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Design and Development of a Smart POS App with Cloud

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Abstract: ***The retail industry is becoming increasingly competitive, and businesses must keep up with the latest technological advancements to stay ahead of the curve. This research paper explores the benefits of a smart POS application integrated with cloud technology. The paper discusses the current state of the retail industry, the challenges facing retailers, and the potential benefits of using a smart POS application. The literature review of smart POS systems, the design and development process, and the outcomes and discussion of the application's implementation are all included in this paper. Despite the potential benefits of digital point-of- sale (POS) systems, small businesses in India have been slow to adopt this technology. This paper aims to identify the factors that affect the adoption of digital POS systems in Indian small businesses. A survey was conducted with 167 small businesses across different industries in India. The results showed that factors such as cost, perceived usefulness, compatibility with existing systems, and complexity of the technology were the primary barriers to adoption. On the other hand, factors such as perceived ease of use, vendor support, and trial ability were identified as the primary drivers of adoption.***
Keywords: Smartphone, Cloud technology, POS Application

I. INTRODUCTION

Systems for managing sales and inventory are known as point of sale (POS) systems. Smart POS systems have been created to improve transaction accuracy and efficiency. Traditional smart POS systems, on the other hand, can be large and expensive, making them inappropriate for mobile sales agents and small enterprises. By designing and creating a smart POS application with many useful features, this research article tries to overcome this problem.

The retail industry is continuously evolving, and businesses need to keep up with the latest trends and technologies to remain competitive. One such technology is the adoption of smart POS apps with cloud connectivity.

India has more than 19 million MSMEs and most of the owners of these stores tend to do accounting and simple sales analysis on paper, at the end of the day, these shop owners sit down for a lengthy process of counting the entire day's revenue. They segregate sales by products to track which of them are doing well and which are not. Additionally, they have to keep inventory in check so that it doesn't run out of stock with growing demand. All this is a tedious process that has a large room for errors like miscalculations or mistakenly missing to mention some products or sales in the analysis at the end of the day. This is where inventory management and electronic point-of-sale systems come into the picture. Inventory management and electronic POS systems help to automate this entire process of keeping inventory in check and making sales reports and updating them instantly right after a new sale has been made.

This system makes store managers' work easier and more efficient. This helps in mitigating human error by automating the entire process. But such systems come at a cost that is not in the budget for most of the MSMEs in India and they take up large space. We want to address this problem by bringing in a Smart and simple solution.

II. LITERATURE REVIEW

The literature review focuses on the previous work done in designing and developing smart POS systems. The review discusses the advantages and limitations of traditional smart POS systems and the need for smart POS systems that are lightweight, portable, and cost-effective. The review also covers the various features and functionalities of smart POS systems, such as inventory management, sales reporting, and customer management.

In the retail sector, the usage of intelligent POS systems has grown recently. These solutions are intended to improve the client experience by making transactions faster and more efficient. The next advancement in this process is a smart POS application with smart features and connectivity.

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There is a study that investigated the effect of inventory management systems on the performance of small and medium-sized businesses (SMEs). A survey of 100 Pakistani SMEs was used to conduct the research. Based on the findings, implementing inventory management systems resulted in significant improvements in business performance, including increased sales, improved inventory control, and cost savings.[1]

According to the findings, inventory management systems can assist SMEs in growing and improving their overall performance.

There is another study sought to identify the factors preventing MSMEs in India from adopting digital payment systems. The researchers conducted a survey of 200 MSMEs from various industries in India and discovered that the main barriers to adoption were a lack of awareness, high transaction costs, and poor trust value in digital payment systems. The study also discovered that government initiatives such as demonetization and the implementation of UPI had a positive impact on adoption, but that more needs to be done to raise awareness and trust in digital payment systems.[2] The evolution of POS systems can be traced back to the 1800s when cash registers were first introduced. These machines provided a basic means of recording transactions and tracking cash flow. In the 1970s, electronic cash registers (ECRs) were introduced, which automated many of the manual processes associated with cash registers, such as calculating totals and providing change.[3]

In the 1980s, the first POS systems were introduced, which integrated ECRs with barcode scanners, providing more accurate and efficient transaction processing. These systems also introduced inventory management features, enabling businesses to track stock levels and reorder products automatically.[3]

The integration of a smart POS application also offers benefits such as real-time inventory management, sales reporting, and customer data analysis. This information can be accessed from any device, allowing retailers to make informed decisions and improve their business processes.[4]

In summary, the incorporation of a smart POS application has the potential to completely transform the retail sector by enabling real-time inventory management, customer data analysis, and faster and more effective service. The use of such an application would enable retailers to remain competitive while also meeting the changing needs of today's consumers.

