Individual Process Orientation as a Two-Dimensional Construct: Conceptualization and Measurement Scale Development

Monika Klun[1(✉)] and Michael Leyer[2,3]

[1] University of Ljubljana, Ljubljana, Slovenia
`monika.klun@ef.uni-lj.si`
[2] University of Rostock, Rostock, Germany
`michael.leyer@uni-rostock.de`
[3] Queensland University of Technology, Brisbane, Australia

Abstract. Organizations continuously aim for improved business performance through a process-oriented transformation. Such a transformation, however, is not limited only to the organizational level, but permeates the individual level as well. Research so far has not investigated the role of employees' behavior and thinking, as individual process-orientation remains under-researched. A first step in this regard, is the clarification of the main construct of interest. Hence, the goal of this paper is to provide deeper insights into the construct of process orientation at the individual level. The paper proposes a two-dimensional conceptualization of individual process orientation that distinguishes between process-oriented thinking and process-oriented behavior. Drawing on this conceptualization, the paper provides a four-stage approach to developing a scale for measuring individual process orientation.

Keywords: Individual process orientation · Measurement scale · Process-oriented thinking · Process-oriented behavior

1 Introduction

Several papers have discussed how the advantages of process-oriented organizations in terms of market competition and business performance aid them in outperforming function-oriented ones [1–3]. They are proposedly more equipped to change during market shifts, focus more on customer needs and deliver high-quality output faster [1, 4, 5]. However, such benefits are only achievable when process-oriented thinking and behavior are established among employees [6]. Nevertheless, literature on process orientation at the individual level remains remarkably scarce [7].

In a first attempt, Leyer, Hirzel and Moormann [7] discuss individual process orientation (IPO) of employees as the way of thinking and behavior of individual employees regarding their daily work activities within the organization. Their literature review has found the concept of process orientation at the individual level strongly under-researched [7] and lacking operationalization. Some exceptions to that are a

limited stream of research that measured process-oriented thinking for the purpose of identifying adequate learning modes. Among these papers, Leyer and Wollersheim [8] and Wollersheim, Leyer and Spörrle [9] describe a measurement based on activities, roles and goals in a process while Leyer, Moormann and Wang [10] extend this view by including the understanding of individuals regarding process orientation on an organizational level.

Another stream of research focusses on researching individual process-oriented behavior [1, 7, 11, 12], which is focused on exploring the aspect of IPO that is observable to companies. These papers incorporate facets such as knowledge, coordination and awareness, contributing to a multifaceted conceptualization of process-oriented behavior. However, some overlap with facets of process-oriented thinking, indication an established link between process-oriented thinking and behavior on an individual level. What remains missing are a theoretical foundation, subsequent conceptualization and a refined measurement scale, to distinguishing between measuring process-oriented behavior and process-oriented thinking.

Several managerial approaches, such as Business Process Management (BPM), discuss the importance of individuals in changing business processes and organizations becoming process-oriented. People are regarded as a core element of BPM [13] and [2] addresses the importance of employees' focus on business processes, however none of these aspects include the individual's perspective, rather they denote them as a group of stakeholders as seen from an organizational level. Similarly, culture also refers to a plurality of individuals, making up a distinct group (e.g. organization, department), indicating a person can hold numerous cultural identities simultaneously [14, 15]. On the other hand, exploring process orientation from the perspective of an individual differs immensely from looking at how an organization thinks and behaves in terms of process-orientation.

Based on this background, we raise the following research questions: (1) How is IPO conceptualized and (2) how can a measurement instrument be operationalized. In answering the research question, we adopt an individual's perspective and propose the two-dimensionality of the process orientation construct, which can be based theoretically in cognitive psychology theory [16–21]. Individuals form a mental model regarding the idea of process orientation (representation of process-oriented thinking) which can then lead to the decision to act in a process-oriented way (process-oriented behavior). Hence, this paper describes the underlying theory and explores existing conceptualizations for IPO. Based on this foundation, we describe IPO as a two-dimensional construct. Finally, we develop the measurement scale to provide empirical evidence for the theoretical underpinnings.

The paper is structured as follows. Section 2 describes the theoretical foundation of our research focus. Section 3 introduces the literature review and resulting conceptualization while Sect. 4 presents the methodology section with the scale measurement operationalization stages. Section 5 provides a description of the results. In Sect. 6 we provide the conclusion and future research possibilities.

2   Theoretical Background

2.1   Process Orientation on the Individual Level

Described as a multidimensional construct, process orientation contains both tangible and intangible elements [22, 23]. According to Leyer, Hirzel and Moormann [7] organizational structure, task description, and goal setting represent the tangible elements, while customer focus, process improvement, and personal responsibility represent the intangible elements. Identifying these elements allows for an identification of process orientation on both the organizational and the individual level [12].

