



Business Process Performance

Investigating the Impact of Process-Oriented Appraisals and Rewards on Success

Tahir Ahmad · Amy Van Looy · Aygun Shafagatova

Received: 10 May 2023 / Accepted: 22 May 2023 / Published online: 28 June 2023
© The Author(s), under exclusive licence to Springer Fachmedien Wiesbaden GmbH 2023

Abstract Considering humans are involved in business process activities, process-oriented appraisals and rewards (POAR) can help stimulate process outcomes. Given a lack of knowledge about the intersection between business process management (BPM) and human resource management (HRM), the authors delve into POAR. The study starts from the theoretical capabilities of BPM and then follows a mixed-method design to develop rich and substantive evidence for successful POAR implementations. Empirical data was collected by ten case organizations experienced in POAR, and a survey with 403 higher-level managers across four continents. From the case data, diverse perspectives have emerged on the supporting capabilities for POAR and especially their interrelationships. Additionally, statistical evidence shows a decisive role of POAR in affecting process performance. While all BPM-specific capabilities seem to matter for POAR, only some also contribute to process performance through POAR. Novelty in the work resides in producing a POAR-based process performance model.

Keywords Business process management · Performance management · Appraisals and rewards · Case study · Survey

1 Introduction

Organizations can align the business process management (BPM) and strategic human resource management (SHRM) disciplines to achieve business goals and increase performance (Santos et al. 2014; Shahreki 2019). Although an organization's structure and culture play a significant role in determining organizational performance (Marcoulides and Heck 1993), individuals strongly contribute to performance (Bronzo et al. 2013; Kohlbacher and Reijers 2013). Similarly, prior research has demonstrated that a process-oriented culture (i.e., corporate values supporting BPM realizations) directly affects process performance (Schmiedel et al. 2020). Because a process-oriented culture is an organizational capability that guides individual attitudes and behaviors in favor of BPM, individual process orientation reflects BPM success through attitudes and beliefs about dedicated BPM roles (e.g., process owners) and duties (Benraad et al. 2022). Therefore, working in a process-oriented way (including process knowledge, process awareness, cross-functional coordination and improvement reflections) is a critical success factor for outcomes such as flexibility, productivity and transparency (Kohlbacher and Reijers 2013; Skrinjar and Trkman 2013). Nevertheless, more research is required on the BPM–HRM intersection to include better the perspective of employees when targeting performance management.

The HRM discipline focuses on performance-related appraisals and reward systems based on different forms (e.g., pay, bonuses, monetary rewards, promotions, and other fringe benefits) (Mone and London 2018). However, differentiating HRM practices according to the strategically relevant business processes is crucial (Huselid 2006). In line with the dynamic capabilities view (Teece et al. 1997), a proper alignment of BPM capabilities with HRM

Accepted after 2 revisions by Jan Mendling.

T. Ahmad · A. Van Looy (✉) · A. Shafagatova
Faculty of Economics and Business Administration, Department
of Business Informatics and Operations Management, Ghent
University, Ghent, Belgium
e-mail: Amy.VanLooy@UGent.be

capabilities can help gain a competitive advantage. For instance, defining BPM-related roles and developing process-oriented attitudes and behaviors will strengthen HRM-related aspects, such as appraisals and rewards, and help increase productivity (Grisold et al. 2019). Moreover, process-oriented appraisals and rewards (POAR) can be applied to various BPM roles, such as the process managers (i.e., process owners), the process improvement teams and even the process executing employees (i.e., process participants) (Shafagatova and Van Looy 2021). The POAR capability implies that an organization's appraisal and reward practices align (or fit) with the organization's needs regarding its business processes and intended BPM outcomes (Shafagatova et al. 2023).

Nevertheless, research on the BPM–HRM intersection fails to understand the complex links between the different capabilities (Figen et al. 2003; Van Looy et al. 2022). Even though certain HRM components are recognized parts of BPM maturity models (vom Brocke and Rosemann 2015), they merely contribute to high-level assessments. Although acknowledged (Grisold et al. 2019; Shafagatova and Van Looy 2021), the BPM implications in HRM initiatives and the role of HRM activities in a process-oriented culture remain under-investigated. For instance, the literature covers people-related aspects of a process orientation on several aspects, but mainly as individual roles and skills (Kohlbacher and Reijers 2013; Lohmann and zur Muehlen 2019) or shared values (Benraad et al. 2022; Schmiedel et al. 2020). Little to no knowledge exists about the BPM-related capabilities that help implement POAR. Similarly, how POAR affects process performance is assumed rather than demonstrated (Shafagatova and Van Looy 2021; Shafagatova et al. 2023). Because process performance relies on various organizational factors that need classification against HRM-related functions (i.e., POAR), we address two research questions.

- RQ1. Which BPM-related capabilities are required for a successful POAR implementation?
- RQ2. Which combinations of POAR and other BPM-related capabilities positively affect business (process) performance?

We propose a multidisciplinary POAR-based process performance model based on a mixed-method design, starting with POAR realizations in multiple case organizations. We then rely on a large-scale and international survey with higher-level managers to test the model statistically using partial least squares structural equation modeling (PLS-SEM). The resulting theory adds knowledge to the intersection of BPM and SHRM, but also contributes to a call for more multifaceted and nuanced BPM research in which the interrelationships between BPM-related capabilities are positioned (Van Looy et al.

2022). We aim to go beyond capability listings by contributing toward theory with dependencies, in which POAR is an important factor for business success. The study also offers practical guidelines to managers and consultants interested in finding a better fit between their organization's appraisals and rewards, and business processes.

The Sect. 2 provides a literature review, followed by the theoretical background (Sect. 3) to guide our case and survey design (Sect. 4). Sections 5 and 6 respectively present evidence of the qualitative and quantitative evidence. The findings are discussed in Sect. 7 to conclude in Sect. 8.

2 Literature review

The maturity and capability literature provides several factors (e.g., strategic alignment, governance, people and culture) to emphasize the importance of non-technical and managerial aspects for BPM success (vom Brocke and Rosemann 2015). For more than two decades, the BPM literature has confirmed that a process orientation positively affects process performance and overall performance (Bronzo et al. 2013; Hernaus 2012; McCormack 2001). Additionally, BPM covers dynamic capabilities from a resource-based view (RBV) to offer organizations a competitive advantage (Niehaves et al. 2014). We add value to this recognition of BPM for achieving performance outcomes through investigating the interrelationships between BPM-related factors (or capabilities) and those HRM aspects related to POAR.

The BPM literature is built around a lifecycle approach to illustrate that each business process starts with an identification phase followed by phases to move gradually toward iterative process improvements. Although different lifecycle variants exist, such as Dumas et al. (2018), they follow the original Plan-Do-Check-Act (PDCA) cycle of Deming (1994). On top of PDCA, POAR is an emerging phenomenon that combines BPM and HRM (Shafagatova and Van Looy 2021; Shafagatova et al. 2023). It differs from typical appraisal and reward systems (e.g., 360-degree appraisals, annual confidential reports, management by objectives) in the sense that POAR is categorically process oriented and thus considered a method for supporting and incentivizing the realization of an organization's BPM approach. For instance, despite financial bonuses and fringe benefits, alternative awards or recognitions increase non-monetary extrinsic motivation (Mone and London 2018). In other words, POAR is related to employee's motivation, attitudes and behaviors, and thus corporate culture.

A corporate culture covers a set of core values among employees to share common perceptions (Schein 2010).

The set of values that focuses on achieving BPM objectives is classified as a process-oriented culture, and can be explained in terms of CERT values (i.e., customer orientation, excellence, responsibility and teamwork) (Schmiedel et al. 2020). Process-oriented values and the related employees' attitudes and behaviors stimulate an employee's motivation and individual performance (Benraad et al. 2022; Kregel et al. 2022). Performance is also linked to the required skills and trainings for managing, executing and improving business processes (Börner et al. 2012; Kohlbacher and Reijers 2013). Although costly, the returns from skill development help increase performance and achieve a corporate strategy (Guest 1997).

Moreover, the job descriptions of employees (as process workers) need alignment with their business processes and tasks involved (Roeckle et al. 2000). Duties related to a process orientation include process measurement, coordinating process jobs and collecting an organization-wide process view (Nadarajah and Sharifah 2016). Top management commitment defines such roles, and gives support by leading by example, transferring experience to subordinates and motivating them to work (Chowdhury et al. 2017; Müller et al. 2017). All these efforts share the purpose of gaining performance.

Using a process view for appraisals and rewards, such as POAR, can enhance process performance and ultimately organizational performance (Shafagatova and Van Looy 2021). Many measurement approaches exist for organizational performance, such as the EFQM assessment model or the CSIRO Organizational Performance Measurement system (Chennell et al. 2000). One of the most prominent and comprehensive performance measurement instruments is the balanced scorecard or BSC (Kaplan and Norton 1992), which differentiates between four performance perspectives (i.e., financial, customer related, process related, and "learning and growth" related). Performance management is a combination of financial and non-financial performance measures on different levels (Van Looy and Shafagatova 2016). For this study's purpose, we target process performance, which ultimately contributes to an organization's overall performance.

