

UDC classification: 005.7

JEL Classification: M10

## The development of a questionnaire to measure business process maturity



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**Purpose:** the creation of a questionnaire for business process maturity measurement.

**Design/Method/Approach.** The authors developed a set of items and applied confirmatory factor analysis in order to demonstrate questionnaire validation and reliability.

**Findings.** The model supports prior research to the extent that business process maturity can be explained by strategic alignment, governance and culture. Surprisingly, methodology showed weak result and IT & Technology as well as people did not seem to be part of the model.

**Theoretical implications.** This research not only confirmed prior research but also showed that there is wiggle room regarding the underlying factors of business process maturity and how to apply them.

**Practical implications.** This research provides a questionnaire for practitioners to assess business process maturity.

**Originality/Value.** The authors created a questionnaire that can be used in practice and is based on factors backed up by academic research and findings.

**Research limitations/Future research.** The authors suggests applying the questionnaire to a larger sample size as well as expanding the statistical methods used.

**Paper type** – empirical.

**Keywords:** business process maturity; business process maturity measurement; business process maturity model; questionnaire.

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## Розробка анкети для вимірювання зрілості бізнес-процесів

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**Мета роботи** – створити анкету для вимірювання рівня зрілості бізнес-процесів.

**Дизайн/Метод/Підхід дослідження.** Розроблено серію питань і застосовано конфірматорний факторний аналіз для визначення валідності та надійності анкети.

**Результати дослідження.** Авторською моделлю зрілості бізнес-процесів підтримано попередні дослідження бізнес-процесів. Показано, що зрілість бізнес-процесів знаходить відображення в конструктах «узгодженість стратегії», «організація управління», а також «культура». На подив, конструкт «методи» показав низький взаємозв'язок, в той час як «ІТ і технології», а також «люди» не узгоджувалися із запропонованою моделлю.

**Теоретичне значення дослідження.** Цією роботою не тільки підтверджено попередні дослідження, але й показано можливості різноманітної інтерпретації чинників, що відображають зрілість бізнес-процесів та її практичного застосування.

**Практичне значення дослідження.** В якості результату у цьому дослідженні запропоновано анкету для практиків, якою вони зможуть вимірити зрілість своїх бізнес-процесів.

**Оригінальність/Цінність/Наукова новизна дослідження.** Створено анкету, яка ґрунтується на результатах наукових досліджень і може бути використана практиками.

**Обмеження дослідження/Перспективи подальших досліджень.** Рекомендовано апробувати анкету на більшій вибірці та розширити коло застосовуваних статистичних методів для її аналізу.

**Тип статті** – емпірична.

**Ключові слова:** зрілість бізнес-процесів; вимірювання зрілості бізнес-процесів; модель зрілості бізнес-процесів; анкетування.

## Разработка анкеты для измерения зрелости бизнес-процессов

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**Цель работы** – создать анкету для измерения уровня зрелости бизнес-процессов.

**Дизайн/Метод/Подход исследования.** Разработана серия вопросов и применен конфирматорный факторный анализ для определения валидности и надежности анкеты.

**Результаты исследования.** Авторской моделью зрелости бизнес-процессов поддержаны предыдущие исследования бизнес-процессов. Показано, что зрелость бизнес-процессов находит отображение в конструктах «согласованность стратегии», «организация управления», а также «культура». К удивлению, конструкт «методы» показал низкую взаимосвязь, в то время как «ИТ и технологии», а также «люди» не согласовались с предложенной моделью.

**Теоретическое значение исследования.** Этой работой не только подтверждены предыдущие исследования, но и показаны возможности разнообразной интерпретации факторов, отображающих зрелость бизнес-процессов и возможности ее практического применения.

**Практическое значение исследования.** В качестве результата этим исследованием предложена анкета для практиков, которой они смогут измерить зрелость своих бизнес-процессов.

**Оригинальность/Ценность/Научная новизна исследования.** Создана анкета, которая основывается на результатах научных исследований и может быть использована практиками.

**Перспективы дальнейших исследований.** Рекомендовано апробировать анкету на большей выборке и расширить круг применяемых статистических методов для её анализа.

**Тип статьи** – эмпирическая.

**Ключевые слова:** зрелость бизнес-процессов; измерение зрелости бизнес-процессов; модель зрелости бизнес-процессов; анкетирование.

