

Mapping Technologies and Tools to the Activities of the Customer Experience Management Process

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Abstract—While good Customer Experience Management (CEM) is said to give organizations a competitive advantage, we still lack some guidance in how to optimize CEM, especially from a technological standpoint. Indeed, despite the many CEM technologies and tools discussed in the literature, none can support the CEM process from beginning to end. Moreover, we do not know how to integrate the many CEM technologies and tools to allow for seamless management of the customer experience. This paper identifies 52 CEM technologies and tools and maps them to each activity of the CEM process in which they can be used. It also proposes four preliminary integration guidelines that can help organizations in their integration efforts.

Keywords—customer experience management; tools; technologies; literature review.

I. INTRODUCTION

This article extends the work that was presented at the BUSTECH 2023 conference [1]. 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 [2]. This would be the case in any industry, whether it be banking [3][4][5], hospitality and tourism [6][7][8], communications [9][10], retail [11][12], and online commerce [13][14]. 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 [15].

Customer experience can be defined as the “customer sensorial, physiological, psychological responses such as cognitive as well as affective responses evoked by customer direct (offline) and indirect (online) interactions with the firm or firm offerings across all the touch points throughout the customer purchase journey” [16]. 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 [17], make it challenging to manage.

To date, several studies have been conducted to investigate what good CEM entails. Others have also explored the usefulness and the effect of some technologies (e.g., software and algorithms) and tools (e.g., methods and canvas) in CEM. Indeed, the customer experience and its management are

closely related to Information Technology (IT). To begin with, customers often learn about a brand through online advertising and social media [18]. 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 [19]). The simple fact of using IT can help organizations improve customer experience even in unexpected settings, such as in temples [20].

Unfortunately, properly leveraging CEM technologies and tools to gain a competitive advantage is an arduous task. First, there are a plethora of technologies and tools available on the market and the literature does not provide any guidance as to which ones can be used to support the CEM process throughout. Indeed, most studies on CEM technologies focus only on one or a few activities of the CEM process. This problem is exacerbated by the fact that the “CEM software” that have recently begun appearing on the market are not yet mature and only focus on a limited number of activities of the CEM process, such as collecting and analyzing feedback from customers. Managers using these new technologies thus risk neglecting crucial activities of CEM to the detriment the organization's competitive advantage. Second, the academic and professional literatures do not provide any guidance as to how CEM technologies and tools can be used in conjunction to support the CEM process. Organizations must know how to go about integrating their CEM technologies and tools to optimize the CEM process and seamlessly manage the customer experience. Only then can they gain a sustainable competitive advantage from their CEM.

To offset these important limits, the objective of this paper is to determine which technologies and tools can support each activity of the CEM process as well as to propose a set of preliminary technology integration guidelines to enable the seamless management of the CEM process from beginning to end. To do so, we first identify the activities that make up the CEM process (Section II). Second, we review the literature to identify technologies and tools that can support the CEM process (Section III). Third, we map the identified technologies and tools to the activities of the CEM process (Section IV). Finally, we propose four preliminary integration guidelines that can be used as a starting point to integrate CEM technologies and tools (Section V).

II. IDENTIFYING THE CEM PROCESS ACTIVITIES

Several concepts led the way to CEM, including consumer behavior, service quality, and relationship marketing [21]. The concept of customer experience first appeared in the literature in the late 1990s, when Pine and Gilmore [22] stated in the Harvard Business Review that providing experiences was the next discipline that would enable organizations to remain competitive. They argued that although some confuse the delivery of an experience with that of a service, they are two distinct approaches. According to the 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” [22].

Customer experience is described as the “aggregate of feelings, perceptions and attitudes” formed by the customer throughout his journey, at each touchpoint [23]. 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” [24].

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. The most

comprehensive come from two literature reviews that had the objective of proposing a CEM process. First, Du Plessi and de Vries [25] conducted a literature review and used inductive thematic analysis to describe the CEM process in four steps and twelve sub-steps. The first step, Customer Experience Understanding, includes segmenting customers and defining their needs. The second step, Customer Experience Design, consists of mapping the desired customer journeys. The third step, Customer Experience Measurement, consists of monitoring the customer experience. 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. Rahimian, ShamiZanjani, Manian and Esfidani’s [26] literature review, in turn, proposed four high-level CEM stages (Customer Identification, Customer Experience Design, Customer Experience Implementation, and Customer Experience Monitoring), each containing steps. These stages and steps were identified through a systematic review of the literature on the hotel, tourism, and hospitality industry. The four stages are very similar to the steps identified by [25] and cover approximately the same activities.

