CUSTOMER EXPERIENCE MANAGEMENT IN THE AGE OF BIG DATA ANALYTICS: A STRATEGIC FRAMEWORK

Maria Holmlund (corresponding author)

Hanken School of Economics, Finland

Yves Van Vaerenbergh

KU Leuven, Belgium

Robert Ciuchita

Hanken School of Economics, Finland

Annika Ravald

Hanken School of Economics, Finland

.

Panagiotis Sarantopoulos

The University of Manchester, UK

Francisco Villarroel Ordenes

University of Massachusetts Amherst, USA

Mohamed Zaki

University of Cambridge, UK

Maria Holmlund (Corresponding author): Hanken School of Economics, Department of Marketing, CERS — Centre for Relationship Marketing and Service Management, Arkadiankatu 22, PO Box 479, FI-00101 Helsinki, Finland. maria.holmlund-rytkonen@hanken.fi, phone: +358 40 352 1396

Yves Van Vaerenbergh: Department of Marketing, KU Leuven, Warmoesberg 26, 1000 Brussels, Belgium. Yves.VanVaerenbergh@kuleuven.be, phone: +32 2 609 82 89

Robert Ciuchita: Hanken School of Economics, Department of Marketing, CERS — Centre for Relationship Marketing and Service Management, Arkadiankatu 22, PO Box 479, FI-00101 Helsinki, Finland. robert.ciuchita@hanken.fi, phone: +358 40 352 1557

Annika Ravald: Hanken School of Economics, Department of Marketing, CERS — Centre for Relationship Marketing and Service Management, Kauppapuistikko 2, P.O.BOX 287, FIN-65101 Vaasa, Finland. annika.ravald@hanken.fi, phone +358 40 352 1755

Panagiotis Sarantopoulos: Alliance Manchester Business School, The University of Manchester, Booth Street West, M15 9PB, Manchester, UK. p.sarantopoulos@manchester.ac.uk, phone +44 (0) 161 275 6423

Francisco Villarroel Ordenes: University of Massachusetts, Isenberg School of Management, Department of Marketing, Amherst, 121 Presidents Drive, Amherst, USA. fvillarroelo@isenberg.umass.edu, phone +1 413-545-4941

Mohamed Zaki: University of Cambridge, Institute for manufacturing, Department of Engineering, Cambridge Service Alliance, 17 Charles Babbage Road, Cambridge, CB3 0FS, UK. mehyz2@cam.ac.uk, phone +44 01223 732614

Acknowledgements:

The authors are grateful to Jamie Burton, Thorsten Gruber, Helen Bruce and Victoria Mansfield for organizing the 2nd Customer Management Leadership Group Academic-Practitioner Workshop at the Alliance Manchester Business School, The University of Manchester. The first two authors were the track chairs of this workshop and are listed alphabetically. The other authors are the team members and are also listed alphabetically. All authors contributed equally.

Abstract

Customer experience (CX) has emerged as a sustainable source of competitive differentiation. Recent developments in big data analytics (BDA) have exposed possibilities to unlock customer insights for customer experience management (CXM). Research at the intersection of these two fields is scarce and there is a need for conceptual work that (1) provides an overview of opportunities to use BDA for CXM and (2) guides management practice and future research. The purpose of this paper is therefore to develop a strategic framework for CXM based on CX insights resulting from BDA. Our conceptualisation is comprehensive and is particularly relevant for researchers and practitioners who are less familiar with the potential of BDA for CXM. For managers, we provide a step-by-step guide on how to kick-start or implement our strategic framework. For researchers, we propose some opportunities for future studies in this promising research area.

Keywords: customer experience; customer experience management; customer experience insight; big data analytics

"*Big data must be mastered in order to be valuable. It is not an automatic cornucopia, or a substitute for insight*" Lanier (2013, p. 110).

1. INTRODUCTION

Customer experience (CX), defined as a customer's response to interactions with an organisation before, during, or after purchase or consumption, across multiple channels, and across time, has emerged as a sustainable source of competitive differentiation (Kranzbühler, Kleijnen, Morgan, & Teerling, 2018; Lemon & Verhoef, 2016; Voorhees et al., 2017). Organisations usually depict and attempt to manage CX through the customer journey (Lemon & Verhoef, 2016; McColl-Kennedy, Zaki, Lemon, Urmetzer, & Neely, 2019; Voorhees et al., 2017), comprising a multitude of touchpoints each representing direct or indirect interactions the customer has with the organisation (Kuehnl, Jozic, & Homburg, 2019). Customer experience management (CXM) is defined as a higher-order resource of cultural mind-sets towards customer experience, strategic directions to design CX, and organisational capabilities to continuously improve CX, with the goals of achieving and sustaining long-term customer loyalty (Homburg, Jozić, & Kuehnl, 2017).

In today's fast developing digital economy, big data analytics (BDA) have an immense potential to empower CXM as they can help organisations to achieve a better and faster understanding of the customer journey and make decisions to improve CX (Wedel & Kannan, 2016). Employing BDA for CXM has been spearheaded by digital-native companies and technology giants such as Facebook, Apple, Amazon, Netflix, and Google (Amirah, 2018). However, most organisations still face challenges in capturing (big) data from a multitude of touchpoints, channels, devices, and applications (Maechler, Neher, & Park, 2016). Moreover, even if (big) data is captured, the majority of organisations still face difficulties in generating relevant customer insights (i.e., knowledge about customers that is valuable to the organisation; Said, Macdonald, Wilson, & Marcos, 2015). Customer insights

are usually derived through analytics (Wedel & Kannan, 2016), and while on average the use of analytics is increasing, most organisations use negligible analytics in decision-making (Moorman, 2019; Ransbotham, Kiron, & Prentice, 2015).

Research on CXM has been developing conceptually (e.g., Bolton, 2018; Lemon & Verhoef, 2016) and empirically (e.g., Kuehnl et al., 2019; McColl-Kennedy et al., 2019). Similarly, the opportunities and challenges of employing BDA have been discussed in business and management literature (e.g., Sivarajah, Kamal, Irani, & Weerakkody, 2017; Villarroel Ordenes & Zhang, 2019). While some authors have explicitly mentioned the potential of BDA to impact CX (e.g., Wedel & Kannan, 2016), our review of the literature reveals that unexpectedly little research has delved into this substantive area. One notable and recent exception is McColl-Kennedy et al. (2019), who studied how customer insights for CXM can be gained through text mining in a business-to-business (B2B) context. While McColl-Kennedy et al. (2019) offered valuable insights into the use of BDA for CXM, their study focused on only one specific type of CX data (i.e., text written in open-ended questions) stemming from organisation-controlled touchpoints (i.e., explicitly solicited using a survey) and with insights being generated through one specific type of analytics (i.e., text mining).

We contend that the recent developments in BDA may expose a broader array of possibilities to unlock customer insights for CXM than described by McColl-Kennedy et al. (2019). The literature needs conceptual work that provides an overview of the possibilities for how to use BDA for CXM and to guide empirical research and management practice, especially with regards to organisational capabilities to continuously improve CX (Homburg et al., 2017). Consequently, the purpose of this paper is to develop a strategic framework for CXM based on customer experience insights resulting from BDA. We structure different types of *CX data* proposed in the literature along two dimensions (solicited versus

unsolicited, structured versus unstructured) and show how these different types of data generated along the customer journey can be used as a source for *CX analytics*, which in turn can be interpreted into *CX insights*. We theorise three types of CX insights, namely, attitudinal/psychographic, behavioural, and market insights. Furthermore, we discuss how these insights can be linked to *CX actions*, i.e., how CX insights can aid organisations' efforts to continuously improve CX. We focus on CX actions for incremental innovation (i.e., prioritisation, monitoring, and adaptation of touchpoints) and for radical innovation (i.e., (re)design of touch points).

With this effort, we bridge and extend the research on CXM (Homburg et al., 2017; McColl-Kennedy et al., 2019) and BDA (Sivarajah et al., 2017; Wedel & Kannan, 2016) by conceptualising how BDA can be used to derive actionable CX insights. Our proposed conceptualisation is comprehensive and might be particularly relevant for practitioners and researchers who are less familiar with BDA and seek an understanding of CXM based on CX data, CX analytics, CX insights, and CX actions. To guide managers, we provide a step-by-step guide on how to kick-start or implement our strategic framework. Finally, we propose some opportunities for future studies in this promising research area.