Before linking prior studies with our research design, we define our key concepts in Table 1.

3 Theoretical Background and Hypothesis Development

We build on three disciplines (i.e., BPM, SHRM and performance management) to theorize about the POAR links toward process performance. The theoretical starting point is Van Looy et al.'s (2014) process-oriented framework that comprehensively conceptualizes the capabilities for an

organization-wide BPM adoption based on seventeen sub-capabilities. We selected this framework because it recognizes POAR's role based on theories (i.e., lifecycle theory and organizational theories), sixty-nine BPM-related maturity models validate it and it is linked to a measurement instrument (Van Looy 2019). Moreover, its content is similar to other capability frameworks (Rosemann and de Bruin 2005; vom Brocke and Rosemann 2015). Our study takes a novel angle by focusing on the interrelationships between these concepts (i.e., defined in Table 1), and by putting POAR in the center of our model to investigate its mediating effect (Fig. 1).

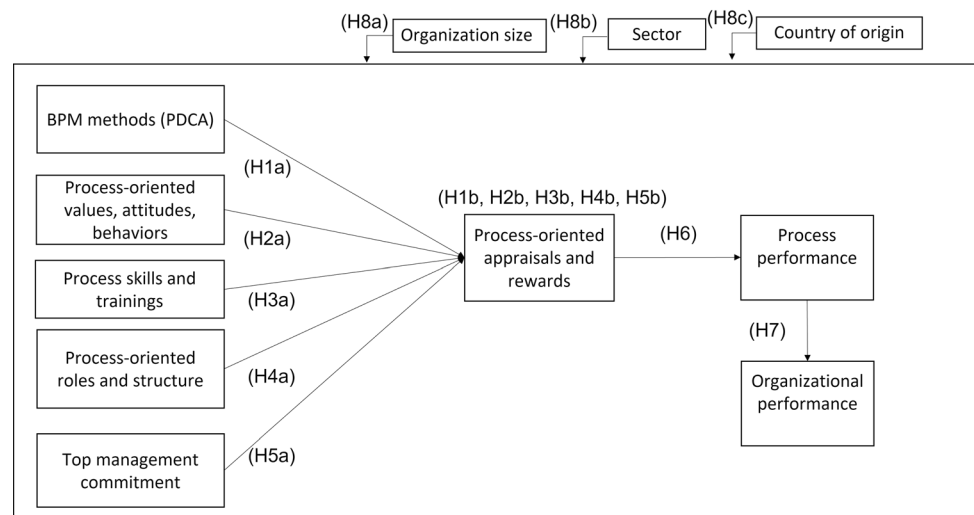
Our hypothesis derivation starts by arguing that the BPM methods across the PDCA lifecycle (Deming 1994; Dumas et al. 2018) play a crucial role for POAR. First, the "Plan" phase contributes to POAR by setting the process scope and defining what to monitor and evaluate in later phases. The execution methods in the "Do" phase are linked to POAR because they depend on people (i.e., employees as process participants and stakeholders as involved actors) for delivering outputs (Souza et al. 2022). Given that employees should have some empowerment (i.e., flexibility or freedom to act) in daily work, rewards and recognitions (e.g., POAR) can encourage them to take process-related decisions and initiatives (e.g., bottom-up standardization, innovation or positive deviance) in a controlled manner while also increasing employee engagement (Baiyere et al. 2020; Goel et al. 2021; Kerpedzhiev et al. 2021; La Rosa 2016). Next, the "Check" phase ultimately covers methods for measuring a business process, and thus guiding POAR. Process measurements occur by financial and non-financial measures (Arifeen et al. 2014), and are most successful when using key performance indicators or KPIs (Haponava and Al-Jibouri 2012). Process performance can be measured across the four pillars of process costs, time, flexibility and quality (Dumas et al. 2018). Finally, also the "Act" phase is linked to continuous monitoring and process improvements, acting as potential inputs for performance appraisals and rewards. Resultantly, we have derived the following hypothesis based on the lifecycle phases.

- H1a: the presence of BPM methods (across the PDCA lifecycle) positively affects POAR.

Although the positive link between PDCA and process performance is widely acknowledged (Dumas et al. 2018), we argue that POAR can stimulate this link by offering systems that aim at increasing performance based on reflection moments and differentiated incentives (Mone and London 2018), while also facilitating dedicated process strategies (Huselid 2006). POAR therefore guides individual behaviors (Grisold et al. 2019) to better run each

Table 1 Concept definitions and literature references

Concepts	Source	Concept definition
BPM methods along the PDCA lifecycle	(Deming 1994; Schmiedel et al. 2020)	A cyclical approach with dedicated methods per phase. The “Plan” phase designs a process for which objectives and process needs are established. The “Do” phase transforms the process design into a running system for execution. The “Check” phase aims at properly monitoring and comparing the process output with the predefined objectives. The “Act” phase focuses on possible modifications due to environmental changes or corrective measures
Process-oriented values, attitudes and behaviors	(Benraad et al. 2022; Marcoulides and Heck 1993; Schmiedel et al. 2020)	Shared views that guide employees’ work for thinking in terms of process recipients (i.e., end customers), promoting excellent process outputs without defects and encouraging commitment toward process objectives and teamwork
Process skills and trainings	(Kohlbacher and Reijers 2013; Lohmann and zur Muehlen 2019)	HRM development efforts for employees to obtain the future benefits of their work input, and to show the required skillset for managing and optimizing business processes
Process-oriented roles and structure	(Kohlbacher and Reijers 2013; Marcoulides and Heck 1993; Roeckle et al. 2000)	Dedicated job descriptions that stipulate duties for managing and optimizing business processes and sustaining a process orientation. Also dedicated governance bodies help realize an organization’s BPM approach. These roles and bodies are ideally formally recognized in the organization chart
Top management commitment	(Chowdhury et al. 2017; Marcoulides and Heck 1993)	Continuous executive support for thinking in terms of business processes and for seeing the organization as a collection of business processes that need management and improvement
POAR	(Shafagatova and Van Looy 2021; Shafagatova et al. 2023)	BPM–HRM alignment for differentiating employee appraisals and rewards to encourage behaviors that contribute to achieving the specific business processes’ performance goals
Process performance	(Dumas et al. 2018)	Outcomes of a single business process in terms of time, costs, quality and flexibility
Organizational performance	(Kaplan and Norton 1992; Skrinjar and Trkman 2013)	Overall business performance regarding profit and business value. One of the most prominent and comprehensive performance measurement instruments is the BSC
Organizational internal factors	(Baker 2012; vom Brocke et al. 2021)	Internal factors include organizational size (i.e., number of employees), sector (i.e., public or private, production or services) and location (i.e., region or origin of the headquarter as being the physical place to operate)

Fig. 1 Initial POAR-based process performance model

lifecycle phase, resulting in the desired process outcomes. Hence:

- H1b: POAR mediates the relationship between using “BPM methods (PDCA)” and “process performance”.

Recently, Schmiedel et al. (2020) theorized about the causal relationship between process-oriented values and process performance. Also other research positioned process-oriented values, attitudes and behaviors as typical cultural components that could be differentiated collectively, and guiding process conformance (Benraad et al. 2022; Kregel et al. 2022). However, Van Looy and Devos (2018) suggested that a process-oriented culture better relates to BPM success when POAR is formally considered to concretize these shared interests and create synergy. Hence, we follow Van Looy's (2019) capability framework for extending Schmiedel et al.'s (2020) model with POAR as another dimension of a process-oriented culture while also establishing a link with POAR.

- H2a: the presence of process-oriented values, attitudes and behaviors positively affects POAR.

We then position POAR as a mediator between BPM's cultural components and process performance because productivity can increase by applying performance appraisal systems (Gomez-Mejia 1990) and motivational techniques (Ciobanu and Androniceanu 2018). This is also in line with Schein's original interpretation of three cultural levels (Schein 2010): (1) underlying assumptions, (2) invisible values, and (3) visible artifacts that cover observed behavior (such as feelable structures and procedures). Hence, we position POAR as visible, formal artifacts of culture that mediate the intended process outcomes.

- H2b: POAR mediates the relationship between “process-oriented values, attitudes and behaviors” and “process performance.”

Next, the HRM categories of process skills and trainings relate to business processes when performed by human actors (Baiyere et al. 2020; Kerpedzhiev et al. 2021; Kohlbacher and Reijers 2013; Lohmann and zur Muehlen 2019). For instance, process design engineers or process developers should be highly skilled in BPM methods and are deeply involved in creating a process-oriented way of working, so they can be appraised and rewarded accordingly. Also other employees who lack the required skillset for executing and improving business processes in their daily work must follow the required trainings (Börner et al. 2012). Hence, the third hypothesis acknowledges the need of skill development for POAR to allow for an effective management and evaluation of employees.

- H3a: the presence of process skills and training positively affects POAR.

