

## Technologies and Tools in Support of the Customer Experience Management Process: A Literature Review

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**Abstract**—There is a trend in organizations to go beyond Customer Relationship Management (CRM) and consider Customer Experience Management (CEM). While CRM software tools are widespread, CEM software tools are more recent and not as refined. Most existing CEM software tools focus on collecting and analyzing feedback from customers. However, the CEM process encompasses several other activities, such as designing the desired customer experience. This paper reviews the literature to synthesize what technologies and tools can assist managers in each activity of the CEM process.

**Keywords**-customer experience management; tools; technologies; literature review.

### I. INTRODUCTION

Gaining and sustaining a competitive advantage is a daunting challenge in today's fast-changing environment. According to some, customer experience is what organizations will now have to compete in to stand out from their competitors [1]. This would be the case in any industry, whether it be banking [2][3][4], hospitality and tourism [5][6][7], communications [8][9], retail [10][11], and online commerce [12][13]. For instance, supply chain management, which used to focus on product development and order processing, is now also looking at Customer Experience Management (CEM or CXM) as a source of competitive advantage [14].

Customer experience can be defined as the “customer sensorial, physiological, psychological responses such as cognitive as well as affective responses evoked by the customer direct (offline) and indirect (online) interactions with the firm or firm offerings across all the touch points throughout the customer purchase journey” [15]. The emotional and sensorial components of the customer experience, as well as the fact that it encompasses all interactions that a customer has with a brand [16], make it challenging to manage.

Naturally, the customer experience is closely related to Information Technology (IT). To begin with, customers often learn about a brand through online advertising and social media [17]. They interact with organizations through various channels, including on their mobile phones, and interact closely with technology even in brick-and-mortar stores (e.g., self-check-out [18]). The simple fact of including IT can

improve customer experience even in unexpected settings, such as in temples [19].

Of course, IT is also useful and needed in managing the customer experience. To that effect, CEM software tools have begun appearing on the market, but they mainly focus on collecting and analyzing feedback from customers. While this is helpful, many other activities are required to manage customer experience, such as designing the desired customer experience.

In contrast, Customer Relationship Management (CRM) software tools are a lot more established and cover all activities encompassing the management of customer relationships. For instance, Buttle and Maklan [20] propose four steps to manage customer relationships, i.e., 1) Identify who your customers are and build a deep understanding of them; 2) Differentiate your customers to identify which customers have most value now and which offer most for the future; 3) Interact with customers to ensure that you understand customer expectations and their relationships with other suppliers or brands; and 4) Customize the offer and communications to ensure that the expectations of customers are met. CRM software tools available on the market commonly cover those four steps.

Therefore, organizations run the risk of focusing only on the activities currently supported by CEM software tools, to the detriment of their customers' experience. Thus, to offset the limits of current available CEM software tools, the objective of this paper is to review the literature to identify technologies and tools which can help managers in each activity of the CEM process.

The rest of this paper is organized as follows. Section II discusses customer experience and the steps required to manage it. Section III describes the methodology used to conduct our literature review. Section IV presents the results. Lastly, Section V concludes the paper and gives implications for future research.

### II. CUSTOMER EXPERIENCE MANAGEMENT

CEM first appeared in the literature in the late 1990s, when Pine and Gilmore [21] stated in Harvard Business Review that providing experiences was the next discipline that would enable organizations to remain competitive. They explain that although some confuse the delivery of an experience with that of a service, they are two distinct approaches. According to

these authors, while products and services are external to the customer, “experiences are inherently personal, existing only in the mind of an individual who has been engaged on an emotional, physical, intellectual, or even spiritual level” [21].

Indeed, customer experience is described as the “aggregate of feelings, perceptions and attitudes” formed by the customer throughout their journey, at each touchpoint [22]. Since customer experience is such a complex, multi-faceted concept, its management is naturally just as intricate. CEM is defined as “the cultural mindsets toward CEs, strategic directions for designing CEs, and firm capabilities for continually renewing CEs, with the goals of achieving and sustaining long-term customer loyalty” [23]. While there is no agreed-upon CEM process in the literature, several similar processes are suggested, some of which are adapted to a particular industry.