## Introduction

Today, business processes are of high importance for companies across all industries. Most companies are permanently concerned with analysing, documenting, measuring, improving and aligning their business processes. However, the status quo of companies and industries with regard to their level of business process maturity is quite different. Even the status quo within a company might be different. Many influence factors and variables have to be taken into account to successfully manage the entire business process landscape of a company. Thus, looking at how the maturity degree of business processes can be scrutinized is a major topic. Measuring the maturity of business processes has become an important management task. Over decades various authors have developed and modified business process maturity models (BPMMs) in order to perfectly measure and improve business process maturity (BPM) (van Looy, de Backer, & Poels, 2011). This paper has the primary objective to develop a questionnaire that is practical useful in order to measure the maturity of the business processes in companies. Against this backdrop, this paper initially discusses and analyzes the most important BPMMs due to their practical relevance. Based on this, the paper gives a description of how a questionnaire to assess process maturity may look like and how it was developed. The initial questionnaire was validated by the application at a bundle of companies.

## Research Questions

1. What are the most practicable business process maturity models and by what criteria do they mainly differ?
2. Which factors have to be considered by creating a practical useful questionnaire?

## Business Process Maturity Models

### Theoretical background of BPMMs

The literature provides a rich set of BPMMs. Tarhan, Turetken, and Reijers (2016) conducted a systematic review of the existing literature about BPMMs. Finally, Tarhan and colleagues (2016) emphasized nine leading BPMMs in regards to their relevance in the literature. We implied that these nine models must be the most common and popular models with the highest practical relevance. We performed a detailed analysis of the main findings of Tarhan and colleagues (2016). The fig. 1 shows the nine models on the horizontal axis and represents the number of existing papers that refer (i.e. discuss, analyze, judge, verify etc.) to the models. The BPMMs with dark coloured bars are subject of our further research.

Some articles may refer to more than only one model. The list is not ext

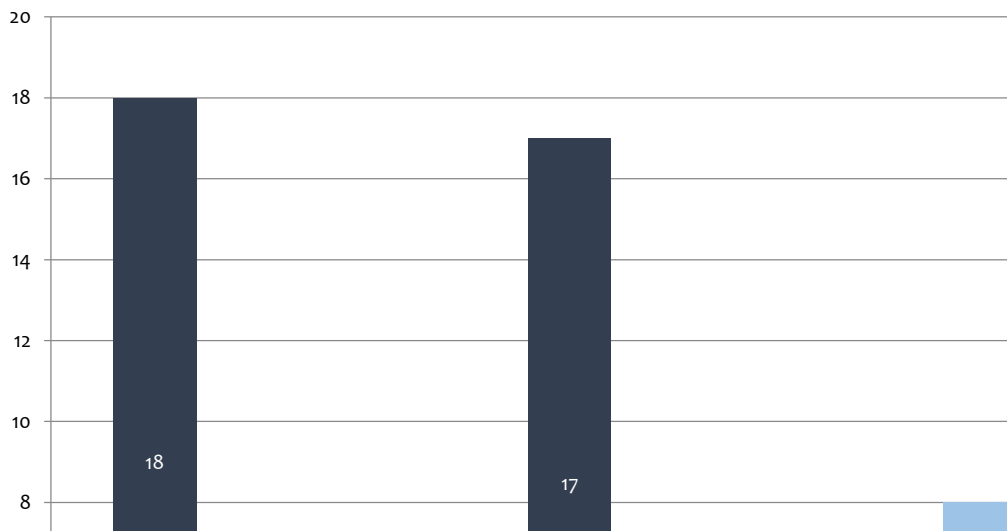


Fig. 1. Number of papers that refer to a BPMM\*

\*Source: adapted from (Tarhan et al., 2016).

BPMMs are typically characterized by a sequence of stages (or levels) which form a desired, anticipated and logical path from the initial stage to ultimate maturity. Generally, a distinction between two types in regards to the BPMMs scope is made: **business process management maturity models** and **business process maturity models**. The former deal with a company's business process management capability; the latter refer to the conditions of business processes in general (Röglinger, Pöppelbuß, & Becker, 2012). The BPMM of Rosemann and de Bruine (2005) is focused on the management of BPM. Therefore, it addresses a company's business process management capabilities (Rosemann, & de Bruine, 2005). It holds a descriptive (as-is-assessment) as well as a prescriptive (guidance for improvement and future process strategy) purpose of use. This BPMM provides five maturity stages – from "Initial" to "Sustained". Since the scope of this BPMM is on maturity management it also provides capability areas for each maturity stage (Röglinger et al., 2012). The scope of McCormack and Johnson's (2001) model is business process maturity (McCormack, & Johnson,

2001). Thus, it is focused on the condition of processes in general or distinct process types. It also has a descriptive and prescriptive purpose which means that it evaluates the level of maturity while it also provides process improvement actions. Their BPMM consists of four maturity stages and additionally provides three components of maturity (Röglinger et al., 2012). Also the popular OMG-Model (2008) is focused on the mastery of processes and mainly refers to the conditions of processes. It provides five stages of maturity and is documented in an extensive framework (Object Management Group, 2008). Consequently, this BPMM is highly prescribed since it comprises four types of appraisals, true-or-false-statements related to goals and practices and specific process element templates (Röglinger et al., 2012). The BPMM by Hammer (2007) mainly deals with individual processes and company-wide capabilities since it separates five process enablers and four process capabilities. Self-assessment sheets are part of this BPMM in order to evaluate true-or-false-statements (Röglinger et al., 2012).

