IMPACT OF IN-STORE RETAIL TECHNOLOGIES ON ENHANCING RETAIL FOOTFALL AMONG PHYSICAL RETAIL FORMATS IN INDIA

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ABSTRACT

This study is concerned with assessing the relevance of emerging in-store retail technologies among retail conglomerates in India. The methodology consists of reviewing emerging in-store retail technologies and their utility in retail organizations, including current levels of adoption in organizational retail in India. Furthermore, the impact of retail technologies in enhancing retail footfall is evaluated based on the in-store technology infusion framework framed by Grewal, Noble, Roggeveen, & Nordfalt. The findings of the study categorize various emerging in-store technologies based on their convenience and social presence. Electronic shelf labels, smart shelves and self-checkout services increase operational efficiency, but may not increase retail footfall. Socially immersive technologies such as augmented reality (AR) applications, proximity marketing can generate higher footfall. Retail robots, virtual avatars, virtual navigtion systems are not recommended as they are not likely to increase retail footfall. In the present era, Omnichannel retail is the norm among both physical and online retailers and there is an increasing convergence of retail technologies across the industry.

Keywords: Retail Technologies, Retail Footfall, Retail Traffic.

INTRODUCTION

E-commerce has been gaining traction and e-retail platforms are now picking up vacant commercial spaces in malls and closer to neighbourhoods due to lower rentals to serve as distribution centres, allowing customers to pick up goods at their convenience (ET Brand Equity, 2020). One of the largest e-commerce players is also making inroads into physical retail by tying up with local vendors. Physical retailers will have to contend with changed purchase behaviour after the pandemic and would need to attract sufficient footfall to shore up revenue. Technology could serve as the differentiating factor for physical stores over online retail. The current retail technologies adopted by retail conglomerates are barcode scanning (at POS terminals), information kiosks (facilitating basic retail transactions) and digital displays (standardized promotional messages regarding new products/offers) (Inman & Nikolova, 2017). Emerging in-store retail technologies could help address various challenges such as stockout, difficulty locating products and long checkout queues and also improve customer experience in Table 1.

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LITERATURE REVIEW

Table 1
INSTORE RETAIL TECHNOLOGIES

S.No	Author	Technology	Utility
1	Michelis & Muller, 2011	Narrowcasting/Digital signage	Provides customized/personalized advertising messages in high retail traffic areas within the store
2	Zhu et al., 2007	In store kiosks	Facilitate quick transactions through touchscreens/digital devices who have time constraints and is usually associated with convenience stores/corner stores.
3	O'Neal, 2016	3D printing	Customers can customize their products with designs that can be manufactured at the retailer's location using 3D printing.
4	Zhu et al., 2018; Intel, 2018	RFID based Smart Shelves	RFID enabled shelves allow data collection regarding inventory without human intervention. This lowers inventory carrying costs and lowers stockout, along with notifying store personnel when inventory levels are low and in case products are misplaced. The ideal smart shelf also allows seamless interaction (product details, alternate modes of purchase, product reviews, provides tailored promotional & pricing offers) between the manufacturer and the customer through his smartphone/communication device.
5	Banakar & Shetty, 2019; Jain, 2019; Wirecard, 2019	Electronic shelf labelling (ESL)/Digital price tags	ESL is the equivalent to of a physical price tag that helps the retailer track customer traffic/footfall, provide promotional offers for perishable goods, allows dynamic pricing displays based on demand and monitors product information. ESL also allows the customer to add the product to his shopping list, make a payment through his device (mobile payment systems)
6	Chaubard & Garafulic, 2018	Automated checkout systems/Grab & Go	Rely on sensors attached the shopping cart which capture the image of the product and using machine learning add to the shopping basket. As the customer exits the story with his list of products, the payment is deducted for a digital wallet.
8	Garcia, 2016; Purohit, 2020	Beacons/Proximity marketing	Utilizes Bluetooth Low Energy (BLE), Wi-Fi or GPS (Geofencing) that facilitate push notifications, personalized communication to customers. Beacons increase retail footfall by offering promotional coupons to competitors in the vicinity of the store or at a competitor's store. This technology also supports