Du Plessi and de Vries [24] conducted a literature review and used inductive thematic analysis to describe the CEM process in four steps and twelve sub-steps. The first step is Customer experience understanding, which includes segmenting customers and defining their needs. The second step is Customer experience design, which consists of mapping the desired customer journeys. The third step is Customer experience measurement. The last step, Customer experience change implementation, consists of identifying the gaps between the current and the desired experience, and taking action to close those gaps.

More recently, Rahiman, ShamiZanjani, Manian and Esfidani [25] proposed four high-level CEM stages, each containing steps. They were identified through a systematic review of the literature on the hotel, tourism, and hospitality industry. The four stages are Customer identification, Customer experience design, Customer experience implementation, and Customer experience monitoring. They are very similar to the steps identified by [24] and cover approximately the same activities.

For the remainder of this paper, we have taken together the stages and steps proposed by [24] and [25] to use as a CEM process. They are presented in Table I. While the steps follow a logical sequence, the process is iterative, since the customers, as well as their experiences, are constantly changing.

### III. METHODOLOGY

We conducted a literature review with the objective of identifying technologies and tools that can assist management in each step of the CEM process. The first step was to search the relevant literature. The flow diagram is presented in Fig. 1. We searched the online database ABI/INFORM and limited our scope to peer-reviewed articles. A preliminary search informed us that relevant articles used at least the expression ‘customer experience’ and most contained the word ‘technology’ or ‘technologies’. We also decided to use the keywords ‘software’ and ‘tool’ to be as comprehensive as possible. We consequently used three search strings, presented in Fig. 1. The expression “technology\*” was used to account for both singular and plural forms of the word. To focus on articles more closely related to our research topic, we search everywhere except full text. We thereby identified

TABLE I. CEM PROCESS

Step	Activities <sup>a</sup>
Customer identification	<ul style="list-style-type: none"> <li>- Segmenting customers</li> <li>- Assessing customers’ characteristics and understanding their needs, expectations, and values</li> <li>- Identifying past experiences and experiences with other competitors</li> </ul>
Customer experience design	<ul style="list-style-type: none"> <li>- Developing a strategy</li> <li>- Designing/mapping customer journeys and touchpoints</li> <li>- Designing services</li> <li>- Prioritizing touchpoints</li> </ul>
Customer experience implementation	<ul style="list-style-type: none"> <li>- Identifying gaps in experience design versus current organizational capability</li> <li>- Prioritizing improvement initiatives</li> <li>- Developing touchpoints</li> <li>- Interacting with customers</li> <li>- Responding to customers’ needs, expectations, and values</li> <li>- Engaging with customers and their communities</li> <li>- Personalizing services</li> </ul>
Customer experience monitoring	<ul style="list-style-type: none"> <li>- Monitoring experiences</li> <li>- Defining internal and external measurements</li> <li>- Implementing escalation mechanisms</li> <li>- Adapting touchpoints</li> </ul>

a. Synthesized from Du Plessi and de Vries [24] and Rahiman, ShamiZanjani, Manian and Esfidani [25]

572 articles, which came down to 438 once the duplicates were removed.

The second step consisted of screening the identified studies. We read the identified articles’ title and abstract. Fourteen articles were excluded because they were not in English.

Then, in the third step, we read the articles relevant to our research topic in their entirety. We found 51 articles that proposed technologies and/or tools that can be helpful in the CEM process. It should be noted that the use of the Internet

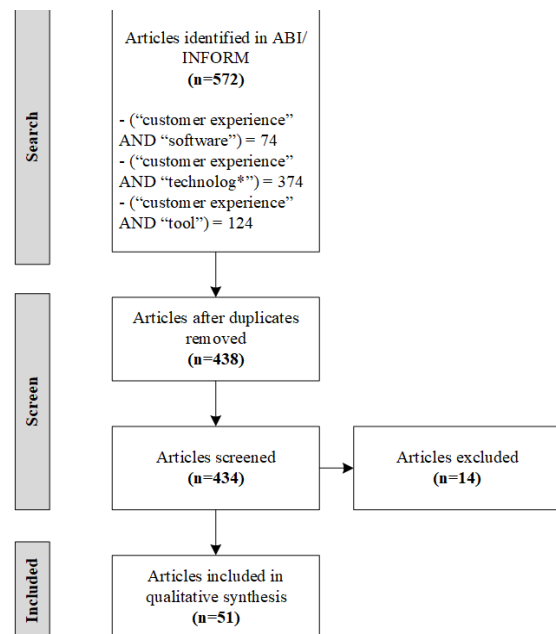


Figure 1. PRISMA flow diagram of the review process.