On an organizational level, process orientation requires employees to be organized along processes, the placement of process owners, and minimal interfaces between employees and customers [24–26]. Employees should have an understanding of their role in a process they are working in from beginning to end [12, 27]. It is important that employees coordinate with all who are involved in their processes, and that they are allowed a certain degree of freedom in process execution [26]. Organizational goals should be clearly aligned with the processes along with being linked to personal goals [28, 29]. As suggested by Kohlbacher and Gruenwald [30] an important dimension in achieving process orientation is the formation of a "corporate culture in line with the process approach". However, such broad claims can lead to generic statements like the importance of "proper organizational culture" which leads to "I do not know what the question is but I know that top management support and organizational culture is the answer." type of conclusions [31]. Thus, we need a more precise investigation of IPO.

On an individual level, Leyer, Hirzel and Moormann [7] IPO represents an individual's "execution of the daily working routine". Existing studies that have discussed IPO, focus predominantly on a more general notion of IPO [7, 11, 12] and the process-oriented behavior of individuals. Because of the limited research on process orientation at the individual level, there is an important conceptual limitation associated with the extant literature. Additionally, there are no established scales for measuring IPO, apart from Leyer, Hirzel and Moormann [7], measuring the change of process-oriented behavior of employees.
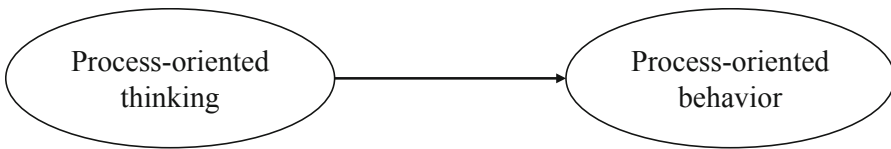
2.2   Cognitive Psychological Theory

The underlying theory of our IPO conceptualization is within the field of cognitive psychological theory which focusses on the mental processes that affect behavior [17]. A major concept of cognition is the mental representation of an individual's environment termed as mental model. The relationship between a mental model/mental representation and observable behavior is a result of subsequent decisions [21, 32–34]. A mental model describes a subjectively perceived representation of the cause-and-effect relation of several factors [35]. It is one's subjective view on an observed system of relations and it can be used by a person being involved in such a system to take actions [21].

In the context of IPO, the mental model relates to the way of an individual's thinking. Process-oriented thinking means that individual employees have an understanding that activities should be designed and executed from the perspective of

processes rather than functions. It means linking the different activities mentally in a broader picture to a mental model in which an individual connects the activities and employees from a process perspective.

This way of thinking influences the observed behavior, i.e., how one decides individually to behave when executing activities. The underlying mechanism is supported by sense-making as a cognitive process, i.e., whether one is seeing a sense in translating process-oriented thinking in process-oriented behavior. The sense-making perspective as our relevant theory within cognitive psychology specifies that their answer determines how they will engage in that situation [34]. In order for individuals to be able to function in the world in a rational manner, they draw a meaning or a sense from a situation [36]. Sense-making can thus be considered a "primary generator of individual action" [37]. One can find different interpretations of "individuals' meanings"; labeled by some as frames [38], cognitive maps [39], schemata [40] or enactments [41]. Regardless of the terminology, the commonalities include three steps; an individual developing his internal map of events, actions and consequences that are guided by a subjective cause-and-effect interpretation; placing himself within this map; and taking distinct steps (action), based on this map as guideline for the unfolding of events [37]. As such process-oriented thinking translates into process-oriented behavior (Fig. 1) in the sense that individuals interpret their reasoning or sense-making into determined and intended behavior.

Fig. 1. Two-dimensionality of IPO from a cognitive psychological perspective

3 Conceptualization of IPO

3.1 Procedure of Literature Identification

The starting point of our analysis was an extensive search for the topic keyword combinations in SCOPUS and Web of Science (WOS). The correspondence of keywords was prepared by the authors and additionally assessed (and complemented) by an external researcher to provide objectivity and validity. The keyword combinations include: "indivi*"/"worker*"/"employ*" together with "process orientation"/"process-orien*". In the next step, abstracts of the resulting hits from the two databases were scanned to ensure the relevance of the papers. After excluding unrelated papers, we were left with a total number of seven papers from both databases discussing IPO with this chosen keyword combination.

However, since the goal of the literature review was to identify relevant work on the topic of process orientation at the individual level, we expanded the search and included all the referenced papers featured in the resulting seven papers. Along with the

definitions of IPO explicitly defined at the individual level, we also found process orientation defined as an individual-characteristic or activity. For the purpose of the literature review, we explored the various definitions of process orientation that inherently refer to personal or individual abilities or characteristics. Namely, even relatively early mentions of process orientation, e.g. by McCormack and Johnson [42] or Peppard and Fitzgerald [43], denote process orientation as a specific "view" or "thinking" in an organization, therefore denoting an intrinsically individual characteristic. Table 1 features the found descriptions and definitions of process orientation that are explicitly or indirectly referring to process orientation at the individual level.