### Factors of BPMMs comparison

In order to analyse and compare these selected BPMMs, we used the framework developed by Röglinger, Pöppelbuß, & Becker (2012). It serves nine criteria on three levels to analyse BPMMs in regards to their practical usefulness and applicability (fig. 2).

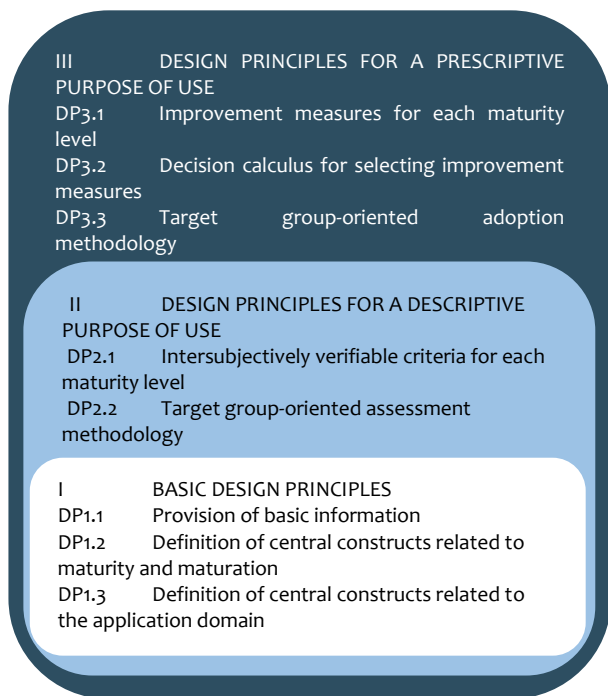


Fig. 2. BPMMs analysis framework\*

\*Source: Röglinger, Pöppelbuß, & Becker (2012).

### BPM analysis and comparison

**DP1.1:** Basic information is provided by all four BPMMS. The target groups are companies as well as organisations of the public sector. All the models are useful for companies independent from their location, size or branch. Furthermore, the OMG-Model particularly mentions professionals, managers and members of appraisal teams as designated users. Also, the OMG-Model provides background information regarding design-choices and development history. Concerning validation, the model of Hammer (2007) was subject to extensive revisions tests, while Rosemann and de Bruine (2005) performed a Delphi study with international experts to identify model dimensions (Röglinger et al., 2012). **DP1.2:** All of the selected BPMMs define maturity stages they comprise. The associated structural components are also defined. Moreover, the BPMM of Hammer (2007) contains two sub-models; one for process maturity and one for company maturity. All the models generally differ in their levels of granularity and capability areas. However, the levels of Rosemann and de Bruine (2005) and the OMG-Model are very similar since both borrowed their level structure from the CMM model. Further on, the OMG-Model defines five process areas threads which are used to link maturity levels with process areas (Röglinger et al., 2012). **DP1.3:** Beside the essential structural elements, some BPMMs also provide concrete information about constructs of the setting the models are applied in. For example, Rosemann and de Bruine (2005) picture their model as a holistic management approach (Röglinger et al., 2012). **DP1.4:** The compared BPMMs differ in the publicly available information. The most detailed documentation exists for the OMG-Model. The model of Hammer (2007) was introduced in the Harvard Business Review (Hammer, 2007). The process maturity management models of Rosemann and de Bruine (2005) and the model of McCormack and Johnson (2001) were published in several research papers which do not