was not retained, as it is broad and omnipresent in all organizations nowadays. Websites and technologies that are specific to a certain industry, such as exhibition service systems [26], were also excluded. The included articles' publication dates range from 1998 to 2023, with five articles published before 2005 and 33 since 2018.

Once we had extracted all technologies and tools, we performed a qualitative synthesis to collect them all in a unified list. As a final step, we identified which technologies and tools can be used in each step of the CEM process. The results are presented in the next section.

#### IV. RESULTS

After reviewing the literature as described in Section III, we were able to identify 35 technologies and tools that can assist in managing the customer experience. They are presented in alphabetical order in Table II. A few similar technologies were gathered, such as artificial intelligence and machine learning.

Table III presents in alphabetical order the technologies and tools that can assist management in each step of the CEM process. The steps are those identified in Table I in Section II. The activities composing each step are not repeated to lighten the presentation. Some technologies and tools can be useful in more than one step and thus appear more than once in the table.

It is no surprise that the first step of the CEM process, Customer identification, can be supported by technologies such as analytics, data mining, and database management. These technologies are helpful in segmenting customers, assessing their characteristics, and understanding their needs.

The second step of CEM, Customer experience design, consists primarily of designing the customer journeys and experiences as a whole. Customer experience/journey mapping and modeling tools are thus essential. Co-creation is a prominent concept in customer experience literature. To that end, technologies/applications enabling co-creation allow organizations to engage customers in the design of their customer experience. Although this step is central to CEM, very few technologies and tools were found. However, designing the customer experience is a crucial step of CEM. Indeed, the implementation can only be as good as the design. Therefore, there seems to be an opportunity to explore what technologies and tools could potentially support customer experience design.

The third step, Customer experience implementation, is the one for which the most useful technologies were found. This is mainly because there exist a plethora of different technologies and tools that allow organizations to interact and engage with their customers, such as Artificial Intelligence (AI), Augmented reality (AR), Virtual Reality (VR), call centers, chatbots, digital kiosks, monitors, messaging applications, social media, smart devices, etc. Digital twins, which are “a dynamic virtual representation of a physical object or system across its lifecycle” [27] also allow organizations to interact with customers, as well as to collect data that is useful in the next step of the CEM process, i.e., Customer experience monitoring. Balanced scorecards, on the other hand, are useful for prioritizing improvement initiatives.

TABLE I. TECHNOLOGIES AND TOOLS IN SUPPORT OF THE CEM PROCESS

Technologies/tools	References
Analytics (text analytics, descriptive analytics, predictive analytics, prescriptive analytics)	[28][29][30]
Artificial Intelligence (AI)/Machine learning	[28][31][32][33][34][35][36]
Augmented Reality (AR)	[11][12][36][37][38][39][40]
Balanced Scorecard (BSC)	[41]
Big data, data mining	[29][42]
Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR))	[43]
Chatbots	[28][30][33][44][45][46][47]
CRM tools/software	[6][48]
Customer experience/journey mapping and modeling tools	[28][29][49][50][51]
Customer identity card	[43]
Database management	[6]
Digital kiosk	[18][43][52][53]
Digital twins	[27][32]
Drones	[11]
(Face) recognition technologies	[30][36]
Geolocation technology, location-based and wearables	[28] [32][36]
Human resources software	[6]
In-store tablet, touchpoint, monitor, LCD screen, multi-touch display	[30][37][54][55]
Internet of Things (IoT)	[11]
Messaging applications	[28][30]
Near Field Communication (NFC)	[56]
Net promoter score	[28][29][30]
Neuroscience	[32]
On-line catalogues	[57]
Property management system	[6]
Quick Response (QR) code	[37]
Radio Frequency Identification (RFID)	[55][58]
Robotic Process Automation (RPA)	[59]
Self-service technologies	[11][18][33][60][61][62][63]
Smart services/devices	[64][65]
Social media	[6][7][18][30][32][66][67]
Technologies/applications enabling co-creation	[17][68]
Video recording	[69]
Virtual Reality (VR)	[32][36][37][70]
Web services	[71]