Table 1. Exemplary description of process-oriented thinking and behavior.

	Description	Paper author(s)
Process-oriented thinking	Achieving process orientation among employee's states as the goal establishing process-oriented behavior, however first they must adopt process-oriented thinking	Leyer, Hirzel and Moormann [7]
	Process orientation by staff is the ability to think in terms of processes and includes knowing one's position in the process value chain, identifying (internal and external) customers and adding to customer value	van Assen [44]
	Process orientation means working and thinking in a cross-functional and customer-oriented way	McCormack [2]
	Without this [process-oriented] mindset, employees cannot visualize the impact of their work	Reijers [45]
Process-oriented behavior	IPO can be deduced from the organizational level and describes the ideas and behaviors of individual employees regarding their daily work activities within such an organizational design	Kettenbohrer, Beimborn and Leyer [12]
	IPO is expressed in the execution of the daily working routine of the employees	Kettenbohrer, Beimborn and Eckhardt [11]
	Process orientation means working and thinking in a cross-functional and customer-oriented way	McCormack [2]
	The individual's process orientation is expressed in the execution of each employee's day-to-day work routine within the process	Leyer, Hirzel and Moormann [7]

3.2 Two-Dimensional Conceptualization of IPO

The results of the literature review showcase a number of individual-level attributes used to describe the notion of process orientation. The manner-based keywords (behave, act) relate to the process-oriented behavior of individuals, which was introduced by [7]. Organizations have long since been aware of the importance of employees in

determining the successfulness of any organizational change and have thus paid greater attention to how individuals act at work. Hence, process-oriented behavior is characterized as a "critical success factor" in implementing process orientation at the organizational level [46]. An individual's process-oriented behavior is defined as the behavior of an individual, within the framework of the organization, that emphasizes process and describes their process-focused manner of executing their everyday work tasks [7].

However, observing behavior alone is not enough to understand the orientation of individuals and even change-compliant behavior of employees can be reversed, if the underlying feelings and beliefs of individuals remain unexplored. As Nonaka [47] puts it sustainable behavior change is very difficult to achieve. In order to categorize the definitions of process orientation on the level of individuals, we follow the aspect duality approach by Feldman and Pentland [48] (adapted from Latour [49]) of two mutually constitutive aspects – the ostensive and performative. While Latour [49] and Feldman and Pentland [48] use the terms to describe power and routines respectively, the concepts can also be applied for IPO. The ostensive concept denotes the understandings of individuals that can be embodied as cognitive states and can vary throughout the organization [50]. Moreover, we also identified the term "process-oriented attitude" in the literature review. However, the intended meaning was the same cognitive feature as denoted with the keywords "view" or "thinking" and not what attitude inherently implies, i.e. the favorable or unfavorable opinion of an individual regarding the attitude object. The performative aspect is represented by specific people, at specific times, in specific place [50]. Feldman [51] describes this aspect as "existence in practice", characterizing the realization or execution of an actual performance by individuals. Building on these findings from literature and in line with the cognitive psychological lens, we define IPO as a compilation of two mutually constitutive aspects – the "dispositional" or "innate" process-oriented thinking which leads to the "realized" process-oriented behavior of individuals.

While often mentioned in the literature as the process-oriented mindset, view or thinking of individuals, the attributes denoting an individual's way of thinking about process orientation remain little addressed and at a very general level. Addressing this lack of operationalization of the concept of IPO, we develop a measurement scale in the following to operationalize and validate IPO as a two-dimensional construct.

4   Development of the Measurement Scale

In order to develop a measurement scale, we investigate, operationalize, and validate IPO in four stages. In doing so, we follow the approach of Karpen, Bove, Lukas and Zyphur [52] who describe a profound procedure how to develop an adequate measurement scale.

Preparing an adequate measurement model rests on an underlying theory and subsequent conceptualization. Based on the examination of prior literature, the concept of IPO consists of several components, representing the two different dimensions of the overall construct. Table 2 gives an overview on the steps and empirical sources.

Table 2. Stages of measurement scale development

Measurement scale development stages	Study details
Stage 1: Item selection	Preparing initial pool from qualitative items regarding process orientation Pool of 60 indicators reduced to 49
Stage 2: Item evaluation	Item sorting (16 academics) 2 dimensions and 10 items
Stage 3: Item purification	Item formulation testing Study: 66 participants (employees)
Stage 4: Item validation	Confirmatory factor analysis, discriminant and convergent analyses Study: 368 participants (employees) Control study: 100 participants (employees working in companies with more than 10 employees)