2. CONCEPTUAL BACKGROUND

2.1 Customer Experience Management (CXM)

CX has been studied from both an organisational as well as a customer perspective (Kranzbühler et al., 2018). The backbone of depicting and understanding CX is the customer journey, which comprises touchpoints (i.e., interactions between customers and the organisation) that are akin to service encounters (Bitner, Booms, & Tetreault, 1990; Voorhees et al., 2017). At each discrete touchpoint, customers have cognitive, affective, behavioural, sensorial, and social responses to the interaction, resulting in a static (or discrete) CX (Kranzbühler et al., 2018).

In recent years, organisations have been shifting their attention from managing discrete touchpoints along the customer journey to managing the entire customer journey (Homburg et al., 2017; Lemon & Verhoef, 2016; Maechler et al., 2016). As a result, CXM has emerged to capture the creation and delivery of a dynamic (or cumulative, or total) CX before, during, and after a purchase or service consumption, and across channels and touchpoints (Kranzbühler et al., 2018; Lemon & Verhoef, 2016; Voorhees et al., 2017). To manage CX effectively, organisations need to manage numerous touchpoints simultaneously and, in doing so, uncover and manage moments of truth (i.e., critical encounters that can significantly affect CX; Homburg et al., 2017; Voorhees et al., 2017). Most notably, elements that influence CX extend far beyond the customer journey as designed and controlled by the service provider (Kandampully, Zhang, & Jaakkola, 2018). CXM involves understanding what customers think about the organisation and the ecosystem that surrounds it (Meyer & Schwager, 2007). Hence, CXM requires organisations to use data stemming not only from their own touchpoints but also from partner-owned, customer-owned, and external touchpoints (Lemon & Verhoef, 2016) in the digital, physical, and social realms (Bolton, 2018) with the primary goals of continuously and proactively adopting CX to achieve customer loyalty and long-term growth. CXM is similar to customer relationship management (CRM) to the extent that both make use of market data, but the primary goals of the latter are customer retention and profit maximisation (Homburg et al., 2017). Thus, while CRM deals with planning, implementing, and monitoring customer relationships, CXM deals with continually improving starting CX at a touchpoint level.

Recent literature conceptualises CXM as a higher order resource of cultural mind-sets, strategic directions, and organisational capabilities (Homburg et al., 2017). This triad is relevant to understanding the scope of CXM as whole and its implication for organisational change (Malshe & Friend, 2018). *Cultural mind-sets* emphasise the relevance of an

organisational culture that sees CX as part of a market network requiring the capture of customer data beyond attitudes towards sensorial and behavioural responses. *Strategic directions* suggest that the design of CX needs a constant assessment of the nature of the value proposition (i.e., thematic cohesion) and how the value in that proposition can be delivered with consistency, context sensitivity, and connectivity amongst touchpoints. Finally, this framework identifies four *organisational capabilities* required for keeping an organisational balance between incremental and radical market innovations: touchpoint journey monitoring, touchpoint prioritisation, touchpoint adaptation, and touchpoint journey design. In this paper, we focus on how to aid these innovations through BDA as they provide the operational foundation for more complex and long-term strategic and cultural changes.

2.2 Big Data Analytics (BDA)

The volume, velocity, variety, veracity, variability, visualisation, and value of data generated and shared by various actors in the (digital) economy has increased immeasurably, paving the way to an era of Big Data (BD; Sivarajah et al., 2017; Wedel & Kannan, 2016). Raw data as such is futile. Only when purposefully processed, aggregated, and organised into a user-friendly format can they become information that can provide meaning given a specific context (O'Brien & Marakas, 2005). Data and information cannot in themselves provide customer insights (i.e., valuable knowledge about the customer; Said et al., 2015). Customer insights are attained through the transformation of data and information through analysis and interpretation, and their value stems from offering organisations the ability to draw conclusions and act (e.g., making managerial decisions). Insights that drive actions (e.g., challenge established norms and push in new directions as would be the case when introducing new touchpoints in the customer journey) are typically more valuable than ones that simply answers questions (e.g., monitor touchpoints to find problems and fix them by adapting existing touchpoints; Ransbotham et al., 2015).

Against this backdrop, *BDA* are approaches, methods, and tools (Villarroel Ordenes & Zhang, 2019) that can help organisations develop customer insights from (big) data and information, with the purpose of supporting managerial decision-making (Rose, 2016). To support managerial decision-making, BDA might encompass four different levels of analysis: descriptive, inquisitive (or diagnostic), predictive, and prescriptive (Sivarajah et al., 2017; Wedel & Kannan, 2016). Academic literature and popular press suggest that considerable value and competitive advantage can be attained by making effective decisions based on BDA (Davenport & Harris, 2017). BDA have the potential to transform business functions (e.g., supply chain and operations management, accounting and finance, sales, and marketing) and entire industries (e.g., retail, healthcare, finance, and legal services). In this paper, we focus on applications of BDA in the area of CXM.

2.3 CXM and BDA: A Structured Literature Review

While the potential and importance of using BDA to help organisations improve their CX capabilities has been signalled (e.g., Wedel & Kannan, 2016), research in this area is still in its infancy. To illustrate this gap, we conducted a Web of Science Core Collection search for "customer experience", "consumer experience", "user experience" or "service experience" at the topic level (i.e., title, abstract, and keywords), which returned 6,990 results. We further screened the results for academic articles published in English (6,425 articles) and published in the fields of business and management (1,005 articles). We then applied a journal quality classification and selected only the 390 articles published in Quartile 1 journals in either the Journal Citation Reports (JCR) or the Scientific Journal Ranking (SJR). Within these 390 papers, we screened the titles, abstracts, and keywords for the mention of at least one of the following terms: (big) data, analytics, journey, touchpoint(s), or experience management, which yielded 123 articles. While 35 of these articles mentioned journey, 21 mentioned touchpoint(s), and 12 mentioned experience management, only 7

mentioned analytics and only 6 mentioned big data. Interestingly, only one paper (i.e., McColl-Kennedy et al., 2019) discussed the customer journey, touchpoints, data, and analytics. Set in the B2B-heavy asset service context, the paper explored how customer insights can be gained from organisation-solicited data (i.e., surveys that are touchpoints under the organisation's control) through text mining. While an important first empirical application, McColl-Kennedy et al. (2019) focused only on one type of touchpoint, one type of data, and one type of analytics. We argue that an expanded perspective is necessary to cover different types of touchpoints, data, and analytics. We offer such a perspective in the subsequent section.

3. A STRATEGIC FRAMEWORK FOR CX INSIGHTS FOR CXM

We draw on the conceptual background of CXM and BDA to define *CX insights* as knowledge about customers attained through BDA with the purpose of continuously improving the CX. While CX insights should be able to also drive CX actions at the strategic and cultural levels, we deliberately focus on organisational capabilities for incremental and radical innovations. We advocate that the initial focus should be directed at generating impact from early use cases at the operational level. Organisations should then build on top of the first achievements to launch projects at the strategic level and ultimately enable a shift in the organisational culture.

In Figure 1, we offer a conceptual framework that integrates CXM and BDA and helps organisations better understand *what* types of CX data and analytics can be used to generate actionable CX insights. Our framework can also be backtracked by answering *why* organisations need analytics for CXM. In line with recent CXM research (e.g., Bolton, 2018; McColl-Kennedy et al., 2019), we ground our framework on customer interactions with organisations at different types of touchpoints in the digital, physical, and social realms. As a result, several types of CX data can be captured, stored, organised, and integrated, ranging

from *structured* to *unstructured* and *solicited* to *unsolicited* (Villarroel Ordenes, Theodoulidis, Burton, Gruber, & Zaki, 2014). In line with recent BDA research (Sivarajah et al., 2017; Wedel & Kannan, 2016), these data can be analysed and interpreted by using *descriptive, inquisitive, predictive,* and *prescriptive* BDA. Organisations can then generate *attitudinal/psychographic, behavioural, and market* CX insights. Finally, organisations can use the CX insights for CX actions related to touchpoint journey *monitoring, prioritisation, adaptation*, and *design*.

