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# BPM ADOPTION IN SMALL AND MEDIUM-SIZED COMPANIES IN BAVARIA

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# BPM ADOPTION IN SMALL AND MEDIUM-SIZED COMPANIES IN BAVARIA

*Completed Research*

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## Abstract

*Small and medium sized (SMEs) companies are a pillar of the Bavarian economy. With business process management (BPM) providing an important competitive advantage in the globalized economy, the adaptation of BPM by SMEs has societal relevance. However, the reasons why, or why not, SMEs implement BPM measures are still not fully understood. Previous research addressed this topic either breadthwise as surveys or in depth as case studies, and thus only has a limited perspective. Therefore, in our work, we carry out a mixed method analysis.*

*We conduct 10 case studies to analyse the current state of adoption as well as the reasons for or against implementing further BPM measures. The insights gained guide the design of the subsequent survey. 114 results allow us to evaluate how widespread a particular reason may be. Lastly, the combined discussion of the results of both the case studies and surveys allow us to identify reasons that hinder or foster BPM adoption in SMEs, which are in-depth as well as generalizable.*

*The study results are analyzed to derive propositions to research and practitioners alike that support SMEs to introduce further measures of BPM and improve their global competitiveness. For example, we could identify that BPM is in some cases enforced by customers, that stricter certifications are necessary, and that BPM trainings aligned to the needs of SMEs are desirable.*

*Keywords: Business Process Management, BPM adoption, Survey, Case Study*

## 1 Introduction

Business Process Management (BPM) is one of the key concepts in information systems and represents a comprehensive approach for managing an organization's business operations (Hammer, 2010). The BPM concept has continually evolved over the last few decades by integrating methods, techniques and tools from various fields (Harmon, 2010). Today BPM is recognized as a holistic management approach encompassing a wide range of aspects (e.g., strategic alignment, governance, methods, information technology, people, and culture (Rosemann and vom Brocke, 2010). Over the years, BPM has been adopted by organizations in various industries all over the world. One main motivation is found in the development of the globalized markets. Increasing demands on organizations for e.g., delivery speed, quality and flexibility together with a growing information transparency force companies to continuously optimize their processes in order to survive in competition.

BPM, if applied in an appropriate manner, facilitates process optimization and is thus considered a competitive advantage (Trkman, 2010). A significant number of studies confirm positive effects of BPM on

organizational performance (e.g., (Kohlbacher, 2010, Komus, 2011)). Further, several studies investigate the adoption of BPM by organizations, both on a worldwide scale (e.g., (Harmon and Wolf, 2014)) and for specific regions (e.g., (Bruckner-Kley et al., 2014, Minonne et al., 2011)). Studies dealing with BPM adoption commonly show (cf. Roeser and Kern (2015) for an overview), despite the generally acknowledged importance of BPM, considerable differences in the BPM adoption between countries, industries and company sizes. In addition, many organizations do not fully exploit the potential of BPM (cf. (Minonne and Turner, 2012)). Whereas large organizations have been making effective use of BPM for quite some time, especially for small and medium sized enterprises (SMEs), the successful adoption of BPM seems to be a particular challenge. Possible reasons identified by Kolář (2014) include, among other things, the lack of internal manpower dedicated to BPM and the different levels of process rigidity in SMEs compared to large organizations. As smaller companies tend to have a higher portion of flexible or ad-hoc processes, it is even more difficult for them to apply existing BPM measures in a SME context. However, a broader evaluation of BPM adoption in SMEs is missing.

Our research, for this reason, focuses on BPM in small and medium-sized enterprises. Especially in the German economy, SMEs play an important role. Currently, they represent 47% of the gross value added and 39% of the aggregated turnover (Söllner, 2014). Further, SMEs currently employ 94% of the employees in the private sector; even more, e.g., in the German state Bavaria, they employ 99.6% of the employees in the private sector (DESTATIS, 2015). In summary, because of their high societal relevance and the role of BPM to sustain their competitiveness, the adoption of BPM by SMEs is a highly relevant topic for research. However, what is needed are reliable insights into this domain to derive the pivotal aspects of how to extend or enrich the future BPM research agenda towards SMEs.

The aim of this paper is to capture the status quo of BPM adoption in Bavarian SMEs. This aim is operationalized with three research questions. (1) To which extent are BPM measures realized in those companies? (2) Which factors influence the adoption of BPM? (3) Which of these factors are distinctive to foster or hinder SMEs in adopting BPM? To address these questions, we use a mixed method approach combining qualitative (i.e. case study) and quantitative (i.e. survey) research.

The remainder of this paper is organized as follows. Section 2 describes the conceptual basics including related work as well as our research method, which is a mixed method approach that integrates a survey and case studies. The results of the survey and the findings of the case studies are presented in section 3. There we elaborate on the findings related to specific BPM topics and carry out an overall evaluation. In section 4, the results are summarized and discussed in the light of SME-specific characteristics. Section 5 concludes the paper.