There is also a considerable number of relevant technologies for the last step of CEM, which is Customer experience monitoring. Indeed, analytics, data mining, chatbots, geolocation technology, Internet of Things (IoT), and video recording are all examples of technologies and tools that can be used to measure customer experience and flag incidents. CRM tools/software can also be used and they themselves contain powerful analytics capabilities.

#### V. CONCLUSION

This literature review allowed us to identify 35 technologies and tools that can help management in the CEM process, which were associated with the specific step(s) in which they can be used. This contributes to assisting organizations to manage the customer experience process from start to finish, thereby improving customer experience.

TABLE II. TECHNOLOGIES AND TOOLS RELEVANT TO EACH STEP OF THE CEM PROCESS

Step	Relevant technologies and tools
Customer identification	<ul style="list-style-type: none"> <li>- Analytics</li> <li>- Big data, data mining</li> <li>- Database management</li> </ul>
Customer experience design	<ul style="list-style-type: none"> <li>- Customer experience/journey mapping and modeling tools</li> <li>- Technologies/applications enabling co-creation</li> </ul>
Customer experience implementation	<ul style="list-style-type: none"> <li>- Artificial Intelligence (AI)/Machine learning</li> <li>- Augmented Reality (AR)</li> <li>- Balanced Scorecard (BSC)</li> <li>- Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR))</li> <li>- Chatbots</li> <li>- Customer identity card</li> <li>- CRM tools/software</li> <li>- Database management</li> <li>- Digital kiosk</li> <li>- Digital twins</li> <li>- Drones</li> <li>- (Face) recognition technologies</li> <li>- Geolocation technology, location-based and wearables</li> <li>- Human resources software</li> <li>- In-store tablet, touchpoint, monitor, LCD screen, multi-touch display</li> <li>- Internet of Things (IoT)</li> <li>- Messaging applications</li> <li>- Near Field Communication (NFC)</li> <li>- On-line catalogues</li> <li>- Property management system</li> <li>- Quick Response (QR) code</li> <li>- Radio Frequency Identification (RFID)</li> <li>- Robotic Process Automation (RPA)</li> <li>- Self-service technologies</li> <li>- Smart services/devices</li> <li>- Social media</li> <li>- Technologies/applications enabling co-creation</li> <li>- Virtual Reality (VR)</li> <li>- Web services</li> </ul>
Customer experience monitoring	<ul style="list-style-type: none"> <li>- Analytics</li> <li>- Big data, data mining</li> <li>- Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR))</li> <li>- Chatbots</li> <li>- CRM tools/software</li> <li>- Database management</li> <li>- Digital twins</li> <li>- (Face) recognition technologies</li> <li>- Geolocation technology, location-based and wearables</li> <li>- In-store tablet, touchpoint, monitor, LCD screen, multi-touch display</li> <li>- Internet of Things (IoT)</li> <li>- Messaging applications</li> <li>- Neuroscience</li> <li>- Social media</li> <li>- Radio Frequency Identification (RFID)</li> <li>- Smart services/devices</li> <li>- Video recording</li> </ul>

This study has some limitations. The scope of our research was limited, as we only searched in one database. Moreover, we did not find any technology covering all four steps of the CEM process in our review of the literature. This could cause a lag between the time a weakness in the customer experience is flagged during customer experience monitoring and the time it is addressed during the continuous improvement of the customer experience design. There is thus a need for a system capable of covering all activities of CEM. This could allow

organizations to be more agile and make their customer experience evolve seamlessly, thereby giving them a non-negligible competitive advantage. As a future research avenue, we suggest investigating how such a system could be designed, or how some of the existing technologies and tools could be connected and organized to work seamlessly as one system.

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