-------- Insert Figure 1 about here --------

3.1. Customer Experience (CX) and CX Data

Interactions between customers and organisations at the digital, physical, and social realms generate CX data ranging from highly structured to highly unstructured (Villarroel Ordenes et al., 2014; Zaki, 2019). While highly structured CX data can be represented by countable numbers (e.g., sales data, geo-location coordinates, or scores on customer satisfaction surveys), highly unstructured data is typically contained in hard-to-count multimedia formats such as text, sound, images, and videos (Balducci & Marinova, 2018). Furthermore, the evaluation of touchpoint interactions can take place by employing solicited or unsolicited data (Villarroel Ordenes et al., 2014; Zaki, 2019). The solicitation of CX data implies an active attempt on behalf of an organisation or its partners to collect feedback and requires customers be sought for participation in the evaluation (e.g., answering a survey, writing an invited review, or participating in a feedback workshop). Unsolicited CX data, on the other hand, predominately result as a product of the customers' initiative. For example, customers can provide feedback through emails (i.e., in the digital realm), social media comments (i.e., in the digital and social realms), or by providing feedback directly to frontline employees in face-to-face interactions (i.e., in the physical realm). We employ these two dimensions (solicited to unsolicited; structured to unstructured) to help organisations consider

which type of CX data can be captured at each touchpoint along the customer journey. Table 1 provides an overview of the different CX data types and their characteristics.

-------- Insert Table 1 about here --------

Solicited–Structured. The most common form of CX data collected in practice is structured and numerical (e.g., solicited customer satisfaction (CSAT) or net promoter score (NPS) metrics). While such CX data is useful, it has a lower potential for use in CXM, as the CX is often too complex to be captured in just one or a few numbers (Lemon & Verhoef, 2016; McColl-Kennedy et al., 2019). Soliciting structured customer feedback is easy to develop, administer, and has a low fixed cost but a relatively high variable cost, especially when using market research agencies to collect data. In addition, most marketers are trained to analyse such CX data using univariate and multivariate statistical methods (e.g., descriptive analytics and regression analysis; Mittal & Frennea, 2010).

Solicited–Unstructured. Organisations solicit more and more unstructured data by including open-ended questions in their customer feedback surveys (e.g., the text box asking NPS respondents to explain their score) or by conducting in-depth interviews or focus groups. Such CX data tends to have a higher potential for use in CXM because it is more multifaceted (i.e., it can be analysed by focusing on its semantics, syntax, or pragmatics; Balducci & Marinova, 2018) than solicited scores. Nevertheless, such CX data also requires more customer participation and is more complex to analyse. Traditionally, employees or market researchers would work directly with text data or transcribe speech or video data into text and analyse the text (e.g., by employing qualitative research methods). Such an approach becomes cumbersome at scale (e.g., when dealing with millions of customer reviews). More contemporary text-mining approaches can be used to automate the process, but they usually come at a higher cost (e.g., Text iQ offered by Qualtrics).

Unsolicited–Structured. Organisations might collect structured CX data that customers provide at their own volition (e.g., customers providing ratings on an independent review platform). Organisations can capture this type of data using web scraping tools (e.g., the rvest package in R or import.io), but such an approach implies some high fixed costs (Bradley & James, 2019). This type of CX data can also come from other sources. For example, counting devices supply valuable information about the numbers of people entering or exiting a store (i.e., the physical realm), or about crowding (i.e., the social realm), aspects that are known to influence customers' reactions. Websites cookies, Google analytics, or the Internet of Things (IoT, which encompasses a multitude of Internet-connected devices, from simple sensors to interconnected wearables) are other sources of unsolicited and structured CX data that can be collected in an unobtrusive manner (Wedel & Kannan, 2016).

Unsolicited–Unstructured. The greatest potential for CXM most likely comes from the plethora of multifaceted (e.g., video) unsolicited and unstructured data (Balducci & Marinova, 2018). Customers can provide such CX data when writing emails, tweets, and online reviews (i.e., text); calling contact centres (i.e., speech); or uploading photos on Instagram (i.e., image) or vlogs on YouTube (e.g., video). Furthermore, non-customer-initiated sources can also provide such CX data. For example, many public spaces are under video surveillance, which generates vast amounts of video data (e.g., traffic, public transport, security, etc.). Nevertheless, while capturing such CX data requires low effort from the customers, it incurs relatively high fixed costs for organisations to capture, organise, and integrate and raises considerable privacy and legal challenges.

3.2. CX Analytics

As a result of the advancements in data storage capacity, computing power, and analytical methods, employing BDA to analyse CX data is becoming more achievable (Huang & Rust, 2018; Villarroel Ordenes & Zhang, 2019; Zaki, 2019). BDA can be classified

into four main types: descriptive, inquisitive (or diagnostic), predictive, and prescriptive (Sivarajah et al., 2017; Wedel & Kannan, 2016).

Descriptive BDA answer the question "What happened?" and comprise tools and methods that help describe the situation for further analysis. Typical examples include descriptive statistics conveyed through charts and graphs (e.g., histograms, scatter plots, etc.), numerical summaries (e.g., mean, median, mode, variance, and standard deviations), cross tabulations, or clustering techniques that can group CX data without labelled responses (e.g., k-means cluster analysis), and word-clouds to provide a visual summary of the most frequent and relevant words in a collection of documents. Descriptive BDA allow organisations to understand the CX status-quo.

Inquisitive BDA answer the question "Why did things happen?". These BDA comprise tools and methods that help validate or reject different business or research hypotheses, determine causation, and aid in identifying variables that can be adjusted to achieve a desired effect (e.g., positive change). Typical examples include statistical inference techniques (e.g., experimental designs, analysis of variance, and non-parametric tests) or factor analyses (e.g. principal component analysis). Inquisitive BDA provide organisations with CX diagnostics.

Predictive BDA answer the question "What could happen?" and comprise tools and methods that help predict future trends and possibilities. Typical examples include forecasting models (e.g., regression-based time-series models, moving averages, auto-regression models, etc.), classification models for the prediction of categorical outcomes, trees and random forests, support vector machines, graph-based methods, and neural networks. Predictive BDA provide organisations with an indication of what is likely to happen with the CX.

Prescriptive BDA answer the question "What should happen or what is the best action or outcome?". These BDA are tools and methods that help provide quantifiable answers to solve a problem (e.g., how to improve certain types of performance, or where it is best to allocate budgets for CX performance improvement). Typical examples include mathematical programming models for optimisation, queueing models, and efficient frontier methods, as well as discrete event simulations. Prescriptive BDA can help an organisation assess its options to enhance CX.

3.3. CX Insights

We classify CX insights as attitudinal/psychographic, behavioural, and market insights: The former two relate to knowledge about the underlying factors that impact individuals' perceptions of their CX, while the latter relates to knowledge about how organisations perform in terms of CX in relation to the marketplace. In particular, attitudinal insights refer to the dispositions customers have towards their current, previous, and future CX with organisations. While customers primarily form their attitudes towards their CX from their current and previous interactions or from the interactions of others, other typical influences include the customers' desire to be pleased, their degree of political correctness, their search convenience, peer pressure, and psychological stressors (Bottomley & Doyle, 1996). In turn, psychographic insights involve the mental states that customers exhibit as a temporary way of relating to their experiences (i.e., thinking or feeling) as well as the more stable and enduring characteristics of customers who these affect and are affected by their experiences. Behavioural insights relate to how customers act and make decisions as consequences of their experiences. Finally, market insights help organisations evaluate and monitor their CX performance in relation to the competition and help organisations assess the impact on their overall brand equity. Below, we discuss how organisation can employ CX data and BDA to derive each type of CX insight.