leave much space for detailed guidelines (Röglinger et al., 2012). **DP2.1:** Each of the BPMMs allows for a descriptive purpose of use. Thereby, the assessment criteria for the maturity levels are available as textual descriptions. The OMG-Model as well as the model of Hammer (2007) provide more detailed assessment criteria, for instance in form of “specific practices” (in case of the OMG-model). The model of Rosemann and de Bruine (2005) and the model of McCormack and Johnson (2001) are still limited in the information available to the public since there are no criteria available to the public for the third and most complex level (Röglinger et al., 2012). **DP2.2:** Only the OMG-Model includes process area templates for further advice on how to conduct the as-is assessment. Thereby, it provides the possibility of self-assessment. Furthermore, it is the only BPMM which includes general guidelines in order to adjust the model domain-specific. **DP3.1:** The advice provided by the models of Hammer (2007), McCormack and Johnson (2001) and Rosemann and de Bruine (2005) mostly stays implicit to the textual stage descriptions. Only the OMG-Model clearly recommends which specific practices should be implemented at each stage (Röglinger et al., 2012). **DP3.2:** None of the selected BPMMs defines a mechanism which allows the practitioners to adapt the decision calculus for the selection of improvement measures to individual strategies or company goals. All the models expect companies to potentially reach the top of the maturity path (Röglinger et al., 2012). **DP3.3:** The model of Hammer (2007) is the only model for that is stated how to use it for a prescriptive purpose of use. However, the advice seems to be quite general since it refers only on areas in the maturity grid (Röglinger et al., 2012). We concluded the analysis with the following key findings:

- the basic design principles are covered well by all reviewed BPMMs;
- the principles for the descriptive purpose of use are sufficiently covered for the models;
- the assessment criteria are often only available as textual descriptions;
- detailed elements of BPM are often not published which limits self-assessment options;
- design principles for the prescriptive use are rarely addressed;
- therefore, the guidance provided by the reviewed BPMMs is rather limited.

These key findings confirm prior research conducted by van Looy and colleagues (2011) which states that the models mainly differ in their scope, design and model methodology. Our analysis leads to the result that the OMG-Model seems to be the most developed BPMM. It is mainly ahead of the other reviewed BPMMs (which also gain high research interest) since it provides detailed information regarding design-choices (DP1.1), defines process dimensions threads which link its maturity levels with process elements (DP1.2), provides the most detailed documentation (DP1.4), provides detailed assessment criteria through specific practices (DP2.1) and includes process element templates for further advice (DP2.2). However, due to the fact that the OMG-Model is highly developed, it consequently leaves little leeway for individual approaches and manual modifications. For instance, it prescribes a structure consisting of specific goals and specific practices which substantially affects the data collection through questionnaires. Due to the high development and standardization of the OMG-Model, it seems not to be the best choice for our purpose of creating an individual questionnaire. Therefore, we decided to proceed with the BPM management model of Rosemann and de Bruine (2005). This choice is mainly reasoned by the clear structure and the pre-definition of process dimensions that the model of Rosemann and de Bruine (2005) includes. In addition, the model is based on a sound academic development, provides detailed capability areas on multiple dimensions and is applied within a number of companies and validated by numerous surveys, case studies and workshops. These facts encourage our decision. Finally, the model choice is additionally supported and validated by an analysis of Rosemann and vom Brocke (2010).

## The creation of a BPM questionnaire

### Determination of process dimensions

The main purpose of questionnaires in the field of BPMM is to collect the required data in order to finally evaluate the process maturity by applying the stage model (Benbasat, Dexter, Drury, & Goldstein, 1984). We created a questionnaire that covers the entire range of a company's process landscape since BPM became more and more a holistic management task over the last decades. The questionnaire has to serve all complexities, challenges and purposes of modern process management. In order to fulfil these requirements in the best possible way, we broke down the complexity to a lower level by operating with business process dimensions. In doing this, we used the model of Rosemann and de Bruine (2005). In fact, we used their model in a slightly amended

way since we do not elaborate on the various maturity stages of this model and the maturity assessment process. Rather, we use the BPM framework to derive and afterwards validate its process dimensions.

Finally, we ended up with six process dimensions which will be briefly outlined in the following section. These dimensions represent critical success factors for business processes and basically determine the overall business processes of a company. Therefore, questions for each process element are required whereas we expect them to cover together all process dimensions of companies. Our initial model was therefore a second order reflective model. Besides considering the model of Rosemann and de Bruine (2005), we followed the approach of Rosemann and vom Brocke (2010). The six factors are also heavily grounded in the existing literature as stated after each outline paragraph (Rosemann, & vom Brocke, 2010).