Nonetheless, process performance inevitably depends on process workers who are competent to execute tasks, realize novel process designs or implementations

(Lohmann and zur Muehlen 2019). Because their skill development is essential for overall BPM success and performance (Baiyere et al. 2020), we have added the following hypothesis with POAR being the mediator that helps assess skill gaps and links them to trainings needs.

- H3b: POAR mediates the relationship between “process skills and training” and “process performance”.

Dedicated roles (e.g., process owners) should be formally assigned and also defined in a structured way (e.g., being visible in a horizontal organogram) to obtain clear control lines (Kohlbacher and Reijers 2013). We hypothesize that official recognitions are needed to have clear agreements on the POAR subjects.

- H4a: the presence of process-oriented roles and structure positively affects POAR.

In organizational management theories, Marcoulides and Heck's (1993) model extends H4a by claiming causality among the organizational structure, business processes and corporate values, and conversely, HRM appraisals and rewards to stimulate performance outcomes. Hence, we argue that POAR (as specific HRM appraisal and reward systems) can stimulate the link between formalization and performance outcomes (among others because of POAR's official monitoring and evaluation nature).

- H4b: POAR mediates the relationship between “process-oriented roles and structure” and “process performance”.

Prior research acknowledges that the success or failure of BPM projects highly depends on top management commitment and that leadership plays a vital role in process improvements (Antony and Gupta 2019; Trkman 2010). Process changes also encounter internal political maneuvering with possible politics such as “applying the hammer”, “struggling to engage”, “walking the talk”, and “keeping up appearances” (Müller et al. 2017). Since appraisals and rewards are typically agreed between employees and managers, we hypothesize that top management commitment helps in offering and promoting POAR.

- H5a: the presence of top management commitment positively affects POAR.

Similar to process improvements that are not possible without authoritative support (Trkman 2010), Shafagatova and Van Looy (2021) linked top management commitment with POAR and process performance. Moreover, since top management commitment is a recognized factor for boosting the success of organizational initiatives (i.e., with POAR being an organizational initiative), and thus

increasing process performance (Chowdhury et al. 2017), we extend H8a by positioning POAR as a mediator.

- H5b: POAR mediates the relationship between “top management commitment” and “process performance”.

Furthermore, several studies offer evidence for a positive effect of appraisals and rewards on organizational performance by guiding employees (Collings and Wood 2009; Lawler 2003; Marcoulides and Heck 1993). These observations align with general HRM theories (Aguinis 2019; Collings and Wood 2009; Milkovich et al. 2011) and SHRM literature (Becker and Huselid 2006; Den Hartog et al. 2004), which motivate the need for HRM methods to evaluate and compensate employees and ultimately enhance organizational performance. We build on this agreement to investigate the effect of POAR on process performance directly and on organizational performance indirectly. The direct and indirect effects align with the BSC (Kaplan and Norton 1992), which claims a causality among its performance pillars (i.e., from employee performance to process performance, then customer performance and ultimately financial performance) to reach overall organizational performance. Thus:

- H6: POAR positively affects process performance.
- H7: Process performance positively affects organizational performance.

Moreover, in line with contingency theory and BPM-contextual papers (vom Brocke et al. 2016; vom Brocke et al. 2021), an organization’s business environment (e.g., size, sector and location) (Baker 2012) can determine organizational performance along with the above-mentioned BPM and HRM perspectives. For instance, the interplay between BPM-related capabilities and contextual factors have been subject of prior research (Mikalef and Krogstie 2020; Romero et al. 2015; Van Looy et al. 2022). Although higher BPM adoption levels can be reached by large or small organizations (Van Looy and Van den Bergh 2018), larger organizations profit more from standardization to increase productivity while less employees need to be coordinated in smaller organizations. Therefore, we hypothesize the following.

- H8a: Organizational size moderates the relationship between POAR and process performance.

Factors such as market competition also differ among sectors. Although the speed of BPM adoption and market velocity may differ between sectors (Van Looy and Van den Bergh 2018), public sector organizations increasingly apply BPM, potentially after adapting BPM methods to their context (Kregel et al. 2022). For instance, competitive reward systems and opaque salary structures often do not

represent public sector reality, and public sector employees tend to be less materialistic and therefore less motivated by financial rewards or differentiated pay systems (Kregel et al. 2022). Although non-financial incentives and alternatives are possible within POAR (Shafagatova and Van Looy 2021), sector is not only translated into public versus private sectors, but also manufacturing versus service industries. Given that distinguished sectors exist with different market velocity and regulations, we hypothesize this moderator as follows.

- H8b: Sector moderates the relationship between POAR and process performance.

In research domains such as marketing, country of origin is commonly considered a moderator to consumer behavior when linking it to performance (Nasution and Rossanty 2018). BPM studies have also considered region as an important factor to predict process performance (Ferraris et al. 2018; Newman and Zhao 2008). Geography such as location of the headquarter can matter because of cross-cultural dynamics (Newman and Zhao 2008) or strict legislation (Lester et al. 2020). Similarly, we have considered country of origin as a moderating factor.

- H8c: A specific country moderates the relationship between POAR and process performance.

All hypotheses guide our study to obtain a POAR-based process performance model. Their respective null hypotheses state that hypotheses cover independent constructs without affecting their dependent constructs.

4 Methodology

Since POAR is a socially constructed phenomenon, rich insights are required. We therefore followed a sequential mixed-method design (Tashakkori et al. 2013) with a developmental purpose but with also elements of completeness and corroboration (Venkatesh et al. 2013). Since POAR remains under-investigated, almost all studies for theoretically developing our constructs and assumptions in Sect. 3 were dealing with employee evaluation and performance measurement instead of concrete POAR realizations. Hence, a first qualitative strand with positivist case analysis (Shanks 2002) was used to find rich explanations for the hypotheses based on real-life POAR implementations and to obtain evidence for the direction/magnitude of the interrelationships. This strand mainly focused on RQ1 (Sect. 4.1), whereas a next quantitative strand focused on both RQs (Sect. 4.2). A large-scale survey was chosen to assess credibility of the case findings and to add the outcome-related perspective in order to test all arguments and hypotheses using structural equation

modeling (SEM). Hence, exploratory and confirmatory research elements were being covered to gradually obtain a more complete picture of POAR success.

4.1 Qualitative Research with Case Study Evidence

We followed a multiple and holistic case design to explore the POAR-based relationships in Fig. 1 in real business environments (Creswell 2007; Sarker et al. 2018). Our main objective was to examine concrete realizations related to different POAR and BPM settings.

4.1.1 Data Collection and Selecting Case Participants

Based on purposive sampling, we selected ten case organizations in which we included one or two BPM and HRM participants (response rate: 37.04%). This resulted in fourteen in-depth semi-structured interviews, with additional sources and corporate documents supporting them. The profiles of case organizations and respondents are available in Appendix A. The cases were large to very large organizations from various sectors and sizes, and all respondents were managers. The analysis relied on the understanding of managers in their working environment, but for which a coherent framework with predefined variables and relationships was used (Sarker et al. 2018). We used a deduction strategy of analysis because the research focused on the theoretical constructs of Sect. 2 (Sarker et al. 2018; Van de Ven 2007).

We contacted the case organizations through LinkedIn, after which both the BPM and HRM representatives were invited for an interview via Skype or Zoom. We conducted the LinkedIn screening of potential case organizations by searching for process-related management profiles (e.g., a chief process officer, BPM manager or process owner) to detect organizations with a higher process orientation. We then sent them a LinkedIn message to further screen about their POAR initiatives and to fill in a quick BPM maturity assessment (Hernaes 2012; McCormack 2001). All ten organizations that came out of this screening were large-sized enterprises across different product, service and social profit sectors (i.e., manufacturing, retail, banking, IT services and human health). Their BPM maturity score varied between 2.4 and 4.5 on a 5-point Likert scale, covering different maturity stages and POAR realizations.

The screening was organized in two rounds. The first four case organizations covered our exploratory phase in which we interviewed both a BPM and an HRM representative. The second confirmatory phase covered six organizations for which we only interviewed the BPM representative. The reason for this respondent selection was because the HRM practices were mostly confirming the options discussed in the HRM literature. However, data

saturation was not yet reached regarding the process orientation aspects for which we needed more insight into the higher-level management practices and decisions.

Previously, the same data set was used for another study to understand better the POAR practices and patterns in organizations (Shafagatova and Van Looy 2021). For the current paper, we screened the data for reporting on the interrelationships between the variables. We used those parts of this qualitative data set to elaborate on the organizational components and capabilities necessary to obtain POAR success. In the remainder, we refer to anonymized case IDs (case A, B, C, etc.) and respondent IDs (respondent A1, A2, B1, B2, etc.).

4.1.2 Instrument and Data Analysis

We performed both coding and a relational content analysis (Krippendorff 2004) after asking the participants about the POAR realizations in their organizations and about the facts or events that had contributed to their POAR success. We applied two interview questionnaires containing process-oriented questions for the BPM representatives and general questions related to appraisals and rewards for the HRM representatives.