Attitudinal/psychographic insights. These types of CX insights are the most prevalent among practitioners, with knowledge about satisfaction, advocacy, or perceived effort being considered valuable by organisations (Dixon, Freeman, & Toman, 2010). Contact centres providing telephone services, email, and direct website interfaces generate a wealth of structured and unstructured CX data that can be used to generate CX insights. For example, by employing predictive BDA (e.g., speech emotion Lu, Cao, Zhang, Chiu, & Fan, 2019), organisations can analyse customers' vocal behaviour, focusing on both the verbal and nonverbal aspects of their speech and gain knowledge about their affect (e.g., emotions, moods, and stress). Previous research suggests that emotions of rage (rancorous and retaliatory) tend to increase verbal expressions (e.g., yelling, and insulting remarks), which can affect the CX of other customers (e.g., spreading negative word of mouth) as well as business outcomes (e.g., switching service providers; McColl-Kennedy, Patterson, Smith, & Brady, 2009). Thus, by monitoring online discussion, organisations can gain knowledge about emotionally charged touchpoints (Villarroel Ordenes, Ludwig, de Ruyter, Grewal, & Wetzels, 2017). Such monitoring processes are valuable for detecting strongly (dis)satisfied customers, since it is often the case that customers do not complain directly to the focal organisation (Van Vaerenbergh, Varga, Keyser, & Orsingher, 2019).

In addition to attitudes and emotions, recent research (Liu, Preotiuc-Pietro, Samani, Moghaddam, & Ungar, 2016) suggests that knowledge about personality traits (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience) can be gained by analysing the images users post, curate, or engage with on social media. CX insights could be generated from customers taking pictures during touchpoint interactions (e.g., pictures of a restaurant's food and/or interior) and sharing these pictures with followers online. Previous research suggests photos actually focus attention on the aspects of the experience that are worth capturing (Diehl, Zauberman, & Barasch, 2016). Therefore,

organisations can employ inquisitive BDA (e.g., factorial experimental designs) to find effective ways to promote capturing experiences with photos. In doing so, they can gain knowledge about contextual factors (e.g., unique or repetitive experiences and the presence of others, etc.) that influence how photo-taking impacts individuals' psychological states.

Behavioural insights. These types of CX insights help organisations understand the behavioural manifestations and consequences (e.g., actions and decisions) of CX. Obtaining behavioural CX insights require organisations to be able to capture consumers' decisions along the customer journey. One of the most prevalent examples of behavioural insights comes from Google Analytics, which provides organisations with a real-time overview of how consumers are interacting with their company-owned digital touchpoints through descriptive BDA (e.g., trends, changes, etc.). These insights allow organisations to use inquisitive BDA (e.g., A/B testing) to obtain knowledge about consumer preferences and actual behaviour (Google, 2019b). Additionally, behavioural insights based on ad-clicking behaviour constantly empower Google Ads to determine the price of keywords using predictive BDA (i.e., automated online auction systems; Google, 2019a). Other sources of behavioural CX insights based on predictive BDA are recommendation systems with the ability to provide consumer recommendations based on past behaviour (e.g., Netflix, Amazon). Insights from these systems help organisation to simplify their customers' decision-making and encourage additional consumption behaviours.

In an omni-channel world, understanding behaviours, not only across the digital but also the physical realms, is of paramount importance (Verhoef, Kannan, & Inman, 2015). While web platforms provide a wealth of CX data (e.g., clickstreams and scroll-tracking), CX data from wireless local area networks (WLANs) provided in physical locations (e.g., airports and shopping malls) can also provide valuable behavioural insights. Devices (e.g., smartphones) connected to these networks generate data that can be integrated into other data

and result in knowledge about customer buying preferences (e.g., acquisition locations and timestamps, type of device registered, and communication opt-in/opt-out flags), visits (e.g., customer movement through parking, retail, or entertainment spaces, and specific zone information), and engagement (e.g., customer reactions to promotional push messages). Hence, shopping centres can analyse customer shopping paths and customer behavioural responses to promotional messages and gain knowledge about what type of promotions are more successful than others.[1] Likewise, organisations can use video CX data to detect customer shopping paths and gain knowledge on how buying behaviour is impacted by shopping paths (Hui, Bradlow, & Fader, 2009; Hui, Huang, Suher, & Inman, 2013).

Market insights. This type of CX insights can help organisations evaluate and monitor their market, brand equity, and competitive position. With CX being a sustainable source of competitive differentiation (Homburg et al., 2017), market insights are extremely valuable as they relate to knowledge about how organisations perform in terms of CX in relation to the marketplace. Previous research suggests that organisations can use social tagging data and predictive BDA (e.g., graph mining techniques) to gain knowledge on customer-based brand equity (Nam & Kannan, 2014) or on brand positioning and market structure (Netzer, Feldman, Goldenberg, & Fresko, 2012). Recent research (Villarroel Ordenes et al., 2018) has shown that knowledge on consumer sharing on social media can be gained by monitoring and assessing the organisation's and its competitor's brand message intentions and visuals (i.e., assertive, expressive, or directive). Furthermore, predictive BDA (e.g., competitive intelligence and trend forecasting) can help organisations monitor changes in the market and gain knowledge on how to protect the organisation's market share (Wedel & Kannan, 2016). Organisations can also employ online keyword search data from Google Trends for marketing intelligence purposes and for identifying and tracking general tendencies in the

[1] See for instance: https://wcai.wharton.upenn.edu/research/research-opportunity-with-majid-al-futtaim/

marketplace. To this end, Du and Kamakura (2012) employed predictive BDA to propose a structural dynamic factor-analytic model that can be applied for simultaneously analysing tens or even hundreds of Google Trends time series.

3.4. CX Actions

Our framework is primarily developed for organisations that operate in data-rich environments and are relatively new to BDA and CXM. Thus, we deliberately focus on CX actions related to organisational capabilities (i.e., process-oriented manifestations to improve CX; Homburg et al., 2017) and propose that organisations can accomplish these capabilities by using BDA-enabled CX insights. Based on previous conceptualisations of CXM (Homburg et al., 2017), we suggest that organisations should use our framework to first build a dynamic system of CX actions related to touchpoint monitoring, prioritisation, adaptation, and journey design. The former three CX actions are more operational, shorter-term oriented, and usually deal with single touchpoints, while the latter CX action type is more strategic, longer-term oriented, and deals with all potential touchpoints in the end-to-end customer journey. Consequently, more radical innovations are likely to result from touchpoint journey design capabilities, whereas more incremental innovations are likely to result from monitoring, prioritisation, and adaptation capabilities (Homburg et al., 2017).

Touchpoint journey monitoring. Organisations can use CX insights to coordinate and depict a comprehensive collection of touchpoint-specific performance indicators. Organisations can establish a dedicated monitoring team with cross-touchpoint responsibilities. For example, organisations can use IoT to connect their products in the field and monitor touchpoints in the physical realm (e.g., field repair services). In the B2B context, Finning, a Caterpillar dealer, has shifted from a traditional repair service team to building a dedicated “Finsight” team to provide support for customers’ machines through predictive and prescriptive BDA. CX insights enable Finning to track a machine’s location (e.g., the team

managed to locate a stolen machine in less than 24 hours[2]), prevent premature failure, prolong service life, minimise downtime, increase operator efficiency, reduce the cost of repair, and recommend solutions (Finning, 2017).

Touchpoint journey prioritisation. Organisations can also employ CX insights to (re)allocate monetary, technical, and human resources to direct the development and modification of single touchpoints in the short-term, without going through the labour and expense of redesigning the whole journey each time. For example, by using CX attitudinal/psychographic insights, a wireless service provider can identify the touchpoints that are most relevant to customers (e.g., signing up for service, using devices, solving technical problems, resolving billing problems, changing a plan, and upgrading a device; Maechler, Kalaoui, & Stone, 2014). Then, the organisation can use CX behavioural insights (e.g., churn/switching behaviour) and predictive BDA (e.g., multivariate regression analysis) to quantify the key drivers of CX (and in turn, loyalty intention). Such CX insights can even reveal new, non-obvious, touchpoints to prioritise (e.g., the billing touchpoint in the digital realm might be a powerful improvement lever for the wireless provider).