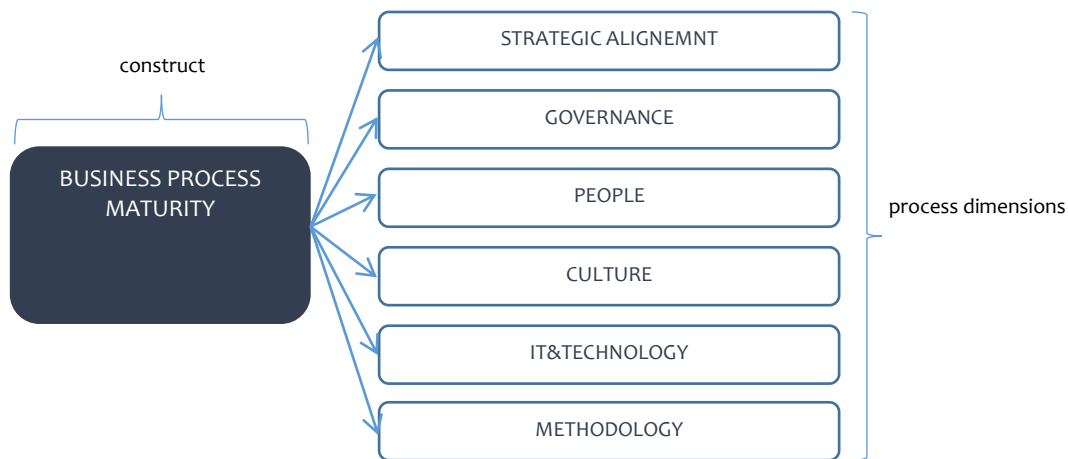


Fig. 3. Process dimensions\*

\*Source: (Rosemann, & vom Brocke, 2010).

The process dimension *Strategic Alignment* deals with the linkage of the company processes and the organisational priorities. It considers to what degree business process management is aligned with the overall strategy of a company. Business processes should be executed, managed, designed and measured according to strategic orientation (Rosemann, & vom Brocke, 2010; Elzinga, Horak, Lee, & Bruner, 1995; Zairi, 1997). The process dimension *Governance* covers appropriate and transparent accountability in terms of responsibilities and roles within the process landscape of companies. It also focuses on the concrete design of decision-making. That means it considers the responsibilities for process-related decisions. This dimension also takes reward-processes to guide actions into account (Rosemann, & vom Brocke, 2010; Braganza, & Lambert, 2000). The dimension *People* deals with the human capital of a company in regards to business processes. It considers the knowledge and skills of the employees or groups to perform the respective processes. It also covers the employee's qualification and regular training activities in order to assure and improve their ability to execute business processes (Rosemann, & vom Brocke, 2010; Hung, 2006; Llewellyn, & Armistead, 2000). The process dimension *Culture* covers all issues of a company's collective beliefs and values related to the process landscape. It considers the environment and attitude of individuals or groups in regards to the executing, design and management of processes (Rosemann, & vom Brocke, 2010; Pritchard, & Armistead, 1999; Spanyol, 2003). The dimension *Methodology* deals with the set of tools and techniques that enable and support all activities along the business process lifecycle and considers process-related initiatives within the company. In particular, this element covers approaches that facilitate process improvement, process analysis or process modelling techniques (Rosemann, & vom Brocke, 2010; Adesola, &

Baines, 2005). The process dimension *IT & Technology* focuses on the application of software or IT-based solutions in order to facilitate, improve and assure company processes. IT-based process support is of strong significance for business processes. Beside the traditional process analysis and process modelling function, this dimension also takes into account the process-awareness of information systems. That means that the software is able to recognize which process need to be executed (Rosemann, & vom Brocke, 2010; Gullede, & Sommer, 2002). Rosemann and de Bruine (2005) define a further level of detail in their model - the so called *capability areas* - for each of these six process dimensions. These sub-areas have the purpose to achieve the objectives of each process dimension in order to ensure the desired performance and capability of the model as a whole (Rosemann, & vom Brocke, 2010).

### Questionnaire design

After defining the process dimensions we drafted a questionnaire. In doing so, we generated a series of neutral statements about each element that need to be responded by the participants. We decided to operate with neutral statements instead of common evaluation questions since simpler formulations are easier to handle for the addressee. In order to apply the questionnaire also in an international environment we formulated the statements in English. We used a *7-Point Likert scale* on a continuum from "strongly agree" to "strongly disagree". Consequently, one neutral answer choice is offered and the participants are not forced to take a decision for agreement or disagreement. Thus, we expected to decrease the number of missing values due to unwillingness to give a precise answer or indecision. Participant responses were afterwards converted into numerical form in

preparation for statistical analyses (Ratray, Johnston, & Wildschmith, 2004). We included additional sections about absorptive capacity (Jansen, van den Bosch, & Volberda, 2005) and customer oriented performance (hereafter performance) (Calantone, Cavusgil, & Zhao, 2002) in order to prove external validity. Also, we required the participants to directly assess the maturity of their business processes (direct maturity assessment) in a separate questionnaire section.

### Questionnaire testing

Since the purpose of this paper is to create a fully consistent and practical implementable questionnaire, we validated the initial questionnaire by performing an online survey. Our survey was technical supported by the professional survey software Qualtrics®. In order to ensure a sufficient data quality, we provided the survey to employees of selected companies. Finally, we were able to use 28 responses equally distributed across five companies, including at least one team leader per company. Doing this, both the strategic and the operational perspective are expected to be taken into consideration when validating the questionnaire. The useful questionnaires are allocated as follows regarding the age and tenure of the addressees (tab. 1).