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			omnichannel customers who research and buy products online, while picking them at a nearby physical store (BOPIS).
9	Dachs, 2020	Virtual navigation system/Location Based Services	Using Ultrawide band (UWB) technologies (low frequency, high bandwidth), retailers can track the movement of customers using UWB antennas placed across the store. This technology allows UWB devices to interact providing a virtual navigation system that allows the customer to locate key facilities within the store and also locate friends/companions inside the store.
10	Pantano et al., 2018; Fourtane, 2019	Augmented reality applications (Smart mirrors)	Interactive mirrors and store front windows that allow the customer to visualize the product in real time through augmented reality, artificial intelligence and gesture recognition.
11	Cruz et al., 2019	Augmented reality applications (Mobile)	Provides a 3D user visualization of a product choice and allows customization to help the customer gain a real time visualization of his product selection. AR applications can also act as navigation systems within stores, helping the customer locate key facilities or product aisles of his choice.
12	Winkler, 2019	Omni channel retail integration	Involves full integration of all retail channels (physical, online) and provides a seamless customer experience and engages the customer across various communication channels (push notifications, promotions & offers, social media updates, invitations for store events etc.)
13	Underwood, 2020; Grewal et al., 2020	Retail robots	Retail robots can help guide customers to desired product aisles, provide an interface for queries and information, retrieve products for customers. Embodied/ humanoid robots boost customer experience, while disembodied/screen-based robots support customer retail activities.
14	Cognizant, 2016; Freitag, 2019	Avatars	Virtual avatars can be deployed in stores through displays and can assist the customer through offering suggestions, answering questions and offering complements. Avatars can also be created by customers to visualize products on their avatars (apparel).

With regard to feasibility; instore kiosks and omni-retail channels are most likely to be adopted by physical retail formats in India. Omni-channel retail is being adopted by online retailers to expand their market presence into the unorganized retail sector. Digital signage is used in most apparel and electronics outlets, but they feature standard advertisements and have little impact on customer behaviour. Self-checkout and automated checkout systems are unlikely

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to be implemented in the FMCG segment in India, as retail shrinkage is a major concern and requires considerable investment. The utility of retail robots and virtual avatars can easily be substituted by smart devices/smartphones, but augmented reality applications can be a differentiating factor for physical retailers.

Current Adoption of In-store Retail Technologies in India

Proximity marketing

Tata's grocery home delivery service, Star Bazaar has collaborated with State Bank of India to improve customer experience. Beacon notifications allow customers to avail Star Bazaar loyalty cards with the support of a in-store person. Customers will receive push notifications at the POS terminal regarding offers on SBI cards, while Star Bazaar will periodically send push notifications of discounts and cash back offers. SBI plans to roll out this service among other organized retail chains in the future. However, the adoption of proximity marketing is still in its infancy in India (Adarsh, 2018).

Location based services/virtual in-store navigation systems

There has been no widespread adoption of location-based service/in-store virtual navigation systems among retail conglomerates in India.

Electronic shelf labelling (ESL)

Panasonic has launched electronic shelf labelling (ESL) in association with E ink that will slowly replace manual labels with dynamic pricing labels and allows store personnel to monitor product information, display promotional offers and reduce pricing errors (Retail4Growth, 2019). The adoption of ESL is still yet to take off in India.

Smart shelves

There has been no widespread adoption of smart shelf technologies by large retail corporations in India.

Self-checkout systems

Future Group has tied up with Perpule, a Bangalore based self-checkout mobile application in around 40 stores of the retail conglomerate through its proprietary UltraPOS device. The device is a cloud-based SaaS solution that has a simple user interface, card swiping mechanism, scanner and printing feature. The aim of the start-up is to replace large checkout terminals with compact, mounted self-service devices (Koshi, 2019). The adoption of self-checkout systems is limited to mobile payment applications which rely on QR codes for making payments and still rely on human intervention.

Automated checkout systems

There has been no widespread adoption of automated checkout systems among retail conglomerates in India.

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Augmented reality (Kiosks)

Tanishq has tied up with Milestone Bradcom to install AR kiosks that uses AI to enhance the customer experience. The proprietary application, MirrAR, allows customers to virtually try out jewellery for as many instances as they desire. Lenskart with the support of US tech start-up Ditto offers 3D face modelling that virtually maps a customer's face and allows them virtual trials of various eyewear (Srivastava, 2019).

Augmented reality (Avatars)

Tresor Systems launched an exclusive service centre for Apple users, TresorCafe at Connaught Place, New Delhi and features a virtual assistant/avatar, Alisha. Alisha offers customer services and remembers customer interactions and has sparked increase in footfall to the store (Massey, 2019). Augmented reality avatars are yet to gain traction in the retail sector in India.

