emerald PUBLISHING

International Journal of Retail & Distribution Manag

# ARE RETAILERS LEVERAGING INSTORE ANALYTICS? AN EXPLORATORY STUDY



| | |
|---|---|
| Journal: | *International Journal of Retail & Distribution Management* |
| Manuscript ID | IJRDM-04-2020-0151.R5 |
| Manuscript Type: | Research Paper |
| Keywords: | Technology Adoption, Brick-and-Mortar, In-store analytics, Retail |
| | |

# Are retailers leveraging in-store analytics? An exploratory study


## Abstract

**Purpose –** The purpose of this study is to analyse the level of adoption of in-store analytics by brick-and-mortar retailers. Web analytics technology has been widely adopted by online retailers, and the technology to gather similar information in physical stores is already available. This study explores how such technology is valued and adopted by retailers.

**Design/methodology/approach –** This study is based on interviews and a focus group of 21 retail executives using a semi-structured interview methodology. An in-store analytics service was defined, along with specific key performance indicators (KPIs) and use cases to structure respondents' feedback.

**Findings –** Although noteworthy differences have been found in the value of KPIs and use cases by type of business, the main finding is that none of the respondents reached the stage of a brick-and-mortar data-driven company. In-store analytics services are in the early stages of Rogers' (1983) model of diffusion of innovations. Three main reasons are presented: lack of technology knowledge, budget priority, and a data culture inside the companies.

**Practical implications –** The results should encourage scholars to further investigate the drivers accelerating the adoption of these technologies. Practitioners and solution providers should strive for improvement in the simplicity of their solutions.

**Originality/value –** This study is the first to analyse the level of adoption of in-store analytics from the perspective of retailers.


**Keywords** Brick-and-mortar, In-store Analytics, Technology Adoption, Retail

**Article Classification:** Research paper.

## Introduction

The retail sector is undergoing a period of transformation and disruption (Hagberg *et al.*, 2016). Although physical retail continues to account for most of the revenue in the sector (Clement, 2019), and customers show a preference for an improved brick-and-mortar experience over online shopping (Spanke, 2020; Wilson, 2013), thousands of stores worldwide are closing down (Meisenzahl, 2021; Retail Dive, 2021). The remaining stores are going through a transformation process that some scholars refer to as the retail apocalypse (Childs *et al.*, 2020; Mende and Noble, 2019) because of the growth of e-commerce (Chiang and Dholakia, 2003).

Indeed, e-commerce has several benefits for shoppers, such as product range, product information, and convenience (Somani, 2015). For retailers, e-commerce provides full information on customer behaviour and traffic (Beri and Parminder, 2013; Bilgic and Duan, 2019). Customer traffic measurement is the key to a profitable business and has been positively correlated with sales in previous research (Anic *et al.*, 2010; Yiu and Ng, 2010). Websites are often organised like traditional shops, with virtual departments, aisles, shopping carts, and counter lanes (Huotari, 2015). By each click, all of a customer's interactions and movements are collected and digitally stored, generating a large amount of data that can be processed to increase customer knowledge and identify actions for the business, such as customer recommendations or website restructuring (Bilgic and Duan, 2019; Ramzan *et al.*, 2019).

Although brick-and-mortar store transactions are not genuinely digital, different types of technologies are available to record and measure the internal activities of a store

(Landmark and Sjøbakk, 2017; Zeng *et al.*, 2015). The evolution of the Internet of Things increasingly introduces hardware and software allowing the registration of real-world transaction data to create valuable information for businesses (Weinswig, 2017). Having access to activity analytics in physical stores is a key asset that allows for more fact-based decisions. Moreover, such analytics can be used to take dynamic and automatic decisions (Huotari, 2015). Customer behaviour data have the potential to raise the interest of any business, as the number of customers and their path in the store impact sales volume (Perdikaki *et al.*, 2012).

This research focuses on the perception and level of adoption of in-store analytics services by retailers based on a proposed service definition that delivers customer insights for physical stores. In-store analytics is a generic term to define the technology and services that provide automated information of activity of customers and sales in a brick-and-mortar store. This study aims to answer the following question: Are brick-and-mortar retailers leveraging in-store analytics? For this purpose, fieldwork based on interviews and a focus group of retailer representatives were conducted. Respondents explained their needs, current level of digitalisation, and their views on the benefits and value of in-store analytics. The results show the level of maturity of retailers in the usage of this technology and support two major contributions. First, it shows that physical retailing remains in the early stages of in-store analytics adoption, whereas the same companies are gathering and analysing customer tracking data in their online businesses. The difference between the two scenarios shows the lack of a homogeneous data culture inside the companies of the sample. Second, the study shows that there is no mature digital plan for retailers with respect to brick-and-mortar technologies, despite ongoing initiatives and an underlying interest in data-driven companies. Three main obstacles explain the situation: lack of technology knowledge, lack of budget priority, and the absence of a data culture. A

simplified plan is presented to overcome these obstacles. These contributions allow practitioners to improve their technology and services. Furthermore, the results will encourage researchers to analyse the value of in-store analytics and related technologies.

The remainder of this paper proceeds as follows. Section 2 sets the theoretical background for this research, explains the value of measuring customer behaviour in brick-and-mortar retailing and related technologies, and addresses privacy concerns. Section 3 develops the empirical analysis, explains the research objectives, the survey model, and the composition of the sample and the data obtained, as well as includes a discussion of the results. Finally, in Section 4, the conclusions, limitations of the study, and proposals for future research are presented.

## Theoretical background

### *Innovation diffusion theory*

There is an extant corpus of literature on technology adoption in brick-and-mortar stores, based on several adoption model theories (Jocevski, 2020; Vakulenko *et al.*, 2018; Wolpert and Roth, 2020). Rogers' diffusion of innovations theory (DOI) (Rogers, 1983) is one of the most frequently used theories and is thus appropriate for an exploratory approach to the adoption of a certain innovation (Bhattacharya, 2015; Kang *et al.*, 2015). DOI synthetises a set of factors (relative advantage, compatibility, complexity, trialability, and visibility) of the process of adoption, and categorises the adopters in groups (innovators, early adopters, early majority, late majority, and laggards), according to their moment of adopting the innovation, as the adoption process is not immediate. DOI has been used as a theoretical framework in previous retail studies to approach

innovation from the perspective of retailers and their managers (Pantano and Vannucci, 2019; Tsai *et al.*, 2010).

*The business value of in-store analytics*

One of the most accepted characteristics of e-commerce, since its beginning, has been the digital recording of interactions (Huotari, 2015), which facilitates accurate business decisions (Chaffey and Patron, 2012; Phippen *et al.*, 2004). Bilgic and Duan (2019, p. 175) identified, through a systematic literature review, the business value of e-commerce data analytics, and highlighted several usages, such as 'pricing a product/service, designing or improving a product/service and recommending a product/service, measuring service quality, etc.'. The goal is to increase sales through conversion rate optimisation (CRO) (Beri and Parminder, 2013; Chaffey and Patron, 2012; Saleem *et al.*, 2019). Under the term CRO, practitioners group techniques to improve conversion rates, which generally refer to sales per visitor (Saleem *et al.*, 2019).

