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Exploring the role of new and enhanced BPM capabilities in customer experience management: does BPM matter?

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Abstract

Purpose – Although improving customer experience (CX) has always been one of the top priorities of business process management (BPM), the evidence on the actual contribution made by traditional BPM to improving CX and customer experience management (CXM) is mixed. Recently, new and enhanced capability areas have been added to the traditional BPM frameworks, yet it is unclear which of them contribute to CXM. Moreover, it is not known which of them are necessary and which are sufficient conditions. The aim of this research is to shed light on the research gap concerning which BPM capabilities, especially new and enhanced ones, are relevant to CXM.
Design/methodology/approach – Quantitative data from 268 medium and large companies in 3 EU countries were analysed using hierarchical linear regression analysis and necessary condition analysis.
Findings – The results show that traditional BPM capabilities are a necessary condition for CXM, but with minor significance. Most highly significant necessary conditions and also most highly or medium significant sufficient conditions belong to the People or Culture area. Agile Process Improvement is the only new or enhanced BPM capability area in the Methods/IT area that is a necessary and also a sufficient condition for CXM maturity. Advanced Process Digitalisation was identified as neither a significant necessary nor a sufficient condition for CXM.
Originality/value – This research contributes to better understanding of the role played by BPM for CXM, where previous research provides mixed results.

Keywords Business process management, New and enhanced BPM capabilities, Customer experience management, Customer experience, Sufficient and necessary conditions analysis

Paper type Research paper

Introduction

One of the top business priorities in recent years is the enhancing of the customer experience (CX) (Klink *et al.*, 2021). Moreover, customer experience management (CXM) – a new

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management discipline focused on managing CX - has been developed (Homburg *et al.*, 2017) and attracted considerable interest from practitioners and academics (Hwang and Seo, 2016; Verhoef *et al.*, 2009). Providing seamless CX is a key goal of CXM, with the presence of enterprise silos often featuring as a recurring barrier to this goal (Banerjee, 2021). This makes it reasonable to assume that the implementation of BPM could lead to better CXM and, in turn, better CX.

On the other hand, BPM can also act as an inhibitor of good CX and a barrier to CXM implementation. For example, the standardising of processes can undermine the performance of business processes in customers' eyes while dealing with changing environments or when customers value variations in products and services (Hall and Johnson, 2009). Although the customer has always been declared to be the central focus of BPM, BPM has mainly been implemented with an internal focus (Trkman *et al.*, 2015). Further, the results of a recent study on the motivations for adopting BPM (Gabryelczyk *et al.*, 2022) show that less than 10% of companies are adopting BPM based on customer-centric motivations.

The importance of BPM for CXM and CX was also mentioned by Rosemann (2014) in his paper calling for new research directions for BPM. One of his suggestions was to complement the prevailing inside-out view of BPM with an outside-in view and to shift the focus to a customer- and opportunity-centric perspective, which is obvious for CXM. Still, studies on the impact of BPM on CX or CXM remain rare (Gabryelczyk *et al.*, 2022) and the results are mixed. For example, Antonucci *et al.* (2021) found that only some traditional BPM capabilities contribute to better CXM and CX.

The existing BPM maturity frameworks and capability areas are challenged nowadays by dynamic environmental changes, competitive pressures, and digitalisation. The observed circumstances gave rise to new studies with the aim of updating the existing frameworks, adding new BPM capabilities and enhancing the existing ones (Gimpel *et al.*, 2018; Klun and Trkman, 2018). Authors of one recent BPM capability framework (Kerpedzhiev *et al.*, 2021) also recommended future research on which capability areas lead to organisational performance in different contexts. To our knowledge, no research has examined the relationship between new and enhanced BPM capabilities and CXM, which positively impacts organisational performance (Klink *et al.*, 2021). It is also not known which BPM capabilities contribute to CXM as necessary and which as sufficient conditions. Hence, the aim of our research is through a survey conducted in three EU countries to explore which BPM capabilities, especially new and enhanced ones, are relevant for CXM.

The paper proceeds as follows: We begin with a theoretical overview of CXM and BPM capabilities, focussing on the importance of new and enhanced BPM capabilities. After we briefly discuss the results of recent research on the role and impact of BPM on CXM success in organisations, we explain the research model. The empirical part of the study follows: the methodology and design of the study are described, while the development of the research instrument and the procedures of collecting, preparing and analysing the data are explained. Once the research instrument and several exploratory statistical analyses are validated, the results are discussed in the context of previous findings. The paper ends with conclusions and recommendations for future research.

Theoretical background and research model

Customer experience management

CX is a multidimensional concept that focuses on sensorial, emotional, cognitive, behavioural and social responses to the offerings of a firm made during a customer's entire purchase journey (Homburg *et al.*, 2017). Customer interactions with the organisation, defined as touchpoints (Burton *et al.*, 2020), must be properly managed to ensure customer satisfaction and loyalty during the pre-purchase, purchase, and post-purchase processes. Customers' past experiences influence the design and perception of their current experiences (Hwang and Seo, 2016). Therefore, management of CX, for example in the form of designing the customer journey, touchpoint prioritisation, touchpoint journey monitoring, and touchpoint adaptation, is necessary (Homburg *et al.*, 2017).

Although managing CX has been around for a long time and is receiving growing attention, only recently was the concept of CXM clearly conceptualised (Homburg *et al.*, 2017) as a management discipline focused on improving the cognitive and affective evaluation of all direct and indirect encounters customers have with the company in relation to their purchasing behaviour. This conceptualisation introduces CXM as an enterprise-wide management approach that encompasses three dimensions: (1) the cultural mindset regarding CX; (2) the strategic direction for shaping CX; and (3) the corporate capabilities for continuously renewing CX with the goal of achieving and sustaining long-term customer loyalty. The concept was further developed by Klink *et al.* (2021). The authors developed a scale to measure the second-order CXM construct, which can additionally be used to measure CXM maturity.

Klink *et al.* (2021) also showed that CXM is positively related to financial performance and that this effect increases with market turbulence, competitive intensity, and technological turbulence. This is consistent with the results of an empirical study by Grønholdt *et al.* (2015) which revealed that CXM affects differentiation, market performance, and financial performance. In terms of how they master CXM, "high-performing companies differ significantly from low-performing companies, implying that companies that integrate superior CX into their products and services have measurable financial success" (Grønholdt *et al.*, 2015).

Capability perspective of traditional BPM

BPM was traditionally based on process change projects that made more or less radical changes to business processes. At the beginning, Business Process Reengineering (BPR) (Hammer and Champy, 1993) was popular with its radical redesign of processes, and the focus was on reducing process cycle time, lowering costs, and improving quality – well-known dimensions of the magic triangle of project management. Later, traditional BPM was developed as a discipline that "encompasses concepts, methods, techniques, and tools for designing, analysing, executing, and monitoring business processes with the goal of improving performance" (Dumas *et al.*, 2018).