4.1 Stage 1: Item Selection

Existing literature provides several examples of process orientation constructs or dimensions, such as Kohlbacher and Gruenwald [30], Kohlbacher [24], Willaert, Van den Bergh, Willems and Deschoolmeester [23], Reijers [45] and Hammer [53] to name a few. However, since our paper deals with the perspective of individuals not all researched indicators are relevant. The focus of IPO are items representing thinking and behavior in a process-oriented manner, thus all items or indicators reflecting an organization's perspective were excluded from item selection. Additionally, any specific individual-based items depicting a specific role (e.g. process owner existence) or management level (e.g. top management support) were excluded, as there are unsuitable for portraying the perspectives, abilities and actions of individuals across the organization. From the seven process orientation dimensions identified by Kohlbacher and Gruenwald [30] and earlier Kohlbacher [24] only two contained individual-level items; among these were items such as customer-focused attitude of employees, worker's knowledge about process execution and employees' accountability for firm results to name a few. The indicator *customer-focus of employees* captured whether employees are aware of the customers' needs and their role in fulfilling them. The item was adapted from other models by Willaert, Van den Bergh, Willems and Deschool-meester [23], Reijers [45] and Hammer [53], also discussing possible process orientation components. The indicator *worker's knowledge* about process execution, discussed by Kohlbacher and Gruenwald [30] as originating from the model by Hammer [53] as whether an employee can describe the design of the business process he is part of and consequently how it affects other employees and customers within the process and the process performance itself. Contrarily, [2] in his definition of business process orientation discusses three dimensions, where the items although discussing employees (e.g. "The average employee views the business as a series of linked processes") do not really reflect the individual employees' perspectives, but rather an assessment of the cumulative outlook and general behavior of employees as seen by

one or a few selected individuals within the organization (usually CEO, CIO, process owners, etc.). All of the above items and other were found (in similar form) in the empirical data, gathered by Leyer, Stumpf-Wollersheim and Kronsbein [54] so the authors chose to base their initial pool on the 60 items, which reflect the personal perspective of "employees, affected by process-orientation in the day-to-day business", exactly the perspective determined for IPO.

This original data was categorized into advantages or disadvantages of process orientation, according to individual perception. For the purpose of evaluating item appropriation across the proposed dimensions, the item pool required some amendments - the next step involved excluding any duplicated content and unifying definitions in order to portray the individual perspective. Additionally, we deleted four items that appeared as opposite aspects (antonyms), since the emphasis was on allocating perception of IPO into categories of thinking or behavior, irrespective of the connotation (e.g. flexibility and inflexibility, we took only flexibility). Furthermore, we adjusted the existing items to improve their readability, clarity and comprehension. In order to receive evaluation of the appropriateness of our items we proceeded with the item evaluation.

4.2   Stage 2: Item Evaluation

The resulting measurement items were submitted for evaluation and ranking into the most appropriate dimension, i.e. process-oriented thinking or behavior, or proposed to be excluded, if considered not relevant. The items were given to a set of 16 academics, chosen for their research expertise in the domain of process orientation. The experts were targeted via an online questionnaire, in which they evaluated the perceived suitability and importance of each item. The key item retention criterion was a 70% consensus for each item, confirming their individual relevance and dimension suitability. This resulted in a set of the following ten items: holistic thinking, goal orientation, customer orientation and organizational width were categorized under the process-oriented thinking dimension, while productivity, effectiveness, knowledge transfer, cooperation, speed and deviations were sorted into the process-oriented behavior dimension.

4.3   Stage 3: Item Purification

In the third stage we examined the formulation of the indicators and the dimensions captured by performing a first confirmatory factor analysis (CFA). We gathered 66 employees using clickworker, a platform for micro tasks and paying participation adequately according to the recommendation of the platform. Participants should refer to their workplace regarding their perceived process orientation. We applied common settings for CFA with principal axis factoring in combination with a varimax rotation. The resulting value of Bartlett's test of sphericity proved significant and the Kaiser-Mayer-Olkin test was appropriate as well, i.e. greater than .50. The results revealed that the items were not loading adequately to the two factors but provided a mixed assignment. The reason could be identified in ambiguous wording. Consequently, we reformulated the items to provide unambiguous texts.

4.4   Stage 4: Item Validation

In the fourth stage, we gathered another sample of employees again on clickworker (excluding prior participants), that resulted in 558 viable questionnaires (42 were deleted as the participants did not pass attention tests). The condition was that employees work at least part-time in an organization. We then used again a CFA to evaluate the remaining items and perform comparative model fit analyses to assess our tentative model. These results regarding item validation are presented in the results section.

Additionally, we collected a control sample of 108 respondents that was referring to employees working in organizations with more than 10 employees. The number of 10 ensures that there the work environment is large enough to be out of personal control of employees. The reasoning for this control sample is drawn from Spector and Brannick [55], that it should enable researchers to remove predictor-criterion contamination by including confounding variables in their analyses. We included attitude (i.e., whether employees "like" each of the items) regarding the items of both thinking and behavior. In addition, we included the control aspect of behavior (i.e., whether employees had the aspects of behavior within their control) as the behavior of individuals can be considered to some degree prescribed Swann [56] due to adherence to rules and procedures in an organizational environment.