III. METHODOLOGY

This project includes four modules i.e. Inventory Management, POS system, Sales Analytics and Customer Relation Management. The Modules in the app are as follows

1) *Inventory Management:* IVM involves collection of product details like barcode, name, category, price, description and stock etc. The Inventory Management module allows businesses to keep track of all their products and supplies with ease, ensuring there are no surprises when it comes to reordering.
2) *POS:* The POS System module allows for seamless transactions, reducing wait times for customers and keeping businesses running smoothly. This consists of scanning barcodes of products or manually identifying products by typing their names and by selecting from search suggest drop-down list and eventually generating a digital Invoice.
3) *Sales Analytics:* Sales Analytics provides in-depth insights into business performance, helping owners make informed decisions. The Sales Analytics module provides a thorough report of sales, products sold, and profit margins, ideal for businesses seeking to increase their revenue. In this section, the collected sales data will be made available in the form of various graphs which helps in keeping track of the progress of the business.
4) *Customer Relation Management:* This module improves customer retention by managing customer feedback and interactions. Businesses can keep track of customer preferences, purchase histories, and respond quicker to customer inquiries or complaints. CRM involves sending promotional notifications to the customers using Whatsapp API.

IV. RESULT AND DISCUSSION

Adoption of a smart POS app can provide numerous benefits to businesses, including increased efficiency and accuracy, real-time data access, lower costs, improved customer experience, and scalability and flexibility. Smart POS apps have several advantages over traditional POS systems:

1) *Increased Productivity and Accuracy*: Improved efficiency and accuracy are two of the primary advantages of using a smart POS app with cloud connectivity. Traditional point-of-sale systems frequently require manual data entry, which can lead to errors and inefficiencies. Data can be automatically entered and stored in the cloud using a smart POS app, ensuring that all information is accurate and up to date. Furthermore, smart POS apps can automate many tasks, such as inventory management and sales tracking, saving time and effort.

2) *Real-time Data Access:* Smart POS apps allow businesses to access their data from anywhere, at any time, allowing them to gain real-time insights into their operations. Businesses can now make informed decisions quickly and easily. Existing POS (Point of Sale) systems have certain limitations when it comes to billing, including:
3) *Limited Payment Options:* Many existing POS systems only support a limited number of payment methods, such as cash and credit cards. This can be a problem for businesses that want to offer customers a wider range of payment options, such as digital wallets or mobile payments.
4) *Difficulty in Handling Complex Orders:* Existing POS systems may struggle with complex orders, such as split payments or discounts applied to specific items. This can lead to errors or delays in the billing process, which can be frustrating for customers and employees.
5) *Lack of Customization:* Some existing POS systems may not offer the ability to customize the billing process to meet the specific needs of a business. This can be a problem for businesses that have unique requirements or want to offer customers a personalized experience.
6) *Limited Mobility:* Traditional point-of-sale systems are large and require a fixed location to operate, limiting mobility and flexibility. This can result in long lines during peak hours, leaving customers dissatisfied.
7) *High Upfront Costs:* Traditional POS systems have high upfront costs, which include hardware and software, installation, and training. For small businesses, this can be a significant investment, making it difficult to implement a POS system.
8) *Maintenance and Upgrade Costs:* Traditional POS systems necessitate ongoing maintenance and upgrade costs, such as hardware replacement and software updates. This can be costly, especially for small businesses on a tight budget.

A. Traditional POS VS Cloud based POS

Cloud-based POS systems are becoming increasingly popular in today's business world due to their numerous advantages over traditional POS systems. A cloud-based POS system is a software solution that is hosted on a remote server and accessed via the internet, as opposed to being run on a local server or computer. This system provides numerous advantages to businesses that traditional POS systems simply cannot match.

1) *Cost-Effective*: One of the most significant benefits of cloud-based POS systems is their low cost. Traditional point-of-sale systems typically necessitate significant upfront hardware investments, such as servers, computers, and other equipment. Cloud-based POS systems, on the other hand, require little hardware and typically run on mobile devices like tablets or smartphones. This means that businesses can save money on both equipment and maintenance and repairs.
2) *.Scalability:* Scalability is another significant advantage of cloud-based POS systems. Traditional POS systems are often rigid and difficult to upgrade or customize as a company grows or changes. Cloud-based POS systems, on the other hand, are designed to be scalable, which means they can expand or contract as a business's needs change. This makes them ideal for businesses that have seasonal sales fluctuations or plan to expand in the future.
3) *Security:* Since data is stored in the cloud as opposed to on-site servers, cloud-based POS systems are typically more secure than conventional systems. This reduces the risk of hardware theft or damage and makes security measures like two-factor authentication and encryption easier to implement which in turn generates more trust and business.

4) *Real-Time Data Analytics:* Cloud-based POS systems, unlike traditional POS systems, support real-time data analytics. This helps businesses to gain valuable insights into their operations by using real-time data analytics, such as understanding inventory levels, sales trends, and customer behavior. These critical data insights can be used to make better decisions, such as adjusting pricing strategies, optimizing inventory levels, and improving overall customer service. Data analysis in traditional POS systems is typically done manually, which can be time-consuming and error prone.