The logging of transactions and interactions in the physical world requires recording technology. Cheaper sensors, improved software algorithms, and mobile devices (Härtfelder and Winkelmann, 2016) narrow the differences between brick-and-mortar retailers and e-commerce merchants in terms of activity information (Mavroudis and Veale, 2018), which leads to a better understanding of the shopping process, with important findings for the business (Perdikaki *et al.*, 2012; Karaman, 2015). Companies measure the level of performance of their processes by defining relevant indicators, called key performance indicators (KPIs), which allow the measurement of the level of achievement of specific targets (Nagyova and Pacaiova, 2009). In retail, the KPIs for the physical world tend to match those of the online stores, even though they are limited by the type of interaction or the deployment costs. For example, in e-commerce, it is easy to

register that a customer is viewing a product page (Bilgic and Duan, 2019), whereas in a brick-and-mortar store, it is more difficult to track a customer's interest in specific products in the aisles through IoT technology (Pfeiffer *et al.*, 2020). Despite such restrictions, the incremental value is colossal. Based only on customer traffic and sales, Perdikaki *et al.* (2012) defined relevant KPIs, such as conversion rate and basket value, and obtained business insights that affected store labour and location decisions. Traffic tracking can also be applied to larger areas, such as an entire high street, and can provide information on customer preferences, specific shopping times for different items, or the propensity to react to promotions (Betzing, 2018). Huotari (2015) conducted a literature review of retail KPIs. He discarded the financial KPIs that focus on the financial targets of the company, such as the level of investment, profitability, or inventory cost, to focus on those of a non-financial nature. The research found that 42.2% of non-financial KPIs were related to customer behaviour, such as traffic (visits), customer flow, mobility, time spent in an area, and loyalty. Sales were used in some ratios to offer important insights into business performance, such as the conversion rate.

Initially, traditional methods were used to register these data, including questionnaires, surveys, and interviews (Das and Varshneya, 2017; Hu and Jasper, 2004; Kesari and Atulkar, 2016). Although these methods can retrieve in-depth information on preferences and opinions, they suffer from bias in the trustworthiness of the answers (Newman *et al.*, 2002). In some cases, they were complemented by direct observations that were labour-intensive (Yiu and Ng, 2010). Although these methods have been broadly used in the past, there is no possibility of real-time usage and continuous measurement, as they require human interaction to register the results (Dogan *et al.*, 2019).

Technology improves the trustworthiness of data without human labour and in real time. Because the objective is to track the movements of customers in physical stores, the technology must detect target individuals in the space. Different technologies and methodologies can be used for these purposes. Table I presents a summary of the main technologies that can be used for in-store analytics and related literature.

(TABLE I HERE)

Privacy is a major issue in tracking and profiling solutions. Although scholars highlight the current privacy concerns (Farshidi, 2016; Groß, 2015; Nguyen, 2019; Turri *et al.*, 2017) and laws are evolving towards the need for explicit approval to use any kind of personal data (Betzing, 2018; Weinswig, 2017), customers are generally willing to receive targeted information that represents their needs more accurately (Infosys, 2013; Kerem and Ulla, 2018). Furthermore, some data can be anonymised and aggregated, providing powerful insights and avoiding personal data privacy issues. Companies that develop solutions must, therefore, choose between explicit user acceptance of the use of personal data or an anonymisation process. An example of such use of anonymised information is the Smart Steps service from Telefónica (Hong *et al.*, 2020; Telefonica, 2020). Based on a mixture of mobile network and web browsing information, it delivers aggregated information on the demographics and preferences of visitors who were present in a specific area at a specific time, as well as their previous and following visit locations.

## Methodology and data

### *Design and sample*

The study employed an interview-based methodology (Rowley, 2012), as it is the most widely used method in the organisational information systems and technology adoption literature (Choudrie and Dwivedi, 2005; Mingers, 2003). The methodology included semi-structured interviews (Louise and Alison, 1994), individual sessions, dual sessions, and a focus group, as the interview methodology allows for different options (Mingers, 2003).

To standardise the sample and ensure valuable answers from all respondents, participating businesses had to have at least 10 brick-and-mortar retail stores and use at least two of the following five technologies: digital signage, mobile app for customers, online analytics, Wi-Fi for customers, and people counters. Furthermore, interviewees had to occupy a specific rank in the company: chief executive officer (CEO), chief financial officer (CFO), chief marketing officer (CMO), or chief digital officer (CDO). Technical roles (operations and IT) were selected for group sessions. Companies could be from different retail sectors.

The final composition of the sample by sector and role is shown in Table II.

(TABLE II HERE).

A total of seven individual interviews, four dual interviews, and one focus group with six participants were conducted from 17 July to 31 July 2019. All sessions were conducted face-to-face. A semi-structured script was used, with the following five-point

agenda: introduction, brick-and-mortar digitalisation, company and role challenges, relevant business KPIs, and service feedback. The first questions allowed us to characterise the sample (Is there a plan in place to digitally transform your company? What level of maturity do you have towards digital transformation?), while the main questions were directly related to the research (What are your day-to-day challenges? How useful would an in-store analytics solution be? How would you use it?).

A specific service definition for an in-store analytics solution was defined to receive the respondents' feedback homogeneously. The service, named In-store Insights, can use different sources of data from three technologies: Wi-Fi, beacons, and cameras. The software gathers all the data from sensors and converts them into a set of KPIs, which are then presented on a dashboard where a user can review the insights, export them, or mix them with other sources to obtain information for making decisions. Participants were informed that all the collected data would be anonymised to comply with the current regulations on data protection and privacy. During the sessions, the service was described to the participants, and they were requested to assess the value of two sets of information: first, a list of KPIs that could be obtained, and second, cases where such information would eventually be used in their businesses. KPIs and use cases were taken from existing service definitions and success stories from the industry (Ipsos, 2017; Luenendonk, 2015; SightCorp, 2020; Telefonica, 2020; Walkbase, 2020).

To characterise the sample, Table III shows the respondents' key declarative statements on their market situation. Very different perceptions are observed. E-commerce has disrupted each sector differently, and retailers focus on improved experiences and bring value with specialised shop assistants and personalised and segmented customer attention (Kamaladevi, 2010). The answers show that price competition and product catalogues are not major concerns for the respondents; instead,

they seek to move away from transactional sales and add extra value to the customer's experiences.

(TABLE III HERE).

*Results*

The respondents provided structured feedback on the technologies currently in use and the value of the In-store Insights service. Table IV presents the respondents' perceptions of the level of digital maturity in their companies and the technologies already installed in their businesses. Three main findings are presented in this table. First, there is no relationship between the perception of maturity and the number of technologies, which shows how abstract the concept of digital transformation is for the respondents. In general, the respondents recognised that they were in the early stages of digital transformation: 'We have just started a digital unit', (operations manager, restaurant); 'I am more a marketing guy than a digital guy', (CMO, dental clinic); 'We don't have a specific department, there is no budget or strategy', (CMO, cosmetics). Second, the only technology that is present in all businesses is web analytics. Most companies are devoted to obtaining and distributing the data: 'There's a person in the web department', (CMO, travel agency); 'The people that did our Web send us the report', (CFO, hairdresser). This finding underscores the value of customer tracking for retailers, when it is simple, available, and established in an organisation. For example, a simple tool, such as Google Analytics, is used by more than 29 million websites (BuiltWith, 2020). Interestingly, there is no similar penetration of brick-and-mortar analytics; only a few of the respondents measured customer flows with people counters and perceived the data obtained (visits) to be of limited value for their businesses compared to the cost of installation. 'We would

only need this data in special events', (CEO, car dealer); 'We do have the technology, but we don't use it, we don't check the data', (operations manager, household goods). Third, the second-most used technology is Wi-Fi for customers: 'No matter the origin of the customer, the first thing they want is the Wi-Fi password and then the room', (CMO, hotel). Despite the evolution of mobile data plans, some businesses see this functionality as necessary, even though they derive no analytics value from it: 'A coffee and the Wi-Fi while the customers wait is a completely different experience', (CFO, hairdresser). None of them use it as a proximity marketing tool or a customer tracking data source, probably due to a lack of information on how Internet access can be converted into a source of data and interaction.