Each interview took about 45 to 60 min and they were conducted face-to-face with additional inquiries via email correspondence. All interviews were recorded and manually transcribed, resulting in 129 interview transcription pages. Afterwards, the coding procedure of the Nvivo coding tool focused on content analysis for uncovering the (sub) themes and relational content analysis for identifying their interrelationships. For instance, the a priori code of [appraisal dimensions] had coded information such as [goals], [objectives], [competences] and [behavior]. Alternatively, the emergent code of [appraisal of process owner] was linked to coded information such as [for process execution] and [for process improvement], indicating potential links with PDCA.

Besides interviews, we asked the respondents to provide relevant documentation to enhance data triangulation. We collected twenty-eight source documents that accounted for 306 pages (i.e., internal documents and online resources such as the organogram, mission statement, vision and strategy; HRM policies regarding appraisals, compensations, rewards; and BPM-related documents such as process designs). We obtained sixty-three nodes based on the interview transcripts and the source documents.

4.2 Quantitative Research with Survey Evidence

We used a survey to test our qualitative part, for which an instrument was adopted from Van Looy's (2019) validated questionnaire, available in Appendix B. Our objective was

Table 2 Background of the survey respondents (N = 403)

Current position		Continent and country		Size		Sector (recoded)	
Middle manager	29.3%	Asia (India)	25.3%	Small	11.2%	Products	34.2%
Senior manager	48.1%	Europe (UK)	24.8%	Medium	16.4%	Services	46.3%
C-level	22.6%	North-America (US)	25.1%	Large	72.5%	Government and social profit	19.5%
		Oceania (Australia)	24.8%				

to look at the interrelationships developed in Sects. 3 and 4, and link them to performance outcomes.

4.2.1 Survey Design

Our survey design applied a secondary data collection as we were granted access to the original data set that was previously used to validate the measurement instrument. Table 2 shows the various organizational backgrounds among 403 higher-level managers (i.e., across four continents, several sizes and sectors), facilitating the generalizability of our findings to some extent.

We specifically opted for PLS-SEM to test our model, which is a variance-based method that uses the total variance to estimate parameters and which relies on bootstrapping to facilitate significance testing. Although the covariance-based SEM alternative (CB-SEM) is typically characterized by better accuracy and consistency if sample size increases (Rigdon et al. 2017), our choice was guided by a relatively complex research model (i.e., many relationships including mediators and moderators) and that is above all formatively constructed (Sarstedt et al. 2022). Interestingly, when using good measures, both PLS-SEM and CB-SEM provide similar results (Hair et al. 2011). Moreover, PLS-SEM is a non-parametric method that better deals with the non-normal data in our research (Hair et al. 2019). We also preferred PLS because the survey's objective is confirming developed paths while exploring theoretical extensions of established theories (Hair Jr. et al. 2020), namely for examining factors involved in process performance (i.e., by using structural model relationships' estimates path coefficients).

4.2.2 Formative Measurement Model Assessment

Construct validity was demonstrated based on the construct redundancy analysis of the original measurement instrument. We assessed indicator collinearity via variance inflation factors (VIF), which VIF values should be less than 5 or ideally 3 (Hair et al. 2019). Afterwards, we evaluated the indicator weights via a bias-corrected and accelerated bootstrap. For insignificant weights, we

crosschecked the outer loadings from the bootstrap results with the minimum acceptance level of 0.50.

4.2.3 Structural Model Assessment

We examined collinearity through the VIF values that were obtained this time by using the latent variable scores of the predictive constructs from the PLS algorithm test, and then we used them in a repeated test to ensure the constructs' VIF values (Hair Jr. et al. 2014). The PLS algorithm results determined the coefficient of determination (R^2) for highlighting the model's explanatory power as a percentage (Hair et al. 2011; Hair et al. 2019; Henseler and Sarstedt 2013). We conducted the bias-corrected bootstrapping procedure with a minimum of 5,000 sub-samples to estimate the significance of path coefficients with a minimum significance level of 0.1. Furthermore, we obtained Q^2 values for assessing the predictive relevance through the blindfolding procedure to predict the relevance of endogenous constructs (Hair et al. 2019). Finally, we used PLSpredict to examine the structural model predictive power, during which we compared the root mean squared error (RMSE) of the PLS-SEM analysis with its linear regression model (LM) benchmark.

4.2.4 Mediation Analysis Procedure

We examined mediating relationships between the independent variables (IVs) and process performance as the dependent variable (DV). We followed Preacher and Hayes's (2008) approach with bootstrap results to acquire path coefficients (or beta coefficients) and their statistical significance (P -values). Mediation was checked in three phases. First, the direct effect of each IV on "process performance" was observed after the bootstrap routine with a minimum of 5,000 sub-samples. Secondly, we added POAR as a mediator and re-ran the bootstrap procedure to observe any changes in the direct effect, and to record the significance of indirect paths. Finally, we calculated variance accounted for (VAF) values according to the formula of Hair Jr. et al. (2014) to obtain the actual strength of the mediation paths. Mediations were considered of partial

strength with VAF values between 0.2 and 0.8, whereas higher VAF values showed strong mediations.

4.2.5 Moderation Analysis Procedure

We examined three categorical constructs (i.e., size, sector and country) in a moderation analysis for depicting their effect on the relationship of POAR (IV) and process performance (DV). We used the two-stage approach instead of the product indicator approach because our IV and DV were formative in nature (Hair Jr. et al. 2014; Memon et al. 2019). In stage one, the direct paths were observed to determine the significance from bootstrap results. We copied the latent variable scores from the PLS algorithm results to the new data sheet to obtain single indicators per construct. Consequently, an interaction term was developed between “sector,” “size,” “country” (as moderators) and POAR (IV) using the mean centered approach, resulting in newly created moderating variables. In the second stage, we re-ran the bootstrap to determine statistical significance by comparing the R^2 values, t values and P values with stage one.

In case of moderation, we looked at statistical differences among the categories. Considering that the conditions for normality and homogeneity of variance were not met for POAR and process performance, we preferred the Welch’s ANOVA F test over the nonparametric Kruskal–Wallis H rank (Vickers 2005), followed by the Games–Howell post hoc test (Shingala and Rajyaguru 2015).

5 Qualitative Results

The case study findings served to specify the a-priori research model with rich insights, as an intermediate phase for preparing the large-scale quantitative investigation (Sect. 6). Although performance outcomes typically depend on many factors, we observed repeated case evidence for a better understanding of the interrelationships between the process-oriented aspects and their vital roles for POAR implementations. For instance, the case study findings confirmed the following reasoning.

- *BPM methods (PDCA)*: Before considering POAR, the BPM basics should be present, and organizations should start with defining, monitoring, measuring and improving business processes (cases A, B, C, D, G, H).
- *Process-oriented values, attitudes and behaviors*: Before encouraging the business setting for POAR, the corporate culture should support BPM adoption. Facilitation can be realized via values supporting teamwork, interdepartmental cooperation, a mindset open to change, a drive toward performance,

continuous improvements and horizontal feedback (cases B, C, D, E, G, I, J).

- *Process-based skills and training*: Before all employees and managers can be appraised and rewarded accordingly, they should be coached and follow trainings to understand truly the BPM philosophy and acquire process-specific knowledge to operate appropriately (cases B, C, D, F, I).
- *Process-oriented roles and structure*: Formal roles and responsibilities should be defined to facilitate a process orientation. Job descriptions should be adjusted to recognize the importance of process work and a formal process manager (or owner) should be appointed per business process who is responsible for process outcomes. Only once those roles are formally recognized, they can be appraised and rewarded accordingly (cases A, B, E, F, H).
- *Top management commitment*: BPM initiatives are more successful if the corporate board supports them. At least one top manager should act as a sponsor to support the idea that business processes are the way of doing business and this top manager should be committed to implementing POAR initiatives (cases B, C, D, E, J).
- *Organizational sector, size and country*: BPM does not follow a one-size-fits-all approach, but contextual factors can lead to different BPM choices and POAR initiatives to realize BPM success (cases A, C, D, H, J).

The Table 3 summarizes our case evidence via some citations to illustrate causality.

Given the observed similarities with Sect. 3, and specifically the theories from Marcoulides and Heck (1993) and Schmiedel et al. (2020), we examined the hypotheses on a larger scale in Sect. 6.