Touchpoint journey adaptation. Organisations can rely on CX insights to proactively generate concrete suggestions to develop and/or modify touchpoints. For example, Spotify, the streaming provider, created a personalised experience for each customer (2019's campaign: #2019Wrapped; Spotify, 2019). Spotify capitalised on descriptive (e.g., frequencies and cluster analysis) and predictive (e.g., content filtering) BDA to generate CX behavioural insights (i.e., knowledge on listening habits) and design highly personalised touchpoints. Spotify sent each customer a personalised email with information about their listening habits in 2019 (e.g., the number of songs they listened to, top artists and genres,

[2] See https://cpnonline.co.uk/news/finnings-visionlink-software-and-finsight-team-recover-stolen-cat-26n-in-less-than-24-hours/

minutes spent listening, and how their habits compare to those of other customers). These actions allowed Spotify to create personalised touchpoints in each customer's journey by generating custom playlists (e.g., Top Songs of 2019 and Taste-breakers, or songs the users have not listened to but that Spotify thinks they would like based on their listening habits).

Touchpoint journey design. Organisations can use CX insights to design potential journey offerings as a means for business planning and modelling as well as to disseminate clear requirements across product development, sales, and communication functions. For example, as early as 2012, agricultural equipment manufacturer John Deere wanted to capitalise on BDA and equipped its machines with sensors and introduced software that allowed its customers to access and analyse their machine data, benchmarking it against other machines and combining it with historical data (e.g., weather) in real time and for free. In doing so, John Deere introduced new touchpoints that changed its customers' entire journey. The company then brought everything under the myJohnDeere.com platform, which it opened to suppliers, retailers, and software developers. In doing so, John Deere transitioned from a manufacturing business model to a platform-centric one and thus achieved radical innovation and revolutionised the agriculture industry (Hopp, Antons, Kaminski, & Salge, 2018).

4. IMPLICATIONS FOR MANAGERS

As discussed in previous sections, employing each type of data, analytics, and insights comes with challenges (e.g., costs and resources). Organisations should not try to capture all types of data, master all types of analytics, or extract all types of insights. Figure 2 offers a step-by-step guide on how an organisation that is relatively new to BDA for CXM can employ our framework. For organisations that are already employing BDA for CXM, our framework is useful in providing a comprehensive overview and signalling other types of data, analytics, insights, and actions that the organisation might be missing out on.

-------- Insert Figure 2 about here --------

Strategize. Organisations should start by determining what type of CX actions they would like to achieve. For the short-term, operationally focused organisations can determine how existing touchpoints are performing (touchpoint monitoring), how to allocate resources to particular touchpoints (touchpoint prioritisation), or how to proactively modify an existing touchpoint (touchpoint adaptation). For the long-term, strategically focused organisations can decide to manage all potential touchpoints and make significant changes in the end-to-end journey (touchpoint journey design; Homburg et al., 2017). Business consultants recommend taking the latter approach as CXM should strive to encompass the entire customer journey (Maechler et al., 2016). Nevertheless, the complexity and investments associated with BDA may not be feasible for all organisations. Hence, we recommend organisations to start monitoring the touchpoints and prioritising or adapting single touchpoints (i.e., taking small steps) to develop their level of experience with and confidence in employing CX analytics (Ransbotham et al., 2015). Executives with a solid understanding of the strategic value of CXM are needed to drive CX actions. Acquiring and developing the necessary hardware, software, and human resources, and launching pilot cases, will be key to getting people to understand and embrace the value of BDA-empowered CX insights.

Assess. Once the desired CX actions have been determined, the next step would be to assess the CX insights (attitudinal/psychographic, behavioural, and/or market) necessary to support those actions and the CX analytics (descriptive, inquisitive, predictive, and/or prescriptive BDA) necessary to generate those CX insights. At this point, organisations should consider to what extent they possess the in-house resources (hardware, software, and human) to perform the desired analytics and generate the desired insights or to what extent they would like to develop such resources or externalise to third parties. To illustrate, if managers are interested in monitoring existing touchpoints, then an external dashboard

solution predominantly employing descriptive CX analytics can provide attitudinal and behavioural CX insights (e.g., Salesforce's journey builder[3]) or market CX insights (e.g., Meltwater's PR Product Suite[4]). Dashboards are modular, so additional CX analytics can be implemented (e.g., inquisitive, predictive, and/or prescriptive) at a cost. An even more complex issue relates to the extent to which managers are comfortable taking CX actions based on CX insights, especially when new and more sophisticated CX analytics are employed (Ransbotham et al., 2015).

Examine. The third step focuses on the CX data that could generate the required insights. The organisation should consider what kind of data (solicited-unsolicited, structured-unstructured) is available at touchpoints in the digital, physical, and social realms. A key question at this step concerns who owns the data generated at each touchpoint: the organisation and its partners, or third parties (e.g., platforms, governments, etc.). Yet another consideration revolves around how the data stemming from touchpoints under the organisation's control are stored, organised, and integrated. Many business functions within organisations still work in silos and often use their own relational (i.e., Structured Query Language - SQL) database management systems to store and process data. Especially when it comes to unsolicited and unstructured data, a large and diverse number of touchpoints will generate data that can become not only too voluminous but also too fast and too complex to be stored in traditional systems. In that case, organisations need a large data storage system that is compatible with the various structured and unstructured CX data types, and that can capture unsolicited CX data. The system must be able to meet many technical requirements (e.g., distributed, scalable, schema-free, and fault-tolerant) for it to be able to process a significant amount of batch data and produce results in a timely manner. These requirements

[3] See https://www.salesforce.com/products/marketing-cloud/journey-management/
[4] See https://www.meltwater.com/products/

might trigger the development of a non-relational database (i.e., NoSQL). Again, SQL and NoSQL storage can be built in-house or leased from third parties with different CX analytics (e.g., Amazon Web Services, Microsoft Azure, Google Cloud, and IBM Watson) at a cost.

After the organisation's capabilities to develop CX insights based on CX analytics have been assessed and the CX data has been examined, the organisation needs to decide on how to proceed. At this point, managers need to consider at least two sets of decisions. On the CX analytics side, is it possible to gain the desired CX insights based on existing in-house analytics resources, or is it necessary to acquire new hardware, software, and/or human resources? If so, should these new resources be developed in-house, be leased, or be outsourced? On the CX data side, is it possible to gain the desired CX insights based on a better or different use of existing CX data or is it necessary to capture new or additional CX data? If so, can or should the organisation do it or does it need to be outsourced? In either case, cost-benefit analyses should be considered. In the short-term, it may be a good idea to experiment with third-party solutions to gain more confidence with new CX analytics and data and later decide if an in-house solution should be developed based on the results of the CX actions. To illustrate, an organisation that collects solicited (e.g., NPS open question) unstructured textual data might consider investing in CX analytics in the form of predictive text mining. One option could be purchasing a software license (e.g., SAS and SPSS text analytics solutions) or building its own solutions using open source libraries (e.g., R, Python, and Knime).

Implement. Once these decisions have been taken, the organisation needs to move to the implementation stage. Whether implementing existing CX data and analytics to gain new CX insights or developing new solutions in the event that existing ones are insufficient, the involvement of various internal and external actors, e.g., engineers, designers, data architects, data scientists, and marketers, is needed (Mela & Moorman, 2018). The age of applications

and digitalisation has made it is a necessity to create seamless, dynamic, and integrated hardware/software experiences. Organisations have to consider using modern user experience (UX) approaches such as (Agile UX) that can define a minimal viable product (MVP) to quickly launch, test, and evaluate the success and failures of the CX solution. Depending on the size of the organisation, deploying a large-scale solution require a large IT team to provide and organise resources. For example, deploying a CX solution that can handle 1,000 concurrent customers is very different than deploying one handling 100 million customers, and with the growth of users and data at an exponential scale, applications these days must be able to meet the load. While software development and information technology operations (i.e., DevOps) tools have simplified this process significantly, it is not just computing and storage powers that are needed to handle such volumes; the solution's design and algorithms must also "scale" to meet the requirements. This is where organisations have to consider the role of external actors and third parties and how much investment will be allocated to this deployment. Finally, to enable reliable insights that allow decision makers to take actions without interruption, this CX solution has to be reliable and live 24 hours. Thus, the organisation has to dedicate a team to monitor and troubleshoot any issues with the CX solution.