5   Results

We started the analysis with a CFA with principal axis factoring in combination with a varimax rotation that was fulfilling the criteria regarding Bartlett's test of sphericity and the Kaiser-Mayer-Olkin test. According to the standard procedures of CFA, we kept all the items with satisfactory weights and modification indices and factor loadings that were above .60 [57]. This resulted in deleting the item regarding deviation as the value was only .386, hence taking nine items into account further on. The final set of items can be found in Table 3.

The second step was testing the reliability of our variables (Table 4), in which case the composite reliability scores are used to indicate whether all values are above the threshold of 0.7, which our results confirm. Also, we can see that the indicator reliability is fulfilled, because all values for average variance extracted were above the threshold of 0.5.

For the third step, we tested discriminant validity applying the heterotrait–monotrait (HTMT) ratio of correlation [58]. By using this criterion, the results provide greater accuracy in terms of detecting discriminant validity when compared to using the Fornell-Larcker criteria. The value of 0.670 was well below the threshold of 0.9.

Fourth, for the purpose of analysing our research model, we conducted a linear regression analysis for which the criteria were fulfilled by our dataset. The results reveal a beta coefficient of .562 and an explained variance of .314 (Adjusted R^2). Thus, our two-dimensional construct including the influence of thinking on behaviour is supported.

Table 3. Final assignment of items.

Items:	Process-oriented thinking	Process-oriented behavior
Holistic thinking: I understand how my tasks within the processes they are part of contribute to the overall company success	X	
Goal-orientation: I understand how I contribute to achieve the goals of the processes my tasks are part of	X	
Customer-orientation: I understand how I contribute to fulfil customer needs within the processes my tasks are part of	X	
Organizational width: I understand how my tasks are connected with other employees' tasks within the same process	X	
Knowledge transfer: I share knowledge of my process execution with other employees with whom I work together in processes		X
Effectiveness: I execute my tasks in a way that the effectiveness of the processes my tasks are part of is increased		X
Productivity: I execute my tasks in a way that the productivity of the processes my tasks are part of is increased		X
Cooperation: I execute my tasks in cooperation with other employees with whom I work together in processes to reach the goals of this processes		X
Speed: I execute my tasks in a way that the speed of orders in the processes my tasks are part of is increased		X

Table 4. Reliability values of the variables.

	Composite reliability	Average variance extracted
Process-oriented thinking	0.871	0.575
Process-oriented behavior	0.910	0.716

Fifth, we determined the power of our analysis by conducting a post hoc statistical power test for multiple regressions [59]. The test shows an observed statistical power of .99999868 for a probability level of 99%, which is well above the recommended threshold of .8 and indicates strong statistical power of our results [60].

Finally, given the value of .314 as explained variance, the results indicated that there are other factors influencing the gap between thinking and behavior. Hence, we included the personal attitude regarding thinking and behavior as well as individual control regarding behavior. This can be attributed to the fact that most employees' behavior in the workplace is prescribed and constrained to a certain degree [56, 61].

Again, we performed the described steps to evaluate the results using SmartPLS for this more complicated model. The first result of these tests revealed that the attitude regarding process-oriented behavior has a HTMT-value of 1.046 which indicates that both constructs are too similar. This is supported by a significant correlation of .798. Hence, the variable attitude regarding process-oriented behavior is removed. Figure 2 provides an overview.
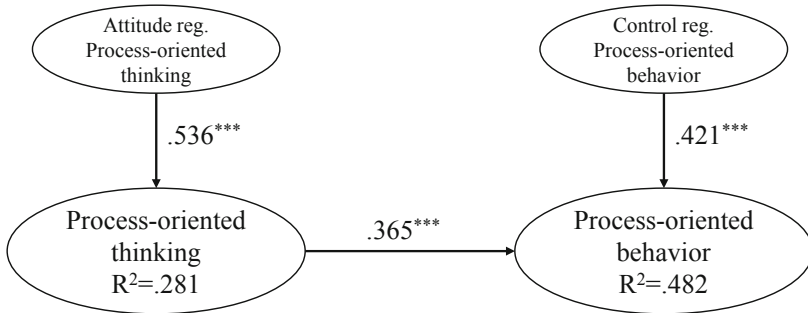

Fig. 2. Controls regarding IPO

6   Conclusion and Future Work

Our paper provides a deeper understanding of the concept of IPO, theoretically, conceptually and empirically. The two dimensions are conceptualized through an extensive literature review and confirmed in the empirical part.

Based on our results, the theoretical implications are as follows. First, we provide a theoretical analysis that describes the causal relationship between thinking and behavior. This theoretical underpinning explains why and how process-oriented thinking leads to process-oriented behavior, thus, revealing the underlying mechanism between the two constructs.