Some important characteristics of traditional BPM, with a focus on process modelling, standardisation and automation, are Harmon (2019): process architecture - a collection of end-to-end, high-level processes in an organisation; the BPM lifecycle - a set of phases in BPM initiatives; methods and tools for process modelling and analysis; IT systems supporting processes, e.g., ERP systems and Business Process Management Suites (BPMSs); process roles, e.g., process owners and process analysts; methods and tools for monitoring business processes, e.g. Key Performance Indicators (KPIs), process performance dashboards, and process mining tools.

Due to the holistic nature of BPM, several BPM maturity frameworks consisting of capabilities have been developed and are commonly used to assess the current state of BPM implementation and guide improvements in this area (Looy *et al.*, 2017). BPM capabilities are generally defined in the literature as a set of skills, activities or routines within an organisation that aim to manage or improve the effectiveness and efficiency of its business processes (Poeppelbuss *et al.*, 2015; Rosemann and vom Brocke, 2015). Most BPM maturity models share eight capability areas: process strategy, BPM project execution, BPM operations, process architecture, governance, process improvement methods, culture/people, and tools and technology (Antonucci *et al.*, 2021).

One of the first traditional BPM maturity frameworks was the business process orientation (BPO) maturity model maturity model developed by McCormack and Johnson (2001), which contains three core elements: Process View, Process Jobs, and Process Management. According to Dumas *et al.* (2018), this is a very important model for the development of BPM since McCormack and Johnson (2001) were among the first to show through empirical research that BPO leads to higher organisational performance.

Another widely used BPM capability framework is presented in de Bruin and Rosemann (2007) and Rosemann and vom Brocke (2015). It consists of six core elements of BPM: Strategic Alignment, Governance, Methods, Information Technology (IT), People and Culture. Each core element includes five capability areas.

New and enhanced BPM capabilities

BPM has evolved over the last decade, especially in the age of digitalisation. Traditional BPM approaches have been criticised for being unable to deal with constant and significant change and uncertainty (Badakhshan *et al.*, 2019). Therefore, in addition to cost, time and quality, the fourth dimension of the Devil's Square – flexibility – has become an important goal of BPM, even though this measure is still the least used to evaluate the impact of process redesign (Dumas *et al.*, 2018).

Several new concepts have been developed in the field of BPM. Rosemann (2014) highlighted value-driven BPM, ambidextrous BPM, and customer process management. Röglinger *et al.* (2018) recognised the great potential of cognitive BPM and outlined several ideas for cognitive BPM use cases. In addition, agile BPM – BPM capable of responding quickly to both internal events and environmental demands (Badakhshan *et al.*, 2019) – has emerged. This development prompted Kerpedzhiev *et al.* (2021) to conduct a Delphi study with international BPM experts from academia and industry to determine new capabilities and enhance existing BPM capability frameworks in the light of digitalisation. They updated the capability framework proposed by de Bruin and Rosemann (2007). The results show that 27 of the 30 capability areas are either new or enhanced versions of existing areas, while only 3 capability areas remain unaltered (Kerpedzhiev *et al.*, 2021). The updated BPM capability framework and a comparison with the traditional framework are shown in Figure 1.

Strategic Alignment	Governance	Methods/Information Technology		People	Culture
Strategic BPM Alignment	Contextual BPM Governance	Process Context Management	Multi-purpose Process Design	BPM and Process Literacy	Process Centricity
Strategic Process Alignment	Contextual Process Governance	Process Compliance Management	Advanced Process Automation	Data Literacy	Evidence Centricity
Process Positioning	Process Architecture Governance	Process Architecture Management	Adaptive Process Execution	Innovation Literacy	Change Centricity
Process Customer and Stakeholder Alignment	Process Data Governance	Process Data Analytics	Agile Process Improvement	Customer Literacy	Customer Centricity
Process Portfolio Management	Roles and Responsibilities	BPM Platform Integration	Transformational Process Improvement	Digital Literacy	Employee Centricity

AS-IS capability area   Enhanced capability area   New capability area

Source(s): Kerpedzhiev *et al.* (2021)

Figure 1. Updated BPM capability framework and a comparison with the traditional one

Kerpedzhiev *et al.* (2021) state that the majority of the new capability areas concern three of the five core elements of BPM: People, Culture, and Methods/IT. Both core elements, People and Culture, include novel customer-focused capability areas Customer Literacy and Customer Centricity. Other new capabilities in People and Culture core elements are Data Literacy, Innovation Literacy, Digital Literacy, Evidence Centricity and Employee Centricity. The Change Centricity capability has been enhanced.

New capability areas are also found in the Methods/IT core element, which has now been merged from two previously separate core elements. There are several new capability areas here, namely, Process Context Management, Process Data Analytics, BPM Platform Integration, and Advanced Process Automation. All the other capability areas in this pillar have been enhanced, although Multi-purpose Process Design, Adaptive Process Execution, and Agile Process Improvement have undergone major changes compared to traditional BPM capabilities.

The relationship between BPM and CXM: a perspective of capabilities

While there are not many papers about the relationship between BPM and CXM, some relevant insights and suggestions about the link between these two concepts can be found in the literature. Improving customer service and satisfaction have been important goals of BPM implementation from the outset (Davenport, 1993; Hammer, 1990) and remain so (Dumas *et al.*, 2018). Schmiedel *et al.* (2013) further identified customer orientation as one of the core values of a BPM culture, an important BPM capability area. Yet, in practice, BPM initiatives still do not place enough emphasis on CX (Pavlić and Ćukušić, 2019). Similarly, Trkman *et al.* (2015) argued that “companies should not mistakenly believe that internal process improvement and automation alone will bring improvement in the eyes of customers” and suggested that “to achieve customer centricity through BPM, companies must gain a deep understanding of their customers’ processes and, if necessary, change not only their interactions with their customers, but also their processes”.

Du Plessis and De Vries (2016) presented a holistic framework for CXM to guide practitioners regarding how to ensure that an organisation is more customer-centric and to implement customer-centric principles in an organisation, which should lead to improved CX. Within this framework, five building blocks are defined as prerequisites for organisational readiness to support CXM. Since one of these building blocks refers to CX-enabled systems, processes, and technologies, we can assume that traditional BPM capabilities are important for CXM implementation. Afflerbach and Frank (2016) also argue the link between BPM and CXM, stating that CXM knowledge about customer satisfaction and BPM process design capabilities must be aligned to assure that the results of customer-centric analytics have a positive impact on process design.

Van den Bergh *et al.* (2012) studied how BPM could contribute to customer centricity and showed that too rigid a process design and too much standardisation usually do not enable the creation of a unique CX. They also suggested that the role of BPM in building a customer-centric organisation should be further explored. Hall and Johnson (2009) also presented very relevant findings that “the movement to standardise processes has gone overboard” and can negatively impact CX in some customer-facing processes, especially when customers value a distinct or unique output. As a counter to process standardisation, they introduced the concept of artistic process management, which refers to more judgement-based work that allows for variability in the process as well as in its inputs and outputs.