Smart mirrors

Shoppers Stop was the pioneer of adopting Smart Mirrors (Magic Mirrors) at its Malad store in Mumbai in 2015. Magic Mirrors uses a AR based virtual dressing room solution, TryON. Smart mirrors are being developed by IBM and plan to deploy them among apparel retailers (Apparel Resources, 2018).

Omnichannel retail

Walmart's subsidiary, Flipkart is expanding its omnichannel presence in India through its rollout of Flipkart wholesale, a platform to aggregate local retailers on its platform. Small vendors can source their products from suppliers on Flipkart's platform. Flipkart Wholesale indicates a shift from the company being purely e-commerce platform to a omnichannel platform that influences the operations of physical vendors. The apparel segment rollout is currently underway in Delhi, Gurugram and Bengaluru and the company intends to expand its offering by including groceries also (Devanesan, 2020). Reliance's e-commerce venture, Ajio which caters to the premium apparel segment is taking the omnichannel route to consolidate its growth through the launch of kiosks at Reliance Jio stores in Tier 2 cities to allow customers to order online from the Reliance's online store (Martins, 2020). E-commerce giant Amazon is also making inroads into physical retail by initiating 'Smart stores' that collaborates with physical stores. Amazon provides small retailers with a digital log of their inventory and a QR code that customers can scan to view list of products, discounts and offers available. Payments are made through Amazon Pay and also offers an instalment-based payment system through its platform. These stores will serve as digital storefronts for the platforms (Singh, 2020). Omni channel retail is widely adopted by physical retail conglomerates and online retail platforms in India.

Retail Technologies and Retail Footfall

The future of physical retail depends on providing meaningful/good customer experience (A T Kerney & Retail Association of India, 2019). In-store retail technologies can play an instrumental role in generating good customer experience which is determined by certain factors. Social presence is an essential element of customer experience as customers are looking for

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social interaction, validation and human interaction in their commercial transactions (Carman, 2019). Customer Convenience is also a determining factor of customer experience as retail technologies that require the little effort for locating required products, making purchase decisions, payments and checkout will lead to better customer experience (Berry et al., 2002). Personalized promotions is another important factor in creating good customer experiences (LS Retail, 2020) and retail technologies that can provide push notifications, dynamic pricing offers, customized promotional message based on purchase behaviour can lead to better customer experience. Seamless communication is also a contributor to customer experience as customers expect real time information such as product details, alternate modes of purchase, product reviews, pricing offers (Intel, 2018). Information transparency such as inventory levels can increase customer confidence and lead to better customer satisfaction regarding the purchase. Customer Experience can lead to word of mouth promotions, advocating usage among peers and repeat purchases (Thakur, 2019). Repeat purchases and advocacy translate into greater footfall.

OBJECTIVES & FRAMEWORK

Research Objectives

1. To evaluate various in-store retail technologies based on their utility to generate retail footfall
2. To evaluate and classify in-store retail technologies based on their utility to generate retail footfall, using the in-store technology infusion framework framed by Grewal, Noble, Roggeveen, & Nordfalt.

Research Methodology

The analysis/evaluation of instore retail technologies is based on secondary data.. The list of secondary sources used for the study are as follows in Table 2.

Table 2
SECONDARY SOURCES

Source	Count
Journal articles	22
Conference Proceedings	1
News articles – Websites	24
Industry Reports	5
Patents	1
Technology Blogs	2

The utility of various instore retail technologies were collated based on published research/secondary sources and instore technologies that deliver better customer satisfaction and customer experience are interpreted as drivers of retail footfall.

The utility of various instore retail technologies to the customer were evaluated using the in-store technology infusion framework framed by Grewal, Noble, Roggeveen, & Nordfalt. The framework categorizes instore retail technologies based on convenience and social media presence and this study categorizes retail technologies that provide high convenience and high social media presence as capable of generating retail footfall in Table 3.

