



An Empirical Study Of Using New Technology like NFC, AI, RFID etc. to be implemented in shopping malls in ajmer : To Ease Out The Customer Shopping Experience Like Queue Less And Cashless Payment Mode

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ABSTRACT: In today's world due to rapid development of new shopping trend. The retailers launches new technologies for new shopping trend. In today scenario every people are busy. When we are talking about shopping from stores, shopping malls etc., the customers waiting in queue for long time for payment process. This is a problematic conditions for customers. The traditional shopping trend consuming more time of customers during shopping. To remove this problem many retailers are focussing that how to save the time of customers during shopping and payment process. For this purpose many latest and emerging technologies like Near field communications (NFC) technology, image sensing cameras, computer vision, sensor fusion and Machine learning algorithm, Artificial Intelligence etc. that has brought a new wave of techniques to the retail industry to attract and interact with customers in innovative ways. In today's scenario the demand of smartphones are increases day by day. Many Smartphones having NFC technology. Therefore with the help of these types of NFC enabled smartphones it can change the way of shopping. Therefore in this paper firstly, the author(s) wants to make aware the customers about latest shopping updations and technology in customers shopping delight. Secondly, we knowing from customers what they feel about queue less, cashless shopping experience, for this purpose we have design a set of questionnaire. The questionnaire filled by only from those customers who are really interested in the same. These technology will help to improve the traditional shopping. Using these technologies no checkout, no queues, no cashier require in shopping malls and stores.

Key Words: NFC, image sensing cameras, computer vision, sensor fusion and Machine learning algorithm, Artificial Intelligence, RFID, Smartphones, Shopping malls, Survey

I. INTRODUCTION

In today's world due to rapid development of new shopping trend. The retailers launches new technologies for shopping. In today scenario every people are busy. When we are talking about shopping from stores, shopping malls etc., the customers waiting in queue for long time for payment process. This is a problematic conditions for customers. The traditional shopping trend consuming more time of customers during shopping. To remove this problem many retailers are focussing that how to save the time of customers during shopping and payment process. For this purpose many latest and emerging technologies like Near field communications (NFC) technology, image sensing cameras, computer vision, sensor fusion and Machine learning algorithm, Artificial Intelligence etc. that has brought a new wave of techniques to the retail industry to attract and interact with customers in innovative ways. In today's scenario the demand of smartphones are increases day by day. Recently many Smartphones having NFC technology. Therefore with the help of these types of NFC enabled smartphones it can change the way of traditional shopping. These technology will help to improve the traditional shopping. Using these technologies no checkout, no queues, no cashier require in shopping malls and stores. Many retailers launches new technologies for new shopping trend For example Amazon Go: It is a new kind of store with no checkout required. With this advance shopping technology customers never have to wait in line. Just walk out shopping



experience, simply use the Amazon Go APP to enter the store. Take the product you want and go. No lines, No checkout, No cash register, simply take and Go.

Therefore in this paper firstly, we discuss about NFC technology then how this technology will work along with other technology like image sensing cameras, computer vision, sensor fusion and Machine learning algorithm, Artificial Intelligence etc. in shopping malls and stores. Secondly, the author(s) wants to make aware the customers of shopping malls like Big Bazaar and Reliance market, V-Mart, Vishal Mega Mart, retail store etc. about latest shopping updations in customers shopping delight. We will also knowing from customers that what they feel about queueless, cashless shopping experience, for this purpose we have design a set of questionnaire. The questionnaire filled by the customers only from those who are really interested in the same. We will also show the Amazon Go video downloaded from youtube to the interested customers for the reference of No lines, No checkout, No cash register, simply take and Go. Therefore with the help of questionnaire, Amazon Go video etc. we want to introduce to customers about some type of new technology to be implemented in shopping malls.

II. HOW TECHNOLOGY WILL WORK IN SHOPPING MALLS

An NFC enabled smartphone is required to use these types of technology. An app install in smartphone via presenting a barcode to a sensor. The barcode consists of other sensor technology like GPS etc. It tracks to the customers that he/she entered in the store. It identifies the movement of customers and then identifies that what product the customer pickup. In store or shopping malls some new technology will also used like image recognition combined with a sensor fusion. This technology has confirmed the order and totaled it up. Therefore in near future all the shopping malls and retail store will uses number of advanced technologies like image sensing cameras, computer vision, sensor fusion and Machine learning algorithm, Artificial Intelligence etc. These technology could help the customers for checkout-free shopping, no queues, No cash register, simply take and Go like Amazon Go.