Bernardo Junior and de Padua (2023) point out that BPM must enable fast and flexible process changes while providing a better CX. While analysing the current state of alignment of BPM and CXM, Pavlić and Ćukušić (2019) found that BPM initiatives in practice are often not focused on enabling better CX. They also suggested the alignment of BPM and CXM initiatives in the form of an integrated BPM-CXM lifecycle that upgrades the traditional BPM lifecycle (Dumas *et al.*, 2018) and introduces several enhanced techniques that improve traditional process modelling, analysis, and redesign techniques by incorporating the customer journey and touchpoint elements into both high-level and detailed internal business process models.

Moore and Misiak (2018) analysed the relationship between BPM and CXM and suggested that BPM and CXM practitioners should join forces to transform the business. BPM practitioners should therefore learn about CXM (e.g., voice-of-the-customer techniques and customer journey mapping approaches) while CXM practitioners should learn about BPM (e.g., process modelling, analysis and redesign, advanced process automation). Using the example of voice recognition technology in the call centres of a logistics company, they also warned that advanced process automation can hinder CX if not implemented correctly.

Antonucci *et al.* (2021) present the results of an empirical study on the relationship between traditional BPM capabilities and digitalisation benefits. They analysed eight BPM capability areas (Process Strategy, BPM Projects Execution, BPM Operations, Process Architecture, Governance, Process Improvement methods, Culture/People and Tools and Technology) and several benefits of digitalisation, including some related to CXM and CX: improved customer service, improved customer satisfaction, improved customer engagement, new service offerings, and new product offerings. Overall, the results show positive associations between BPM capabilities and digitalisation benefits, yet not for all BPM capability areas studied and all digitalisation benefits. For example, the Culture/People capability area has a strong positive association with almost all digitalisation benefits. Process Improvement Methods, in contrast, are not associated with enabling new services or product offerings. Similarly, neither Process Improvement Methods nor Governance are significantly related to improved customer satisfaction.

Research model

As shown above, the evidence on the impact of traditional BPM capabilities on CXM or CX is mixed. Although traditional BPM should by definition lead to better CX, it is often implemented with an inside-out view (Pavlić and Ćukušić, 2019; Trkman *et al.*, 2015). Over-standardisation of processes and incorrect implementation of IT can also degrade CX (Van Den Bergh *et al.*, 2012). Alignment and stronger linkages between BPM and CXM initiatives were suggested, for example, by Pavlić and Ćukušić (2019) and Moore and Misiak (2018). Moreover, research by Antonucci *et al.* (2021) shows that some traditional BPM capabilities have positive effects on CXM and CX, albeit not all of them.

Further, several of the new concepts mentioned above have emerged in BPM and led to the development of new and enhanced BPM capability areas (Kerpedzhiev *et al.*, 2021) whose relationship with CXM and CX has yet to be explored. Some new customer-focused capability areas are very likely to contribute to better CXM. However, other BPM capability areas might also contribute.

We may conclude from all of this that it is unclear which traditional, enhanced, and new BPM capabilities enable or improve CXM and CX. Future research in this area was also recommended by Kerpedzhiev *et al.* (2021) and Gabryelczyk *et al.* (2022). Building on this, we formulated the following research question:

RQ1. Which traditional, enhanced and new BPM capabilities are relevant for CXM?

Further, it is not clear whether all capabilities are equally important and which of them are necessary and which are sufficient conditions. Current research on the BPM–CXM relationship does not distinguish between these two concepts. This led us to formulate the second research question:

RQ2. Which traditional, enhanced and new BPM capabilities are necessary and which are sufficient for CXM?

We limited the study to those BPM capability areas which have undergone more significant changes in this respect, i.e. Methods/IT, People and Culture. The research model is presented in Figure 2.

To answer the research questions, we developed a questionnaire based on traditional, enhanced and new BPM capability areas and used it in a survey of medium- and large-sized companies. We expected that the results of our study would provide answers to the research questions and highlight issues that could become the focus of future research.

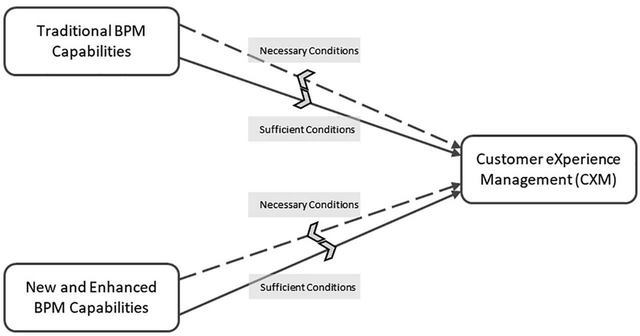
Research design and methodology

Instrument development

The design, measurement items, and questionnaire were developed according to the guidelines proposed by MacKenzie *et al.* (2011). We used a questionnaire consisting of three parts: (1) Traditional BPM capabilities; (2) New and enhanced BPM capabilities; and (3) Customer experience management. The questionnaire was developed by building on the previous theoretical basis to assure content validity. For all constructs, existing measurement instruments established in earlier studies were used or measurement instruments were developed based on established models. To ensure face validity (Cooper and Schindler, 2004), pre-testing was conducted using a focus group involving five selected BPM practitioners and academics who were not included in the subsequent research. Some changes were made based on their suggestions.

For measuring traditional BPM capabilities, we applied the BPO maturity model (McCormack and Johnson, 2001) that has three dimensions: Process View (PV), Process Jobs (PJ), and Process Management and Measurement (PMM). Based on suggestions, during pre-testing we removed PJ and PMM from the questionnaire since these two dimensions also form part of enhanced BPM capabilities.

The measures of enhanced and new BPM capabilities applied in this research are based on the updated BPM capability framework (Kerpedzhiev *et al.*, 2021). Given that the majority of the new capability areas in this framework belong to the Methods/IT, People and Culture core elements, we included all new capability areas and substantially enhanced the capability areas from these three pillars. According to this criterion, all capability areas except BPM and Process Literacy and Process Centricity, which haven't been enhanced, were included. Similarly, all new BPM capability areas from the Methods/IT pillar and also Multi-purpose Process Design, Adaptive Process Execution and Agile Process Improvement were included. We designed several items for each capability area directly from the definition, whereby we broke the definition up into individual unambiguous statements.



Source(s): Figure by authors

Figure 2. Conceptual research model

Based on the pre-testing conducted to ensure the face validity of the questionnaire, one BPM capability area was eliminated from further analysis. Practitioners namely did not understand the difference between Adaptive Process Execution and Process Context Management, leading us to eliminate the latter. Finally, the questionnaire included the following constructs in the area of new and enhanced BPM capabilities:

(1) Methods/IT core element: Process Data Analytics (PDA), BPM Platform Integration (PI), Adaptive Process Execution (APE), Multi-purpose Process Design (MPD), Advanced Process Automation (APA), Agile Process Improvement (API).

(2) People core element: Data Literacy (DL), Innovation Literacy (IL), Customer Literacy (CL), Digital Literacy (DGL).

(3) Culture core element: Evidence Centricity (EDC), Change Centricity (CC), Customer Centricity (CUC), Employee Centricity (EC).

To measure CXM, we relied on the questionnaire developed by Klink *et al.* (2021). It is a two-level, second-order construct comprising three dimensions: cultural mindset regarding CXs (CXMCUL), strategic directions for designing CXs (CXMSTR) and firm capabilities of continually renewing CXs (CXMCAP).