(TABLE IV HERE).

Table V presents feedback from the interviewees on the KPIs. Two types of KPIs were discussed with the respondents: simple KPIs, obtained directly from the sensors of the service, and composite KPIs, which mix information with other sources. Five simple KPIs were presented: *number of visitors*, measuring the number of customers entering the store; *street attraction*, measuring the number of people entering the store related to the number of people passing by the store; *frequency of visits*, providing information on the number of times the same person enters the store; *dwell time*, delivering the time spent by a customer inside the store; and *In Store flows*, providing information about the customer paths inside the store. The following were the three composite KPIs presented: *Sales conversion*, that offers ratios using sales information and simple KPIs; *other external sources*, that was presented to respondents as 'the possibility to obtain ratios mixing sensor data with external data like weather, flight information in an airport,

information presented in digital signage screens, or stock level, as examples'; and *comparison among stores*, that shows any of the other KPIs compared for different stores of the same retailer. The results show distinct differences among the different kinds of businesses. By sector, the first finding is that the number of visitors is more relevant for businesses where there are no previous appointments and visitors can leave without a purchase, such as cosmetics or household goods ('It would be great. I could plan and focus my sales attendants', CMO, cosmetics). Hairdressers or restaurants do not see the value of such information, as they convert almost every visit into a sale ('We do not need it as most visits have an appointment', CFO, hairdresser).

There are three KPIs that stand out from the rest of the respondents' preferences: street attraction, dwell time, and comparison among stores.

1) Street attraction represents the ratio of the number of people entering the store to those passing by the store. The reasons for this preference vary among the respondents, depending on the type of business: 'It would allow for a comparison of the performance of our restaurants', (operations manager, restaurant); 'It is really relevant when there is a new launch', (CEO, car dealer); 'It is useful in looking for a new store location', (CEO, parapharmacy). The respondents' interest in this measure is consistent with Graham's work (2016): Although retailers cannot impact the density of shoppers, different attributes of the brands and spaces can influence their attraction (Calvo-Porral and Lévy-Mangín, 2018; Mohd-Ramly and Omar, 2017).

2) Dwell time is relevant for all the respondents, although the reasons for the interest vary by business type: 'It would allow us to optimise the services (CMO, dental clinic); 'We could change the layout of the tables to serve more meals', (CFO, restaurant); 'I could decide to set make-up artists depending on this', (CMO,

cosmetics). This finding is consistent with previous studies that found sales conversion and dwell time to be positively related in retail stores (Hui *et al.*, 2009), but negatively related to customer satisfaction in services, such as hotels and restaurants (Jones and Dent, 1994; De Vries *et al.*, 2018). Interestingly, a respondent from the restaurant business stated the opposite, in relation to their bar area: 'The longer people stay, the more they spend', (operations manager, restaurant).

3) The comparison among stores is relevant, as insights can be obtained about area performance. 'I compare today by calling and asking the sales manager. This is not reliable', (operations manager, household goods); 'Paramount' (CMO, cosmetics). This is a major issue in the physical retail business (Li *et al.*, 2019), as location is the main factor in customer traffic outside stores (Graham, 2016).

(TABLE V HERE)

The interviewees were then asked to indicate their level of interest in the list of business use cases (11) that employed the KPIs. Table VI presents a summary of their feedback, wherein we again observe differences among businesses. At the bottom of the table, a simplified ratio between positive and negative answers highlights the overall level of interest. *Adapt out-of-store promotions*, *improve stock management,* and *modify the layout of the store* are the least relevant. *Improve stock management* clearly shows its business-related effect as some of the businesses do not manage stock; however, it is noteworthy for household goods stores, fashion stores, and parapharmacies. *Adapt out-of-store promotions* and *modify layout of the store* are considered by the respondents to

be out of their control ('the car brand controls the layout', (CEO, car dealer); 'the design is well defined by the corporation and no changes are made', (CMO, cosmetics)). Therefore, their interest is reduced, even though store layout plays an important role in sales performance (Webber *et al.*, 2018).

The respondents were more interested in customer experience, as shown by the three most interesting use cases: *Adapt in-store promotions*, *improve service personalisation,* and *measure the effect of campaigns*. 'I would like to know the amount of time our sales attendant spends with each customer and the value of the sale', (operations manager, household goods). The interest in creating a more personalised service with better targeted promotions and measuring its impact is in line with previous studies. Pantano and Timmermans (2014) and Willems *et al.* (2017) included this functionality in the definition of retail and shopper-oriented technologies. Another finding is apparent from looking at the topic with the least negative answers (15% of total answers): *plan staff and schedule store times*. The results show the relevance of this topic as one of the major cost drivers (Chuang *et al.*, 2016), even though the respondents declared that they did not need automated processes to perform this activity.

From a sectorial perspective, there are three main findings. First, the lack of interest in the banking sector in most of the use cases (only 22.7% of positive answers). 'I don't see the need to know the number of visitors', (CIO, bank); 'We don't want to generate attraction to the branches but increase the Web', (operations manager, bank). The banking sector focuses on existing customers and online transactions, making the role of the branches uncertain (Arguedas-Sanz *et al.*, 2013; Marakarkandy *et al.*, 2017; Myerson and Sandbiller, 2018). Second, the data show few positive answers (24.2%) in the health and wellness sectors. Most of their services are by appointment; thus, their current systems may allow them access to the first level of information that reduces the value gap of

automated KPIs. Third, most positive answers come from retail shops: cosmetics stores, household goods stores, fashion, stores car dealerships, and retail telco stores. These are businesses where the conversion rate is the most relevant, which explains their higher level of interest.

(TABLE VI HERE)

*Discussion*

All respondents claim that their companies are working on digital transformation. However, in most cases, they imply solving short-term needs with isolated solutions rather than building a comprehensive transformation plan. 'We talk about building the digital transformation department in 1-2 years', (CMO, cosmetics); 'We have a master plan for digitalisation, but we are just starting to see solutions and all we do is still rudimentary', (CFO, restaurant). Why are all respondents in the same situation? Why are companies running behind and what can be done to speed the process? Based on the responses, there are three main interrelated reasons. The first reason is the limited knowledge about and little confidence in the technology, which prevents them from seeing a return on investment (ROI). Although they have embraced new in-store technologies, they remain concerned about the ROI and the effort required to adopt such technologies. For example, in the case of digital signage, the most extensive technology, they recognise important set-up costs and the need for extra resources to manage the contents properly, as well as important investments in tailoring the space. However, they fail to measure whether the space configuration performs according to design. The data collected by existing solutions are spread across the company, but a systematic analysis of the data is not performed which makes it difficult to measure the value added by the

investment. This leads to the second reason: budget priorities. From a budget perspective, digital transformation competes with other strategies, such as the opening of new shops or restaurants, or even the marketing budget. If the technology and data are not used properly in the formulation of an organisation's strategy, little value may be derived from them. The budget allocation and limited priority lead to the third reason: there is no data culture in the companies. None of the respondents mentioned data governance or data-driven decisions. This analysis is consistent with the work of Gerrnann *et al.* (2014). In their study, conducted through a survey of 418 top managers, they found that the potential of analytics is not perceived by retailers; therefore, they do not invest in appropriate levels, even though they would obtain relevant benefits of analytics deployments. Following the classification of Rogers' DOI theory (Rogers, 1983), there are only a few innovators in the sample. Moreover, they do not feel convinced of the value of in-store analytics, showing that this technology is in its early stages.