III. DIFFERENT TYPES OF TECHNOLOGY USED FOR SHOPPING

1. NFC TECHNOLOGY

NFC (near field communication) is a short-range wireless connectivity technology(less than 10 cm) that are used for the exchange of data between two electronic devices. It operates at 13.56 MHz frequency. NFC is designed to be a secure form of data exchange. One of the device in NFC network is known as 'NFC tag' and the other device is known as 'NFC reader'. This unique feature allows NFC devices to communicate peer-to-peer. NFC technology is the upgrade of RFID (radio frequency identification) standard technology. It uses principle of electromagnetic induction between two loop antennas for establishing communication. The connection of NFC is established in few seconds. The frequency range of NFC falls under unlicensed radio frequency band. It is considered as ISM

band. NFC can also work when one of the devices is not powered by a battery [1].

1.1 How NFC technology will work in shopping malls:

For efficient shopping system, with the help of unique NFC Tags that are used to record the article name, number, location of goods placed. Phone have NFC reader recognizes the NFC Tag. NFC could provide Shoppers or costumers with more benefits beyond faster payments. On the one hand, NFC based Rebate coupons and loyalty cards could further accelerate the check-out process. On the other hand, NFC devices could be used to support customers with more Information on available products. This could also reduce the customers' need for store personnel assistance. Therefore with the help of these types of NFC enabled smartphones it can change the way of shopping.

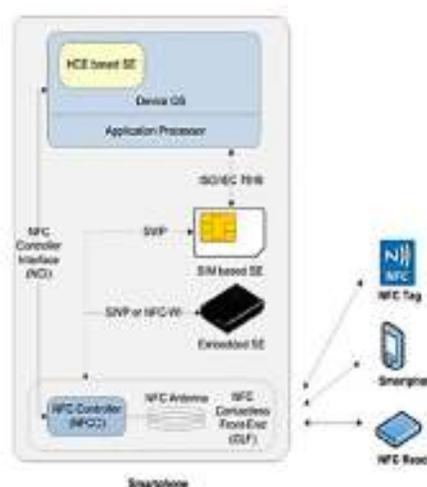


Fig.1: NFC enabled smartphone

2. Computer vision: computer vision system help to detect which items a shopper pulls off a shelf and carries out of the store. Computer vision is an interdisciplinary field that deals with how computers can be made for gaining high-level understanding from digital images or videos. From the perspective of engineering, it seeks to automate tasks that the human visual system can do. [2]. It allowing the computer not only to record images but also to interpret them.

3. Image recognition and Sensor fusion: in shopping malls we can identify the products using image recognition. Combine this with the Fusion Sensors that cross confirm the new virtual "shopping cart" we can create not only just by taking an item in our hand, but also by putting it back, there is actually even less of a likelihood of an erroneous transaction. It is a process by which data from several different sensors are "fused" to compute something more than could be determined by any one sensor alone. An example is computing the orientation of a device in three-dimensional space. That data might then be used to alter the perspective presented by a 3D GUI or game.



4. Machine learning algorithm, Artificial Intelligence:

Artificial Intelligence (AI), Machine Learning (ML) and deep learning garnered from decades of being a retailer. It starts with the hardware that includes image sensors using camera optics, LIDAR arrays using laser sensing and other technology to correctly identify the item on a shelf, taken off the shelf, returned back to the shelf or taken out of the store. [3]



Fig.2: figure shows the Impact of AI on the retail industry
Source: <https://yourstory.com/2017/01/impact-ai-retail-industry/>

Artificial Intelligence and Machine Learning both are at the forefront of technical innovation. Machine learning is a subset of artificial intelligence that uses algorithms to learn from data sets. Algorithms are essentially a series of steps that lead to the completion of a task. Using data and algorithms, Machine learning technologies make intelligent predictions or perform actions. In machine learning, the framework is developed and data is provided, so that machines can teach themselves what they need to know and understand what to do [4].

5. RFID (Radio frequency identification): It is a new technology which uses an electromagnetic field to track and identify tags attached to the object. The tags are small in size that emit distinct signals. Small Tags contain electronically stored information.

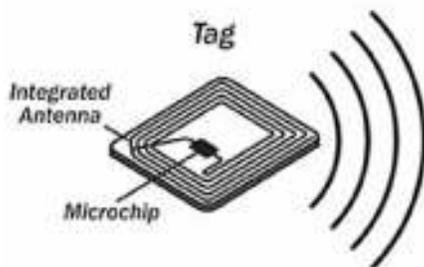


Fig.3: figure shows RFID technology

Shopping malls and Retail stores can use this technology to record or store a variety of information such as quantities of various items that are available in store, serial number, their locations, purchase record etc.. The tags can be attached to all sorts of things. With the help of this technology the customer will have the information about price of every item that are scanned in, total price of the item, detail of product

etc. This technology will save time of customers, cost, manpower etc. that is required in shopping malls and retail store.