We used a structured questionnaire with five-point Likert scales, with 1 indicating complete disagreement and 5 complete agreement. The complete questionnaire with all the survey items is included in the Appendix.

Data collection, preparation and analysis

The data were collected through a survey addressed to all medium and large companies in three EU countries: Croatia, Germany and Slovenia. The definition of medium and large companies is consistent across the entire EU. These classifications encompass companies that fulfil at least two of the following criteria: having more than 50 employees, achieving a turnover exceeding €10 million, or possessing a balance sheet total exceeding €10 million. The invitation to participate was sent through various channels (e-mail and traditional mail) in order to ensure the highest possible response rate. The questionnaire was to be completed by the person most familiar with the survey topic, e.g., a board member responsible for business processes, digitalisation, IT, marketing or sales, or another person responsible for these areas in the organisation, e.g., the head of IT, digitalisation or marketing. To make it easier for respondents to understand the questions and statements, the questionnaire was translated into the local language. Two rounds of the call were made, yielding a total sample of 268 who at least partially answered the survey, among whom 147 were in Germany, 71 in Slovenia, and 50 in Croatia.

The data preparation process was performed using RapidMiner (Mierswa *et al.*, 2006). To cope with missing values, two commonly used methods were employed. First, we used case-wise deletion (Madley-Dowd *et al.*, 2019; Wang *et al.*, 2022) to eliminate entire observations with 10 or more missing values, resulting in no variable having a proportion of missing values exceeding 10%. These turned out to mainly be cases where respondents started the questionnaire but did not complete it. This step was done in line with the principle that analyses which account for missing data must consider the reasons for missingness (Madley-Dowd *et al.*, 2019) and the general statistical guidance which states that bias is likely in analyses with more than 10% of values missing (Madley-Dowd *et al.*, 2019). After this removal, 165 observations were obtained.

The remaining missing values, which appear to be missing at random, were imputed using k-nearest neighbours (KNN), which is these days primarily popular due to its accuracy in missing value imputation (Wang *et al.*, 2022). Outlier analysis revealed one outlier, which was removed. This altogether resulted in 164 complete observations that were used for further analysis.

The requirements of the regression analysis caused us to convert the nominal variables into numerical variables using dummy coding. This resulted in three variables for three countries (Slovenia, coded as SI; Croatia, coded as HR, Germany, coded as D) and four variables for four size classes according to the number of employees (less than 50, coded as Size1; 50–249, coded as Size2; 250–1,000 coded as Size3; more than 1,000, coded as Size4). Finally, the variables of the second-order construct CXM were calculated as the average of the variables for each first-order construct representing the corresponding CXM dimension: CUL (CXM1-CXM4), STR (CXM5-CXM8) and CAP (CXM9-CXM12).

To conduct the data analysis, hierarchical regression analysis (Field, 2018) and necessary condition analysis (Dul, 2016) were used. Exploratory factor analysis and regression analysis were performed using IBM SPPS (Field, 2018), while for the confirmatory factor analysis and the necessary condition analysis SmartPLS 4 (Ringle *et al.*, 2022) was used.

Analysis and results

Exploratory factor analysis

In this research, we employed some new constructs (new and enhanced BPM capabilities) and some already developed constructs (PV and CXM). Therefore, we first performed exploratory factor analysis (EFA) in SPSS for all new constructs. We applied the Maximum Likelihood extraction method and a Promax rotation on the 43 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, KMO = 0.926 – values above 0.9 are considered to be superb. Bartlett's test of sphericity was highly significant ($p < 0.000$) (Field, 2018).

After the initial analysis, we checked highly correlated (correlation coefficients of more than 0.7) items and items with low communalities (less than 0.4) or low factor loadings (less than 0.4). Before making the decision to remove an item, we checked its content and removed only those that did not fit well to the factor as well in terms of content (Field, 2018). We also combined some items into the same construct if they loaded onto the same factor and this was justified with respect to their content. Based on these criteria, we eliminated the whole construct Digital Literacy (items DGL1 and DGL2), items EC1, CC1, CL1, MPD3. Further, we merged items APA1 and PI1 to form a single construct, which we named Advanced Process Digitalisation (APD).

After that, 39 items were retained for the analysis. The Kaiser–Meyer–Olkin measure was still very high (KMO = 0.920) and Bartlett's test of sphericity was also highly significant ($p < 0.000$).

Assessment of the measurement model (CFA)

As the first step in the evaluation of the reliability and validity of our measurement model, we evaluated the model resulting from the EFA, where the individual CXM dimensions were modelled as first-order constructs.

Almost all measures showed the measurement model had a satisfactory level of quality, apart from the multicollinearity indicator Variance Inflation Factor (VIF). While there is no consensus on which cut-off score is most appropriate (Thompson *et al.*, 2017), VIF values for Process Data Analytics variables (PDA2, PDA3, PDA4), where some were considerably higher than 3, indicate a certain level of multicollinearity, which can cause a problem when a regression analysis is being conducted (Thompson *et al.*, 2017). After reviewing the questions, we found that PDA3 actually has some overlap with the other PDA questions and thus excluded it from further analysis. After removing PDA3, the reliability and validity assessment showed satisfactory values for all the measures.

Finally, in the third step, we examined the reliability and validity measures (see Table 1) for the model where CXM was modelled as a second-order construct, as used later in the

Table 1. Reliability and validity measures of the measurement model

	Cronbach's alpha	Composite reliability (ρ_A)	Composite reliability (ρ_C)	Average variance extracted (AVE)
PV	0.687	0.735	0.803	0.507
MPD	0.724	0.739	0.844	0.645
APE	0.708	0.736	0.828	0.617
API	0.833	0.839	0.888	0.666
APD	0.707	0.712	0.872	0.773
PDA	0.878	0.879	0.925	0.804
DL	0.807	0.809	0.886	0.721
IL	0.847	0.848	0.929	0.867
CL	0.852	0.854	0.910	0.772
EDC	0.883	0.885	0.914	0.681
CC	0.875	0.877	0.914	0.728
CUC	0.859	0.859	0.914	0.780
EC	0.872	0.874	0.921	0.796
CXM	0.904	0.904	0.940	0.838

Source(s): Table by authors

regression analysis. In this model, all Cronbach alphas easily exceeded the 0.7 threshold (Nunnally and Bernstein, 1994), except for PV where the value was borderline. Without exception, the latent variables' composite reliabilities ranged between 0.7 and 0.9, which is considered as satisfactory to good, and none of the values exceeded 0.95, which would be considered as problematic (Hair *et al.*, 2019). The average variance extracted (AVE) was mostly around 0.7 or above, thus always exceeding the threshold of 0.5, demonstrating the constructs' convergent validity (Fornell and Larcker, 1981).

The reliability of the measurement model was also confirmed by computing standardised loadings for the indicators. All but one of the standardised loadings of the indicators in the model exceed the recommended 0.708 threshold (Hair *et al.*, 2019), thereby demonstrating acceptable reliability.

