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RFID: The Silver Bullet towards Seamless Indian Petro Retail Customer Service

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Abstract

Objective: To explore the applicability and Impact of deploying an RFID solution on customer identification, personalization, and satisfaction at a fuel retail outlet. **Method:** A live outlet was chosen in Delhi, where an RFID solution was deployed for six months, from January to June 2022. The study is carried out on the data gathered during the period. **Findings:** RFID implementation can yield significant benefits towards customer identification, increased operational efficiency, and customer acquisition & retention, thus leading to increased revenue. The result showed that 74.5% of customers became more satisfied with automatic identification and personalization, incl digital greetings and fueling confirmation through SMS. **Novelty:** The study is original towards applying RFID-based solutions to customer experience in Indian Petro Retail**.** While similar technologies have been tried for customer identification purposes, our study attempted to test the Impact of RFID technology adoption on customer satisfaction and enhancement of experience during their fueling journey.

Keywords: RFID; Indian fuel retail; RFID in Oil & Gas; Customer Experience; Customer Identification

1 Introduction

India, one of the leading countries in energy consumption, has enhanced its focus on the petro retail sector. Conventionally, Fuels such as Petrol and Diesel have been sold in India at fuel stations operated by Oil Marketing Companies (OMC) through their dealers & distributors. In pre-independence and early years of post-independence in India, Fuel was made available as a commodity. The Government and State-run Oil Companies regulated the price of Fuel (PSUs) in the business with hardly any competition. With the phased regulation of prices by the government and the entry of private players in the petro retail sector, competition has increased considerably and, with time, with exposure to the latest technology, has become a service-based business and thus has led to a shift in customer buying behaviour [1].

The last few decades have witnessed significant technological advancement from analogue to digital and from digital to Artificial Intelligence (AI), Big data, and IoT.

This is changing how industries function worldwide, from manufacturing to service[2] and led to more evolved modern customers with a change in their buying habits. Customer expectations & experience, in general, have changed and still evolving. The retail sector has witnessed a remarkable shift in customer behaviour due to technology adoption and enhancement. There is overlap among customers in retail and petro retail as well. Customer behaviour towards petro retail is also evolving. Adopting technologies such as AI, Bigdata, Cloud, mobile technology, etc., in the upstream part is quite visible. However, in the Indian context, adopting technologies on the downstream side is not significant, particularly in customer identification, recognition, and meeting their expectation of product & service mix. While general retail has rapidly advanced technology adoption and thus led to enhanced customer experience, petro retail is yet to catch up[2]. ICT has proven to correlate positively with business benefits, especially towards customer closeness and product leadership, including operational excellence and strategic intelligence using the enterprise architecture management process[3]. Strategic alignment and efficiently managed ICT help the industry decrease expenses, enhance process efficiency and customer satisfaction, and ensure governance and structural concern[4]. Information technology (IT) has helped standardize productivity and customization of customer services during the last decades. It is considered a strategic decision to promote success in multi-input and output variable operational contexts[5].

Fuel station management, Price of Fuel, and Technology Adoption in services are critical factors that significantly influence retail petrol consumption in India. Other factors, such as fuel station image, service quality, product assortment, and additional benefits, are closely related to consumer preference[6]. Technology adoption influences the customers' buying behaviour. Service providers are also required to invest more attention in developing technology-based infrastructure and services to meet the evolving behaviour and requirement of the Indian petro retail customers[7].

In the modern technology era, the Internet of Things (IoT) can be an enabler and promoter of interactive and dynamic services for businesses to play a pivotal role in the next generation[8]. It has also been observed that IoTs are in use in other sectors with the advancement of in adoption in the last few years[9,10].

Technology like the usage of IoT & AI in petro retail has impacted enhanced customer experience and enhanced operational efficiency[11]. Using IoTs has also significantly impacted the organization's overall service excellence and profit maximization[12]. It has also been observed that a gap exists in adopting digital payment technology in petro retail in the Indian context. In contrast, it is widely accepted in the general retail sector[13].

The advancement in sensing and transmitting technologies, such as RFID, have been adopted in various industries, like architecture, construction and engineering. RFID enables sensing, identifying, counting, locating, measuring, documenting, and transmitting information on a real-time basis helping managers towards efficient project management and decision–making[14]. RFID has improved the monitoring and identification of goods within retail stores to enhance efficiency and safety[15].