In addition to [25] and [26], other studies propose activities to manage the customer experience. For instance, Popa and Barna [27] proposed “seven steps to better customer experience management”. Johnston and Kong [28], for their part, proposed a “road map for improving the customer experience” containing ten CEM activities.

Based on [25] [26][27][28], we thus characterize the CEM process as comprising four complementary phases and 13 steps/activities (see Table I). The first phase, Customer Identification, aims to gain a better understanding of the customers. It comprises two activities. During the first activity, *Assessing customers’ characteristics and past experiences with other competitors and understanding their needs, expectations, and values*, organizations build knowledge of their customers. During the second activity, *Segmenting customers*, customers are divided into segments that share certain characteristics.

The second phase, Customer Experience Design, aims to determine what is the desired customer experience. During the first activity, *Developing a plan/strategy*, the organization’s global customer experience strategy is determined. During the second activity, *Designing/mapping customer journeys and touchpoints*, the desired customer experience journey is mapped, including all touchpoints. During the third activity, *Prioritizing touchpoints*, the organization decides which touchpoints should be the main interaction points with the customer and thus, which touchpoints should receive the most attention.

The third phase, Customer Experience Implementation, aims to implement the desired customer experience that was designed during the second phase. During the first activity, *Identifying gaps in experience design versus current organizational capability*, the gaps that need to be filled in order to implement the desired customer experience are identified. During the second activity, *Prioritizing improvement initiatives*, the initiatives that will allow the implementation of the desired customer experience are

TABLE I. CEM PROCESS

Phase	Step/Activity	Reference(s)
1) Customer Identification	1- Assessing customers’ characteristics and past experiences with other competitors and understanding their needs, expectations, and values	[25][26][27][28]
	2- Segmenting customers	[25][26]
2) Customer Experience Design	1- Developing a plan/strategy	[26][27][28]
	2- Designing/mapping customer journeys and touchpoints	[25][26][27][28]
	3- Prioritizing touchpoints	[26]
3) Customer Experience Implementation	1- Identifying gaps in experience design versus current organizational capability	[25]
	2- Prioritizing improvement initiatives	[25][27][28]
	3- Implementing required changes to IT systems and other support systems	[27][28]
	4- Implementing the improvement initiatives	[26][28]
	5- Interacting with customers and personalizing services	[26]
4) Customer Experience Monitoring	1- Defining internal and external measurements	[25]
	2- Monitoring experiences	[25][26][27][28]
	3- Adapting and deploying improvement initiatives	[27][28]

prioritized. During the third activity, *Implementing required changes to IT systems and other support systems*, all changes to IT systems (e.g., developing customer-centric information architecture, deploying workflow-based tools) and to other support systems (e.g., revise employee training documentation) that need to be done to allow the implementation of the improvement initiatives are implemented. During the fourth activity, *Implementing the improvement initiatives*, touchpoints are changed and/or developed to reflect the desired customer experience designed in the second phase. During the fifth activity, *Interacting with customers and personalizing services*, changes that were required to implement the desired customer experience designed in the second phase are implemented and the organization interacts with the customers through the upgraded and/or new touchpoints.

The fourth phase, Customer Experience Monitoring, aims to monitor the customer experience to identify issues and opportunities for improvement. During the first activity, *Defining internal and external measurements*, measurements and escalation mechanisms that will be used to monitor the customer experience are determined. During the second activity, *Monitoring experiences*, the measurements defined in the first activity are used to assess the performance of the current customer experience, to flag issues, and to enhance the organization’s understanding of its customers. During the third activity, *Adapting and deploying improvement initiatives*, the customer experience is adjusted according to the data collected during the second activity.

To conclude this section, it is important to mention that although the phases and activities are presented in a logical sequence, the CEM process is iterative, since the customers, as well as their experiences, are constantly changing.

III. IDENTIFYING CEM TECHNOLOGIES AND TOOLS: A LITERATURE REVIEW

This section first details the methodology followed to identify CEM technologies and tools and second, exposes our findings from the literature review.