Becoming a data-driven company brings several benefits (Santoro *et al.*, 2019), despite being a major challenge. None of the respondents had a holistic view of data collection and analysis. Although they are knowledgeable about online analytics, they do not show the same concern about their physical spaces for the reasons mentioned above. Beyond sales, they have no digitally recorded data, and some merely use manual input from sales attendants to record traffic or customer flows. They acknowledge this lack of data culture in the physical space and do not expect the organisation to allocate specific resources to properly process the data, if such data need to be obtained.

The three barriers (lack of knowledge about the technology, lack of priority in the budgets, and lack of data culture in the organisations) are consistent with previous studies on data-driven companies (Olszak and Zurada, 2019) and technology acceptance models by organisations. Technology knowledge, financial resources, and technology readiness

are frequently related to the lack of technology (Ratchford and Barnhart, 2012; Zhu *et al.*, 2004). Respondents' answers match the early stages of Rogers' DOI theory (Rogers, 1983).

Each of these challenges must be addressed to reach the level of a data-driven company in the physical environment. Any action plan should tackle these three topics together, as they are interdependent. Solving only two of these leads to a plan's failure. If the company increases its knowledge of the technology and allocates its budget but does not establish data management policies and data-driven decisions, the management will consider these investments as useless. If the technology is mastered and there is a data culture, but no budget is prioritised, it will not be possible to achieve deployment. Finally, if there is a data culture in the company and budgets are prioritised, but there is an unawareness about the potential of the technology, the appropriate solutions will go unnoticed.

As an example, Figure 1 shows a potential action plan for companies to advance towards a data-driven company. They need to become more knowledgeable about technology, undertake pilots, and receive training. The board of directors must ensure that the organisation believes in digital transformation through resource allocation. Finally, they must implement a data governance model that includes the organisation, processes, and technology.

(FIGURE 1 HERE).

To ensure that advanced technology is properly understood, practitioners and manufacturers must simplify the technology and communicate real implementation use

cases and their benefits. Companies will devote more of their budgets to in-store analytics technology if they see an ROI. Only then will companies adopt a structured approach to their decision-making based on data (Troisi *et al.*, 2020).

Beyond these findings, the respondents can see the most advanced technology only in a few selected stores. Their view of the role of physical stores in the future is much more experiential, something that cannot be replicated in the online world. This is consistent with previous studies (Poncin and Ben Mimoun, 2014; Garaus *et al.*, 2017).

## Conclusions

The objective of this study was to analyse the level of acceptance of in-store analytics in brick-and-mortar stores. The study follows an interview-based methodology, with semi-structured questions that allow the exploration of different high-value topics for future research. This work is relevant to the study of brick-and-mortar technologies because it addresses in-store analytics technology from the perspective of organisations and delivers an exploratory analysis of advanced technology and the level of interest from the retailers' perspective. This approach is unique, as none of the previous studies on the value of in-store analytics from a technology and customer perspective refers to the perception of retailers or managers.

We highlight three major contributions of our study. First, related to our main research question (Are brick-and-mortar retailers leveraging in-store analytics?), the findings show that following the nomenclature of the DOI theory (Rogers, 1983), in-store analytics technologies remain in the early stages of their adoption. Prior to implementation, companies must know about a technology and be convinced of its value

before making deployment decisions. This will allow them to adopt organisational and strategic decisions for the digital transformation of their stores. Furthermore, technology knowledge must be linked with the allocation of the budget and the solid intention to become a data-driven company. To address these three topics together, a simplified action plan is presented, even though further research is required on how to accelerate the plan from the point of view of technology, budget, organisation, and data management. Technology providers and practitioners should make significant advances on how to present technology in an easy-to-use business language and integrate in data-driven companies to facilitate ROI analysis and confidence in the solutions. Success stories should be replicated, and pilots should be affordable. Second, it was found that there was no digital master plan for brick-and-mortar stores in most retailers, regardless of their size or structure. Practitioners and scholars should focus on structured methodologies to achieve such plans in a simple and cost-effective manner. Third, there is genuine interest in data-driven companies, although no actions are taken to achieve such a platform on the physical side of the business. Further research could investigate an omni-channel data-driven framework that merges data from online and offline worlds.

Two interesting findings emerged from the analysis of responses by sector. First, in-store analytics are less interesting to businesses with appointments or reservations, where customer flows are more predictable. Second, the banking sector exhibits the lowest interest in customer flow information because of the profound transformation of the banking business and the priorities in their digital transformation (Cuesta *et al.*, 2015; Vasiljeva and Lukanova, 2016).

This study had several limitations. The main factor was the number of respondents. As the sample comprised only one respondent per business type, the results may be biased by the knowledge or personality of the respondents, and some results may not represent

the general trend in businesses. Nevertheless, consistent results were found for most questions, as shown in the results section, including the core question of our research. Despite the exploratory nature of the study, it brings interesting new insights that link with and extend previous research. The second limitation is the definition of service. In-store analytics is a term that does not have a single definition or scope in the industry. However, this study narrowed the definition to a specific service, In-store Insights, to allow a comparison of answers and obtain significant findings. Finally, the number of different sectors in the sample is appropriate for an exploratory study. Nevertheless, specific work per sector should be done in future research to support or negate our findings with more evidence.

This study opens several avenues for research as, to the best of our knowledge, there are no studies on in-store customer tracking technology adoption model that address the adoption status and the method to accelerate the implementation of such technologies. Further work should consider the three major barriers that respondents have revealed in the research: lack of data culture, lack of technology knowledge, and lack of budget priority. We urge scholars to focus on technology adoption models that can explain and confirm the exploratory findings of this study. We recommend that practitioners focus on simplifying the solution from a user experience perspective, clearly showing the added values based on the KPIs that can be obtained automatically, and how to apply these solutions to the specific use cases of each company. Finally, scholars and practitioners should develop practical methodologies to evaluate the digital transformation maturity of organisations and generate action plans leading to execution.

## References

Anic, I.D., Radas, S. and Lim, L.K.S. (2010), "Relative effects of store traffic and customer traffic flow on shopper spending", *International Review of Retail, Distribution and Consumer Research*, Vol. 20 No. 2, pp. 237–250.

Arguedas-Sanz, R., Pra-Martos, I. and Reina-Paz, M.D. (2013), "Las TIC y el sector bancario. Nuevos canales y herramientas de negocio", *Papeles de Economía Española*, No. 136, pp. 243–257.

Beri, B. and Parminder, A.P. (2013), "Web Analytics: Increasing Website's Usability and Conversion Rate", *International Journal of Computer Applications*, Vol. 72 No. 6, pp. 35–38.

Betzing, J.H. (2018), "Beacon-based customer tracking across the high street: Perspectives for location-based smart services in retail", *Americas Conference on Information Systems 2018: Digital Disruption, AMCIS 2018*, New Orleans, USA, available at: https://aisel.aisnet.org/amcis2018/OrgTrasfm/Presentations/4/ (accessed 28 January 2021).