Assessing the indicator cross-loadings was the first procedure in testing the discriminant validity (Hair *et al.*, 2019). The results indicated that the manifest variable loadings on their theoretically assigned latent variables have an order of magnitude larger than all other loadings on other constructs (Gefen and Straub, 2005). Therefore, all the item loadings met the criteria.

The second criterion used to assess discriminant validity was the Heterotrait-monotrait (HTMT) ratio of correlation (Henseler *et al.*, 2009) that has recently become preferred over the traditionally used Fornell and Larcker criterion, which is less suitable for assessing discriminant validity (Hair *et al.*, 2019). HTMT values close to 1 indicate a lack of discriminant validity. Almost all HTMT values (see Table 2) are significantly below the 0.90 threshold, indicating a high level of discriminant validity. The exception is the CXM-CUC construct pair where the value is close to 0.9 but still well below 0.95, which is the threshold for constructs that are conceptually similar (Henseler *et al.*, 2009), as is also the case for this pair.

Common method bias

We performed two different tests to determine the presence of common method bias (CMB): Harman's single factor test and the full collinearity test. For Harman's test, we performed exploratory factor analysis in SPSS based on the unrotated single factor. If the total variance extracted in this way exceeds 50%, common method bias is present (Podsakoff and Organ, 1986). In our case, a single factor explained 32.4% of the variance, suggesting there was no indication of substantial common method bias.

Table 2. Heterotrait-monotrait (HTMT) ratio of correlation

	PV	MPD	APE	API	APD	PDA	DL	IL	CL	EDC	CC	CUC	EC	CXM
PV														
MPD	0.436													
APE	0.476	0.444												
API	0.459	0.827	0.615											
APD	0.397	0.608	0.421	0.512										
PDA	0.683	0.541	0.589	0.615	0.680									
DL	0.292	0.707	0.352	0.720	0.522	0.438								
IL	0.291	0.521	0.329	0.620	0.499	0.381	0.676							
CL	0.441	0.592	0.586	0.695	0.434	0.581	0.609	0.520						
EDC	0.460	0.719	0.452	0.738	0.547	0.606	0.839	0.532	0.654					
CC	0.518	0.642	0.460	0.772	0.514	0.643	0.690	0.713	0.739	0.768				
CUC	0.319	0.601	0.441	0.723	0.400	0.478	0.617	0.491	0.720	0.661	0.667			
EC	0.517	0.632	0.372	0.670	0.480	0.540	0.624	0.674	0.604	0.625	0.842	0.664		
CXM	0.343	0.702	0.496	0.821	0.521	0.507	0.754	0.608	0.779	0.794	0.765	0.890	0.651	

Source(s): Table by authors

For a full collinearity test, all latent variables in the model are included as predictors pointing to a single dummy variable (Kock and Lynn, 2012). Trying to find the common variance between unrelated latent factors, likely due to a CMB, rather than natural correlations, VIFs equal to or greater than 3.3 suggest the existence of CMB (Kock and Lynn, 2012). In our case, all VIFs are below this threshold, most of them significantly.

Regression analysis

In order to discover which BPM capabilities are sufficient conditions for CXM, we continued the analysis with a hierarchical regression. At the start of the analysis, the assumptions for a regression analysis were tested following the guidelines proposed by Field (2018). The normality test, linearity test, and outliers were checked with the Normal Probability Plot (P-P) of the Regression Standardised Residual and the scatterplot. The scatterplots showed that there were no outliers. The result of the Durbin-Watson test was 2.034, meaning that the residuals are uncorrelated since the value is very close to 2 (Field, 2018).

We built five models:

(1) Model 1 included only control variables coded as dummy variables. The first set of control variables included variables that represent the number of employees: Size1, Size2, Size3 and Size4. We selected Size4 as a baseline, which was not included in regression since it was the largest. The second control variable was country. Given that most of the responses came from Germany, we included the variables SI and HR in the model to denote responses from Slovenia and Croatia.

(2) Model 2 also included the variable PV, which represents traditional BPM.

(3) In model 3, we added variables from the Methods/IT core elements. These were the variables APE, PDA, MPD, API and APD.

(4) Model 4 also included variables from the People core element: DL, IL, CL.

(5) In the final model, model 5, we added variables from the Culture core element: EDC, CC, CUC, EC.

Table 3 presents a summary of the models included in the hierarchical regression. As we can see, the first model had very low R^2, only 0.02 and F Change was not significant, which means that the control variables do not influence the results. For all the following models, the increase of R^2 was significant. However, R^2 was low for model 2 (0.095) and then increased considerably (to 0.572) for model 3, which included a variable from the area Methods/IT from new and enhanced BPM capabilities. The final model, model 5, had a very high R^2 (0.791).

Table 4 presents standardised regression coefficients and their significance for all five models.

Model 5 had the highest R^2 value (0.791), which means this model is relevant (Field, 2018). As may be seen in Table 4, four variables have a statistically significant effect on CXM, namely the variables API, CL, CUC and EDC.

Necessary condition analysis

While traditional analytical tools, such as multiple regression analysis, indicate the sufficiency of a condition that ensures that the outcome exists, identifying the necessary determinants has great practical relevance and impact because a necessary condition allows an outcome to exist and therefore the absence of the necessary factors inhibits the organisation from achieving the outcome, and in turn a better performance (Dul, 2016). In other words, a necessary condition as a barrier or a bottleneck that must be managed to attain the desired outcome.

Table 3. Summary of models included in the hierarchical regression

	Predictors	R^2	R^2 change	F change
Model 1	Size1, Size2, Size3, SI, HR	0.020	0.020	0.633
Model 2	Size1, Size2, Size3, SI, HR, PV	0.095	0.075	13.003***
Model 3	Size1, Size2, Size3, SI, HR, PV, APE, PDA, APD, MPD, API	0.572	0.477	33.902***
Model 4	Size1, Size2, Size3, SI, HR, PV, APE, PDA, APD, MPD, API, DL, IL, CL	0.690	0.118	18.846***
Model 5	Size1, Size2, Size3, SI, HR, PV, APE, PDA, APD, MPD, API, DL, IL, CL, EC, CUC, CC, EDC	0.791	0.101	17.527***

Note(s): Dependent Variable: CXM; *p < 0.05, **p < 0.01, and ***p < 0.001
Source(s): Table by authors

Table 4. Standardised regression coefficients and their significance for all five models

	Model 1	Model 2	Model 3	Model 4	Model 5
(Constant)	***	***	***	*	
Size1	0.003	0.019	−0.027	−0.064	−0.081
Size2	0.048	0.028	−0.035	−0.078	−0.072
Size3	−0.111	−0.098	−0.130*	−0.111*	−0.061
SI	−0.081	−0.140	−0.024	0.058	0.029
HR	0.019	−0.062	−0.120	−0.080	−0.050
PV		0.288***	−0.008	−0.020	−0.022
MPD			0.136	0.046	0.006
APE			0.104	0.034	0.034
API			0.554***	0.359***	0.199**
APD			0.109	0.066	0.053
PDA			0.010	−0.065	−0.106
DL				0.221***	0.071
IL				0.046	0.041
CL				0.335***	0.176**
EDC					0.195**
CC					0.075
CUC					0.394***
EC					−0.043

Note(s): Dependent Variable: CXM; *p < 0.05, **p < 0.01, and ***p < 0.001
Source(s): Table by authors

We accordingly also carried out a Necessary Condition Analysis (NCA) to look for potential constraints or bottlenecks that prevent high levels of CXM from occurring. NCA identifies empty areas in scatterplots that display values for one latent variable and CXM and draws "ceiling lines" (see Figure 3) which separate empty from full data areas (Dul, 2016). The CE-FDH ceiling line is a piecewise linear function along the upper left observations, while the CR-FDH draws a regression line through the upper-left edges of the CE-FDH piecewise linear function. The necessity effect size *d* is calculated by dividing the "empty" area by the entire area size. Generally, a value of *d* between 0.1 and 0.3 indicates a medium effect, values between 0.3 and 0.5 a large effect, and values above 0.5 a very large effect (Dul, 2016).