A. Methodology

We conducted a literature review with the objective of identifying CEM technologies and tools. The flow diagram of the literature review is presented in Figure 1. First, we searched the online databases ABI/INFORM and Business Source Complete. We 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 Figure 1. The expression “technolog*” 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 572 articles in ABI/INFORM and 645 articles in Business Source Complete and ended up with 840 articles once the duplicates were removed.

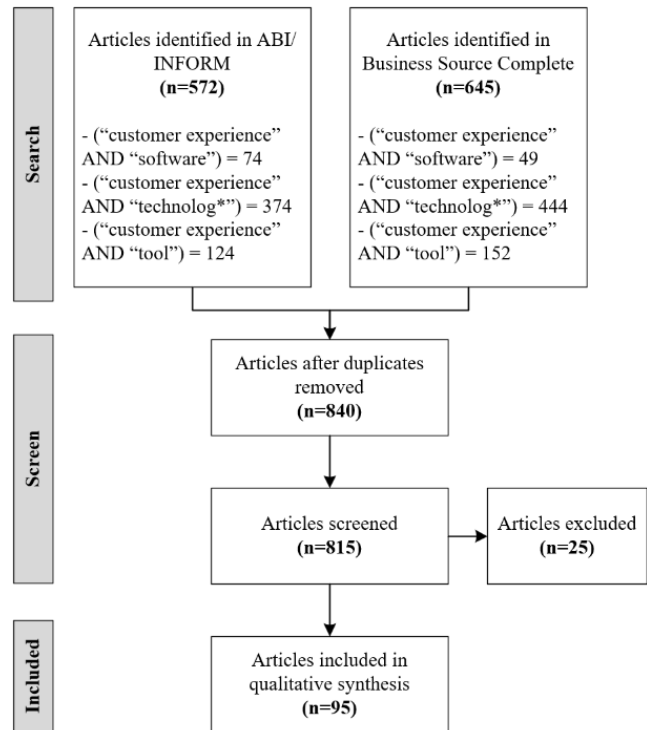


Figure 1. PRISMA flow diagram of the review process.

The second step consisted of screening the identified studies. We read the identified articles’ title and abstract. Twenty-five (25) articles were excluded because they were not in English.

In the third step, we read the articles relevant to our research topic in their entirety. We found 95 articles that proposed CEM technologies and/or tools. It should be noted that the use of the Internet 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 [29], were also excluded. The included articles’ publication dates range from 1998 to 2023, with only one article published before 2003 and 74 since 2018. Hence, as shown in Figure 2, almost 70% of the articles included in our qualitative analysis were published in the last five years.

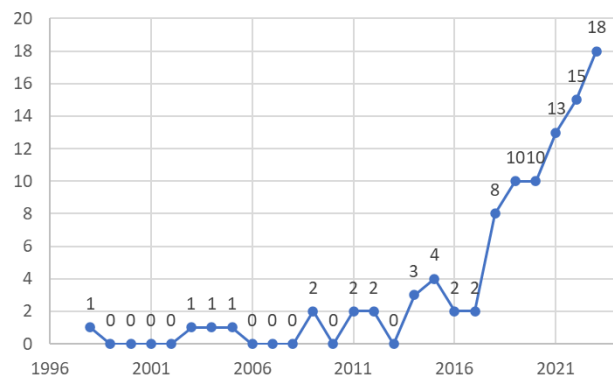


Figure 2. Articles published per year.

B. Results

After extracting the technologies and tools identified in the 95 articles found in the literature and synthesizing then, we came up with a list of 52 CEM technologies and tools. They are presented in alphabetical order in Table II. A few similar technologies were gathered as one because they were often talked about as one and were difficult to separate. For instance, we identified “analytics” as encompassing text analytics, descriptive analytics, predictive analytics, and prescriptive analytics.