Smart Trolley using RFID can also be used for shopping. In shopping malls the technology will work by simply attaching RFID tags to the products and a RFID reader with a LCD display on the shopping trolley. It has a tags that are two types: passive and active. Tags are used to identify the object and tied with them. Active tags send radio waves to the RFID reader and hence will inform about its location. Passive tags reflect the radio waves transmitted by RFID reader and hence reader will come to know about location of the tags.



Fig.4: figure shows Smart Trolley using RFID
Source: <https://www.linkedin.com/pulse/smart-retail-stores-ensuring-best-customer-experience-rowan-klaiber>

V. MANY RETAILERS WORK ON NFC TECHNOLOGY

Amazon Go is the latest example which is also considering creating NFC-based marketing services. Amazon already offers an application for Apple's iPhone, called Price Check by Amazon, that lets consumers compare prices of in-store items with Amazon's by scanning bar codes, snapping pictures, or saying or typing the product's name.

Google brought it to market first with the Nexus S and now have jumped on board with the Near Field Communications Forum.

Microsoft is already planning to enable NFC technology in soon-to-be-released Windows Phone 7 models; even Apple has been focusing on their game by paving the way for iPhone and other iOS devices to embed NFC-reader chips.

In fact, outfits like Google and Amazon would find huge benefit if they decided to partner with retail establishments by tailoring not just NFC but hyper local marketing to permit retail stores to transmit and/or allow access to their daily deals via smartphones [5].

VI. SURVEY DONE IN SHOPPING MALLS FOR REALISTIC VIEW OF CUSTOMERS

We have done a survey in various shopping malls/retail store like Big Bazaar and Reliance market, V-



Mart, Vishal Mega Mart, retail store etc. of Ajmer. We awaring the customers about future technology to be implemented in near future in developed countries to know about the technology and seeking the answers of the questions that the shopping malls and customers are ready to adept forthcoming technological changes and revolution in shopping trend.



Image 4: Acquire shopping experiences of customers.



Image 1: Survey done in shopping mall.



Image 5 : Survey outside the Reliance Fresh



Image 2: Survey done in shopping mall.



Image 6: Providing awareness to the customers in shopping malls about the new shopping trends



Image 3: Survey done in shopping mall.



Image 7: letter for survey visit



Image 8: letter for survey visit



Image 12: letter for survey visit



Image 9: letter for survey visit



Image 10: letter for survey visit

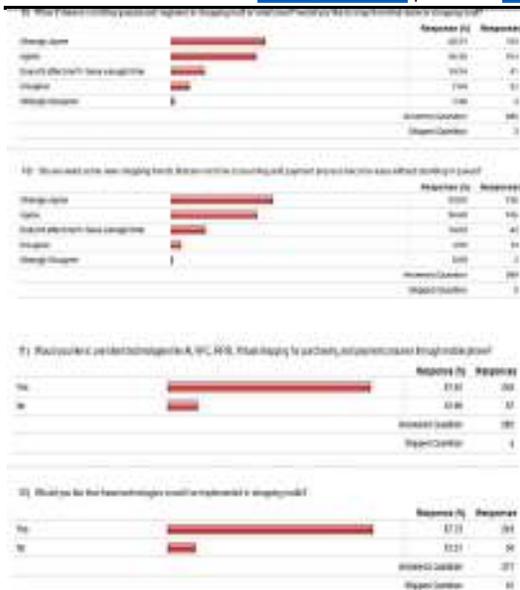


Image 11: letter for survey visit

VII. SURVEY RESULT

Results for: An empirical study of Using new technology like NFC, AI, RFID in Shopping malls in Ajmer to ease out the customer shopping experience like queue less n cashless payment mode





VIII. DATA INTERPRETATION AND ANALYSIS

In this paper the online survey conducted for seeking the awareness of new technology like NFC, AI, RFID in Shopping malls in Ajmer to ease out the customer shopping experience like queue less and cashless payment mode.

The age and income group questions were excluded from the questionnaire as any person of any age group and any income group who possess smartphone can purchase goods from the Hi-Tech store without making payment in cash and customer could be any person irrespective of his/her age group. The author (s) has taken two steps ahead by excluding the regular features of questionnaire like age group, male or female and income group.

In this survey in response to the question regarding do you have smartphone? Out of 289 respondents 82.35% owns smartphone as people are aware of usage of smartphones with the latest 4th generation of communication available for mobile technology. In response to the question regarding NFC enable smartphone 43.66 percent have NFC enable smartphone or they know about NFC but about 56% respondents do not know about this feature of their smartphone and 5 respondent skipped this question due to lack of knowledge. In response to the question regarding visit to shopping mall 4 respondent skipped this question and 285 respondents gave response to this question according to them about 20% they visit more than 4 times to shop in shopping mall, 28% visits in between 2-4 times and 29% visits 2-3 times. 22 percent make this visit in a month to shop from the above mentioned data, the frequency of visitors are more if we combine 2-3 and 2-4 times visitors that makes 29% + 28%=57 percent. This is a huge amount of population who makes the purchasing and stand in the queue for shopping and billing.