V. CONCLUSION

The adoption of a smart POS app with cloud connectivity has the potential to revolutionize the retail industry by providing improved efficiency, accuracy, real-time data access, lower costs, improved customer experience, and scalability and flexibility. The evolution of POS systems has brought about significant improvements in transaction processing, inventory management, and analytics capabilities. Cloud computing has emerged as a game-changer for the retail industry, providing businesses with secure and scalable platforms for storing and processing data. However, the adoption of this technology requires technical expertise and training, and businesses should carefully consider their needs and resources before making the switch. The smart POS application mentioned in this research paper is a cost-effective and user-friendly solution for small businesses and mobile sales agents. Overall, while existing POS systems are useful for billing, they do have limitations that can impact the efficiency and effectiveness of the billing process. Businesses should carefully evaluate their needs and consider alternative solutions, such as cloud-based POS systems or mobile payment solutions, to overcome these limitations and improve their billing processes.

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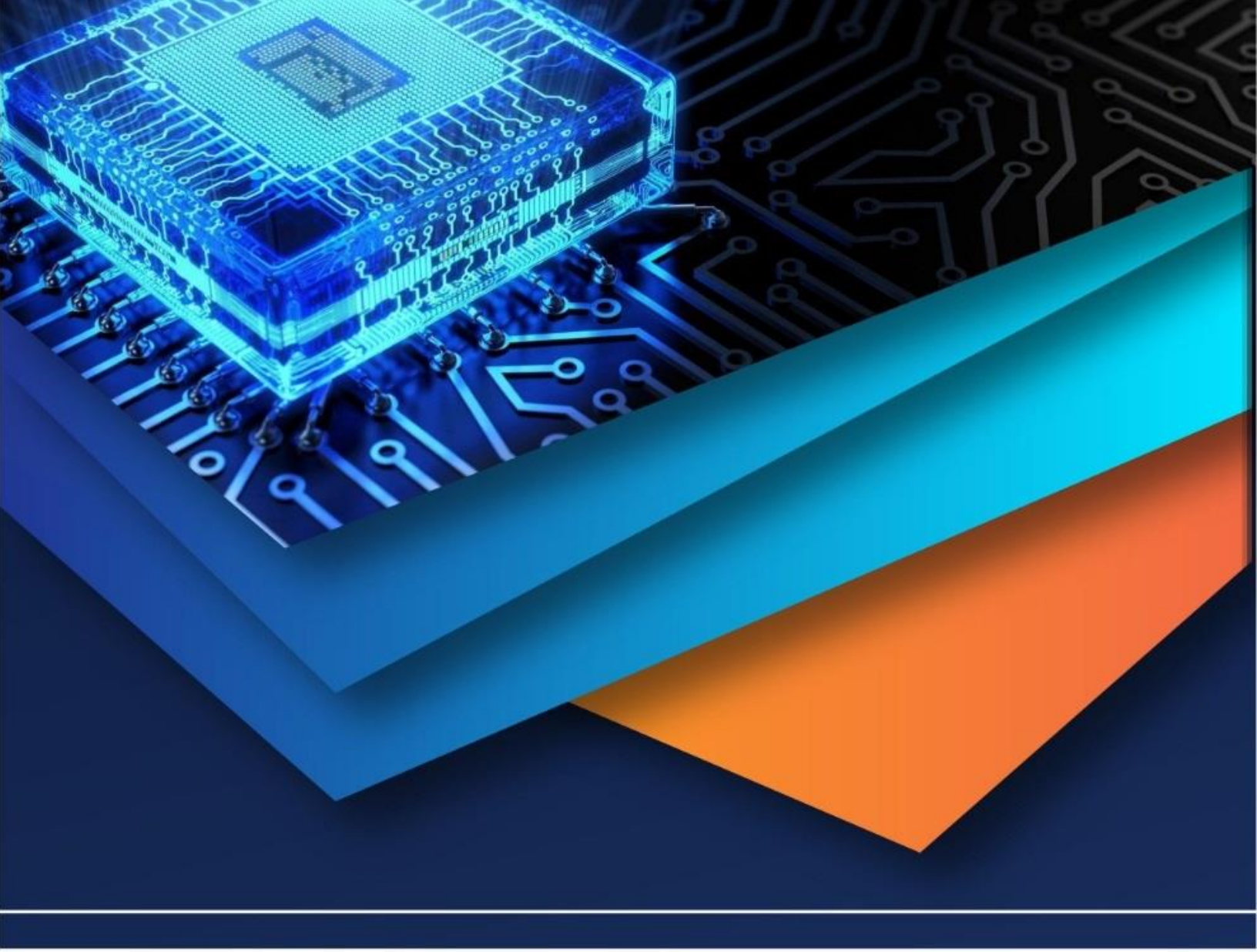

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