Table 5 shows the necessity effect size *d* values for both CE-FDH and CR-FDH, including the indication of the statistical significance of the effect size resulting from the permutation test. It turned out that the factors with a large statistically significant necessity effect on CXM were DL, CL, CC and CUC, while MDP, APE, API, PDA and IL have only a medium (to minor) necessity effect.

The levels of some selected medium to high effect factors needed to achieve certain CXM levels are clearly visible in the ceiling line charts that depict both the CE-FDH and CR-FDH (see Figure 3).

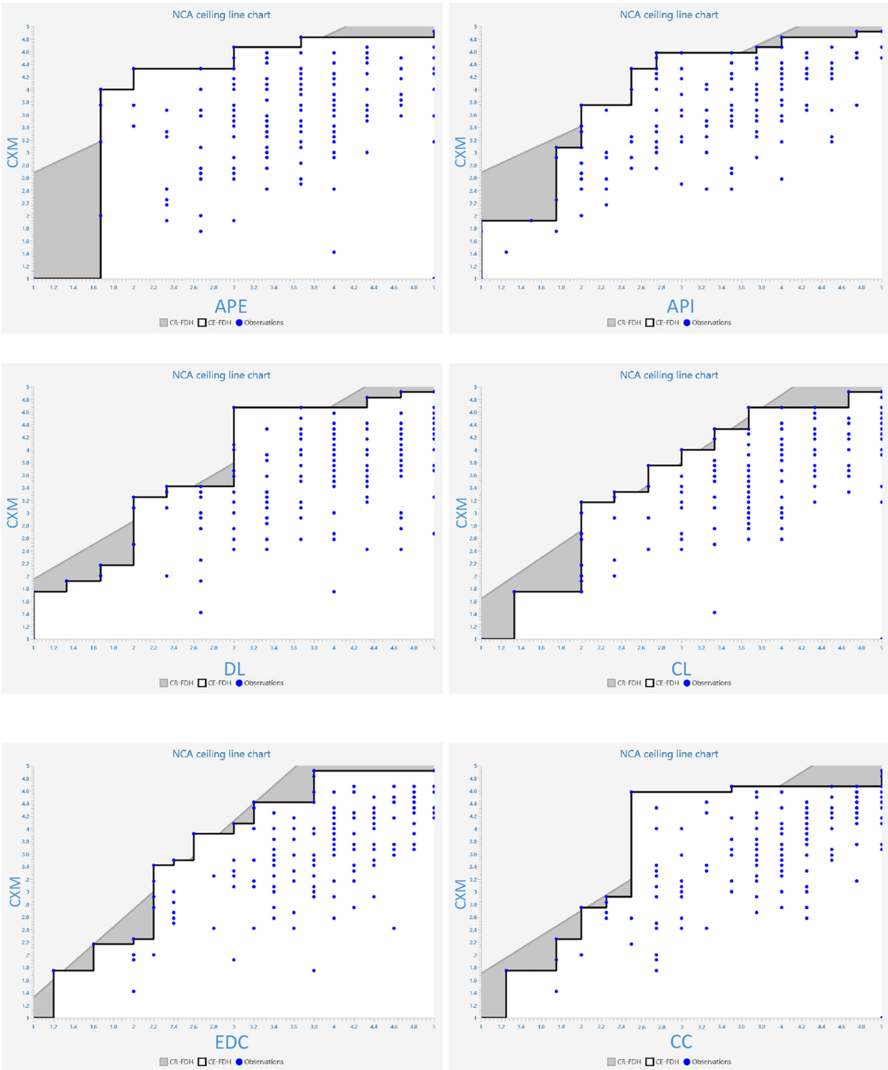


Figure 3.
NCA ceiling line charts for selected factors (APE, API, DL, CL, EDC, CC, CUC)

(*continued*)

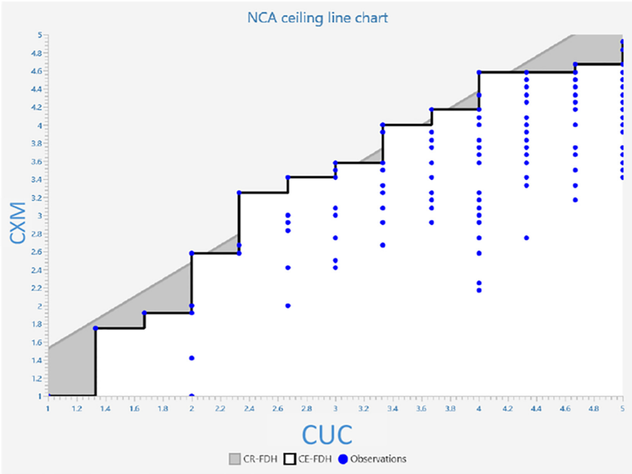


Figure 3.

Source(s): Figure by authors

Table 5.
Effect size d for CE-FDH and CR-FDH

	Effect size *d*	
	CE-FDH	CR-FDH
PV	0.051*	0.045*
MPD	0.156**	0.170**
APE	0.258**	0.227**
API	0.263**	0.229**
APD	0.032*	0.028
PDA	0.118**	0.102**
DL	0.324**	0.316**
IL	0.106**	0.083*
CL	0.373**	0.327**
EDC	0.335**	0.302**
CC	0.332**	0.341**
CUC	0.427**	0.397**
EC	0.128*	0.121

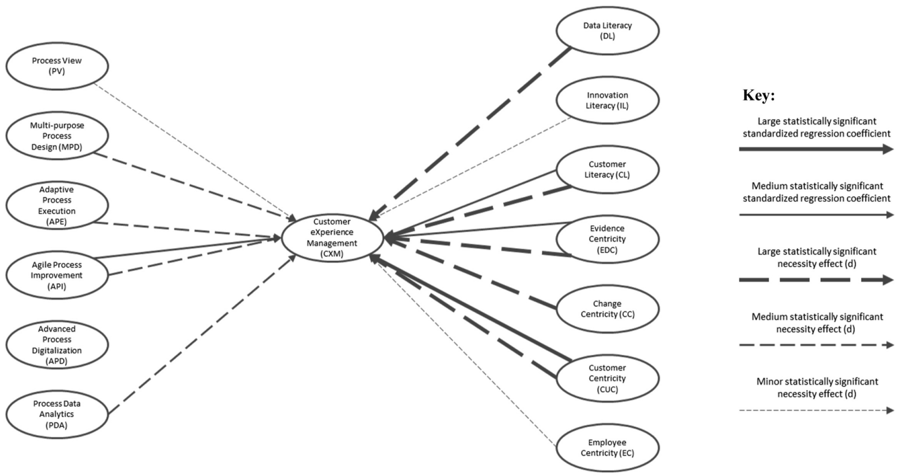
Note(s): ***p*-value <0.01; *<0.05
Source(s): Table by authors