Learn. The final step revolves around making sure feedback loops are in place, learning from the implementation, and soft and hard challenges that could be resolved. One of the biggest challenges to learning stems from the actual use of the CX insights. These insights need to be shared throughout the organisation (e.g., by using dashboards or by including these insights into internal communication). This action requires that employees throughout the organisation are trained in understanding how these insights were generated and how they can act upon these insights. In order to improve CX and facilitate change throughout the organisation, the organisation might consider creating a cross-functional team

(Jacobs & Moore, 2017) that reviews the BDA-generated CX insights, develops action plans for implementing these insights, and reaches out to managers of the different departments, locations, or business units in order to help execute these action plans. Finally, one of the key benefits of CX implementation is measuring the impact of these insights on the business. This could be translated into increases in customer satisfaction, revenue streams, new service offerings, process optimisation, productivity, and efficiency.

5. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Our goal with this paper was to signal the vast amount of data generated at different touchpoints along the customer journey and to provide some guidance on how organisations can go from CX data to CX actions for CXM. Consequently, we provided a comprehensive and integrative framework in which CX insights are developed through CX analytics of CX data. Throughout our paper, we emphasised that more data, more analytics, and more insights do not necessarily lead to better CXM. We integrated literature on BDA and CXM and highlighted how an organisation can apply different types of CX analytics to different types of CX data, with the aim of gaining different types of CX insights that can be used to take different types of CX actions. Research at the intersection of CXM and BDA is in its early development phase (e.g., McColl-Kennedy et al., 2019) and we hope that our integrative framework can help both practitioners and researchers reflect on the growing complexities of using BDA for CXM. To conclude, we have outlined some avenues for future research in the area of CXM.

Customer experience. CX data and insights are crucial and BDA can surely assist in capturing and handling more data. But a fundamental question remains: To what extent do the data in fact reflect what the CX is? If the intention is to improve the CX, then this question is vital. The foundational starting point for CXM is how the customer and the customer experience are defined. We therefore call for the re-conceptualisation of CX itself

and suggest, as an alternative to customer-company interactions, starting from the customers' lifeworld, goals, or jobs to be done, or considering the immediate or broader network or ecosystems of customers. While such holistic, dynamic, and context-specific expanded understandings of customers and their experiences would be more challenging to accomplish, they would contribute an extended view on the nature of CX and thereby enable new CX insights and new CXM potential. Furthermore, even if CX is relevant not only for business organisations but also for non-commercial organisations and authorities, it has been researched much less in these settings. We therefore call for CXM research attention to these areas and their beneficiaries and clients, which are outside of buying and consuming in the traditional sense. To illustrate, at the time of writing, the European Commission is actively developing policies for shaping the Digital Single Market (DSM) in which access to and sharing of personal and non-personal data are key topics (European Commission, 2019).

Customer experience insights. CX insights or knowledge about the customers that is valuable for CX actions are fundamental to this research. Usefulness and actionability distinguish knowledge that can be considered insights from what is "merely" data and knowledge. While our research proposed three different types of insights in a CX context and briefly discussed their links to CX actions, we urge other researchers to develop CX insights further. The notion of CX insights is genuinely relevant for CXM research and practice and needs to be explored. Some further questions include: What is the nature of such insights? How do single or combinations of CX data types form insights? In what ways can BDA generate insights and how can methods and tools be improved? What are the most efficient ways to generate different types of CX insight? How can the insights be visualised to maximise their actionability? And how useful are different types of insights for different kinds of CX actions and how can their usefulness be optimised?

Customer experience management. Our final set of research topics in need of more scrutiny relates to the actual management of CX. Acknowledging that organisations are in different maturity stages when it comes to BDA-driven CXM is important since a novice, non-digital native, experimenting organisation's opportunities and challenges differ significantly from those of an experienced organisation with a strong CXM orientation. For example, developing CX metrics, CX data quality measures, CX analytics toolboxes, and CX insight requirements adjusted to different maturity phases would imply theoretical contribution and be of practical usefulness. In all stages, being able to "speak data" and having a BDA-driven organisational culture will substantially affect the extent CXM becomes a strategic capability.

REFERENCES

Amirah, S. (2018). What it Takes to Win in the Age of the Customer. Retrieved December 12, 2019, https://tinyurl.com/w7lfxsf.

Balducci, B., & Marinova, D. (2018). Unstructured Data in Marketing. *Journal of the Academy of Marketing Science*, *46*(4), 557–590.

Bitner, M. J., Booms, B. H., & Tetreault, M. S. (1990). The Service Encounter: Diagnosing Favorable and Unfavorable Incidents. *Journal of Marketing*, *54*(1), 71–84.

Bolton, R. N. (2018). Customer Experience Challenges: Bringing Together Digital, Physical and Social Realms. *Journal of Service Management*, *29*(5), 776–808.

Bottomley, P. A., & Doyle, J. R. (1996). The Formation of Attitudes Towards Brand Extensions: Testing and Generalising Aaker and Keller's Model. *International Journal of Research in Marketing*, *13*(4), 365–377.

Bradley, A., & James, R. J. E. (2019). Web Scraping Using R. Advances in Methods and Practices in Psychological Science, 2(3), 264–270. *Advances in Methods and Practices in Psychological Science*, *2*(3), 264–270.

Choi, S. H., Yang, Y. X., Yang, B., & Cheung, H. H. (2015). Item-Level RFID for Enhancement of Customer Shopping Experience in Apparel Retail. *Computers in Industry*, *74*(August), 10–23.

Davenport, T., & Harris, J. (2017). *Competing on Analytics: Updated, with a New Introduction: The New Science of Winning*. Boston: Harvard Business Press.

Diehl, K., Zauberman, G., & Barasch, A. (2016). How Taking Photos Increases Enjoyment of Experiences. *Journal of Personality and Social Psychology*, *111*(2), 119–140.

Dixon, M., Freeman, K., & Toman, N. (2010). Stop Trying to Delight your Customers. *Harvard Business Review*, *88*(7/8), 116–122.

Du, R. Y., & Kamakura, W. A. (2012). Quantitative Trendspotting. *Journal of Marketing*

Research, *49*(4), 514–536.

European Comission (2019). A Digital Single Market for the benefit of all Europeans. Retrieved January 13, 2020, https://tinyurl.com/ycdxa86g.

Finning (n.d.). *What is Finsight?* Retrieved January 09, 2020, https://tinyurl.com/w7k5z3p.

Google. (2019a). About Automated Bidding. Retrieved December 15, 2019, Google Ads Help https://tinyurl.com/vtaft22.

Google. (2019b). Create an A/B test. Retrieved December 15, 2019, Optimize Resource Hub https://tinyurl.com/sf2tuex.

Homburg, C., Jozić, D., & Kuehnl, C. (2017). Customer Experience Management: Toward Implementing an Evolving Marketing Concept. *Journal of the Academy of Marketing Science*, *45*(3), 377–401.

Hopp, C., Antons, D., Kaminski, J., & Salge, T. O. (2018). What 40 years of research reveals about the difference between disruptive and radical innovation. *Harvard Business Review*, 6.

Huang, M.-H., & Rust, R. T. (2018). Artificial Intelligence in Service. *Journal of Service Research*, *21*(2), 155–172.

Hui, S. K., Bradlow, E. T., & Fader, P. S. (2009). Testing Behavioral Hypotheses Using an Integrated Model of Grocery Store Shopping Path and Purchase Behavior. *Journal of Consumer Research*, *36*(3), 478–493. https://doi.org/10.1086/599046

Hui, S. K., Huang, Y., Suher, J., & Inman, J. J. (2013). Deconstructing the "First Moment of Truth": Understanding Unplanned Consideration and Purchase Conversion Using In-Store Video Tracking. *Journal of Marketing Research*, *50*(4), 445–462.

Jacobs, J, & Moore, C (2017). Get Started on Creating Great Customer Experiences with Journey Strategies. Retrieved Janyuary 10, 2020, https://tinyurl.com/qk3gfff.