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RESULTS

Impact of In-Store Retail Technologies on Retail Footfall

Table 3
IN-STORE RETAIL TECHNOLOGIES AND RETAIL FOOTFALL

S.No	Author	Technology	Impact on retail footfall
1	Dennis et al., 2014; Roggeveen et al., 2016	Narrowcasting/Digital signage	In-store digital signage can feature seasonal promotional offers (hedonic goods) and can lead to impulsive buying. Furthermore, emotional advertising messages can enhance brand associations. However, digital signage within a store cannot drive retail footfall.
2	Modern Retail, 2019	In store kiosks	The utility of in-store kiosks has expanded to serve customers in restaurant and fast-food segments, allowing customization of orders and reducing long waiting times at queues. This could improve customer experience and lead to higher footfall.
3	Chen et al., 2017	3D printing	The provision of customization could draw more customers to design their own products (build to order model) and lead to more customer satisfaction. This could translate into increased footfall.
4	Intel, 2018	RFID based Smart Shelves	Automation of data collection and timely notification of inventory requirements will free up store personnel to attend to customers, which will improve customer experience. Furthermore, the availability of product information and promotions/offers could more attract customers.
5	Wirecard, 2019	Electronic shelf labelling (ESL)/Digital price tags	ESL allows the customer to make more confident purchase decisions as dynamic pricing helps physical retails match offers provided by e-commerce companies. This could generate greater retail footfall.
6	Manyika et al., 2015; Cheng, 2019; Meuter, 2000	Automated checkout systems/Grab & Go	Automated checkout systems eliminate waiting time and long queues at the POS terminal, while removing the frustration of self-checkout activities to be performed by the customer. Advanced technologies allow replacement/return of items and only bill as the customer exits the store. This novel technology could draw greater retail traffic when implemented.
7	Lamba et al., 2019	Self –service checkout (SSC) systems	Decentralized self-service checkout systems allow easy purchases through smartphones and allow the store personnel to focus more on attending to customers, which could

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			enhance customer experience. The desire for privacy/limited interaction among certain customers could attract more retail traffic.
8	Purohit, 2020	Beacons/Proximity marketing	Notifications regarding current promotional offers and discounts to existing customers in proximity to any company store along with navigational tools will generate additional retail traffic and repeat purchases. It is not suitable for increasing footfall among new customers.
9	Arora & Lagudu, 2013	Virtual Navigation System/ Location based services (LBS)	LBS can collect data regarding footfall patterns and help forecasting retail traffic. Furthermore, it can improve instore experience of customers by reducing time spent searching for the desired product. However, it is unlikely to generate footfall.
10	Kar, 2019; Fourtane, 2019	Augmented reality applications (Smart mirrors)	Smart mirrors have the potential to convert more footfalls into sales and the novelty of the technology could generate more retail traffic in the fashion and apparel segments.
11	Engine Creative, 2020	Augmented reality applications (AR) (Mobile)	Retailers can create location-based AR incentives attracting customers to physical stores. Furthermore, Mobile AR enhances the customer experience by creating in store engagement through 3D visualization tools, activities and games.
12	Winkler, 2019	Omni channel retail	Provision of a unified brand experience increases the average transaction value and boosts customer loyalty. However, it only enhances customer experience with regard to existing customers and is unlikely to increase retail footfall.
13	Chowdhary, 2019; Grewal et al., 2020	Retail robots	The utility of retail robots is restricted to navigation and information sharing and embodied/humanoid robots enhance customer experience. the novelty may attract customers during its launch.
14	Mull I et al., 2015	Avatars	There are mixed views regarding use of avatars as many customers have no desire to interact with virtual avatars they cannot relate to or find not credible. This novelty could attract footfall in its inception, but is not suitable for increasing footfall.

The role of in-store retail technologies on retail footfall is neglected due to low adoption of emerging retail technologies. In-store retail technologies are viewed by most physical retailers as a means to increase operational efficiency, as opposed to improving customer experience. As a result, physical retailers are unable to prevent customers migrating to online retail platforms who

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offer better prices and better customer service. The key to sustaining physical retail footfall lies in adopting in-store retail technologies that add value to customer experience in Figure 1.

Evaluation of In-Store Retail Technologies Based on Utility to the Customer

The selection of retail technology alternatives is based on the in-store infusion framework proposed by (Grewal et al. 2020). The framework evaluates various in-store technologies on the basis of convenience and social media presence. Convenience refers to the effort exterted by the customer to make a purchase and consists of five aspects of conveniece - decision, access, transaction, benefit and post-benefit (Berry et al. 2002). Social presence refers to products or services that create a sense of human involvement/feelings (Biocca & Harms, 2002).