Discussion

Discussion of the research findings

In this research, we analysed which traditional, enhanced and new BPM capabilities are relevant to CXM (RQ1), which of them are necessary conditions, and which are sufficient conditions (RQ2). A hierarchical linear regression was used to determine which BPM capability areas are sufficient conditions for CXM, and necessary condition analysis was used to find out which are necessary conditions. The joint results of both analyses are shown in Figure 4.

As we can see, traditional BPM, which focuses on modelling and standardising processes (Dumas *et al.*, 2018; Harmon, 2019), is only a necessary condition for CXM with minor importance. Activities such as understanding processes, identifying bottlenecks, recognising



Source(s): Figure by authors

Figure 4. Summarised results of the regression and necessary condition analysis

inefficiencies and areas for improvement, and designing and implementing improved processes are not sufficient to achieve higher levels of CXM. Therefore, the mixed results of previous research on the impact of BPM on CXM (Antonucci *et al.*, 2021; Hall and Johnson, 2009) are not surprising.

On the other hand, almost all new or enhanced BPM capabilities that were included in the study, except for Advanced Process Digitalisation, are at least minor statistically significant necessary conditions for CXM. Data Literacy, Customer Literacy, Evidence Centricity, Change Centricity and Customer Centricity even have a large effect. Sufficient conditions are Customer Centricity, Evidence Centricity, Customer Literacy, and Agile Process Improvement. It is worth noting that Advanced Process Digitalisation is neither a necessary nor a sufficient condition for CXM. The fact that the results of this research show the different importance of BPM capabilities for CXM may somewhat explain the contradictory results of previous studies on the relationship between BPM and CXM.

Most BPM capability areas that are necessary and sufficient conditions for CXM are in the People and Culture core elements. This is not surprising given that earlier research, e.g., Antonucci *et al.* (2021) and Hall and Johnson (2009), also concluded that the People and Culture core elements are the most important for CXM and CX. Customer Centricity and Customer Literacy are very important necessary and also sufficient conditions for CXM maturity. This was largely expected as both are customer-focused capability areas that resemble CXM to some degree. However, there are also important differences because these two capability areas are in the BPM context. Customer Centricity means that an organisation takes the customer perspective into account and incorporates customer feedback in all stages of the BPM lifecycle (Frank *et al.*, 2020), while Customer Literacy involves knowledge about the customers' processes (Kerpedzhiev *et al.*, 2021). They both bring dynamics to business processes since it is necessary to respond quickly to changes in customer expectations and the environment in general.

The results of this study show that Evidence Centricity is an important necessary and also sufficient condition for CXM. Commitment to grounding BPM and process decisions based on evidence and analytical insights (Kerpedzhiev *et al.*, 2021; Palvölgyi and Moormann, 2021) is obviously a very important precondition for CXM, yet it can also lead to higher CXM maturity. Further, evidence-centric business processes can enable organisations to monitor and measure the impact of their changes on the customer experience. This can help organisations to optimise their processes and continuously improve the customer experience over time.

On the other hand, the only new or enhanced BPM capability area in the Methods/IT core element that is a necessary and sufficient condition for CXM is Agile Process Improvement. Although the importance of dynamics, agility and flexibility of business processes in order to create a unique CX was already pointed out in prior research, e.g. by Bernardo Junior and de Padua (2023), our research extends previous findings by using an enhanced understanding of agile process improvement, a larger sample of companies, and empirical research methods. Several other BPM capability areas were also revealed as significant necessary conditions for CXM, albeit they were not sufficient. Again, the majority were in the People and Culture core elements.

Further, the majority of other new and enhanced BPM capabilities in the Methods/IT core element – Adaptive Process Execution, Multi-purpose Process Design and Process Data Analytics – are medium important necessary conditions to implement CXM in a company. The importance of similar concepts was also noted in prior research. For example, Van den Bergh *et al.* (2012) suggested that the adaptability of processes is important for CX. The important role of multi-purpose process design determined by external environment factors like customers, suppliers, and regulatory pressures has also been recognised (Gabryelczyk and Roztocki, 2018). However, our research adds to previous research by showing that these capabilities are only necessary conditions for CXM, meaning that while CXM is not possible without them, they are apparently unable to significantly improve CXM on their own.

Advanced Process Digitalisation should also be emphasised here, where the results of the analysis show it has no impact on CXM. This result can be related to the research in which Haleem *et al.* (2021) explain the term hyperautomation as an extension of the traditional concept of business process automation. According to Haleem *et al.* (2021), hyperautomation is the application of advanced technologies such as robotic process automation (RPA), machine learning (ML), and artificial intelligence (AI) to process automation. The impact of automating existing processes is mostly internal and is seen in reduced costs and manual activities, the higher quality and safety of process execution (while eliminating mistakes), and minimising the risk of non-compliance, even though it is usually only visible weakly or in very limited way to customers (Haleem *et al.*, 2021; Ray *et al.*, 2019). It may thus be concluded that the internal nature of process automation outcomes is the reason that Advanced Process Digitalisation does not contribute to achieving better CXM and is even not a prerequisite for CXM.

Theoretical contributions

The answers to the research questions and the discussion reveal that this research makes an important contribution to understanding the impact of BPM on business performance, especially in light of the contemporary view of BPM that emphasises many new or enhanced capabilities (Kerpedzhiev *et al.*, 2021). Although we generally assume that the updated BPM capability framework is the key for BPM to drive corporate success, notably in the digitalisation context, the underlying mechanisms of BPM's impact on business performance are not yet fully explored and understood. In particular, this research focuses on understanding the impact of new and enhanced BPM capabilities on business performance through CXM and indirectly on CX. This approach to bridging the gap in better understanding the business value of BPM builds on the already known findings that CXM is positively related to financial performance (Klink *et al.*, 2021). Consequently, the theoretical contribution of the research lies in a better understanding of the role played by BPM for CXM, where previous research provides mixed results (Antonucci *et al.*, 2021; Van Den Bergh *et al.*, 2012; Hall and Johnson, 2009; Moore and Misiak, 2018).

Practical implications
The study's findings enable organisations to guide the development of BPM capabilities so that BPM can play an important role in building a customer-centric organisation. Both initiatives, BPM and CXM, must therefore work in unison (Moore and Misiak, 2018; Pavlić and Ćukušić, 2019) to develop a decision-making culture based on facts and agility in process improvements. In summary, understanding the importance of and developing various new and enhanced BPM capabilities permits organisations to dynamically capture ever-changing customer needs and expectations, to transform their business processes with the customer perspective in mind, and manage their business operations to improve competitiveness and business performance.