6 Quantitative Results

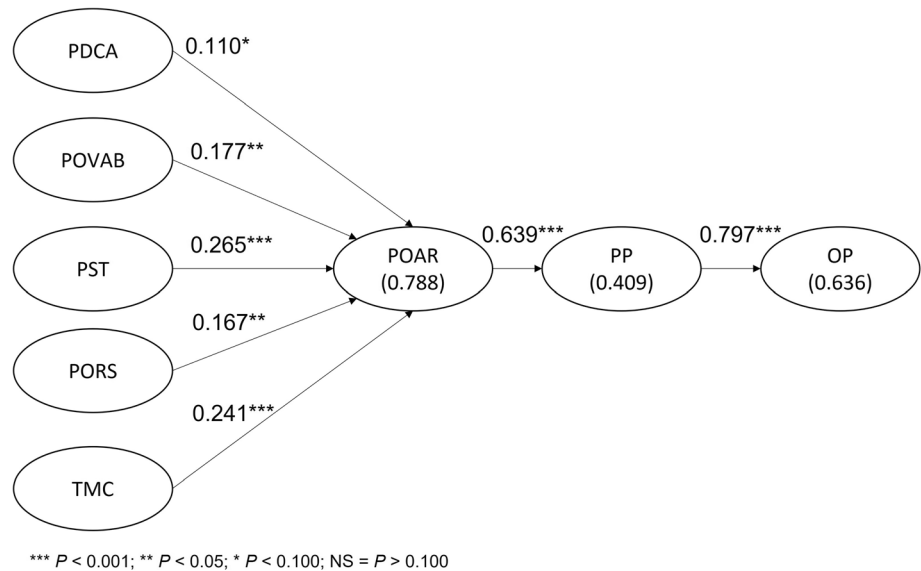
A PLS-SEM analysis (Hair et al. 2011) further established our research model (Fig. 1). We performed mediation analyses considering POAR as a mediating factor between our independent constructs and process performance, whereas we considered the business environment as single-item categorical constructs in moderation analyses.

6.1 Formative Measurement Model Assessment

Our formative assessment showed convergent validity by performing a redundancy analysis with global indicators depending on the first qualitative research phase (Sect. 5), and for which correlations were higher than 0.70. We observed that the VIF values were less than 5 for two

Table 4 Coefficients of determination (R^2 values)

Latent constructs	R square	R square adjusted
Process-oriented appraisals and rewards	0.788	0.785
Process performance	0.409	0.407
Organizational performance	0.636	0.635

Fig. 2 Statistical research model without mediation analysis

indicators, and they were less than 3 for all other indicators, confirming that no multicollinearity issues were present. Although most indicator weights were significant and only some had insignificant weights, all outer loadings were greater than the 0.50 threshold. Hence, the relevance of indicator weights was sufficiently established to continue.

6.2 Structural Model Assessment

Also the structural assessment detected no collinearity issues, with VIF values for constructs being less than 3. The R^2 values for the endogenous constructs in Table 4 highlighted a predictive accuracy from average to high. POAR possess the highest explanatory power significance in our research model, namely 78%.

We measured the predictive relevance through a blind-folding test where the Q^2 value was assessed above zero for each endogenous construct. We found a predictive relevance of 56% for “process-oriented appraisal and rewards”, 25% for “process performance” and 32% for “organizational performance”. Additionally, the PLS algorithm and bias-accelerated bootstrapping were performed based on Fig. 2 (current section) and Fig. 3 (Sect. 6.3).

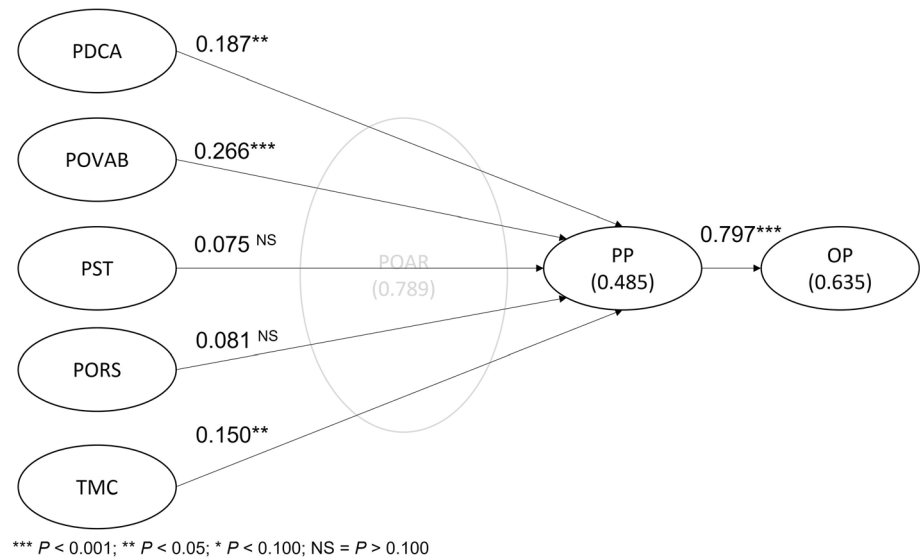
The Table 5 shows the path coefficients in column O to reflect the magnitude of the obtained effect sizes (Mohajeri et al. 2020). We verified that the t values were greater than

1.65 and that significant values were less than 0.1, and we considered the null hypothesis significance testing (Mertens and Recker 2020). Only the effects of “process-oriented roles and structure” and “process oriented skills and trainings” on “process performance” could not be supported. Consequently, until now, our data supported seven hypotheses (H1a, H2a, H3a, H4a, H5a, H6 and H7) based on a 0.1 significance level and null hypothesis testing. Moreover, our data supported a significant positive POAR effect on process performance (H6), as well as a significant positive effect of “process performance” on “organizational performance” (H7). Finally, only 9 out of 27 indicators of endogenous constructs had a higher RMSE or MAE than the related LM benchmark, indicating medium predictive power of our research model.

6.3 Mediation Results

The mediation results are shown in Fig. 3, while other effects were taken from the original bootstrap (Table 5).

The data showed no mediation of POAR between the paths of “process skills and trainings” (PST) and “process-oriented roles and structure” (PORS) toward “process performance” because the direct effect was already insignificant (Table 5). Hence, we could not support H3b and H4b. In contrast, the other paths were significant in both direct and indirect paths, and were therefore included

Fig. 3 Statistical research model with mediation analysis**Table 5** Bootstrap results

Effects	Original sample (O)	Sample mean (M)	Standard deviation	<i>t</i> value	<i>P</i> value	95% confidence interval		Explanation
						Lower	Upper	
PDCA → POAR (H1a)	0.110	0.145	0.060	1.838	0.066	0.049	0.245	Both effects were significant and used in mediation
PDCA → PP (preparation for H1b)	0.187	0.252	0.074	2.528	0.012	0.128	0.375	
POVAB → POAR (H2a)	0.177	0.183	0.075	2.357	0.018	0.060	0.309	Both effects were significant and used in mediation
POVAB → PP (preparation for H2b)	0.266	0.275	0.068	3.891	0.000	0.160	0.386	
PST → POAR (H3a)	0.265	0.250	0.073	3.612	0.000	0.131	0.371	Only one effect was significant, thus not used in mediation
PST → PP (preparation for H3b)	0.075	0.062	0.080	0.936	0.349	– 0.074	0.193	
PORS → POAR (H4a)	0.167	0.155	0.060	2.763	0.006	0.057	0.257	Only one effect was significant, thus not used in mediation
PORS → PP (preparation for H4b)	0.081	0.061	0.077	1.048	0.295	– 0.071	0.184	
TMC → POAR (H5a)	0.241	0.233	0.059	4.086	0.000	0.135	0.329	Both effects were significant and used in mediation
TMC → PP (preparation for H5b)	0.150	0.136	0.070	2.144	0.032	0.021	0.250	
POAR → PP (H6)	0.639	0.645	0.031	20.313	0.000	0.592	0.695	Significant
PP → OP (H7)	0.797	0.803	0.020	38.966	0.000	0.768	0.835	Significant

Bold refers to insignificance

for VAF calculations. Table 6 shows that H1b, H2b and H5b were supported with partial VAF strength, indicating that POAR turned out to have some significant influence between the direct paths of “PDCA”, “process-oriented values, attitudes and behaviors,” and “top management commitment” toward “process performance”.

6.4 Moderation Results

We continued with the moderation analyses for size, sector and country. In the first moderation stage, we assessed the direct effects of the categorical constructs with the same bootstrap results of the initial test in Table 5 (Sect. 6.2). The *P* values for “Country versus process performance”

Table 6 Strength of the mediating paths

Mediating paths	Direct effect	Indirect effect	Total effect	VAF (indirect/total)	Mediation
PDCA > POAR > PP (H1b)	0.187	0.110	0.297	0.370	Mediation
POVAB > POAR > PP (H2b)	0.266	0.177	0.443	0.399	Mediation
PST > POAR > PP (H3b)	Direct effect was not significant				No mediation
PORS > POAR > PP (H4b)	Direct effect was not significant				No mediation
TMC > POAR > PP (H5b)	0.150	0.241	0.391	0.616	Mediation

Table 7 Bootstrap results of stage 2 in our moderation analysis

Moderation paths		Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	<i>T</i> statistics (O/STDEV)	<i>P</i> values
Stage 1	Size (H8a)	Not significant in stage 1, thus not considered for moderation				
Stage 2	Sector*POAR > PP (H8b)	– 0.030	– 0.029	0.025	1.198	0.231
	Country*POAR > PP (H8c)	0.120	0.118	0.049	2.463	0.014

Bold refers to insignificance

and “Sector versus process performance” were significant at 0.095 and 0.009. For size, no significant relation was present ($P = 0.301$). Consequently, we only conducted a moderation analysis for sector and country as moderators. The stage 1 results were determined through the same PLS and bootstrap results of Tables 4 and 5 (Sect. 6.2), respectively. The R^2 value for “process performance” was 0.489 (49%), with a t value for “sector > PP” of 2.60 and a t value for “Country > PP” of 1.67. Both values were higher than the minimum threshold of 1.65 (Hair et al. 2019). Next, the interaction terms were created and we reran PLS and bootstrapping using the new datasheet and assigned single items to constructs. Table 7 illustrates the summary of this moderation analysis.

