pay for things at shops. You can also invest in funds and buy insurance using Phonepe. Paytm, short for 'Pay through mobile,' is a big company in India. It lets you do lots of things like recharging your phone, paying bills, and even buying tickets for travel and movies. You can also use it to pay in stores by scanning a special code they have.

Kotak 811 is a digital bank account from Kotak Mahindra Bank. Anyone in India can open it without needing any money in the account initially. You can choose between having no minimum balance or opt for an 811 edge savings account. It's a handy solution for your money needs and day-to-day transactions.

Bhim is a mobile payment app in India. It was made by the National Payments Corporation of India (NPCI) and uses the Unified Payments Interface (UPI). It helps people make electronic payments through their banks, encouraging the use of digital money instead of cash. [23]

The Payments App is a crucial feature of mobile wallets because most people prefer to pay their bills online, whether it's for shopping, groceries, dining out, booking movie or train tickets, paying rent, classes, utilities, or loans. As digital money becomes more popular, mobile wallets aim to provide essential services for the general public. A key focus is on making the registration process easy and fast. The main purpose of introducing e-wallets is to save consumers time and effort, making transactions convenient. The simple self-registration procedure encourages users to easily install the app on their phones, sign up by providing necessary information, confirm the registration, set up a password and login, link their debit/credit card or bank account, and add money to the wallet, enabling hassle-free transactions..

Steps in the Registration Process:

- Users install the app on their mobile phones, making it easily accessible.
- They provide necessary information to sign up, streamlining the registration process.
- Confirmation of registration is a simple step, verifying the user's identity and account creation.
- Users establish a secure password and login credentials, ensuring their account's safety.
- Linking the wallet with a debit/credit card or bank account is necessary, catering to individual requirements.
- Finally, users add money to the wallet, enabling them to make hassle-free digital transactions.

Conclusion

After analysing various research papers we can clearly state that, the integration of automatic cart update systems in Indian retail environments is poised to transform the shopping experience. The use of QR codes, mobile applications, and real-time cart updates offers convenience and transparency to shoppers. However, continued efforts in research and development are essential to address challenges and secure the systems' future.

Future research should align with these emerging trends and holds the potential to offer an innovative and convenient shopping experience. However, successful implementation will require a user-friendly mobile application, efficient product scanning capabilities, and seamless integration with digital payment systems.

Future Research

Despite the encouraging progress, there are ongoing difficulties in guaranteeing the dependability and safety of automated shopping cart update systems in the Indian retail sector. The need for additional research and development is evident in areas such as safeguarding data privacy, deterring fraudulent scanning, and improving system resilience.

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