In the current era, when customers have exposure to social media and technology-based services in the retail sector, they have enhanced expectations for technology-based advancement in products and services. Customer expectation has also evolved with the shift in customers' buying behaviour in petro retailing. While technology adoption is more visible in general retail, petro retail has yet to catch up, mainly in identifying and meeting customers' expectations. A gap is visible in adopting technologies in customer identification, recognition and enriching their buying journey.

Currently, OMCs have an automation system at their fuel stations that provide an array of functionalities and MIS reports to handle the fuel station operation and facilities equipment, including the dealerships/franchisees, to manage the operation and customer satisfaction. The automation system has various customer-centric functionalities like personalized billing, e-bill in the form of SMS, and capturing all the transactions at the fuel station electronically on a real-time basis. The customers have appreciated these functionalities in the industry; however, there is a gap in identifying the customer once they are inside the fuel station to initiate the differentiated offerings. The study with an RFID-based customer identification system, the first in petro retail in India, provides the benefit to the identification of the customer, instant recognition of customers & better service experience.

2 Methodology

In our study, one fuel station in Delhi city was selected, and RFID based identification system was provided. The fuel station was monitored for six months for the system's efficiency, impact on the system on forecourt efficiency, customer experience, and sales growth. The study was conducted in the period January- June 2022. Sales volume data was gathered from OMC officials. A survey of 110 customers was performed using the convenience sampling method. The pretested standard survey questionnaires included demographic details of the customer and their experience & satisfaction levels pre and post-implementation of the identification system. The data received through survey were analysed statistically to understand the system's efficacy in the Indian Petro retail context.

3 Solution Architecture

3.1 Island Display System

The Island Display system consists of two LCD Displays mounted on the Island, visible from both sides of the fueling positions. It allows customers to see the ongoing fueling transaction of their vehicle along with a welcome note with their name. The customer is not required to come out of the car as it will be visible inside it. Besides the transaction view, the LCD can also show advertisements and promotional offerings for the customers Figure 1.
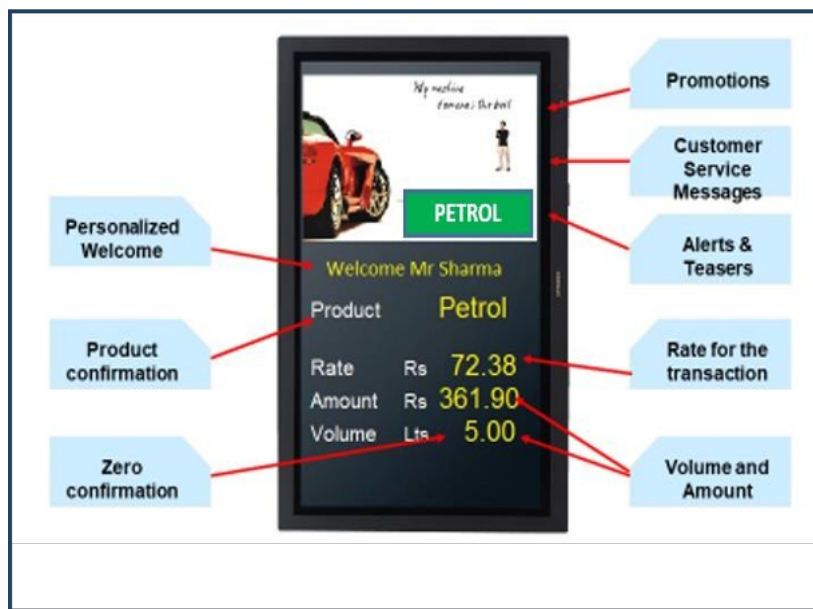

Fig 1. Schematic Diagram of display on the forecourt

3.2 Customer Identification System and Process

Customers were issued personalized RFID Tags having information about the vehicle number, type of vehicle, the product allowed, owner information, etc., preloaded on it. These Tags were placed at any convenient place on the cars, preferably on the windshield, which was read by using a handheld device (NFC (near field communication) enabled Electronic Data Capture machine (EDC)) by the attendant before the fueling started. Once the tags are recognized, the automation system authenticates and authorizes the vehicle for fueling. The attendant at the fuel stations is provided with a handheld RFID Reader, and each RFID Reader is associated with specific Fueling Positions (BAY). The reader communicates with the fuel station automation Controller (Forecourt controller – FCC) over a wireless protocol.