TABLE II. CEM TECHNOLOGIES AND TOOLS

Technology/tool	Reference(s)
Analytics (text analytics, descriptive analytics, predictive analytics, prescriptive analytics)	[30][31][32][33]
Artificial Intelligence (AI)/Machine learning	[30][34][35][36][37][38][39][40][41][42][43][44][45]
Augmented Reality (AR)	[12][13][39][46][47][48][49][50][51][52][53][54][55][56][57][58][59]
Balanced Scorecard (BSC)	[60]
Big data, data mining	[31][61]
Biometrics	[62]
Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR))	[63]
Chatbots	[30][32][36][51][64][65][66][67][68][69][70][71]
Chat GPT	[72]
Cloud computing	[73]
CRM tools/software	[7][74]
Customer experience/journey mapping and modeling tools	[30][31][75][76][77]
Customer identity card	[63]
Database management	[7]
Digital kiosk	[19][57][63][78][79][80]
Digital twins	[35][81]
Diminished Reality (DR)	[55]
Drones	[12]
(Face) recognition technologies	[32][39][45][80][82]
Exoskeletons/Exosuits	[80]
Eye-tracker	[82]
Geolocation technology, location-based and wearables	[30][35][39][57][80][82]
Human Enhancement Technology (HET)	[41][83]
Human resources software	[7]
Immersive technology	[84]
In-store tablet, touchpoint, monitor, LCD screen, multi-touch display	[32][46][85][86][80][87][88]
Internet of Things (IoT)	[12][89]
Marketing technology (pop-up ads, targeted ads, coupons)	[90]
Messaging applications	[30][32]
Metaverse	[91]
Mixed-Reality (MR)	[51][52]
Near Field Communication (NFC)	[92]
Net promoter score	[30][31][32]
Neuroscience	[35]
On-line catalogues	[93]
Product-service system	[94]
Property management system	[7]
Quick Response (QR) code	[46]

Radio Frequency Identification (RFID)	[86][95] [57]
Robotic Process Automation (RPA)	[96][97]
Service robots	[57][98]
Self-service technologies (SST)	[12][19][36][57][62][99][100][101][102][103][104][105][106]
Smart services/devices	[107][108] [57]
Smart wearable devices	[57][109]
Social media	[7][8][19][32][35][110][111]
Technologies/applications enabling co-creation	[18][112]
Technology for faster billing (automatic checkout, mobile checkout, mobile payment)	[57][113]
Video recording	[114]
Virtual assistant	[51]
Virtual Reality (VR)	[35][39][46][51][52][55][57][115][116]
Voice assistant	[71]
Web services	[117]

It is also worth noting that some of the technologies identified are closely related to one another. For example, many use Artificial Intelligence (AI), such as chatbots, Internet of Things (IoT), and both Virtual Reality (VR) and Augmented Reality (AR). We kept them separate because some authors proposed specific usage for each of the technology, and as such we did not want to lose their individual purpose.

IV. MAPPING THE TECHNOLOGIES AND TOOLS TO EACH ACTIVITY OF THE CEM PROCESS

After having extracted all the technologies and tools found in the literature, we identified, for each of them, in which activities they could be useful according to the way they were described in the studies from which they were extracted. Table III presents all the technologies and tools (identified in Section III) that can assist management in each activity of the CEM process (described in Section II). Some technologies and tools can be useful in more than one activity and thus appear more than once in the table.

It is no surprise that the activities in the first phase 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 same technologies can support the two activities of this first phase.

The second phase 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 can allow organizations to engage customers in the design of their customer experience. Although this phase is central to CEM, very few supporting technologies and tools were found. Indeed, none were found for the activity *Developing a plan/strategy* and only one was found for *Prioritizing touchpoints*, i.e., Balanced Scorecard (BSC). Moreover, BSC