Table 1

Age and tenure of questionnaire participants

Age	# of respondents	Tenure	# of respondents
18-24	3	Less than one year	2
25-34	9	1-2 years	6
35-44	7	3-4 years	11
45-54	3	5 or more years	9
55-64	5		
65 or above	1		

Our sample contains two SMEs (less than 250 employees) and three large companies (more than 250 employees). The reported industries are “Professional, Scientific and Technical Services” (NAICS code 54, n=4) and “Administrative and Support and Waste Management and Remediation Services” (NAICS code 56, n=1). We followed the procedure applied by Shuradze, Bogodistov and Wagner (2018) forthcoming the bias reduction of socially desirable answers. We also stated that the data will be handled confidentially and for further questions we provided e-mail addresses as a point of contact. To make sure that we don't have any ethical issues in our questionnaire we discussed all questions with our research supervisor. We did not include any sensitive topics in our questionnaire (Ritchie, Lewis, Nichols, & Ormston, 2013; Shuradze et al., 2018). Since we allowed missing values, we performed a positive missing completely at random analysis (MCAR) and replaced missing values by the median of the nearby latent factor (Rubin, 1976; Dong, & Peng, 2013).

### Demonstrating questionnaire validation and reliability

Validity refers to whether a questionnaire measures what it purports to measure. Reliability refers to the stability, internal consistency or repeatability of a questionnaire (Ratray et al., 2004). We found that *business process maturity level* (BPML) is a latent factor of *Strategic Alignment, Governance and Culture* whereas *IT & Technology and People* did not appear to be part of the model. Surprisingly *Methodology* did not seem to be measuring BPML well. Nonetheless, this second order reflective models showed a very good model fit:  $\chi^2/df = 1.739$  ( $\chi^2 = 279.823$ ,  $df = 161$ ). Although, the Tucker-Lewis Index TLI of 0.741 and the comparative fit index CFI of 0.781 did not support this (Hu, & Bentler, 1999). Our analysis shows no validity or reliability concerns as can be seen in Table 2.

Table 2

Questionnaire reliability and validity; average factor loadings

	$\alpha$	Composite Reliability	Average Variance Extracted	Maximum Shared Variance	Maximum reliability H	Methodology	Absorptive Capacity	Business Process Maturity Level	Performance
Methodology	0,896	0,907	0,711	0,368	0,926	0,843 <sup>†</sup>	-	-	-
Absorptive Capacity	0,727	0,749	0,509	0,039	0,943	0,197	0,713 <sup>†</sup>	-	-
Business Process Maturity Level	0,929	0,972	0,920	0,368	0,991	0,607	0,104	0,959 <sup>†</sup>	-
Performance	0,908	0,909	0,769	0,328	0,992	0,510	-0,171	0,573	0,877 <sup>†</sup>

<sup>†</sup> Note: average factor loadings.

All variables have a higher average variance extracted than 0.5 (Diamantopoulos, & Siguaw, 2000) and were lower than composite reliability. This confirms the convergent validity (Hair, Ringle, & Sarstedt, 2011). Further, all CR values exceed 0.7 which proves the reliability. Cronbach's  $\alpha$  exceeds 0.7 in all cases and in three cases also 0.8 (Bowling, 1997; Bryman, & Cramer, 1997; Ratray et al., 2004). The cut-off value of 0.8 for the maximum reliability H was also exceeded for all variables (Hancock, & Mueller, 2001). Discriminant validity is supported by our results for the maximum shared variance since it is lower than the average variance extracted (Hair et al., 2011). Figure 6 shows the final structural model including factor loadings. We report high factor loadings on all our variables. The latent factor BPML is well explained by *Strategic Alignment, Governance and Culture*. Average Factor loadings for *Methodology, Absorptive Capacity, BPML and Performance* are 0.843, 0.713, 0.959 and 0.877 respectively, stating

that the latent factors are well explained by their underlying questions.

*External validity* can be confirmed by showing that the questionnaire is actually useful to determine the business process maturity of companies. Therefore, we required the participants to choose among the statements in Tab. 3 with regard to the business process maturity of their companies (direct business process maturity assessment).

Out of these twelve questions we created a latent factor maturity sum. A positive correlation of the respective factor with the BPML factor is sufficient to conclude that all levels are positively correlated as the underlying principle is a stage-to-stage concept. Once a certain stage is reached, it is assumed that all requirements of the previous stage are fulfilled.