Bhattacharya, M. (2015), "A conceptual framework of RFID adoption in retail using Rogers stage model", *Business Process Management Journal*, Vol. 21 No. 3, pp. 517–540.

Bilgic, E. and Duan, Y. (2019), "E-commerce and Business Analytics: A Literature Review", *International Conference on Digital Economy*, Springer, Cham, pp. 173–182.

BuiltWith. (2020), "Google Analytics Usage Statistics", available at: https://trends.builtwith.com/analytics/Google-Analytics (accessed 11 April 2020).

Calvo-Porral, C. and Lévy-Mangín, J.P. (2018), "Pull factors of the shopping malls: an empirical study", *International Journal of Retail & Distribution Management*, Vol. 46 No. 2, pp. 110–124.

Chaffey, D. and Patron, M. (2012), "From web analytics to digital marketing optimization: Increasing the commercial value of digital analytics", *Journal of Direct, Data and Digital Marketing Practice*, Vol. 14 No. 1, pp. 30–45.

Chiang, K.P. and Dholakia, R.R. (2003), "Factors driving consumer intention to shop online: An empirical investigation", *Journal of Consumer Psychology*, Vol. 13 No. 1–2, pp. 177–183.

Childs, M., Blanchflower, T., Hur, S. and Matthews, D. (2020), "Non-traditional marketplaces in the retail apocalypse: investigating consumers' buying behaviours", *International Journal of Retail & Distribution Management*, Vol. 48 No. 3, pp. 262–286.

Choudrie, J. and Dwivedi, Y.K. (2005), "Investigating the research approaches for examining technology adoption issues", *Journal of Research Practice*, Vol. 1 No. 1, pp. 1–12.

Chuang, H.H.C., Oliva, R. and Perdikaki, O. (2016), "Traffic-Based Labor Planning in Retail Stores", *Production and Operations Management*, Vol. 25 No. 1, pp. 96–113.

Clement, J. (2019), "E-commerce share of total global retail sales from 2015 to 2023", *Statista*, available at: https://www.statista.com/statistics/534123/e-commerce-share-of-retail-sales-worldwide/ (accessed 19 January 2021).

Cuesta, C., Ruesta, M., Tuesta, D. and Urbiola, P. (2015), "The digital transformation of

the banking industry", *Digital Economy Watch*, Vol. August 201, pp. 1–10.

Das, G. and Varshneya, G. (2017), "Consumer emotions: Determinants and outcomes in a shopping mall", *Journal of Retailing and Consumer Services*, Vol. 38, pp. 177–185.

Dogan, O., Gurcan, O.F., Oztaysi, B. and Gokdere, U. (2019), "Analysis of Frequent Visitor Patterns in a Shopping Mall", in Calisir, F., Cevikcan, E. and Camgoz Akdag, H. (Eds.), *Industrial Engineering in the Big Data Era*, Springer, Cham, pp. 217–227.

Farshidi, A. (2016), "The New Retail Experience and Its Unaddressed Privacy Concerns: How RFID and Mobile Location Analytics are Collecting Customer Information", *Journal of Law, Technology, & the Internet*, Vol. 7 No. 1, pp. 15–38.

Garaus, M., Wagner, U. and Manzinger, S. (2017), "Happy grocery shopper: The creation of positive emotions through affective digital signage content", *Technological Forecasting and Social Change*, Vol. 124, pp. 295–305.

Germann, F., Lilien, G.L., Fiedler, L. and Kraus, M. (2014), "Do Retailers Benefit from Deploying Customer Analytics?", *Journal of Retailing*, Vol. 90 No. 4, pp. 587–593.

Graham, C. (2016), "The relationship between high street footfall, attraction and conversion", in University., L.S.B. (Ed.), *Business in a Dynamic World Conference*, Limassol, Cyprus, available at: https://openresearch.lsbu.ac.uk/download/5398c570cce6e8c9d665951ad881bd7a3d57bfcb2f11d2bb54c5bb60f534ad27/99110/The relationship between high street footfall.docx.

Groß, M. (2015), "Mobile shopping: A classification framework and literature review", *International Journal of Retail & Distribution Management*, Vol. 43 No. 3, pp. 221–241.

Hagberg, J., Sundstrom, M. and Egels-Zandén, N. (2016), "The digitalization of retailing: an exploratory framework", *International Journal of Retail & Distribution Management*, Vol. 44 No. 7, pp. 694–712.

Härtfelder, J. and Winkelmann, A. (2016), "Opportunities and challenges for local retailing in an environment dominated by mobile internet devices - Literature review and gap analysis", in Nissen, V., Stelzer, D., Straßburger, S. and Fischer, D. (Eds.), *Multikonferenz Wirtschaftsinformatik, MKWI 2016*, Vol. 1, Ilmenau, Germany, pp. 33–44.

Hong, Y., Li, Z. and Wang, J. (2020), "Business Value of Telecom Operators' Big Data", *Journal of Physics: Conference Series*, IOP Publishing, Vol. 1437 No. 1, pp. 1–7.

Hu, H. and Jasper, C.R. (2004), "Men and women: a comparison of shopping mall behavior", *Journal of Shopping Center Research*, Vol. 11 No. 1, pp. 113–131.

Hui, S.K., Bradlow, E.T. and Fader, P.S. (2009), "Testing Behavioral Hypotheses Using an Integrated Model of Grocery Store Shopping Path and Purchase Behavior", *Journal of Consumer Research*, Vol. 36 No. 3, pp. 478–493.

Huotari, V. (2015), *Depth Camera Based Customer Behaviour Analysis for Retail.*, *Master's Thesis*, available at: https://pdfs.semanticscholar.org/fb14/eb61ba91e33c040420df8567604a8a421e20.pdf.

Infosys. (2013), "Consumers Worldwide Will Allow Access To Personal Data For Clear Benefits", *Infosys*, available at: https://www.infosys.com/newsroom/press-releases/2013/digital-consumer-study.html (accessed 19 January 2021).

Ipsos. (2017), "In-store Analytics and Why You Need Them", available at: https://www.ipsos-retailperformance.com/en/insights/store-analytics-need/

(accessed 16 January 2021).

Jocevski, M. (2020), "Blurring the Lines between Physical and Digital Spaces: Business Model Innovation in Retailing", *California Management Review*, Vol. 63 No. 1, pp. 99–117.

Jones, P. and Dent, M. (1994), "Improving Service: Managing Response Time in Hospitality Operations", *International Journal of Operations & Production Management*, Vol. 14 No. 5, pp. 52–58.

Kamaladevi, B. (2010), "Customer experience management in retailing", *Business Intelligence Journal*, Vol. 3 No. 1, pp. 37–54.

Kang, J.Y.M., Mun, J.M. and Johnson, K.K.P. (2015), "In-store mobile usage: Downloading and usage intention toward mobile location-based retail apps", *Computers in Human Behavior*, Elsevier Ltd, Vol. 46, pp. 210–217.

Karaman, E. (2015), "Integration of People Counter Systems to Decision Support Systems in Clothing Retail Industry: A Preliminary Analysis and Possible Applications", *Journal of Graduate School of Social Sciences*, Vol. 19 No. 2, pp. 271–290.