TABLE III. TECHNOLOGIES AND TOOLS RELEVANT TO EACH ACTIVITY OF THE CEM PROCESS

Phases	Step/Activity	Relevant Technologies and Tools
Customer Identification	Assessing customers' characteristics and past experiences with other competitors and understanding their needs, expectations, and values	<ul style="list-style-type: none"> - Analytics - Big data, data mining - Database management
	Segmenting customers	<ul style="list-style-type: none"> - Analytics - Big data, data mining - Database management
Customer Experience Design	Developing a plan/strategy	- None
	Designing/mapping customer journeys and touchpoints	<ul style="list-style-type: none"> - Customer experience/journey mapping and modeling tools - Technologies/applications enabling co-creation
	Prioritizing touchpoints	- Balanced Scorecard (BSC)
Customer Experience Implementation	Identifying gaps in experience design versus current organizational capability	- Customer experience/journey mapping and modeling tools
	Prioritizing improvement initiatives	- Balanced Scorecard (BSC)
	Implementing required changes to IT systems and other support systems	- Database management
	Implementing the improvement initiatives	<ul style="list-style-type: none"> - Artificial Intelligence (AI)/Machine learning - Augmented Reality (AR) - Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR)) - Chatbots - Customer identity card - CRM tools/software - Database management - Digital kiosk - Digital twins - Drones - (Face) recognition technologies - Geolocation technology, location-based and wearables - Human resources software - In-store tablet, touchpoint, monitor, LCD screen, multi-touch display - Internet of Things (IoT) - Marketing technology (pop-up ads, targeted ads, coupons) - Messaging applications - Near Field Communication (NFC) - On-line catalogues - Property management system - Quick Response (QR) code - Radio Frequency Identification (RFID) - Robotic Process Automation (RPA) - Self-service technologies - Service robots

		<ul style="list-style-type: none"> - Smart services/devices - Smart wearable devices - Social media - Technologies/applications enabling co-creation - Technology for faster billing (automatic checkout, mobile checkout, mobile payment) - Virtual Reality (VR) - Web services
	Interacting with customers and personalizing services	<ul style="list-style-type: none"> - Artificial Intelligence (AI)/Machine learning - Augmented Reality (AR) - Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR)) - Chatbots - Customer identity card - CRM tools/software - Database management - Digital kiosk - Digital twins - Drones - (Face) recognition technologies - Geolocation technology, location-based and wearables - Human resources software - In-store tablet, touchpoint, monitor, LCD screen, multi-touch display - Internet of Things (IoT) - Marketing technology (pop-up ads, targeted ads, coupons) - Messaging applications - Near Field Communication (NFC) - On-line catalogues - Property management system - Quick Response (QR) code - Radio Frequency Identification (RFID) - Robotic Process Automation (RPA) - Self-service technologies - Service robots - Smart services/devices - Smart wearable devices - Social media - Technologies/applications enabling co-creation - Technology for faster billing (automatic checkout, mobile checkout, mobile payment) - Virtual Reality (VR) - Web services
Customer Experience Monitoring	Defining internal and external measurements	- None
	Monitoring experiences	<ul style="list-style-type: none"> - Analytics - Big data, data mining - Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR)) - Chatbots - CRM tools/software - Database management - Digital twins - (Face) recognition technologies - Geolocation technology, location-based and wearables

	<ul style="list-style-type: none"> - In-store tablet, touchpoint, monitor, LCD screen, multi-touch display - Internet of Things (IoT) - Messaging applications - Neuroscience - Social media - Radio Frequency Identification (RFID) - Smart services/devices - Smart wearable devices - Video recording
Adapting and deploying improvement initiatives	<ul style="list-style-type: none"> - Artificial Intelligence (AI)/Machine learning - Augmented Reality (AR) - Call center technology (Voice Response Units (VRU) and Interactive Voice Response (IVR)) - Chatbots - Customer identity card - CRM tools/software - Database management - Digital kiosk - Digital twins - Drones - (Face) recognition technologies - Geolocation technology, location-based and wearables - Human resources software - In-store tablet, touchpoint, monitor, LCD screen, multi-touch display - Internet of Things (IoT) - Marketing technology (pop-up ads, targeted ads, coupons) - Messaging applications - Near Field Communication (NFC) - On-line catalogues - Property management system - Quick Response (QR) code - Radio Frequency Identification (RFID) - Robotic Process Automation (RPA) - Self-service technologies - Service robots - Smart services/devices - Smart wearable devices - Social media - Technologies/applications enabling co-creation - Technology for faster billing (automatic checkout, mobile checkout, mobile payment) - Virtual Reality (VR) - Web services

was discussed in only one of the articles found in the literature. The activities included in this phase are thus neglected in the literature from a technical standpoint.

The third phase, Customer Experience Implementation, is the one for which the most useful technologies and tools were found. More specifically, a large number of technologies can support the activities *Implementing the improvement initiatives* and *Interacting with customers and personalizing services*. Indeed, there are many 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” [81] also allow organizations to interact with customers, as well as to collect data which is useful in the next phase of the CEM process, i.e., Customer Experience Monitoring. Looking at Table III, it is evident that there is a keen interest in such technologies and tools in the literature. However, other activities included in this phase are not supported by nearly as many technologies. Indeed, only customer experience/journey mapping and modeling tools can be used to support the activity *Identifying gaps in experience design versus current organizational capability*. Similarly, the activity *Prioritizing improvement initiatives* can be supported only by BSC, at least among the identified technologies and tools in our review of the literature.