In India the shopping trends are shifting from regular market to shopping mall culture; due to new generation and double income group family standards, they prefer to shop in shopping malls and variety of brand availability. They are

the target customers for the new Hi-Tech shopping mall in future.

The experience in shopping mall is very time consuming in comparison to traditional shopping as the variety of goods and offers made by companies and shopping malls too makes the choice difficult and the queue at cash register is always a time consuming feature of any shopping mall, 79 percent respondent support this through of time consuming affair in shopping through shopping mall.

Shopping experience in shopping mall is rated by 289 respondents in which 19% says it much better, 39 percent says it a better experience and 29% are neutral and about 10 percent are in support of work experience. The above facts of information implicates that around 30 percent are not supportive. They purchase from shopping mall due to various reasons but they are not happy with their shopping experience may be due to the billing procedure or other things who are in support of this.

In response to the question regarding selection of products with various discount scheme only 13 percent supports the reason about the selection of goods with different discount schemes available there. The information derived from the above facts is that people are very much disturbed due to long billing queue but they do not have any alternatives except to stand in a row and wait for their turn.

This billing queue phenomenon is growing day by day from metro to tier-2 and tier-3 cities but people do not find any suitable solution for it. This gives the researcher the 'research gap' to full filled by using the technology. As it is very clear from earlier questions that people are having smartphones and most of them are aware of using technology on smartphone.

In regard to queue less and cashless shopping the respondents are very much in support about 86 percent respondents are in support of this and 14 percent says 'no', may be these respondents are those who comes only 'once' and when they are only 'once' type of customers. The billing queue doesn't affects them more in comparison to them who came frequently to shop in shopping mall.

While standing in billing queue makes the person boaring according to 40 percent respondents. Tiring 33 percent as the customers can be of any age group from children to old age those standing in the queue is definitely tiring. Having more cash register that is supported by 9 percent respondents is a temporary solution to divide the surge in festival season but having extra manpower during normal season is a cost increasing issue to shopping mall. 16 percent respondents supports to have a new technology to shorter the billing queue.

In response to the question what if there is no billing queue and cash register would they prefer to shop from that shopping mall/store out of 289 respondents 40 percent are strongly agree, 36 percent agree and 14 percent they have enough time to stand in a queue and 7 percent disagree and 1 percent strongly disagree. It is very clear from the situation above 40+36=76 percent are in support of cashless/queue less shopping experience and for those who do not agree the percent is low and may be they are 'once' times and may be they do not have smartphones or probably do not know now to use new technology for their betterment.

79 percent respondents are in support of question regarding some new change/trends in shopping experiences only 5 percent are not in support of change and 14 percent neutral



due to any reason they do not want to change or do not wish to be a part in new changes in shopping mall experience.

In response to the question about using new technology like NFC, AI, etc. for purchasing and payment procedure out of 289 respondents 87 percent are in support of the question about 12 percent says 'No'. The huge percent of supports indicates that people want change and they wish to use new technology for their shopping experience as new generation are already using web portals for online shopping and facilities like cash on delivery options to make ease of their shopping experience.

In response to the question regarding technologies should be implemented in shopping mall, near about 87 percent respondents are in support of the question. Only 12 percent respondents says 'no'. It is clear that the huge percent of supports indicates that people want change and they wish to use new technology for their shopping.

IX. CONCLUSION

In this paper we concluded that with the help of new technology like NFC, AI, RFID in Shopping malls, it will change the way of shopping in future. Because in current scenario every people are busy and they want to spend minimum time for shopping process like billing, standing in queue etc.. So in this paper with the help of survey we find that most of people wants to upgrade the traditional way of shopping. In this research paper we had surveyed many malls of Ajmer like Reliance market, V-Mart, Vishal Mega Mart, Big Bazaar and retail store also. Some of the malls did not give us the permission for survey in their malls like Big Bazaar, Vishal Mega Mart. So we had done the survey outside the shopping malls. During survey we found that the customers are not aware with these kind of technologies. Most of the customers had NFC enabled mobile phone but they do not aware that their phones are NFC enabled or not. With the help of survey we aware them about these technologies and how these technologies will be beneficial for shopping in future.

The managers of the malls also show their positive and helping response for give us permission to doing a survey and they also appreciate these kind of technologies. They want to implemented these kind of technologies in future for providing better services to their customers.

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