Kerem, K. and Ulla, M. (2018), "Perceived Intrusiveness of Personalized Marketing", in Pucihar, A., Kljajić Borštnar, M., Ravesteijn, P., Seitz, J. and Bons, R. (Eds.), *31st Bled EConference: Digital Transformation: Meeting the Challenges, June 17 - 20, 2018*, Univeristy of Maribor Press, Maribor, Slovenia, pp. 147–158.

Kesari, B. and Atulkar, S. (2016), "Satisfaction of mall shoppers: A study on perceived utilitarian and hedonic shopping values", *Journal of Retailing and Consumer Services*, Vol. 31, pp. 22–31.

Landmark, A.D. and Sjøbakk, B. (2017), "Tracking customer behaviour in fashion retail

using RFID", *International Journal of Retail & Distribution Management*, Emerald Group Publishing Ltd., Vol. 45 No. 7–8, pp. 844–858.

Li, K., Li, Y.N., Yin, H., Hu, Y., Ye, P. and Wang, C. (2019), "Visual analysis of retailing store location selection", *The 12th International Symposium on Visual Information, Communication and Interaction (VINCI'2019), September 20–22, 2019, Shanghai, China*, Association for Computing Machinery, New York, NY, USA, pp. 1–8.

Louise, B.K. and Alison, W. (1994), "Collecting data using a semi-structured interview: a discussion paper", *Journal of Advanced Nursing*, Vol. 19 No. 2, pp. 328–335.

Luenendonk, M. (2015), "How Does In-Store Analytics Work", *Cleverism*, available at: https://www.cleverism.com/store-analytics-work/ (accessed 16 January 2021).

Marakarkandy, B., Yajnik, N. and Dasgupta, C. (2017), "Enabling internet banking adoption: An empirical examination with an augmented technology acceptance model (TAM)", *Journal of Enterprise Information Management*, Vol. 30 No. 2, pp. 263–294.

Mavroudis, V. and Veale, M. (2018), "Eavesdropping whilst you're shopping: Balancing personalisation and privacy in connected retail spaces", *Living in the Internet of Things: Cybersecurity of the IoT - 2018*, Vol. 2018, IET Conference Publications, London, UK, pp. 28–29.

Meisenzahl, M. (2021), "Stores Closing in 2021 Retail Apocalypse", *Business Insider*, available at: https://www.businessinsider.com/stores-closing-in-2021-list-2021-3 (accessed 2 May 2021).

Mende, M. and Noble, S.M. (2019), "Retail Apocalypse or Golden Opportunity for Retail Frontline Management?", *Journal of Retailing*, Vol. 95 No. 2, pp. 84–89.

Mingers, J. (2003), "The paucity of multimethod research: A review of the information

systems literature", *Information Systems Journal*, Vol. 13 No. 3, pp. 233–249.

Mohd-Ramly, S. and Omar, N.A. (2017), "Exploring the influence of store attributes on customer experience and customer engagement", *International Journal of Retail & Distribution Management*, Vol. 45 No. 11, pp. 1138–1158.

Myerson, J. and Sandbiller, K. (2018), "Hybrid space making: Rethinking the bank branch experience for the digital age", *Corporate Real Estate Journal*, Vol. 7 No. 3, pp. 256–266.

Nagyova, A. and Pacaiova, H. (2009), "How to build manual for key performance indicators--KPI", *DAAAM International Scientific Book*, DAAAM International Vienna, pp. 135–143.

Newman, A.J., Yu, D.K.. and Oulton, D.P. (2002), "New insights into retail space and format planning from customer-tracking data", *Journal of Retailing and Consumer Services*, Vol. 9 No. 5, pp. 253–258.

Nguyen, V. (2019), "Shopping For Privacy: How Technology in Brick-and-Mortar Retail Stores Poses Privacy Risks for Shoppers", *Fordham Intellectual Property, Media and Entertainment Law Journal*, Vol. 29 No. 2, p. 535.

Olszak, C. and Zurada, J. (2019), "Big Data-driven Value Creation for Organizations", *HICSS-52 2019, 52nd Hawaii International Conference on System Sciences, Jan 8-11, 2019, Grand Wailea, Maui*, Vol. 6, University of Hawaii at Manoa, Grand Wailea, Maui, Hawaii, pp. 164–173.

Pantano, E. and Timmermans, H. (2014), "What is Smart for Retailing?", *Procedia Environmental Sciences*, Elsevier B.V., Vol. 22, pp. 101–107.

Pantano, E. and Vannucci, V. (2019), "Who is innovating? An exploratory research of digital technologies diffusion in retail industry", *Journal of Retailing and Consumer*

*Services*, Vol. 49, pp. 297–304.

Perdikaki, O., Kesavan, S. and Swaminathan, J.M. (2012), "Effect of traffic on sales and conversion rates of retail stores", *Manufacturing and Service Operations Management*, Vol. 14 No. 1, pp. 145–162.

Pfeiffer, J., Pfeiffer, T., Meißner, M. and Weiß, E. (2020), "Eye-Tracking-Based Classification of Information Search Behavior Using Machine Learning: Evidence from Experiments in Physical Shops and Virtual Reality Shopping Environments", *Information Systems Research*, INFORMS Inst.for Operations Res.and the Management Sciences, Vol. 31 No. 3, pp. 675–691.

Phippen, A., Sheppard, L. and Furnell, S. (2004), "A practical evaluation of Web analytics", *Internet Research*, Vol. 14 No. 4, pp. 284–293.

Poncin, I. and Ben Mimoun, M.S. (2014), "The impact of 'e-atmospherics' on physical stores", *Journal of Retailing and Consumer Services*, Vol. 21 No. 5, pp. 851–859.

Ramzan, B., Bajwa, I.S., Kazmi, R. and Ramzan, S. (2019), "An intelligent data analytics based model driven recommendation system", *Journal of Universal Computer Science*, Vol. 25 No. 10, pp. 1353–1372.

Ratchford, M. and Barnhart, M. (2012), "Development and validation of the technology adoption propensity (TAP) index", *Journal of Business Research*, Vol. 65 No. 8, pp. 1209–1215.

Retail Dive. (2021), "The running list of 2021 retail bankruptcies", *Retail Dive*, available at: https://www.retaildive.com/news/the-running-list-of-2021-retail-bankruptcies/594891/ (accessed 2 May 2021).

Rogers, E.M. (1983), *Diffusion of Innovations*, edited by Free Press of Glencoe, 3rd ed., New York.

Rowley, J. (2012), "Conducting research interviews", *Management Research Review*, Vol. 35 No. 3–4, pp. 260–271.

Saleem, H., Khawaja, M., Uddin, S., Habib-Ur-Rehman, S., Saleem, S. and Aslam, A.M. (2019), "Strategic Data Driven Approach to Improve Conversion Rates and Sales Performance of E-Commerce Websites", *International Journal of Scientific & Engineering Research*, Vol. 10 No. 4, pp. 588–593.

Santoro, G., Fiano, F., Bertoldi, B. and Ciampi, F. (2019), "Big data for business management in the retail industry", *Management Decision*, Emerald Group Publishing Ltd., Vol. 57 No. 8, pp. 1980–1992.

SightCorp. (2020), "In-Store Analytics. What is it? How to use the Benefits?", available at: https://sightcorp.com/knowledge-base/in-store-analytics/ (accessed 16 April 2020).

Somani, V. (2015), *Retail of the Future : O2O or O&O?*, Massachusetts Institute of Technology, available at: https://dspace.mit.edu/bitstream/handle/1721.1/98992/921181181-MIT.pdf.