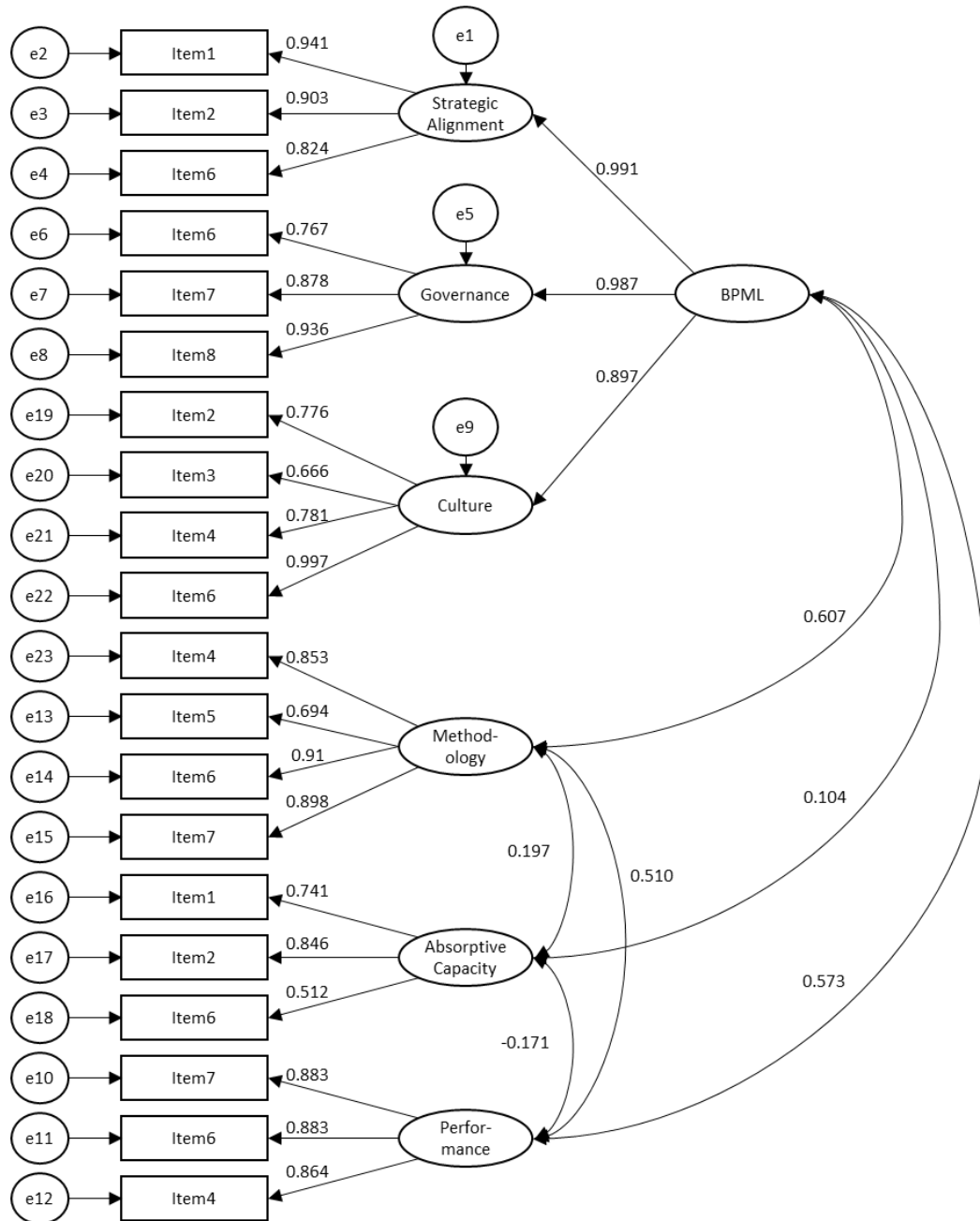


Fig. 4. Final factor model with factor loadings (Appendix A)

Table 3

Direct Maturity Assessment Section (\* indicates reverse stated items)

Stages	Characteristic
1 <sup>st</sup> stage (initial)	<input type="checkbox"/> Processes are not defined.*
	<input type="checkbox"/> There is no procedural and organizational support.*
	<input type="checkbox"/> The results are rather unpredictable.*
2 <sup>nd</sup> stage (managed)	<input type="checkbox"/> The processes exist on the operational/working level.
	<input type="checkbox"/> Management takes care of stable working conditions.
	<input type="checkbox"/> Process management is planned.
3 <sup>rd</sup> stage (standardized)	<input type="checkbox"/> Standardized processes and process metrics are implemented.
	<input type="checkbox"/> The employees have the necessary process know-how.
4 <sup>th</sup> stage (predictable)	<input type="checkbox"/> Process results and performance are managed with quantitative tools.
	<input type="checkbox"/> The processes produce expected and predictable results.
5 <sup>th</sup> stage (innovating)	<input type="checkbox"/> Processes are managed proactively, innovated, and constantly optimized.
	<input type="checkbox"/> Processes fulfil the internal and external requirements.