3.3 Key Components of the Solution

The RFID-based solution, deployed at the fuel station for our study purpose, has the following key components:

1. FCC controller for integration of NFC-based reader integration with fuel station automation solution.
2. Customer Identification Tag writer along with Tag writing software.
3. NFC-based handheld Terminal (EDC) for reading RFID Tags.
4. Internet connectivity through existing arrangements at the fuel station

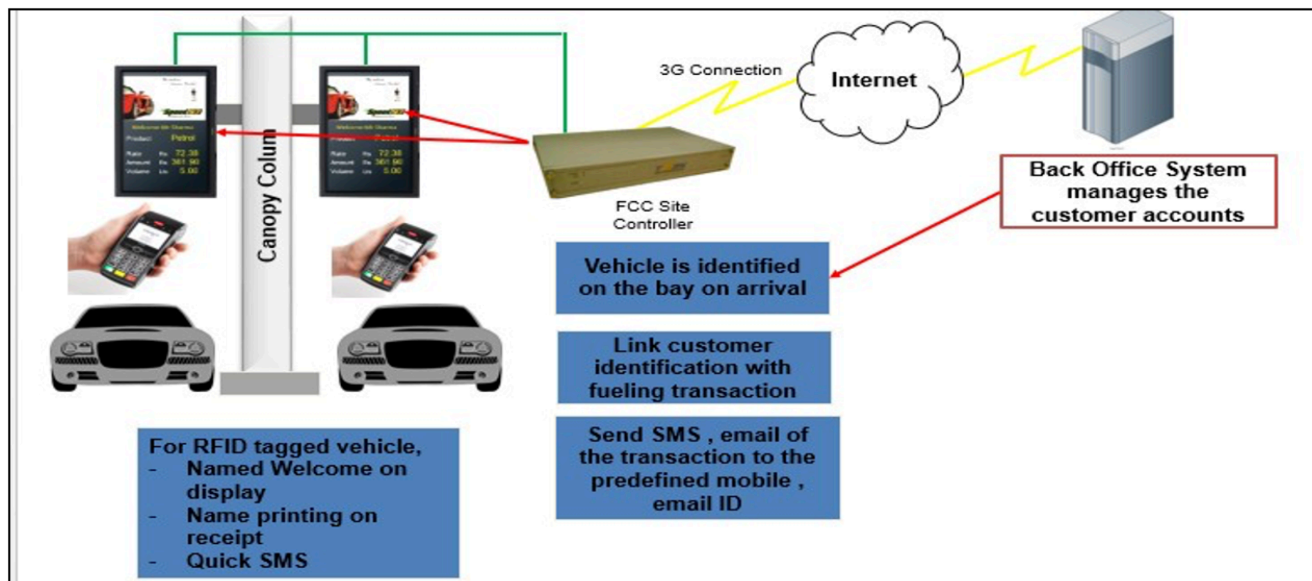Schematic diagram of the solution and the components is depicted in Figure 2.

Fig 2. Schematic diagram of the solution

3.4 Process flow

Key attributes of the customer identification process considered are (i) quick, (ii) with less manual intervention (iii) error-free (iv) convenient & cost-effective and (v) simple & efficient deployment process. The RFID-based identification process recognizes attributes like customer mobile number, vehicle number, and fuel type fetched from the back-end system. The solution has helped link the fueling transaction with customer detail and send transaction details to the customer through SMS, email, etc. It also helped to provide provisions for extending customized offers, promotions, statements, etc. Step-wise process flow detail is depicted in Figure 3.
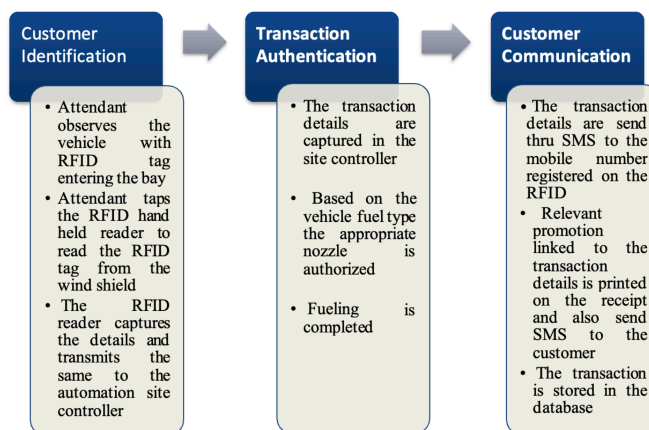