Second, by providing a clear, more in-depth understanding of IPO, we introduce the two dimensions of process-oriented thinking and process-oriented behavior, underpinned by the review and analysis of existing literature. Hierarchical or multi-dimensional constructs, such as our proposed two-dimensional IPO construct, are claimed to have many theoretical as well as empirical contributions [62–64]. Proponents argue that they reduce model complexity and allow for more theoretical parsimony [62, 63]. These conceptual benefits are complemented by empirical issues such as the reliability and validity of the measures of the multidimensional construct [62]. In terms of higher-order constructs the degree of criterion-related validity is proposedly higher, especially when they are considered predictors [65].

Third, we provide a validated instrument for empirical measurement of the two-dimensional IPO. The results provide confirmation of our developed measurement scale, introducing it as a reliable, valid and stable measurement instrument for IPO. We also include relevant direct control variables to ensure that the relationship is not

hampered by individual attitudes as well as not being able to control process-oriented behavior.

Fourth, our results regarding the control study show that the attitude regarding behavior is almost similar to showing such behavior while this does not hold true for thinking. This means that the way of process-oriented thinking is partly determined by the attitude of an individual towards process orientation highlighting the more cognitive aspects of this variable. The attitude is not quite strong in still thinking that process orientation is useful. Showing such behavior is however driven by attitude which is in line with sensemaking within our theoretical cognitive perspective. It has to make sense for employees to translate thinking into behavior. Furthermore, control of the behavior is a relevant factor in further exploring the gap between thinking and behavior. Hence, the organizational circumstances matter to a certain extent and reduce the transformation of thinking into behavior. While there is quite an increase in the explained variance, one however also has to note that there is still quite some room for further explanatory factors. Nevertheless, the two-dimensionality of the construct remains stable.

As for practical contributions of this paper, the management can be offered a deeper understanding of their employees' process orientation. McCormack [2] argues that process-oriented employees have a clear view and understanding of the organization's processes and can more easily facilitate innovative process improvement. Arguably such individuals would also fair better in difficult and pressing work situations. Understanding their role in the business process could increase their sense of importance and contribution to the customer, since process-oriented employees thus considers it their work to satisfy the needs of customers [30]. Additionally, we provide a viable tool for practice to assess their employees' current state of IPO across the organization. Organizations, prone to understanding process orientation on a company level thus gain insight into the workings and understanding of their employees and can explore their current process-oriented thinking and process-oriented behavior levels. Such employee status information can prove crucial, when deciding whether to embark on a BPM project.

As with any research, there are limitations. First, our quantitative data in steps 3 and 4 stems from clickworker as an unsupervised online platform on which participants are paid for participating in a survey. We followed the recommendations of Goodman et al. [66] with having a short survey and including attention checks. However, in order to overcome the bias of a certain group of employees joining clickworker, the study should be extended to question employees in cooperation with companies. Second, we have not tested antecedents and outcomes of IPO which might have an influence on the reflection of participants regarding their perceived process orientation. Future studies should link the constructs to antecedents such as group cohesion and psychological ownership or outcomes such as work engagement and innovation behavior. Third, we did not measure organizational process orientation although we had an additional study including the perceived possibilities due to the organizational environment. Future case studies should be conducted to include organizational process orientation as an individual's view is limited to the directly perceived work environment. Fourth, we develop a measurement scale for IPO as a construct not considering antecedents and outcomes such as performance. Results using the scale should be gathered in future

work and compared with other studies providing evidence regarding the antecedents and effects of IPO.