The fourth and last phase of the CEM process, i.e., Customer Experience Monitoring, can also be supported by a fairly large number of technologies and tools. This is especially true for the activity *Monitoring experiences*. 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. Most of the technologies identified for this activity were also identified for the activity *Interacting with customers and personalizing services* in the previous phase. This is because most of them can gather feedback from customers as they are interacting with them. For instance, a chatbot can interact with a customer at a touchpoint, being part of the customer’s journey. The input from this customer in the chatbot can then be analyzed and used to monitor its experience. Another example is smart wearable devices. While these devices can enrich the customer’s experience, they can also collect data that can be used to monitor customer experience, such as the path that customers take in a physical store. Indeed, this technology could identify possible areas of improvements in the layout of the store. Other technologies and tools are especially useful for monitoring experiences. For example, video recording will not allow interaction with customers, but can be helpful in assessing the customer experience. While many technologies and tools were found to support *Monitoring experiences*, there is however an activity in this last phase of the CEM process that is not supported by any technology, which is *Defining internal and external measurements*.

To conclude this section, three main observations arise from mapping the CEM technologies and tools to the activities of the CEM process. First, when looking at the distribution of technologies and tools in Table III in comparison with the activities of the CEM process identified in Table I, we can see that there is a clear discrepancy between the portion of literature interested in the CEM process and the portion of literature interested in CEM technologies and tools. Indeed, while the activity *Designing/mapping customer journeys and touchpoints* (Phase 2) was described by all references included in Table I, only two technologies and tools were found that can support this activity. The activity *Interacting*

with customers and personalizing services (Phase 3), for its part, was only proposed by one of the references included in Table I, but can be supported the largest number of technologies and tools. This discrepancy could potentially be a hindrance to good CEM. Indeed, it is crucial that organizations provide the right customer experience and Designing the Customer Experience is thus a crucial phase of CEM. Indeed, the implementation can only be as good as the design. Therefore, the activities in the phases Customer Identification and Customer Experience Design should not be neglected and there seems to be an opportunity to explore what technologies and tools could potentially support customer experience design.

Second, while there is an emphasis on the different technologies and tools that allow different types of interactions with the customers, simply using these technologies and tools is not guaranteed to improve the customer experience. In fact, some have observed that, in some cases, they could rather have a negative impact on customer experience (e.g., self-checkout [118]).

Finally, and most importantly, while a large number of CEM technologies and tools was identified, no single technology can support all the activities of the CEM process. Yet, for CEM to procure a real competitive advantage, it is essential that the technologies supporting the CEM process be integrated, thereby allowing the optimization of the CEM process for seamless management of the customer experience from beginning to end.

V. CEM TECHNOLOGIES AND TOOLS: PRELIMINARY INTEGRATION GUIDELINES

In the previous section, we concluded that the technologies and tools supporting the CEM process should be integrated for CEM to procure a sustainable competitive advantage. Of course, this is easier said than done. Considering the number of CEM technologies and tools identified as well as the countless combinations of technologies possible, there is no single way to go about it. In this section, we propose four guidelines – one per phase – to properly integrate the technologies and tools for the seamless integration of the CEM process.

In the first phase, ‘Customer Identification’, we must optimize the usage and the update of customer knowledge. Therefore, the technologies and tools used to support the activity *Assessing customers’ characteristics and past experiences with other competitors and understanding their needs, expectations, and values* should be integrated with the technologies and tools used in the activities *Interacting with customers and personalizing services* and *Monitoring experiences* (see Figure 3). Indeed, the data collected while interacting with customers and while monitoring their experience should be added to the data used to gain a better understanding of the customers. Additionally, the customer’s data should be used when interacting with the customer to improve customer service and personalize its experience.