Kandampully, J., Zhang, T., & Jaakkola, E. (2018). Customer Experience Management in

Hospitality: A Literature Synthesis, New Understanding and Research Agenda. *International Journal of Contemporary Hospitality Management*, *30*(1), 21–56.

Kranzbühler, A., Kleijnen, M. H. P., Morgan, R. E., & Teerling, M. (2018). The Multilevel Nature of Customer Experience Research: An Integrative Review and Research Agenda. *International Journal of Management Reviews*, *20*(2), 433–456.

Kuehnl, C., Jozic, D., & Homburg, C. (2019). Effective Customer Journey Design: Consumers' Conception, Measurement, and Consequences. *Journal of the Academy of Marketing Science*, *47*(3), 551–568.

Lanier, J. (2013). Who Owns the Future?. New York: Simon and Schuster.

Lemon, K. N., & Verhoef, P. C. (2016). Understanding Customer Experience Throughout the Customer Journey. *Journal of Marketing*, *80*(6), 69–96.

Liu, L., Preotiuc-Pietro, D., Samani, Z. R., Moghaddam, M. E., & Ungar, L. (2016). Analyzing Personality through Social Media Profile Picture Choice. *Tenth International AAAI Conference on Web and Social Media*, 211–220.

Lu, Z., Cao, L., Zhang, Y., Chiu, C.-C., & Fan, J. (2019). Speech Sentiment Analysis via Pre-trained Features from End-to-end ASR Models. *ArXiv Preprint ArXiv:1911.09762*.

Maechler, N., Kalaoui, H., & Stone, D. (2014). Identifying the Journeys that Matter… to the Customer. Retrieved December 11, 2020, McKinsey & Company https://tinyurl.com/yaeobak2.

Maechler, N., Neher, K., & Park, R. (2016). From Touchpoints to Journeys: Seeing the World as Customers Do. Retrieved February 21, 2019, https://tinyurl.com/rzwsph3.

Malshe, A., & Friend, S. B. (2018). Initiating Value Co-Creation: Dealing with Non-Receptive Customers. *Journal of the Academy of Marketing Science*, *46*(5), 895–920.

McColl-Kennedy, J. R., Patterson, P. G., Smith, A. K., & Brady, M. K. (2009). Customer Rage Episodes: Emotions, Expressions and Behaviors. *Journal of Retailing*, *85*(2), 222–

237.

McColl-Kennedy, J. R., Zaki, M., Lemon, K. N., Urmetzer, F., & Neely, A. (2019). Gaining Customer Experience Insights that Matter. *Journal of Service Research*, *22*(1), 8–26.

Mela, C. F., & Moorman, C. (2018). Why Marketing Analytics Hasn't Lived Up To Its Promise. *Harvard Business Review*, 1–7.

Meyer, C., & Schwager, A. (2007). Understanding Customer Experience. *Harvard Business Review*, *85*(2), 116–128.

Mittal, V., & Frennea, C. (2010). Customer Satisfaction: A Strategic Review and Guidelines for Managers. Retrieved December 15, 2019, Marketing Science Institute Fast Forward Series https://tinyurl.com/y42zsscd.

Moorman, C. (2019). Top Ten Results from The CMO Survey – August 2019. Retrieved December 21, 2019, https://tinyurl.com/yx75qt3f.

Mudambi, S., & Schuff, D. (2010). What Makes a Helpful Online Review? A Study of Customer Reviews on Amazon.com. *MIS Quarterly*, *34*(1), 185–200.

Nam, H., & Kannan, P. K. (2014). The Informational Value of Social Tagging Networks. *Journal of Marketing*, *78*(4), 21–40.

Netzer, O., Feldman, R., Goldenberg, J., & Fresko, M. (2012). Mine Your Own Business: Market-Structure Surveillance Through Text Mining. *Marketing Science*, *31*(3), 521–543.

O'Brien, J. A., & Marakas, G. M. (2005). *Introduction to Information Systems*. New York City: McGraw-Hill/Irwin.

Proserpio, D., & Zervas, G. (2017). Online Reputation Management: Estimating the Impact of Management Responses on Consumer Reviews. *Marketing Science*, *36*(5), 645–665.

Ransbotham, S., Kiron, D., & Prentice, P. K. (2015). Minding the Analytics Gap. *MIT Sloan Management Review*, *56*(3), 63–68.

Rose, R. (2016). Defining Analytics: A Conceptual Framework. Retrieved December 21, 2019, OR/MS Today https://tinyurl.com/ue7cuts.

Said, E., Macdonald, E. K., Wilson, H. N., & Marcos, J. (2015). How Organisations Generate and Use Customer Insight. *Journal of Marketing Management*, *31*(9–10), 1158–1179.

Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical Analysis of Big Data Challenges and Analytical Methods. *Journal of Business Research*, *70*(1), 263–286.

Spotify. (2019). Spotify Wrapped 2019 Reveals Your Streaming Trends, from 2010 to Now. Retrieved January 2, 2020, https://tinyurl.com/sxvtaln.

Van Vaerenbergh, Y., Varga, D., Keyser, A. De, & Orsingher, C. (2019). The Service Recovery Journey: Conceptualization, Integration, and Directions for Future Research. *Journal of Service Research*, *22*(2), 103–119.

Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2015). From Multi-Channel Retailing to Omni-Channel Retailing. *Journal of Retailing*, *91*(2), 174–181.

Villarroel Ordenes, F., Grewal, D., Ludwig, S., de Ruyter, S., Mahr, D., & Wetzels, M. (2018). Cutting through Content Clutter: How Speech and Image Acts Drive Consumer Sharing of Social Media Brand Messages. *Journal of Consumer Research*, *45*(5), 988–1012.

Villarroel Ordenes, F., Ludwig, S., de Ruyter, K., Grewal, D., & Wetzels, M. (2017). Unveiling What is Written in The Stars: Analyzing Explicit, Implicit and Discourse Patterns of Sentiment in Social Media. *Journal of Consumer Research*, *43*(6), 875–894.

Villarroel Ordenes, F., Theodoulidis, B., Burton, J., Gruber, T., & Zaki, M. (2014). Analyzing Customer Experience Feedback Using Text Mining: A Linguistics-Based Approach. *Journal of Service Research*, *17*(3), 278–295.

Villarroel Ordenes, F., & Zhang, S. (2019). From Words to Pixels: Text and Image Mining

Methods for Service Research. *Journal of Service Management*, *30*(5), 593–62.

Voorhees, C. M., Fombelle, P. W., Gregoire, Y., Bone, S., Gustafsson, A., Sousa, R., & Walkowiak, T. (2017). Service Encounters, Experiences and the Customer Journey: Defining the Field and a Call to Expand our Lens. *Journal of Business Research*, *79*(10), 269–280.

Wedel, M., & Kannan, P. K. (2016). Marketing Analytics for Data-Rich Environments. *Journal of Marketing*, *80*(6), 97–121.

Zaki, M. (2019). Digital Transformation: Harnessing Digital Technologies for the Next Generation of Services. *Journal of Services Marketing*, *33*(4), 429–435.