Conclusions
The earlier research failed to account for differences in the relevance of individual BPM capabilities for CXM and often ignored the fact that, contrary to its stated goals and principles, BPM has largely been implemented with an internal focus (Trkman *et al.*, 2015) rather than an outside-in view. Hence, we answer the call to further investigate the role of BPM in building a customer-centric organisation (Van Den Bergh *et al.*, 2012; Gabryelczyk *et al.*, 2022; Rosemann, 2014). Our findings not only add to understanding of the BPM value, but also confirm the relevance and comprehensiveness of the updated BPM capability framework developed by Kerpedzhiev *et al.* (2021). Further, this research distinguishes between necessary and sufficient BPM capabilities to achieve a high level of CXM.

This study also has some limitations. The data were collected in three Central European countries with similar national cultures. If the data had been collected in countries on other continents, the results might have been different as national culture is also reflected in organisational culture (Sunny *et al.*, 2019). This is especially important since BPM capabilities, which are the main necessary and sufficient conditions for CXM maturity, come from the People and Culture core elements. It could thus be interesting to replicate the same research in countries on other continents.

We also recommend some areas for future research. Confirmative research methods could be used to analyse how and when the capability areas lead to CXM maturity. Various constructs could be used as mediating or moderating variables. In particular, the role of the capability areas associated with digital technology – BPM Platform Integration and Advanced Process Automation – needs to be analysed in greater detail in relation to CXM. For BPM capabilities that are only necessary conditions for CXM, it would be interesting to determine in which circumstances they might become sufficient conditions. Qualitative research in the form of case studies would also be valuable.

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Appendix
Constructs and items from the questionnaire

Traditional BPM capabilities (McCormack and Johnson, 2001)

Process view (PV)

PV1 The average employee views the business as a series of linked processes.

PV2 Process terms such as input, output, process, and process owners are used in conversation in the organisation.

PV3 Processes within the organisation are defined and documented using inputs and outputs to and from our customers.

PV4 The business processes are sufficiently defined so that most people in the organisation know how they work.

New and enhanced BPM capabilities (Kerpedzhiev *et al.*, 2021)

Process data analytics (PDA)

PDA1 We collect and extract process execution data.

PDA2 We correlate data with business processes.

PDA3 Our company grounds BPM decisions on evidence and analytical insights.

PDA4 Our company grounds process decisions on evidence and analytical insights.

BPM platform integration (PI)

PI1 We established and maintain a BPM platform with integrated components for all BPM lifecycle phases and standardised interfaces (application programming interfaces) with other platforms and systems (e.g., other BPM platforms, enterprise systems, smart things, event-processing engines).

Adaptive process execution (APE)

APE1 We implement processes depending on the context (e.g., task modalities, data flows, resource availability, process performance, process dependencies as well as for process participants' skills and mental states).

APE2 We re-design processes depending on the context.

APE3 We recommend next best actions depending on the context.

Multi-purpose process design (MPD)

MPD1 We collaboratively design business processes.

MPD2 We make process decisions in line with multiple purposes (e.g., customer centricity, flexibility awareness).

MPD3 We leverage reference processes and process fragments.

MPD4 We support personal processes tailored to the needs of individual process participants.

Advanced process automation (APA)

APA1 We systematically exploit automation technologies (e.g., robotic process automation, cognitive automation, social robotics, and smart devices) to assist human process participants in unstructured tasks and complex decisions or fully automate such tasks and decisions.

Agile process improvement (API)

API1 We improve business processes fast.

API2 We improve business processes iterative.

API3 We evaluate new process designs based on performance data.

API4 We evaluate new process designs based on feedback from process participants, particularly from customers.

Data literacy (DL)

DL1 We have knowledge about data analysis techniques (e.g., statistical methods, data mining, machine learning, data quality management).

DL2 We have knowledge about data privacy and security.

DL3 We have knowledge about corporate data assets related to business processes.

Innovation literacy (IL)

IL1 We have knowledge about innovation techniques (e.g., creativity techniques, lateral thinking, design thinking, lean start-up, open innovation, business model innovation).

IL2 We have ongoing innovation activities in the organisation.

Customer literacy (CL)

CL1 We have knowledge about customer analysis techniques (e.g., customer journey mapping, customer valuation, customer segmentation).

CL2 We have knowledge about customers' needs.

CL3 We have knowledge about customers' interaction preferences in omni-channel environments.

CL4 We have knowledge about customers' processes.

Digital literacy (DGL)

DGL1 We have knowledge about the mechanisms underlying the digital economy.

DGL2 We have knowledge about the opportunities associated with emerging technologies.

Evidence centricity (EDC)

EDC1 We believe that having, understanding and using data and information plays a critical role.

EDC2 We are open to new ideas and approaches that challenge current practices on the basis of new information.

EDC3 We depend on data-based insights to support decision making.

EDC4 We use data-based insights for the creation of new services or products.

EDC5 We use data-based insights for the creation of new services or products.

Change centricity (CC)

CC1 Our company is committed to continuously scrutinise business processes.

CC2 Our company is committed to capitalise on opportunities of emerging technologies.

CC3 Our company is committed to tackle unprecedented challenges in the corporate environment.

CC4 Our company is committed learn from failure.

CC5 Our company is committed embrace fast and iterative approaches to change.

Customer centricity (CUC)

CUC1 Our company is committed to take the customer perspective.

CUC2 Our company is committed to embrace customer feedback in all BPM lifecycle phases.

CUC3 Our company is committed to delight customers with business processes that yield excellent products and services.

Employee centricity (EC)

EC1 Our company is committed to involve employees in BPM and process decisions.

EC2 Our company is committed to account for the effects of these decisions on employees' work lives.

EC3 Our company is committed to contribute to employees' satisfaction and self-fulfilment.

EC4 Our company is committed to grant employees the sovereignty to make self-dependent decisions.

Customer experience management (Klink *et al.*, 2021)

Cultural mindset regarding CXs (CUL)

CXM1 We understand the customer perspective across the entire customer journey.

CXM2 We recognise the importance of customer touchpoints across pre-purchase, purchase and post-purchase situations.

CXM3 We go beyond customer satisfaction by creating the total CX.

CXM4 We use business partners to streamline the CX.

Strategic directions for designing CXs (STR)

CXM5 Our touchpoints are consistent (e.g. have a similar look and feel).

CXM6 Our touchpoints are seamless (e.g. easy transition between online and offline environments).

CXM7 Our touchpoints are customised (e.g. are tailored to individual customers).

CXM8 Our touchpoints are thematic (e.g. convey a central message such as luxury and family friendly).

Capabilities to continually renewing CXs (CAP)

CXM9 To improve CX, we map the entire customer journey.

CXM10 To improve CX, we monitor our performance at various touchpoints.

CXM11 To improve CX, we (re)allocate resources, as needed.

CXM12 To improve CX, we coordinate different organisational competencies (e.g., product development, sales and communications).

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