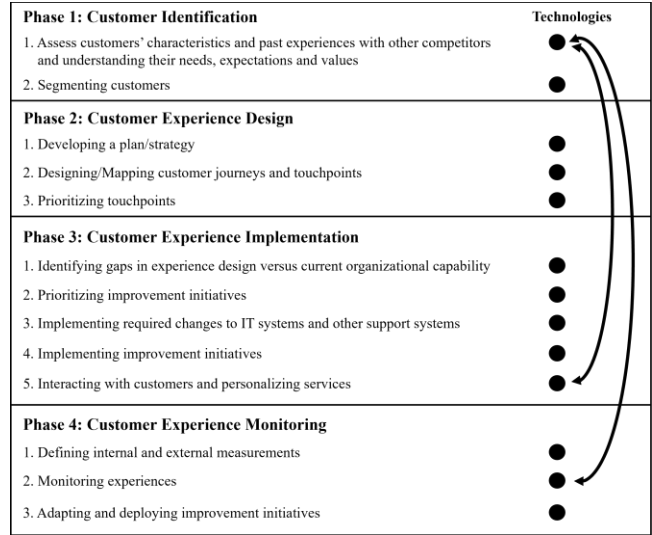


Figure 3. Integration Guideline for Customer Identification.

In the second phase, ‘Customer Experience Design’, we must keep the customer strategy up to date as well as ensure that any changes to said strategy are reflected in the customer experience implementation. Therefore, while we did not find any technologies and tools relevant to the activity *Developing a plan/strategy*, this activity should be closely integrated with the technologies and tools used to support three activities, i.e., *Implementing improvement initiatives*, *Prioritizing improvement initiatives*, and *Monitoring experiences* (see Figure 4). Indeed, these integrations are required for updating the customer strategy and adjusting the customer experience. Since the customer experience is not static, it is crucial to adapt the customer experience strategy in accordance with the data collected while monitoring the customer experience, such as customers’ feedback. Then, the changes to the customer experience strategy should be reflected in the prioritization of the improvement initiatives as well as in the implementation

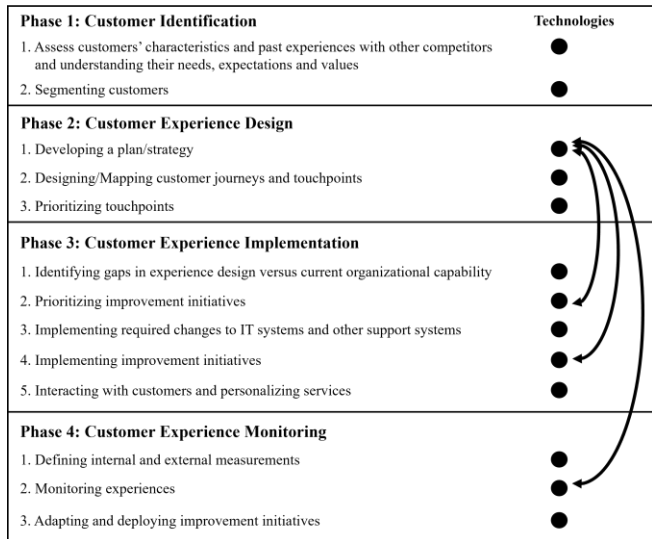


Figure 4. Integration Guideline for Customer Experience Design.

of improvement initiatives. Of course, changes to the strategy will eventually be reflected in the customer experience by following the normal CEM process. However, directly integrating the technologies and tools supporting these critical activities can allow for more agility and quicker response time, as small changes can be applied without going through the whole process.

In the third phase, “Customer Experience Implementation”, we must ensure that the right initiatives are implemented, that they have the desired effect on customer experience, and that the current customer experience design is being updated once the initiatives are implemented. Therefore, the technologies and tools used to support the activity Implementing improvement initiatives should be integrated with the technologies and tools used to support the activities *Designing/mapping customer journeys and touchpoints*, *Prioritizing improvement initiatives*, and *Monitoring experiences* (see Figure 5). Indeed, the improvement initiatives should be implemented according to the prioritization done in *Prioritizing improvement initiatives* which, as mentioned, is subject to change if the customer strategy itself changes. The implementation of new initiatives should be closely monitored to allow for prompt adjustment if these initiatives have an unexpected negative impact on customer experience. Once the initiatives implemented, the current customer experience journey map should also be updated consequently.