References

1. Leyer, M., Hirzel, A.-K., Moormann, J.: Achieving sustainable behavioral changes of daily work practices: the effect of role plays on learning process-oriented behavior. Bus. Process Manag. J. **24**, 1050–1068 (2018)
2. McCormack, K.: Business process orientation: do you have it? Qual. Prog. **34**, 51 (2001)
3. Škrinjar, R., Bosilj-Vukšic, V., Indihar Štemberger, M.: The impact of business process orientation on financial and non-financial performance. Bus. Process Manag. J. **14**, 738–754 (2008)
4. Braganza, A., Bytheway, A.: Process orientation. A key to managing an unpredictable future. Effective organizations. Looking to the future, pp. 29–32. Cassell, London (1997)
5. Hammer, M., Champy, J.: Reengineering the Corporation. HaperCollins, New York (1993)
6. Riege, A., Zulpo, M.: Knowledge transfer process cycle: between factory floor and middle management. Aust. J. Manag. **32**, 293–314 (2007)
7. Leyer, M., Hirzel, A.-K., Moormann, J.: Effectiveness of role plays on process-oriented behaviour in daily work practices: an analysis in the financial services sector. In: Proceedings of the European Conference on Information Systems, p. 26 (2015)
8. Leyer, M., Wollersheim, J.: How to learn process-oriented thinking: an experimental investigation of the effectiveness of different learning modes. Schmalenbachs Bus. Rev. **65**, 454–473 (2013)
9. Wollersheim, J., Leyer, M., Spörrle, M.: When more is not better: the effect of the number of learning interventions on the acquisition of process-oriented thinking. Manag. Learn. **47**, 137–157 (2016)
10. Leyer, M., Moormann, J., Wang, M.: How should we teach the logic of BPM? Comparing e-learning and face-to-face setting in situated learning. In: Australasian Conference on Information Systems, ACIS 2014 (2014)
11. Kettenbohrer, J., Beimborn, D., Eckhardt, A.: Examining the influence of perceived job characteristics on employees' process orientation (2016)
12. Kettenbohrer, J., Beimborn, D., Leyer, M.: Examining the impact of business process management system use on employees' process orientation (2016)
13. Rosemann, M., vom Brocke, J.: The six core elements of business process management. In: vom Brocke, J., Rosemann, M. (eds.) Handbook on Business Process Management 1. IHIS, pp. 105–122. Springer, Heidelberg (2015). https://doi.org/10.1007/978-3-642-45100-3_5
14. Huntington, S.P.: Clash of Civilizations and the Remaking of World Order Touchstone. Touchstone, New York (1997)
15. Tajfel, H., Turner, J.: The social identity theory of intergroup behavior. In: Jost, J.T., Sidanius, J. (eds.) Key Readings in Social Psychology. Psychology Press, New York (2004)
16. Braisby, N., Gellatly, A.: Cognitive Psychology. Oxford University Press, Oxford (2012)
17. Neisser, U.: Cognitive Psychology, Classic edn. Psychology Press, New York (2014)
18. Anderson, J.R.: Cognitive Psychology and Its Implications. Macmillan, London (2005)
19. MacLin, M.K., Solso, R.L.: Cognitive psychology. Pearson Education Limited, Harlow (2007)
20. Eysenck, M.W., Keane, M.T.: Cognitive Psychology: A Student's Handbook. Psychology Press, New York (2013)

21. Gary, M.S., Wood, R.E.: Mental models, decision rules and performance heterogeneity. Strat. Manag. J. **32**, 569–594 (2011)
22. Kohlbacher, M., Reijers, H.A.: The effects of process-oriented organizational design on firm performance. Bus. Process Manag. J. **19**, 245–262 (2013)
23. Willaert, P., Van den Bergh, J., Willems, J., Deschoolmeester, D.: The process-oriented organisation: a holistic view developing a framework for business process orientation maturity. In: Alonso, G., Dadam, P., Rosemann, M. (eds.) BPM 2007. LNCS, vol. 4714, pp. 1–15. Springer, Heidelberg (2007). https://doi.org/10.1007/978-3-540-75183-0_1
24. Kohlbacher, M.: The effects of process orientation: a literature review. Bus. Process Manag. J. **16**, 135–152 (2010)
25. Škrinjar, R., Trkman, P.: Increasing process orientation with business process management: critical practices. Int. J. Inf. Manag. **33**, 48–60 (2013)
26. Zarei, B., Chaghouee, Y., Ghapanchi, A.H.: Investigating the relationship between business process orientation and social capital. Knowl. Process Manag. **21**, 67–77 (2014)
27. Kohlbacher, M.: The impact of dynamic capabilities through continuous improvement on innovation: the role of business process orientation. Knowl. Process Manag. **20**, 71–76 (2013)
28. Forsberg, T., Nilsson, L., Antoni, M.: Process orientation: the Swedish experience. Total Qual. Manag. **10**, 540–547 (1999)
29. Nilsson, L., Johnson, M.D., Gustafsson, A.: The impact of quality practices on customer satisfaction and business results: product versus service organizations. J. Qual. Manag. **6**, 5–27 (2001)
30. Kohlbacher, M., Gruenwald, S.: Process orientation: conceptualization and measurement. Bus. Process Manag. J. **17**, 267–283 (2011)
31. Trkman, P., de Oliveira, M.P.V., McCormack, K.: Value-oriented supply chain risk management: you get what you expect. Ind. Manag. Data Syst. **116**, 1061–1083 (2016)
32. Schaffernicht, M., Groesser, S.N.: A comprehensive method for comparing mental models of dynamic systems. Eur. J. Oper. Res. **210**, 57–67 (2011)
33. Kelton, A.S., Pennington, R.R., Tuttle, B.M.: The effects of information presentation format on judgment and decision making: a review of the information systems research. J. Inf. Syst. **24**, 79–105 (2010)
34. Gonzalez, C., Lerch, J.F., Lebiere, C.: Instance-based learning in dynamic decision making. Cogn. Sci. **27**, 591–635 (2003)
35. Schaffernicht, M.F.G., Groesser, S.N.: The SEXTANT software: a tool for automating the comparative analysis of mental models of dynamic systems. Eur. J. Oper. Res. **238**, 566–578 (2014)
36. Duffy, M.: Sensemaking in classroom conversations. In: Openness in Research: The Tension Between Self and Other, pp. 119–132 (1995)
37. Drazin, R., Glynn, M.A., Kazanjian, R.K.: Multilevel theorizing about creativity in organizations: a sensemaking perspective. Acad. Manag. Rev. **24**, 286–307 (1999)
38. Bateson, G.: Steps to an Ecology of Mind. Ballantine Books, New York (1972)
39. Porac, J.F., Thomas, H., Baden-Fuller, C.: Competitive groups as cognitive communities: the case of Scottish knitwear manufacturers. J. Manag. Stud. **26**, 397–416 (1989)
40. Poole, P.P., Gioia, D.A., Gray, B.: Influence modes, schema change, and organizational transformation. J. Appl. Behav. Sci. **25**, 271–289 (1989)
41. Weick, K.E.: The Social Psychology of Organizing Addison-Wesley. Addison, Reading (1979)
42. McCormack, K., Johnson, W.C.: Business Process Orientation: Gaining the E-Business Competitive Advantage. St. Lucie Press, Florida (2001)