TABLE 1: CX DATA TYPES AND THEIR CHARACTERISTICS

	Solicited – Structured	Solicited – Unstructured	Unsolicited – Structured	Unsolicited – Unstructured
Typical examples	Customer satisfaction or NPS ratings on surveys	Customer responses to open-ended survey questions	Customer ratings on independent online review platforms, observed behaviour	Online reviews, social media posts, voice recordings, branded vlogs
Degree of application in practice	High	Medium to high	Medium to high	Low
Format of CX data	Numerical	Mainly text	Numerical	Text, audio, image, video
Number of facets to the data	Low (a number is a number)	High (e.g., semantics, syntax, speech acts)	Low (a number is a number)	Very high (e.g., pitch, speech rate, pauses, static versus dynamic, recording quality)
Complexity of capture	Low	Medium	Low to medium	Medium to high
Effort required from customers	Medium	High	None to medium	None to medium
Fixed costs for organization	Low	Low	High	High
Variable costs for organization	High	Low	High	Low
Privacy and legal concerns	Low	Low to medium	Low to medium	Medium to high
Representative studies	Choi, Yang, Yang, & Cheung (2015); Mudambi & Schuff (2010)	Villarroel Ordenes et al. (2014); McColl-Kennedy et al. (2019)	Choi, Yang, Yang, & Cheung (2015); Mudambi & Schuff (2010)	Proserpio & Zervas (2017); Villarroel Ordenes & Zhang (2019)

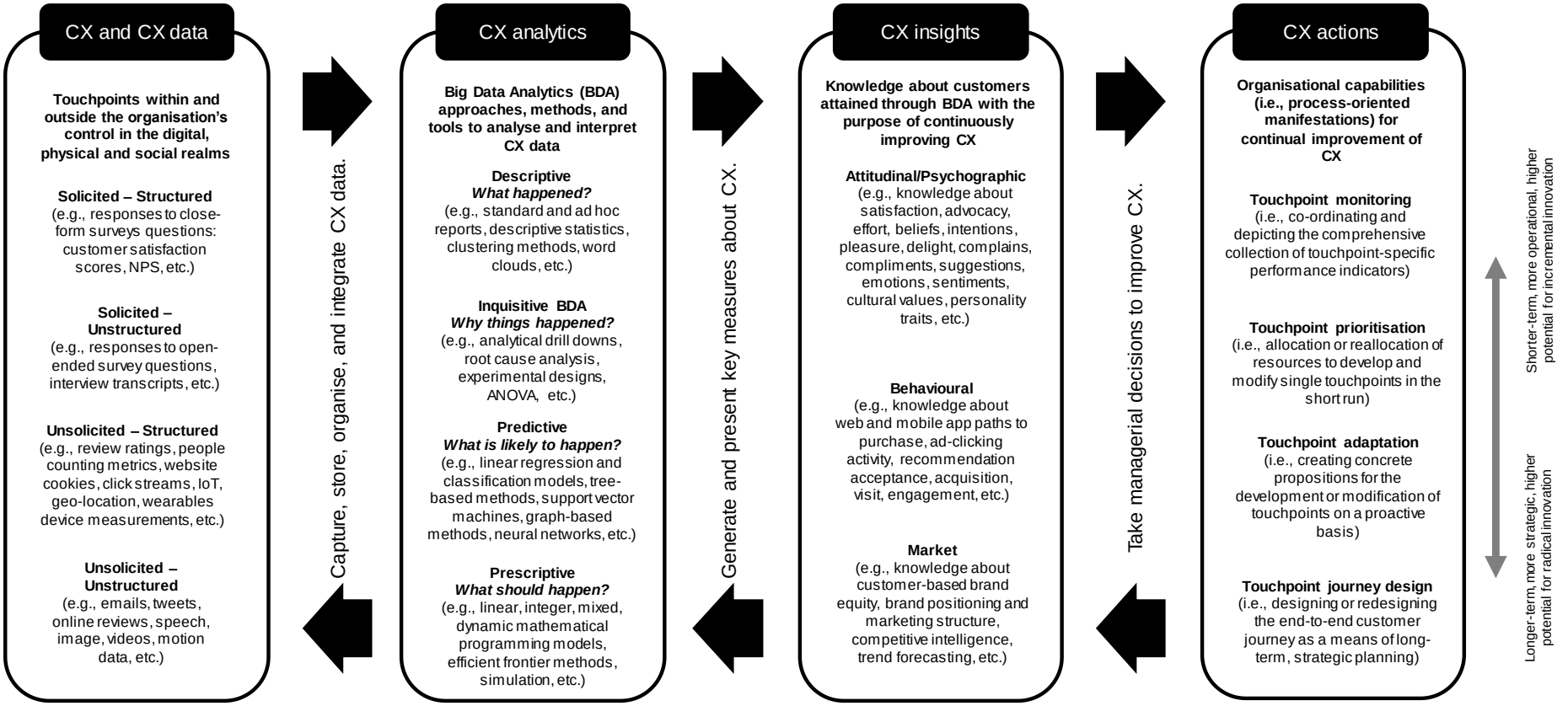

FIGURE 1. A STRATEGIC FRAMEWORK FOR CXM BASED ON CX INSIGHTS RESULTING FROM BDA

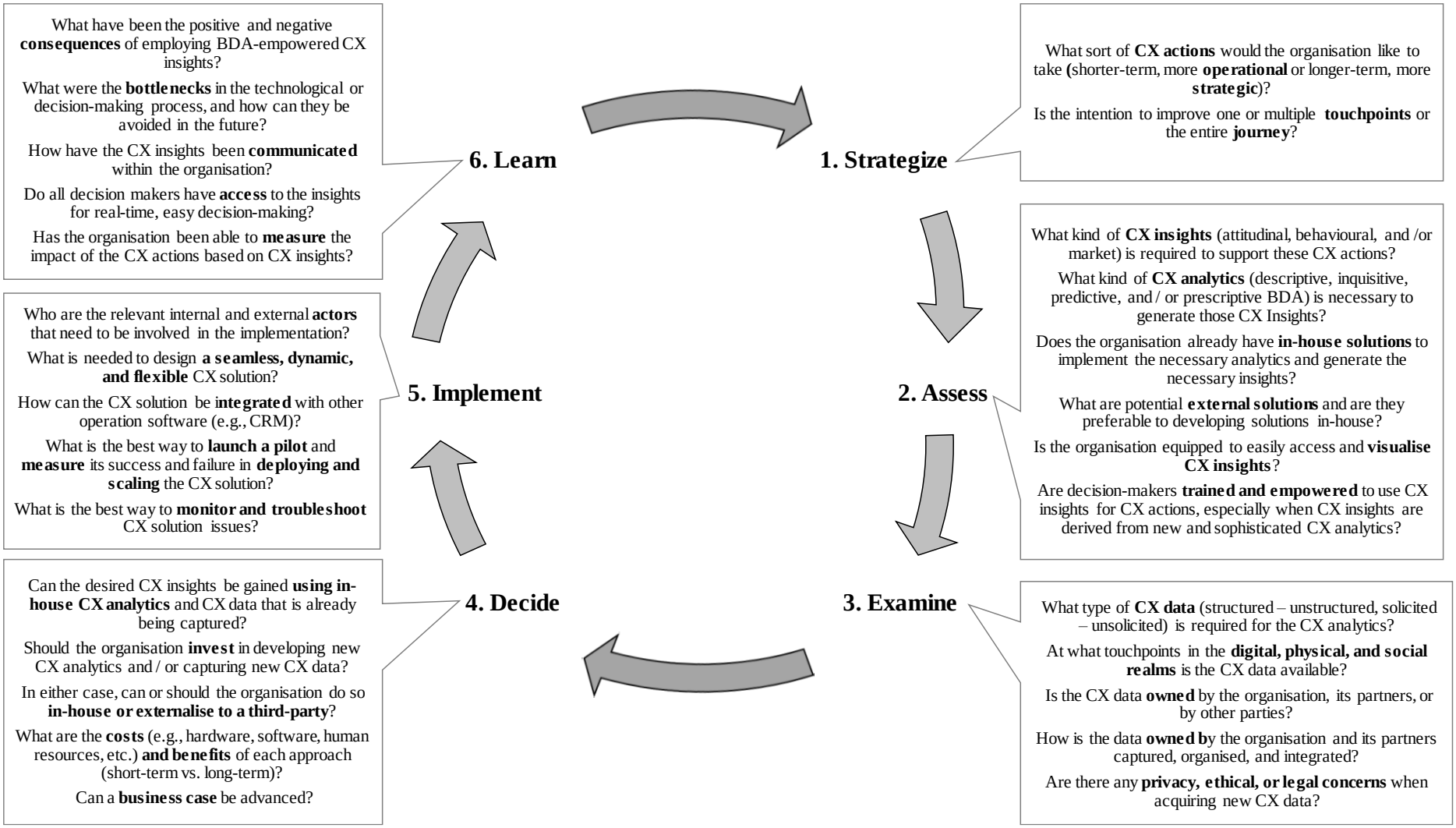

FIGURE 2. STEP-BY-STEP GUIDE FOR MANAGERS ON HOW TO USE BDA FOR CXM