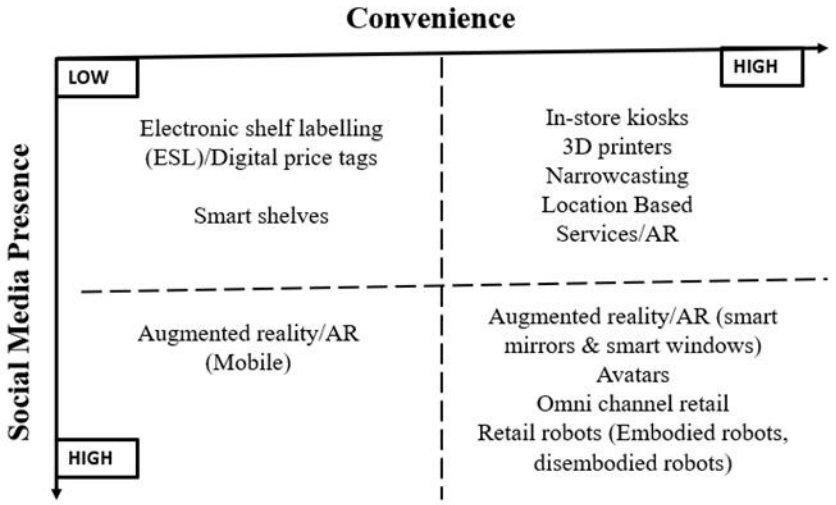

Figure 1
INSTORE INFUSION FRAMEWORK

Smart shelves and ESL reduce inventory costs and boost retailer profit, they have limited impact on retail footfall as they have low social media presence. They help grab the customer's attention (Törn, 2018) but do not enhance convenience of the customer and have limited social media presence. Retailers could still invest in these technologies for operational efficiency. 3D printing, in-store kiosks allow customization of services and offer high convenience for customers, but are low on social presence and could have a limited impact on retail footfall. Narrowcasting/In-store digital signage can offer personalized advertising messages based on AI and big data (Holmvik, 2018), but may not increase retail footfall. Smart mirrors and smart windows have high convenience as they facilitate customization and customers can share their customized displays to peers/friends on social media (Carman, 2019), which could in turn increase retail footfall. Omnichannel retail could significantly increase retail footfall by inducing online customers to visit physical stores through interaction with store personnel (Hruschka, 2019). The seamless integration could ensure that the customer is constantly engaged with the brand through immersive social media experience and high convenience with personal support.

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DISCUSSION

The in-store retail technologies currently used by physical retail formats/chains offer little or no experiential value to customers. Customers in physical retail formats still have to contend with long queues, checkout hassles, time wasted on locating products.

Retail Technologies for Operational Efficiency

The adoption of smart shelves and electronic shelf labels/digital price tags can serve the interests of both the retailer and customer, where the retailer can cut costs on inventory management and the customer can gain vital product information to support purchase decisions (Zhu et al., 2018; Banakar & Shetty, 2019). However, these technologies will not contribute to increased retail footfall. Self-checkout systems can easily be adopted by retailers as digital payment systems/mobile payment systems are commonly used by customers, but must be used as a complementary service in addition to store personnel-based checkout. The adoption of digital payment technologies is still in its growth phase in India and full-fledged self-checkout systems in retail outlets in not feasible. Self-checkout systems could reduce labour cost, free up time for store personnel to attend to customers (Lamba et al., 2019), but will not generate additional footfall. Automated checkout systems are still in development and may take several years before wide scale rollout by retailers.

Retail Technologies for Enhancing Customer Experience and Retail Footfall

Adoption of socially immersive retail technologies such as augmented reality devices (smart mirrors, smart shop windows, AR apps) can promote retail experiences across social platforms, leading to increased customer footfall (Kar, 2019; Fourtane, 2019). Proximity marketing can provide a clear advantage by luring potential customers away from rival stores towards the retailer's store through attractive promotions and events (Purohit, 2020). Omnichannel retail is the most feasible technological solution currently used by retail conglomerates and would require an integration of numerous retail technologies. Small retailers would not be in a position to leverage omnichannel retail due to limitations in infrastructure and expertise.

Retail Technologies with Limited Impact on Operational Efficiency and Retail Footfall

Novel retail technologies such as retail robots, virtual avatars, virtual navigation systems are not recommended for retail store formats as they lack social presence and human elements in retail interactions (Mull I et al., 2015). They may draw footfall during the initiation phase, but do not add value to the retail interaction.

CONCLUSION

Technology is an indispensable part of modern retail formats and adoption of appropriate retail technologies could determine the competitiveness of physical retail formats against online competitors. The lines between physical and online stores are slowly disappearing with the convergence of retail technologies and the emergence of omni channel retail. Early adopters of in-store retail technologies stand to gain a competitive advantage over rivals and could determine the survival and profitability of the retailer in the long run.

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