43. Peppard, J., Fitzgerald, D.: The transfer of culturally-grounded management techniques: the case of business reengineering in Germany. Eur. Manag. J. **15**, 446–460 (1997)
44. van Assen, M.: Process orientation and the impact on operational performance and customer-focused performance. Bus. Process Manag. J. **24**, 446–458 (2018)
45. Reijers, H.A.: Implementing BPM systems: the role of process orientation. Bus. Process Manag. J. **12**, 389–409 (2006)
46. Chen, H., Tian, Y., Daugherty, P.J.: Measuring process orientation. Int. J. Logist. Manag. **20**, 213–227 (2009)
47. Nonaka, I.: A dynamic theory of organizational knowledge creation. Organ. Sci. **5**, 14–37 (1994)
48. Feldman, M.S., Pentland, B.T.: Reconceptualizing organizational routines as a source of flexibility and change. Adm. Sci. Q. **48**, 94–118 (2003)
49. Latour, B.: The powers of association. Sociol. Rev. **32**, 264–280 (1984)
50. Pentland, B.T., Feldman, M.S.: Designing routines: on the folly of designing artifacts, while hoping for patterns of action. Inf. Organ. **18**, 235–250 (2008)
51. Feldman, M.S.: Organizational routines as a source of continuous change. Organ. Sci. **11**, 611–629 (2000)
52. Karpen, I.O., Bove, L.L., Lukas, B.A., Zyphur, M.J.: Service-dominant orientation: measurement and impact on performance outcomes. J. Retail. **91**, 89–108 (2015)
53. Hammer, M.: The process audit. Harv. Bus. Rev. **85**, 111–123 (2007)
54. Leyer, M., Stumpf-Wollersheim, J., Kronsbein, D.: Stains on the bright side of process-oriented organizational designs: an empirical investigation of advantages and disadvantages. Schmalenbach Bus. Rev. **18**, 29–47 (2017)
55. Spector, P.E., Brannick, M.T.: Methodological urban legends: the misuse of statistical control variables. Organ. Res. Methods **14**, 287–305 (2011)
56. Swann, A.: The Human Workplace: People-centred Organizational Development. Kogan Page, London (2017)
57. Hulland, J.: Use of partial least squares (PLS) in strategic management research: a review of four recent studies. Strat. Manag. J. **20**, 195–204 (1999)
58. Henseler, J., Ringle, C.M., Sarstedt, M.: A new criterion for assessing discriminant validity in variance-based structural equation modeling. J. Acad. Mark. Sci. **43**, 115–135 (2015)
59. Soper, D.: Post-hoc statistical power calculator for multiple regression [Software] (2018)
60. Cohen, J., Cohen, P., West, S.G., Aiken, L.S.: Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Lawrence Erlbaum Associates, Mahwah (2003)
61. Katz, D.: The motivational basis of organizational behavior. Behav. Sci. **9**, 131–146 (1964)
62. Edwards, J.R.: Multidimensional constructs in organizational behavior research: an integrative analytical framework. Organ. Res. Methods **4**, 144–192 (2001)
63. MacKenzie, S.B., Podsakoff, P.M., Jarvis, C.B.: The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. J. Appl. Psychol. **90**, 710 (2005)
64. Petter, S., Straub, D., Rai, A.: Specifying formative constructs in information systems research. MIS Q. **31**, 623–656 (2007)
65. Wetzels, M., Odekerken-Schröder, G., Van Oppen, C.: Using PLS path modeling for assessing hierarchical construct models: Guidelines and empirical illustration. MIS Q. **33**, 177–195 (2009)
66. Goodman, J.K., Cryder, C.E., Cheema, A.: Data collection in a flat world: the strengths and weaknesses of Mechanical Turk samples. J. Behav. Decis. Mak. **26**, 213–224 (2012)