During the final moderation stage, the R^2 value for “process performance” increased from 48 to 50%. The results indicated that sector did not act as a moderator between POAR and process performance because of insignificant results (t value = 1.198). However, the t value for “country” was 2.46 and was significant ($P = 0.014$), thus acting as moderator. In sum, hypothesis H8c was supported while our data could not support hypotheses H8a and H8b.

Based on Welch’s ANOVA, we observed that at least one country significantly differs for POAR ($F = 42.659$; $df_1 = 3$; $df_3 = 218,131$; $P = 0.000$) and process performance ($F = 31.492$; $df_1 = 3$; $df_3 = 208,781$; $P = 0.000$). Post-hoc testing revealed that for both variables, India turned out to have somewhat higher values than Australia, US and UK ($P < 0.001$). We did not find statistically significant differences between Australia, US and UK ($P > 0.100$).

7 Discussion

We first discuss the revised POAR-based process performance model (Sect. 7.1) and its theoretical implications (Sect. 7.2), followed by practical implications (Sect. 7.3) and limitations (Sect. 7.4).

7.1 Interpretation of Main Findings

This study has investigated which BPM-related capabilities are required inputs for POAR (RQ1) and which combinations boost performance (RQ2). Table 8 shows that our analysis was broadly in line with the hypothesized theoretical expectations of Sect. 3.

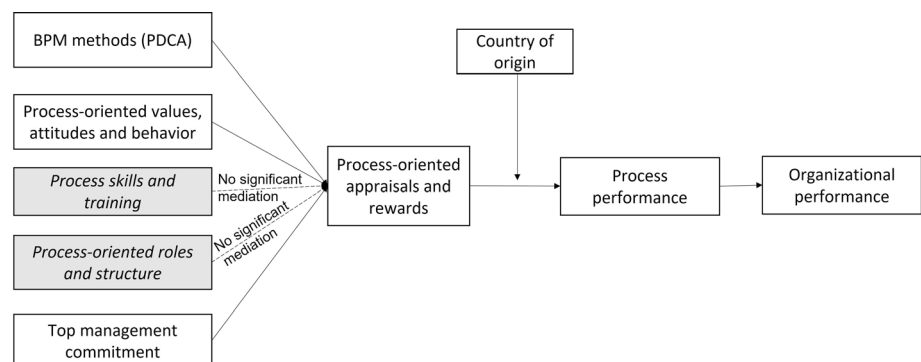
The Fig. 4 presents the resulting POAR-based process performance model, which is derived from the body of knowledge, refined by case insights and tested by a large-scale international survey.

Regarding RQ1, our case and survey data support the assumption that all BPM-related capabilities are required to some extent for successful POAR implementations. Not only the BPM methods appear to positively affect POAR, but similar links could be observed regarding the other capabilities. In sum, all hypotheses related to the direct effects on POAR have been supported (H1a, H2a, H3a, H4a and H5a). Especially the capabilities related to “top management commitment” and “process-based skills and training” resulted in being the most supportive for realizing POAR (Table 5, after calculating t values).

Regarding RQ2, we have found a positive link between POAR and process performance (H6), which in turn positively contributes to organizational performance (H7).

Table 8 Summary of hypothesis testing

Hypothesis	Description	Evidence
H1a	BPM methods (PDCA) → POAR	Supported
H1b	BPM methods (PDCA) > POAR > process performance	Supported (mediation)
H2a	Process-oriented values, attitudes and behaviors → POAR	Supported
H2b	Process-oriented values, attitudes and behaviors > POAR > process performance	Supported (mediation)
H3a	Process skills and trainings → POAR	Supported
H3b	Process skills and trainings > POAR > process performance	Not supported (mediation)
H4a	Process-oriented roles/structure → POAR	Supported
H4b	Process-oriented roles/structure > POAR > process performance	Not supported (mediation)
H5a	Top management commitment → POAR	Supported
H5b	Top management commitment > POAR > process performance	Supported (mediation)
H6	POAR → Process performance	Supported
H7	Process performance → Organizational performance	Supported
H8a	Size*POAR > Process performance	Not supported (moderation)
H8b	Sector*POAR > Process performance	Not supported (moderation)
H8c	Country*POAR > Process performance	Supported (moderation)

Fig. 4 Revised POAR-based process performance model

Interestingly, our study suggests an even more positive effect on performance when POAR is combined with BPM methods (H1b), process-oriented values, attitudes and behaviors (H2b), and top management commitment (H5b) (Table 6). POAR appears to mediate these capabilities to enhance performance. Although the case findings also showed a POAR-based mediation for process-based skills and training (H3b) and process-oriented roles and structure (H4b) with process performance, both hypotheses lack survey support. This is illustrated as grey boxes with italics and dashed links in Fig. 4. Hence, based on Preacher and Hayes's (2008) approach, we only propose POAR mediations for H1b, H2b and H5b.

Furthermore, our data suggest a country-related moderation effect (H8c) (Table 7), with India having more POAR realizations and higher process performance outcomes than Australia, US and UK. Examples of location differences that might affect POAR decisions are based on country-specific policies, laws and types of decision-

making or evaluation processes used in specific countries (Lester et al. 2020). More in-depth research is required to understand which POAR adaptations are possible based on country-specific conditions. Although we have not identified significant differences among organizational sizes (H8a) and sectors (H8b), our cases suggest some intervention of size and sector, requiring further investigations.

7.2 Theoretical Contributions and Implications

This study has contributed to multifaceted BPM research (Van Looy et al. 2022) by examining the relative importance of POAR to other capabilities while suggesting that POAR's impact on performance is nuanced. By delving into dependencies, our findings go beyond classifications in maturity models (McCormack 2001; Rosemann and de Bruin 2005), capability frameworks (Kerpedzhiev et al. 2021; Van Looy et al. 2014) and studies about success factors (Skinjar and Trkman 2013; Trkman 2010). Our

mediation approach extends studies that link individual capabilities to performance (Bronzo et al. 2013; Kohlbacher and Reijers 2013). We also extend works that examine BPM-specific interrelationships by stressing the missing HRM angle (Schmiedel et al. 2020). Consequently, we help refine the complexities regarding BPM adoption.

Besides contributing to multifaceted research, Fig. 4 creates synergy by combining multiple research disciplines with BPM. Our model extends the HRM literature with knowledge about an under-investigated type of appraisals and rewards in multidisciplinary teams (Shafagatova and Van Looy 2021; Shafagatova et al. 2023), and more specifically, about ways to enhance POAR implementations. The performance management literature is extended with dependencies for increasing business success.

Subsequently, we look at implications for the five BPM-related capabilities. First, both case and survey data provide evidence for the crucial role of lifecycle thinking (Dumas et al. 2018), with PDCA efforts being an important starting point for POAR. One of the reasons is because POAR heavily depends on monitoring KPIs, as inputs into POAR. Since employees can only take process-related decisions when being somewhat empowered (Goel et al. 2021), POAR is one way of evaluating employees.

Secondly, we have added knowledge about a process-oriented culture. Past studies mostly position process-oriented values by relying on CERT (Schmiedel et al. 2020). Our study extends CERT with a proven link to POAR. Meaning, a process-oriented culture is ideally in place before launching POAR initiatives. While two CERT values (responsibility, teamwork) correspond to an employee perspective and the excellence value corresponds to the idea of measuring outcomes, our results support the idea of putting employees more explicitly at the center (e.g., next to end customers). Hence, CERT might be extended to CEERT, in which an additional “E” acknowledges the need for employee centricity (Kerpedzhiev et al. 2021) or employee-driven BPM (La Rosa 2016) to stimulate employee engagement. This extra employee-related value would also better reflect the need for bottom-up ideas that are important for digital innovation and transformation. For instance, Baiyere et al. (2020) referred to “mindfulness” of process actors. Our case findings also suggest new challenges to CERT by linking POAR with a mindset for adaptability, with values of agility and flexibility being relevant for digital innovation and transformation (Kerpedzhiev et al. 2021).

Thirdly, although the literature has acknowledged the need for process-based skills and training (Lohmann and zur Muehlen 2019), we provide empirical evidence for being a prerequisite for POAR (Table 5), albeit not as a mediation relationship for process performance (Table 6). Our interviews have focused more on present needs and

real-time issues (e.g., current needs of BPM experts and awareness programs for process clients) as an extra dimension to the future needs positioned in the literature.