Spanke, M. (2020), *Retail Isn't Dead*, edited by Palgrave McMillan*Retail Isn't Dead*, Springer International Publishing, Cham, available at:https://doi.org/10.1007/978-3-030-36650-6.

Telefonica. (2020), "Crowd Analytics to identify and understand audiences: Smart Steps", available at: https://luca-d3.com/products-services/business-insights/crowd-analytics (accessed 25 January 2021).

Triantafyllou, S., Koutsokera, L., Stavrou, V. and Griva, A. (2017), "Enhance shopping experience and support decision making leveraging BLE beacons in a grocery retail store", *DMST Student Conference, 27 May*, pp. 1–9.

Troisi, O., Maione, G., Grimaldi, M. and Loia, F. (2020), "Growth hacking: Insights on data-driven decision-making from three firms", *Industrial Marketing Management*, Vol. 90, pp. 538–557.

Tsai, M.C., Lee, W. and Wu, H.C. (2010), "Determinants of RFID adoption intention: Evidence from Taiwanese retail chains", *Information and Management*, Vol. 47 No. 5–6, pp. 255–261.

Turri, A.M., Smith, R.J. and Kopp, S.W. (2017), "Privacy and RFID Technology: A Review of Regulatory Efforts", *Journal of Consumer Affairs*, Vol. 51 No. 2, pp. 329–354.

Vakulenko, Y., Hellström, D. and Oghazi, P. (2018), "Customer value in self-service kiosks: a systematic literature review", *International Journal of Retail & Distribution Management*, Emerald Group Publishing Ltd.

Vasiljeva, T. and Lukanova, K. (2016), "Commercial banks and FINTECH companies in the digital transformation: Challenges for the future", *Journal of Business Management*, No. 11, pp. 25–33.

De Vries, J., Roy, D. and De Koster, R. (2018), "Worth the wait? How restaurant waiting time influences customer behavior and revenue", *Journal of Operations Management*, Elsevier B.V., Vol. 63, pp. 59–78.

Walkbase. (2020), "Retail Market", available at: https://www.walkbase.com/markets/retail/ (accessed 16 January 2021).

Webber, C. da C., Sausen, J.O., Basso, K. and Laimer, C.G. (2018), "Remodelling the retail store for better sales performance", *International Journal of Retail & Distribution Management*, Vol. 46 No. 11–12, pp. 1041–1055.

Weinswig, D. (2017), "IoT in Retail. Digitalizing Brick and Mortar Stores", *Fung Global*

*Retail & Technology*, pp. 1–20.

Willems, K., Smolders, A., Brengman, M., Luyten, K. and Schöning, J. (2017), "The path-to-purchase is paved with digital opportunities: An inventory of shopper-oriented retail technologies", *Technological Forecasting and Social Change*, Elsevier Inc., Vol. 124, pp. 228–242.

Wilson, M. (2013), "Consumers prefer customized in-store experiences over online", *CSA*, available at: https://chainstoreage.com/operations/survey-consumers-prefer-customized-store-experiences-over-online (accessed 15 January 2021).

Wolpert, S. and Roth, A. (2020), "Development of a classification framework for technology based retail services: a retailers' perspective", *International Review of Retail, Distribution and Consumer Research*, Vol. 30 No. 5, pp. 498–538.

Yiu, C.Y. and Ng, H.C. (2010), "Buyers-to-shoppers ratio of shopping malls: A probit study in Hong Kong", *Journal of Retailing and Consumer Services*, Vol. 17 No. 5, pp. 349–354.

Zeng, Y., Pathak, P.H. and Mohapatra, P. (2015), "Analyzing shopper's behavior through WiFi signals", *WPA 2015 - Proceedings of the 2nd Workshop on Physical Analytics*, Association for Computing Machinery, Inc, pp. 13–18.

Zhu, K., Kraemer, K.L., Xu, S. and Dedrick, J. (2004), "Information Technology Payoff in E-Business Environments: An International Perspective on Value Creation of E-Business in the Financial Services Industry", *Journal of Management Information Systems*, Vol. 21 No. 1, pp. 17–54.

**Table I: Technologies used for in-store analytics**

| Technology | Description | Use cases presented in previous works | Limitations | References |
|---|---|---|---|---|
| RFID<br><br>(Radio Frequency Identification) | Short range radio technology frequently used for supply chain control and goods tracking.<br><br>Implemented inside trolleys and shopping baskets that are tracked thanks to layout antennas. | Analyse shopping paths.<br>Improve fitting room interaction.<br>Analyse purchase probability based on dwell time.<br>Analyse dwell time.<br>Modify paths to draw attention to less visited areas of the store | Only measures people with basket or trolleys.<br>No customer opt-in, only anonymous data can be used. | Fujino *et al.*, 2014; Landmark and Sjøbakk, 2017; Larson *et al.*, 2005; Takai and Yada, 2010; Vukovic *et al.*, 2012 |
| Bluetooth Sensors | Radio technology available in most mobile devices. The tracking solution track bluetooth signals from customers' phones | Analyse customer behaviour inside a shopping mall. | No customer opt-in, only anonymous data.<br>Only Bluetooth enabled phones are detected. | Oosterlinck *et al.*, 2017 |
| Beacons | Battery powered devices emitting a Bluetooth Low Energy (BLE) unique identifier. A mobile application can read this signal and check on a cloud database the position of the beacon | Analyse shopping paths.<br>Improve user interactions.<br>Analyse customer behaviour.<br>Attitude towards beacons from consumers.<br>Indoor positioning system. | Customers must have the appropriate App and Bluetooth enabled in their phones.<br>Expensive installations for customer tracking, as the accuracy of beacons is limited and requires a dense network of sensors. | Betzing, 2018; Dogan *et al.*, 2019; Pierdicca *et al.*, 2015; Sturari *et al.*, 2016; Thamm *et al.*, 2016; Triantafyllou *et al.*, 2017 |
| Audio and visual Beacons | Instead of using radio, audio beacons use sound waves beyond the hearing threshold to trigger the mobile application logic, based on microphone of Bluetooth. Visual beacons are camera based and use imperceptible changes of light. | Technical and regulatory analysis. | | Mavroudis and Veale, 2018 |
| Wi-Fi | Scanning from Wi-Fi Access Points (APs) of the customer devices. | Pedestrian and cyclists monitoring.<br>Customer tracking inside a mall.<br>Indoor positioning system.<br>Optimizing Store Layout.<br>Detecting visited areas. | No customer opt-in, only anonymous data.<br>Limitations of accuracy. | Abedi *et al.*, 2015; Bai *et al.*, 2014; Carrera *et al.*, 2018; Fukuzaki *et al.*, 2015; Hwangbo *et al.*, 2017; Zeng *et al.*, 2015 |
| Computer Vision | Usage of image processing to detect customer movements. | Detecting potentially suspicious behaviours in shopping malls.<br>Customer instore tracking.<br>Analyse purchasing behaviour. | Complex algorithms or manual work to be done. No customer opt-in, only anonymous data. | Arroyo *et al.*, 2015; Celikkan *et al.*, 2011; Merad *et al.*, 2016; Oosterlinck *et al.*, 2017; Quintana et al, 2016; Wu *et al.*, 2015 |