Our test shows an appropriate model fit:  $\chi^2/df = 0.911$  ( $\chi^2 = 37.371$ ,  $df = 41$ ).  $R^2$  is 0.282, which is above the required value of 0.2. We report a B-value of -1.154<sup>1</sup> (S.E. 0.366,  $p = 0.002$ ), as well as a  $\beta$ -value of -0.531. This proves that our questionnaire is generally valid and practical implementable and useful to assess the maturity of business processes.

## Discussion

Our research provided good results on the confirmatory factor analysis (CFA). In order to achieve also strong results on the exploratory factor analysis (EFA) we assume that a minimum of at least 100 participants as well as a minimum participant-to-variable-ratio of N/p: 2:1 -10:1, a minimum variable-to-factor-ratio of p/m: 2:1-6:1 and a minimum participant-to-factor-ratio of N/m: 2:1-6:1 (Ferguson, & Cox, 1993; Rattray et al., 2004) is required. Once these statistical requirements are met, we expect that our conceptual model might become even stronger. In the limits of one paper we could not provide all possible tests. We expect that a series of common method bias tests would definitely refine our measurement; such as a Harman single factor test or a common latent factor test. This could be an interesting subject for further research papers.

## Conclusions

In the course of this work, we developed a questionnaire that is practical useful in order to measure the maturity of business processes in companies. The most established and practical maturity models are the models of Rosemann and de Bruine (2005), McCormack and Johnson (2001), Hammer (2007) as well as the OMG-Model. We analyzed these models by applying the framework of Pöppelbuß and Röglinger (2011). The models mainly differ in their scope, design and model methodology. As a result of our model analysis, we decided to proceed with the model of Rosemann and de Bruine (2005) that we finally used as base for identifying the process dimensions. These in turn are reflectively represented by several formulated questionnaire-statements. Using this approach, we ensured the completeness and integrity of our questionnaire.

## Limitations

Although, we based our initial approach on appropriate academic literature, some of the applied business process dimensions seemed not to be significantly valid. This may have several reasons. Basically, we are convinced that the six chosen underlying dimensions are generally suitable for our purpose of use as they cover all aspects of business processes. In addition, these factors are confirmed several times by prior research (e.g. in Rosemann, & vom Brocke 2010). It might be that not all initially defined questionnaire-statements were sufficiently precise because they did not represent the respective dimensions; or they were too similar to another statement. Surprisingly, the process dimension Methodology did not sufficiently explain the factor BPML. This could be caused by our selection of survey participants and the small survey sample size. Consequently, our target group might not have been homogenous enough within a company since employees in different positions might have a different view on operational details and the perspective of strategy and operations. We tested for MCAR but our small survey sample could still be biased by responses that were not thoroughly provided.

<sup>1</sup> Please note that that the negative B-value should be interpreted as positive since the items were coded in the mentioned way.

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## Appendices

### A – Final Survey Questionnaire

Table A.1

Form of final survey questionnaire

Constructs	Item #	Items, 7-Point Likert scale (-3 = strongly disagree; +3 strongly agree)
Methods	Item 4	We are fast in implementing process changes.
	Item 5	We have structured interdepartmental meetings to discuss process issues.
	Item 6	We plan and document our work processes in a structured way.
	Item 7	We are fast in reducing process risks.
Culture	Item 2	We address problems within a process and across interfaces.
	Item 3	We demand and appreciate feedback to current process improvement activities.
	Item 4	We are open to process changes in our workplace.
	Item 6	The basic values of our company include process optimization.
Governance	Item 6	The business and financial aspects of our products and services are managed throughout the product-lifetime.
	Item 7	We address root causes of problems in our processes and systematically prevent them from recurring.
	Item 8	We are constantly improving our business processes.
Alignment	Item 1	Process improvement is addressed as an issue by our top management.
	Item 2	Our top management feels responsible for process improvement strategies in our firm and approves plans for implementing these.
	Item 6	We identify and prioritize improvement potentials of our work processes.
Performance (Customer Orientation)	Item 4	Retaining valued customers.
	Item 6	Growth in sales revenue.
	Item 7	Acquiring new customers.
Absorptive capacity	Item 1	Our unit has frequent interactions with corporate headquarters to acquire new knowledge.
	Item 2	Employees of our unit regularly visit other branches.
	Item 6	Employees regularly approach third parties such as accountants, consultants, or tax consultants.