Past studies have described process-oriented roles and structure as formalizing BPM duties in job descriptions (Lohmann and zur Muehlen 2019; Nadarajah and Sharifah 2016; Roeckle et al. 2000), possibly as part of organization hierarchy. Additionally, our interviewees have opened the debate for correcting such roles to reduce workloads. For example, participant A1 expressed the need for more specific roles (i.e., owners focusing more on process improvements) without combining departmental duties and dedicated roles with technical process skills (instead of job rotation). Nevertheless, most examined organizations did not formalize dedicated job descriptions with clear BPM-related responsibilities.

Finally, the importance of top management commitment is traditionally recognized for adopting change (Chowdhury et al. 2017; Müller et al. 2017). This work has extended its importance for adopting POAR as a new phenomenon, namely with a POAR mediator between top management commitment and process performance, in addition to its direct link to process performance.

7.3 Practical Implications

We advise managers (e.g., chief operations officers, HRM managers, BPM managers and department heads) and IT consultants to consider the guidelines in this work when implementing POAR for the sake of increasing process performance and, in turn, organizational performance.

First, our findings suggest that merely focusing on BPM-related capabilities (such as using BPM methods or acquiring a process-oriented mindset) is satisfactory but still insufficient, while POAR can help increase the intended outcomes. POAR formally recognizes the relevance of employees, empowers them, and helps obtain employee engagement. Moreover, POAR can better position what HRM actions are possible when process KPIs are (not) met (e.g., rewards versus training needs). Although clarifying accountability, POAR should rather be seen as an extra dimension on top of traditional appraisals and rewards for employees not to be demotivated when teammates are underperforming.

Next, focusing on POAR initiatives is more useful once organizations have realized some progress in other BPM-related capabilities. Some degree of BPM maturity is thus a primary condition before managers may consider POAR. It is also important to align POAR initiatives to those processes and BPM methods that an organization already applies to stay close to measuring concrete practices that fit within the existing corporate culture. For instance, if some processes are not yet carefully designed or monitored, then

POAR will be introduced too early. Hence, POAR will not be suitable for all organizations. Organizations are also advised to introduce process-oriented roles and structure to help formalize the responsibilities that are needed as inputs for POAR efforts. The reason is that official duties need a clear definition and line of control before employees can be evaluated accordingly.

Because managers inherently need to approve POAR, top management commitment is essential for reasons of continuation but also for convincing employees about the need for BPM and POAR. Given that strategies differ among organizations, a contingent approach is still possible to adapt HRM policies in accordance with the organization's BPM implementation strategies. Moreover, the observed differences across countries may indicate that different POAR implementations are possible while still improving process performance (i.e., when fitting the business context). Hence, POAR is not only shaped by BPM decisions, but managers should also consider the conditions under which POAR can be incorporated into their organization's HRM policies to further increase acceptance by employees and facilitate BPM adoption.

8 Research Limitations and Future Research

Although our POAR-based process performance model (Fig. 4) benefits from its strong predicting power, including good validity and reliability checks, we acknowledge limitations regarding our case protocol and survey design. First, our results for exploring links among the BPM-related capabilities and POAR success depend on ten organizations, although they were carefully selected to cover different maturity levels.

Secondly, the survey data can be extended with additional countries per continent to recognize better the cultural and regional differences. Besides considering more demographics, future research may target a higher number of respondents. However, we must note that especially motivating higher-level managers to participate in a relatively long questionnaire remains challenging. As such, we esteem our data collection as fruitful and sufficiently representative of our purpose. Another limitation concerns our choice for PLS-SEM, as compared to other approaches (e.g., covariance-based). While this method is criticized because of potential biases and model inaccuracy under some conditions (Rigdon et al. 2017), we have focused on its proven advantages when facing model complexity and examining formative constructs (Ringle et al. 2012).

Future research may delve into the constructs that did not act as moderators (i.e., size and sector) by reconsidering their impact with additional case evidence. Research could also examine the role of process owners and adaptive

structures for POAR realizations. Moreover, identifying dedicated skills and trainings and their connection with POAR remains underexplored. Other avenues relate to the use of POAR when initiating BPM methods or when providing process-based trainings and aligning them with cultural aspects.

9 Conclusion

This study has reported on multiple cases and a survey with higher-level managers. The findings support the role of HRM efforts, and specifically process-oriented appraisals and rewards (POAR), to increase the effect of BPM-related capabilities on process performance and organizational performance. They contribute to the BPM discipline because scholars used to investigate the BPM-related capabilities separately (e.g., in maturity models or success models) and with less focus on HRM efforts. The findings also contribute to the strategic HRM field for better differentiating HRM practices according to a value chain perspective, while performance managers have gained insight into the dependencies for increasing business success. Although the literature has recognized the need to consider cultural, structural and people-related aspects in BPM, our study's novelty lies in highlighting their mutually reinforcing effect on performance outcomes.

While we have found ample evidence for all BPM-related capabilities playing a vital role in POAR (RQ1), some capabilities seem to have more effect on performance through POAR (i.e., BPM methods, culture and top management commitment) (RQ2). We encourage organizations to adopt POAR and reinforce the effects of their BPM initiatives by taking advantage of HRM. However, POAR adoption is only advised after organizations have evolved somewhat regarding BPM maturity and when top managers can defend POAR toward employees. Scholars and practitioners benefit from our identified links with POAR and the demonstrated need for an early adoption of BPM methods (even the basics) to boost performance.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12599-023-00820-z>.

Funding No external funding was received for this research.

Data availability The first author led the statistical analysis and contributed to the writing. The second author led the overall study, gave access to the quantitative dataset, and contributed to the design, writing, feedback and revision. The third author contributed to the case data collection.

Declaration

Conflict of interest There are no declared conflicts of interest.