**Source: Prepared by authors**

## Table II: Composition of the sample by sector

| Sector | Number of interviewees | Rank of the interviewees | Participants in the focus group session | |
|---|---|---|---|---|
| Specialized retail (travel agency, cosmetics, and household goods) | 3 | Chief Marketing Officer Travel Agency<br>Chief Marketing Officer Cosmetics<br>Chief Marketing Officer household goods | 1 | Chief Financial Officer household goods |
| Bank and financial services (branches) | 2 | Chief Information Officer<br>Operations Manager | 1 | IT Manager |
| Hotels | 2 | Chief Marketing Officer<br>Chief Digital Officer | | |
| Restaurants | 2 | Chief Financial Officer<br>Operations Manager | 1 | Chief Financial Officer |
| Fashion (clothing) | 1 | Chief Executive Officer | 1 | Operations Manager |
| Car dealer | 1 | Chief Executive Officer | 1 | Operations Manager |
| Telecommunications Retail | 1 | Chief Digital Officer | 1 | IT manager |
| Health and wellness | 3 | Chief Marketing Officer Dental Clinic<br>Chief Executive Officer Parapharmacy<br>Chief Financial Officer Hairdresser | | |
| **TOTAL** | **15** | | **6** | |

**Source: Prepared by authors**

**Table III: Business situation**

| Sector | Company Business | Market Situation (declarative) |
|---|---|---|
| Specialized retail | Travel agency | It is a mature market. Most of it has gone online. It requires advanced in-store experiences. |
| | Cosmetics | The business requires specialized shop assistants. The testing of products is a key element for sales. |
| | Household goods | The attraction to the store is key. They handle a catalogue too broad that complicates the experience. |
| Banking | Bank | The number of branches has dramatically diminished. The business is moving to online. The reputation of banks is not high. |
| | Financial Services | The business requires skilled financial advisors. |
| Hotels | Hotel | Most of the bookings are handled through digital platforms. Customer experience is the key element of the service. |
| Restaurants | Restaurant | Home delivery is changing the market. |
| Fashion | Clothing | It is a mature and segmented marketed, that requires to address perfectly target segment needs. |
| Car dealers | Car dealer | As the brands fix the layout and technology, the difference lies in the human interaction (sales specialist). |
| Retail Telco | Retail Telco | It is a price driven, mature market. The reduction of waiting times and the product rotation are key elements to sell. |
| Health and wellness | Dental Clinic | Price competition and omnichannel are the key elements of the business. |
| | Parapharmacy | It is a growing sector that requires expert sales attendants. |
| | Hairdressing | It is a highly competitive business, where the marketing is basically through word of mouth. |

**Source: Prepared by authors**

**Table IV: Technology maturity**

| Sector | Company Business | Level of Digital Maturity (Declarative) | Technologies | | | | |
|---|---|---|---|---|---|---|---|
| | | | Digital Signage | Mobile App | Web Analytics | Wi-Fi for customers | People counters |
| Specialized retail | Travel agency | Average | ✓ | ✓ | ✓ | | ✓ |
| | Cosmetics | Average | ✓ | ✓ | ✓ | | |
| | Household goods | Below average | | | ✓ | ✓ | |
| Banking | Bank | Above average | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Financial Services | Average | ✓ | | ✓ | | |
| Hotels | Hotel | Above average | ✓ | ✓ | ✓ | ✓ | |
| Restaurants | Restaurant | Average | | | ✓ | ✓ | |
| Fashion | Clothing | Below average | ✓ | | ✓ | ✓ | ✓ |
| Car dealers | Car dealer | Above average | ✓ | | ✓ | ✓ | |
| Retail Telco | Retail Telco | Below average | | ✓ | ✓ | ✓ | |
| Health and wellness | Dental Clinic | Above average | ✓ | ✓ | ✓ | ✓ | |
| | Parapharmacy | Average | ✓ | | ✓ | ✓ | |
| | Hairdressing | Average | | | ✓ | ✓ | |

**Source: Prepared by authors**

**Table V: Interest in customer tracking data (declarative)**

| Sector | Company Business | Customer tracking data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Simple KPIs | | | | | Composite KPIs | | |
| | | Number of Visitors | Street Attraction | Frequency of visits | Dwell time | In Store Flows | Sales Conversion | Other External Sources | Comparison among stores |
| Specialized retail | Travel agency | ✓ | ✓ | ✓ | ✓ | × | ✓ | ✓ | ✓ |
| | Cosmetics | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Household goods | ✓ | ✓ | ✓ | = | ✓ | ✓ | ✓ | ✓ |
| Banking | Bank | × | × | × | ✓ | ✓ | × | × | ✓ |
| | Financial Services | × | = | × | × | × | × | = | × |
| Hotels | Hotel | × | ✓ | ✓ | ✓ | = | ✓ | ✓ | ✓ |
| Restaurants | Restaurant | × | ✓ | = | ✓ | = | ✓ | ✓ | ✓ |
| Fashion | Clothing | × | ✓ | × | × | × | × | × | ✓ |
| Car dealers | Car dealer | = | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Retail Telco | Retail Telco | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Health and wellness | Dental Clinic | ✓ | ✓ | = | ✓ | × | = | ✓ | = |
| | Parapharmacy | × | ✓ | ✓ | ✓ | × | ✓ | = | ✓ |
| | Hairdressing | × | ✓ | × | × | × | × | × | ✓ |

✓ Interested = Neutral × Not Interested

**Source: Prepared by authors**

**Table VI: Interest in business use cases (declarative)**

| Sector | Company Business | Use Cases: Modify layout of the store | Modify product areas inside the store | Plan staff and schedule store times | Improve stock management | Improve waiting time management | Adapt in store promotions | Adapt out-of-store promotions | Stores' closure or new openings | Improve service personalization | Measure the effect of campaigns | Adjust product mix in the store |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specialized retail | Travel agency | = | = | ✓ | × | ✓ | ✓ | = | × | ✓ | ✓ | = |
| | Cosmetics | × | = | ✓ | = | ✓ | ✓ | ✓ | = | ✓ | ✓ | ✓ |
| | Household goods | = | ✓ | ✓ | ✓ | × | ✓ | = | × | ✓ | = | ✓ |
| Banking | Bank | × | ✓ | × | × | = | × | × | ✓ | ✓ | = | × |
| | Financial Services | × | × | × | × | × | ✓ | × | × | ✓ | × | × |
| Hotels | Hotel | ✓ | ✓ | ✓ | × | = | × | × | × | ✓ | ✓ | ✓ |
| Restaurants | Restaurant | × | ✓ | ✓ | = | ✓ | ✓ | ✓ | ✓ | × | ✓ | ✓ |
| Fashion | Fashion | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ | = | ✓ | ✓ |
| Car dealers | Car dealer | × | ✓ | ✓ | × | ✓ | ✓ | × | × | ✓ | ✓ | × |
| Retail Telco | Retail Telco | ✓ | ✓ | = | ✓ | = | ✓ | = | × | ✓ | ✓ | ✓ |
| Health and wellness | Dental Clinic | × | × | = | × | ✓ | ✓ | = | = | ✓ | ✓ | = |
| | Parapharmacy | = | × | = | ✓ | × | × | × | ✓ | = | × | × |
| | Hairdressing | × | × | = | × | × | ✓ | × | ✓ | = | = | = |
| Simplified Interested – Not Interested ratio | | -4 | 3 | 5 | -3 | 2 | 7 | -5 | -1 | 8 | 6 | 2 |

✓ Interested = Neutral × Not Interested

**Source: Prepared by authors**

**Figure 1: Proposed action plan to introduce in-store analytics**