Fig 3. Process Flow

4 Results & Discussion

Analysis of the respondents about age, gender, educational qualifications, occupation, vehicle use, type of Fuel consumed, and frequency of Fuel (Figure 4 and Figure 5) were analyzed. It showed that respondents are fairly distributed for all the parameters, and responses from probable segments of customers are covered.
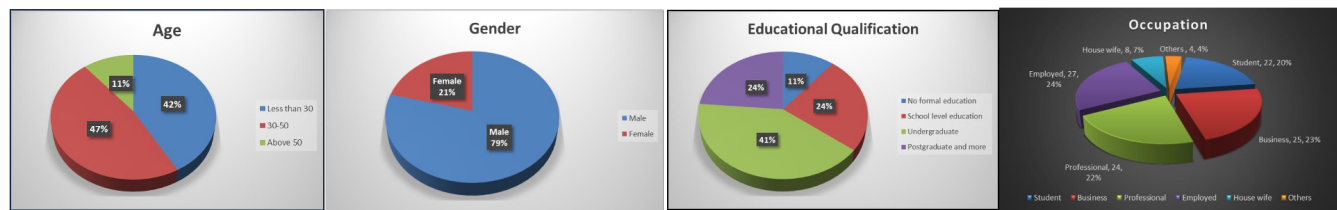
Fig 4. Demographic, Educational and Occupational detail of respondents
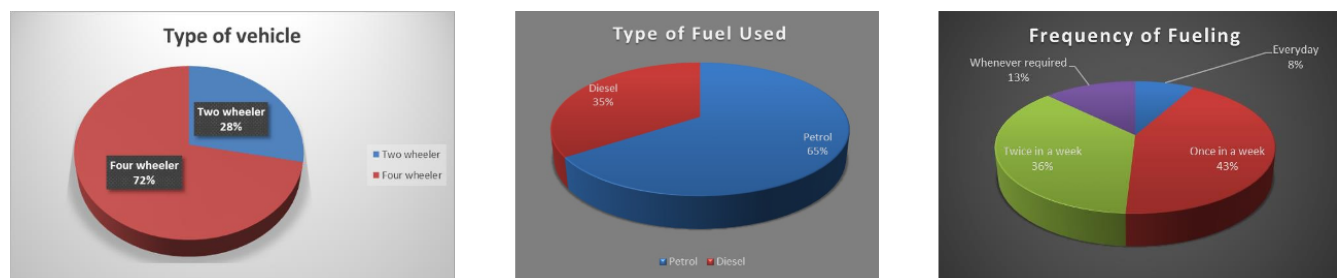

Fig 5. Typeof vehicle, Fuel used and frequency of fuelling of respondents

Sales volume data for an observation period of six-months, which is collected from OMC were analyzed, and it shows a steady increase in the volume month-on-month basis, and a rise of 10.7% has been recorded in six month time. Figure 6. Over six months, 17406 customers were registered with the contact details. Confirmation of Fuel delivered to the registered customers from their subsequent fueling was sent using an RFID-based solution. The sharp increase in the number of registration of customers and total SMS sent to them over the observation period Figure 7). More than 36000 SMS confirmations were sent to the customers in the observed period of six months.
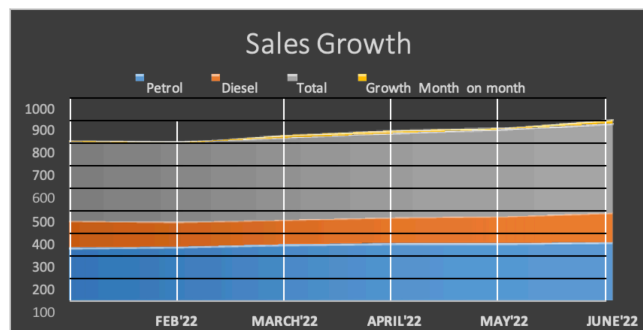

Fig 6. Sales growth
(Volume data in KL/Month)*

It has also been observed that 74.5% of the respondents became more satisfied with identifying and displaying welcome messages and SMS confirmations. All these functionalities created a feeling of superior experience and assurance & validation of the quantity of fuelling, thus leading to enhanced satisfaction. (Figure 8).