References

- Aguinis H (2019) Performance management. Pearson Education, New Jersey
- Antony J, Gupta S (2019) Top ten reasons for process improvement project failures. *Int J Lean Six Sigma* 10(1):367–374
- Arifeen N, Hussain M, Kazmi S, Mubeen M, Mughal SL, Akbar W (2014) Measuring business performance. *Europ J Bus Manag* 6(4):38–45
- Baiyere A, Salmela H, Tapanainen T (2020) Digital transformation and the new logics of business process management. *Europ J Inf Syst* 29(3):238–259
- Baker J (2012) The Technology–Organization–Environment Framework. In: Dwivedi Y, Wade M, Schneberger S (eds) *Information Systems Theory*. Springer, New York, pp 231–245
- Becker BE, Huselid MA (2006) Strategic Human Resources Management *J Manag* 32(6):898–925
- Benraad M, Ozkan B, Turetken O, Vanderfeesten I (2022) The influence of BPM-supportive culture and individual process orientation on process conformance. *Bus Process Manag J* 28(8):1–22
- Börner R, Moormann J, Wang M (2012) Staff training for business process improvement. *J Workplace Learn* 24(3):200–225
- Bronzo M, de Resende PTV, de Oliveira MPV, McCormack KP, de Sousa PR, Ferreira RL (2013) Improving performance aligning business analytics with process orientation. *Int J Inf Manag* 33(2):300–307
- Chennell AF, Dransfield SB, Fisher NZ, Field JB, Saunders W, Shaw DE (2000) OPM®: a system for organisational performance measurement. Proceedings “Performance Measurement – Past, Present and Future”, University of Cambridge, p 1–8
- Chowdhury M, Paul H, Das A (2017) The impact of top management commitment on total quality management practice. *Glob J Flex Syst Manag* 8(1):17–29
- Ciobanu A, Androniceanu A (2018) Integrated human resources activities. *Manag Res Pract* 10(3):60–79
- Collings GD, Wood G (2009) Human resource management. Routledge, Oxon
- Creswell JW (2007) Qualitative inquiry and research design. Sage, Thousand Oaks
- Deming WE (1994) The new economics, 2nd edn. MIT Press, Cambridge
- Den Hartog DN, Boselie P, Paauwe J (2004) Performance Management. *Appl Psychol. Int Rev* 53(4):556–569
- Dumas M, La Rosa M, Mendling J, Reijers HA (2018) Fundamentals of business process management, 2nd edn. Springer, Cham
- Ferraris A, Monge F, Mueller J (2018) Ambidextrous IT capabilities and business process performance. *Bus Process Manag J* 24(5):1091–1109
- Figen C, Umit SB, Jillian M (2003) A business process approach to human resource management. *Bus Process Manag J* 9(2):190–207
- Goel K, Bandara W, Gable GA (2021) Typology of business process standardization strategies. *Bus Inf Syst Eng* 63(6):621–635
- Gomez-Mejia LR (1990) Increasing productivity: performance appraisal and reward systems. *Pers Rev* 19(2):21–26
- Grisold, T, Gross S, Röglinger M, Stelzl K, vom Brocke J (2019) Exploring explorative BPM. Proceedings of the 17th International Conference BPM, Vienna, Austria, pp 23–31
- Guest DE (1997) Human resource management and performance. *Int J Hum Res Manag* 8(3):263–276
- Hair JF, Ringle CM, Sarstedt M (2011) PLS-SEM: indeed a silver bullet. *J Market Theor Pract* 19(2):139–152
- Hair JF, Risher JJ, Sarstedt M, Ringle CM (2019) When to use and how to report the results of PLS-SEM. *Europ Bus Rev* 31(1):2–24
- Hair JF Jr, Howard MC, Nitzl C (2020) Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *J Bus Res* 109:101–110
- Hair Jr JF, Hult GTM, Ringle CM, Sarstedt M (2014) A primer on partial least squares structural equation modeling (PLS-SEM) *Europ J Tour Res* 6(2):211–213
- Haponava T, Al-Jibouri S (2012) Proposed system for measuring project performance using process-based key performance indicators. *J Manag Eng* 28(2):140–149
- Henseler J, Sarstedt M (2013) Goodness-of-fit indices for partial least squares path modeling. *Comput Stat* 28(2):565–580
- Hernaus T (2012) Influence of strategic approach to BPM on financial and non-financial performance. *Baltic J Manag* 7(4):376–396
- Kaplan RS, Norton DP (1992) The balanced scorecard. *Harvard Bus Rev* 71–79.
- Kerpedzhiev GD, König UM, Röglinger M, Rosemann M (2021) An exploration into future business process management capabilities in view of digitalization. *Bus Inf Syst Eng* 63(2):83–96
- Kohlbacher M, Reijers HA (2013) The effects of process-oriented organizational design on firm performance. *Bus Process Manag J* 19(2):245–262
- Kregel I, Distel B, Coners A (2022) Business process management culture in public administration and its determinants. *Bus Inf Syst Eng* 64(2):201–221
- Krippendorff K (2004) Content analysis. Sage, Thousand Oaks
- La Rosa M (2016) Interview with Michael Rosemann on “The role of business process management in modern organizations.” *Bus Inf Syst Eng* 58(1):89–91
- Lawler EE (2003) Reward practices and performance management system effectiveness. *Organ Dyn* 32(4):396–404
- Lester L, Haby MM, Chapman E, Kuchenmüller T (2020) Evaluation of the performance and achievements of the WHO evidence-informed policy network (EVIPNet) *Europ Health Res Polic Syst* 18(1):109
- Lohmann P, zur Muehlen M (2019) Regulatory instability, business process management technology, and BPM skill configurations. Proceedings of the 17th International Conference BPM, Vienna, Austria, pp 419–435
- Marcoulides GA, Heck RH (1993) Organizational Culture and Performance *Organ Sci* 4(2):209–225
- McCormack KP (2001) Business Process Orientation *Qual Prog* 34(1):51–58
- Mertens W, Recker J (2020) New guidelines for null hypothesis significance testing in hypothetico-deductive IS research. *J Assoc Inf Syst* 21(4):1072–1102
- Mikalef P, Krogstie J (2020) Examining the interplay between big data analytics and contextual factors in driving process innovation capabilities. *Europ J Inf Syst* 29(3):260–287
- Milkovich G, Gerhart B, Newman J (2011) Employee compensation. McGraw-Hill Irwin, New York
- Mohajeri K, Mesgari M, Lee AS (2020) When statistical significance is not enough. *MIS Q* 44(2):525–559
- Mone EM, London M (2018) Employee engagement through effective performance management. Routledge, New York
- Müller SD, Mathiassen L, Saunders C, Kraemmergaard P (2017) Political maneuvering during business process transformation. *J Assoc Inf Syst* 18(3):173–205
- Nadarajah D, Sharifah SL (2016) Measuring business process management using business process orientation and process improvement initiatives. *Bus Process Manag J* 22(6):1069–1078
- Nasution TPMD, Rossanty Y (2018) Country of origin as a moderator of halal label and purchase behavior. *J Bus Retail Manag Res* 12(2):194–201

- Newman M, Zhao Y (2008) The process of enterprise resource planning implementation and business process re-engineering. *Inf Syst J* 18(4):405–426
- Niehaves B, Poeppelbuss J, Plattfaut R, Becker J (2014) BPM capability development. *Bus Process Manag J* 20(1):90–106
- Preacher KJ, Hayes AF (2008) Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Meth* 40(3):879–891
- Rigdon EE, Sarstedt M, Ringle CM (2017) On comparing results from CB-SEM and PLS-SEM. *Marketing: ZFP J Res Manag* 39(3):4–16
- Ringle CM, Sarstedt M, Straub DW (2012) Editor's comments: a critical look at the use of PLS-SEM in "MIS Quarterly". *MIS Q* 36(1):iii–xiv
- Roeckle H, Schimpf G, Weidinger R (2000) Process-oriented approach for role-finding to implement role-based security administration in a large industrial organization. *Proceedings of the ACM Workshop on Role-Based Access Control*, Berlin, pp 103–110
- Romero HL, Dijkman RM, Grefen PWPJ, van Weele AJ (2015) Factors that Determine the Extent of Business Process Standardization and the Subsequent Effect on Business Performance. *Bus Inf Syst Eng* 57(4):261–270
- Rosemann M, de Bruin T (2005) Towards a business process management maturity model. *Proceedings of the 13th European Conference on Information Systems*, Regensburg, pp521–532.
- Sarker S, Xiao X, Beaulieu T, Lee A (2018) Learning from first-generation qualitative approaches in the IS discipline. *J Assoc Inf Syst* 19(8):752–774
- Sarstedt M, Hair JF, Pick M, Liengaard BD, Radomir L, Ringle CM (2022) Progress in partial least squares structural equation modeling use in marketing research in the last decade. *Psychol Market* 39(5):1035–1064
- Schein EH (2010) *Organizational culture and leadership*, 4th edn. Jossey-Bass, San Francisco
- Schmiedel T, Recker J, vom Brocke J (2020) The relation between BPM culture, BPM methods, and process performance. *Inf Manag* 57(2):103175
- Shafagatova A, Van Looy A (2021) Alignment patterns for process-oriented appraisals and rewards. *Bus Process Manag J* 27(3):941–964
- Shafagatova A, Van Looy A, Maleki Shamasbi S (2023) Uncovering the combined impact of process characteristics and reward types on employees' job satisfaction: a European quantitative study. *SAGE Open* 13(1):1–21
- Shahreki J (2019) The use and effect of human resource information systems on human resource management productivity. *J Soft Comput Decis Support Syst* 6(5):1–8
- Shanks G (2002) Guidelines for conducting positivist case study research in information systems. *Australas J Inf Syst* 10(1):76–85
- Shingala MC, Rajyaguru A (2015) Comparison of post hoc tests for unequal variance. *Int J New Technol Sci Eng* 2(5):22–33
- Skrinjar R, Trkman P (2013) Increasing process orientation with business process management. *Int J Inf Manag* 33(1):48–60
- Souza LAHD, Carvalho VDHD, Santos RJRD, Silva JMND (2022) Managing BPM life cycle transition risks in a small educational company to support change management. *Benchmarking Int J* 29(8):2555–2592
- Tashakkori A, Teddlie C, Sines MC (2013) Utilizing mixed methods in psychological research. In: Schinka JA, Velicer WF, Weiner IB (eds) *Handbook of psychology*. Wiley, New Jersey, pp 428–450
- Teece DJ, Pisano G, Shuen A (1997) Dynamic capabilities and strategic management. *Strateg Manag J* 18(7):509–533
- Trkman P (2010) The critical success factors of business process management. *Int J Inf Manag* 30(2):125–134
- Van de Ven AH (2007) *Engaged scholarship*. Oxford University Press, Oxford
- Van Looy A (2019) Capabilities for managing business processes: a measurement instrument. *Bus Process Manag J* 26(1):287–311
- Van Looy A, Devos J (2018) A roadmap for (un)successful BPM: positivist case studies. *Bus Process Manag J* 25(5):1164–1190
- Van Looy A, Shafagatova A (2016) Business process performance measurement: a structured literature review of indicators, measures and metrics. *Springerplus* 5(1):1–24
- Van Looy A, Van den Bergh J (2018) The effect of organization size and sector on adopting business process management. *Bus Inf Syst Eng* 60(6):479–491
- Van Looy A, De BM, Poels G (2014) A conceptual framework and classification of capability areas for business process maturity. *Enterp Inf Syst* 8(2):188–224
- Van Looy A, Trkman P, Clarysse E (2022) A configuration taxonomy of business process orientation. *Bus Inf Syst Eng* 64(2):133–147
- Venkatesh V, Brown SA, Bala H (2013) Bridging the Qualitative-Quantitative Divide *MIS Q* 37(1):21–54
- Vickers AJ (2005) Parametric versus non-parametric statistics in the analysis of randomized trials with non-normally distributed data. *BMC Med Res Meth* 5(35):1–12
- vom Brocke J, Rosemann M (2015) *Handbook on business process management 1*. Springer, Cham
- vom Brocke J, Zelt S, Schmiedel T (2016) On the role of context in business process management. *Int J Inf Manag* 36(3):486–495
- vom Brocke J, Baier MS, Schmiedel T, Stelzl K, Röglinger M, Wehking C (2021) Context-aware business process management. *Bus Inf Syst Eng* 63(5):533–550

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.