In the fourth phase, “Customer Experience Monitoring”, we must of course monitor the customer experience. The three previous guidelines propose integrating the activity *Monitoring experiences* to activities from the three first phases of the CEM process. Another important activity of the fourth phase is *Adapting and deploying improvement initiatives*. We propose integrating the technologies and tools used to support this activity to those used to support the activities *Prioritizing improvement initiatives*, *Implementing*

required changes to IT systems and other support systems, and *Implementing improvement initiatives* (see Figure 6). Indeed, while the literature proposes a distinct activity for adapting improvement initiatives following the monitoring of the customer experience, the concrete actions done in this activity are very similar, if not identical, to those done in the activities *Implementing required changes to IT systems and other support systems* and *Implementing improvement initiatives*. This illustrates the iterative nature of the CEM process.

Finally, the integration between the different technologies and tools should allow the right people to have access to the right, updated data in a timely manner. As mentioned previously, the CEM process is iterative since the customer experience is in constant evolution. Therefore, all the activities required to manage the customer experience should also be adapted constantly. Organizations should be wary of creating punctual integration points, as the CEM process is hardly a one-and-done initiative. These four guidelines are only preliminary, but they still offer a good a starting point to determine how to integrate the technologies and tools that support the CEM process.

Phase 1: Customer Identification	Technologies
1. Assess customers' characteristics and past experiences with other competitors and understanding their needs, expectations and values	●
2. Segmenting customers	●
Phase 2: Customer Experience Design	
1. Developing a plan/strategy	●
2. Designing/Mapping customer journeys and touchpoints	●
3. Prioritizing touchpoints	●
Phase 3: Customer Experience Implementation	
1. Identifying gaps in experience design versus current organizational capability	●
2. Prioritizing improvement initiatives	●
3. Implementing required changes to IT systems and other support systems	●
4. Implementing improvement initiatives	●
5. Interacting with customers and personalizing services	●
Phase 4: Customer Experience Monitoring	
1. Defining internal and external measurements	●
2. Monitoring experiences	●
3. Adapting and deploying improvement initiatives	●

Figure 5. Integration Guideline for Customer Experience Implementation.

Phase 1: Customer Identification	Technologies
1. Assess customers' characteristics and past experiences with other competitors and understanding their needs, expectations and values	●
2. Segmenting customers	●
Phase 2: Customer Experience Design	
1. Developing a plan/strategy	●
2. Designing/Mapping customer journeys and touchpoints	●
3. Prioritizing touchpoints	●
Phase 3: Customer Experience Implementation	
1. Identifying gaps in experience design versus current organizational capability	●
2. Prioritizing improvement initiatives	●
3. Implementing required changes to IT systems and other support systems	●
4. Implementing improvement initiatives	●
5. Interacting with customers and personalizing services	●
Phase 4: Customer Experience Monitoring	
1. Defining internal and external measurements	●
2. Monitoring experiences	●
3. Adapting and deploying improvement initiatives	●

Figure 6. Integration Guideline for Customer Experience Monitoring.

VI. CONCLUSION

The objective of this paper was to determine the technologies and tools that can be used to support each activity of the CEM process and to offer guidelines for integrating these technologies and tools. We found 52 technologies and tools, and we mapped them to each activity of the CEM process in which they can be useful. We also proposed four preliminary guidelines, each related to one phase of the CEM process, to consider for the integration of CEM technologies and tools.

The results of this literature review have several contributions. First, they can help management identify relevant technologies and tools to support the CEM process, thereby leading to a better customer experience and, in turn, a

sustainable competitive advantage. Second, they highlight the fact that no single technology is sufficient to manage the whole CEM process, raising caution with managers and minimizing the risk that they neglect some CEM activities. Third, the four preliminary integration guidelines represent a good starting point to determine how to go about integrating all CEM technologies and tools.

This literature review shed light on gaps in the literature that could be the basis for future research avenues. First, more research should be conducted on technologies and tools that can support the activities for which few to no technologies were found, especially the activities that are key to CEM according to the literature, such as *Designing/mapping customer journeys and touchpoints*. Second, as we found that some technologies can actually be detrimental to the customer experience, more research should explore how to best select the technologies and tools to support CEM, especially the ones with which customers might interact. Third, more studies should further explore integration guidelines that could help organizations in integrating all technologies supporting their CEM process from beginning to end, thereby improving the customer experience.

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