In order to offer a seamless experience to the customer when they visit fuel stations, there is a dependency on infrastructure at the outlet and the technology-based solution available at the fuel station. RFID technology-based customer identification solution is one step towards providing a better seamless buying experience at the fuel station. The RFID-based solution offers a better experience to the customers. At the same time, it positively impacts all stakeholders, such as fuel stations, customers, and service providers, i.e. OMCs.
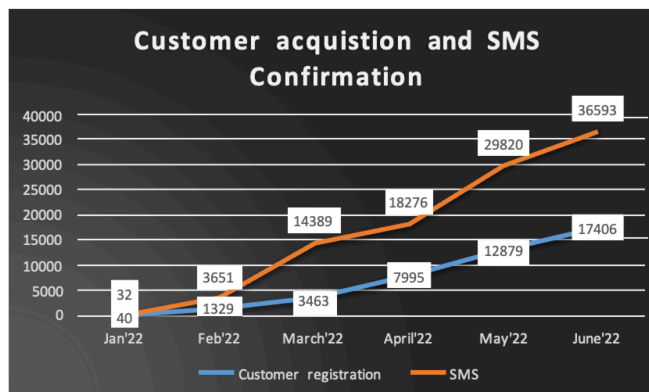
Fig 7. Customer registration and SMS delivered

Fig 8. Customer Satisfaction survey

4.1 Impact on Fuel Station

Fuel station owners/operators came to know the vehicles/customers visiting the RO and can have targeted communication to select customers since the frequency and value generated by customers are known now. At the same time, since identification & product selection is based on the pre-configured tag on the solution, wrong fueling to the vehicle is also eliminated

4.2 Impact on Customer

Through the RFID-based solution, customers get alert confirmation against fueling transactions and personalized services, including offers & promotions. Since customers are identified through RFID tags, customized consumption statements are available at regular intervals.

4.3 Impact on Service Providers (OMC)

The solution enabled service providers to capture customer details for every transaction, making customer insight available for the fuel station. The service provides visibility of customer buying behaviour and has information to design a differentiated value-based offering for the customers. The solution helps the OMCs monitor customers' fueling patterns, thus enabling them to develop an effective approach to building long-lasting relationships.

The data show that fueling volume has increased by 10.6%, and fueling cycle duration has also been substantially reduced. The new digitized and modern look & feel of the fuel stations and intelligent database with the help of RFID captured identification, auto SMS to the customer has increased drastically, helping enhancement the Brand image of the fuel station.

5 Conclusion

The RFID-based identification system amalgamated with dynamic forecourt display has emerged as a differentiating functionality and will pave the way to bag the crown of leading service providers. The RFID-based solutions have a positive impact in (i) Enhanced Customer Experience. Customers aim to have a smooth fueling experience, including personalization and SMS confirmation, without hiccups at the fuel stations. (ii) Increase in Operation Efficiency by reducing the fueling cycle time, (iii) enhanced brand building, including new customer acquisition and retention, (v) designing better service delivery, and (vi) leading to additional revenue for the service provider. The study showed an increase of 74.5% in customer satisfaction and impacted sales growth by more than 10%. Thus, rapid technological advancements and increasing exposure to digitization have led to increasing adoption of digital technologies, including RFID-based solutions for bridging gaps in service deliveries from customer and provider perspectives. At the same time, there is the scope for technology intervention to enhance customer buying experience and satisfaction in the Indian petro retail context. Adopting RFID-based identification provides a complete view of customer buying behaviour, including buying patterns, customer segments, and type of Fuel or combination. The study is unique and helps bridge the gap in customer identification, recognition and customer satisfaction. Also, it became an enabler for the managers to design service protocols towards superior experience to the customer, bridging gaps in service deliveries and thus business growth.

6 Limitations and future research directions

This Article tried to articulate how RFID-based technology can be helpful in the Fuel retail business as well from a service provider & customer perspective. The study is limited to one fuel station in one city only. The same can be adopted and scaled up by OMCs to enhance customer buying experience and satisfaction across the fueling journey. The comparison of the findings reported herein elucidates the critical usage of RFID technologies to create better service quality and databases for strategic decisions in the Petro retail industry.

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