## **2 Conceptual Basics**

### **2.1 Related Work**

Previously, the adoption of BPM was empirically addressed by surveys. For example, the bi-annual survey “The State of Business Process Management”, a survey on the adoption of BPM, has been focusing operational BPM measures and tools from companies of all sizes and locations since 2006 (cf. (Harmon and Wolf, 2014)). Another example is the ZHAW study (Bruckner-Kley et al., 2014, Minonne et al., 2011), which has a particular focus on the strategic aspects of BPM adoption (see section 3.4). A literature review by Roeser and Kern (2015) examines the status quo and the use of surveys published in the BPM domain. They classify the surveys based on the research goals into six classes. Class IV shows surveys on the status quo of BPM in practice. However, none of these surveys answer our research questions because they focus different objectives or subjects. More empirical research in this area has been conducted by means of case studies, which also follow a slightly different focus in their research. E.g., Dallas and Wynn (2014) carried out a BPM initiative in a middle-sized Australian accounting firm

analysing whether BPM can be successfully applied in this particular SME, and Chong (2007) conducted a BPM initiative in an Australian wine company analysing factors that drive or hinder BPM adoption.

## **2.2 Methodology**

To address the research questions, we follow a mixed method approach combining qualitative (i.e. case study) and quantitative research (i.e. survey). Since these two methods complement each other well, they have been advocated for the study of organizations in IS in particular. Whereas a case study allows an in-depth investigation into the fuzzy and complex nature of an organization, its findings can be tested for generalization with a survey. (cf. (Goes, 2013, Huysmans and De Bruyn, 2013, Venkatesh et al., 2013))

Gable (1994) formalized such an approach. He argues that a preceding case study may inform the survey design, e.g., by pilot testing the survey instruments or construct validation. Also, in his case, notes from the case study were used to interpret survey findings (cf. (Gable, 1994)). Our work instantiates the mixed method approach as presented by Gable (1994). The methods' consistency is ensured in two ways. First, in both methods, the targets were selected from the same list of companies. Second, both methods' instrument is built on the same theoretical groundwork.

Regarding the aforementioned statements, our case studies involved repeated visits at the companies' sites over a longer period of time to conduct the studies in person. To make the case studies logistically possible and ensure their consistency, we decided to focus the research context on SMEs in Bavaria. As for that, Bavaria is suitable as it is an economically strong state in Germany having the majority of private sector employments in SMEs. Thus participants of both the case study and the survey were recruited from a list of Bavarian companies that have previously declared their interest in research co-operation. This list - provided by the Bavarian State Ministry of Economy - contained 10,864 companies fitting the criteria of SMEs.

Our measurement is based on the literature on BPM maturity models. BPM maturity models are meant to measure an organization's capabilities of implementing business processes which achieve their business goals (Van Looy et al., 2011). Characteristically, the said models provide, among others, lifecycle levels and capability areas for improvement. The levels reflect the progress of implementing measures towards a mature BPM (Van Looy et al., 2011). The adaption for our study was done as follows.

First are the assessment items resulting from a systematic search for BPM maturity literature. From these sources, we assembled the means for survey-based maturity assessment. Van Looy et al. (2011) found a common structure among maturity models' capabilities according to which we grouped our assessment items (see Table 2). For example, the category #1 items "Is the process documentation of your organization maintained permanently?" or "Does your organization have a process map?" stem from the maturity model by Schmelzer and Sesselmann (2008).

The second aspect of our instrument is the level classification. While the maturity models do not share a common calculation scheme, they are designed for an assessment of a finer scope than used in our study. However, each assessment item can be mapped to a category of BPM measures (see Table 2), and the item categories have a natural order. E.g., it is clearly mandatory to properly identify and document processes before it makes sense to introduce process performance management (PPM). In fact, this is the systematics of process maturity models and, as Paulk et al. (1993) observe, companies should follow this order. Also, we do realize that companies do not implement a full set of BPM measures for each and every auxiliary process. Because of that, we map the current progress of such companies to the highest category whose items are rated with at least 50% fulfilment on average. To further avoid terminological confusion, we will use the term 'category' for rating progress instead of 'maturity level'. The common list and the common measurement instrument were used in both the case study and the survey to ensure consistency.

## 2.3 Case Studies

To find participants for the case studies, we randomly selected companies from the list of Bavarian SMEs (see section 2.2) until ten companies agreed to participate in the study (see Table 1). In total, we contacted 137 companies. After 10 companies had agreed, the case studies, which consisted of two phases, were performed between March and October 2014.

First, we conducted a semi-structured interview with a representative from each of the participating companies, with these interviews being based on an interview protocol asking about the current situation of the company and its market, current and previous initiatives of BPM, the existence of process documentation, and the measure regarding process performance management. Due to the explorative nature of the interviews, we refrained from more specific interview items. The interviews, which usually took about one day, were conducted by two researchers, protocolled and consolidated afterwards.

Second, we launched a basic BPM initiative with the company, e.g., documenting or revising the existing documentation of a process, which served to provoke a very intensive discussion about BPM. Regarding the documentation, we conducted separate interviews with all employees involved in the process. We used these interviews to also ask about their knowledge of, experience with and attitude towards BPM. Finally, we presented the results of the initiative to the leading board in a workshop. This workshop also served to initiate a discussion of both potential uses and benefits of BPM initiatives and potential drivers or hindrances of implementing further BPM measures. In summary, this second phase produced a rich background of information about why or why not BPM is installed at Bavarian SMEs.

Integrating the case study, we could realize some of the benefits of the mixed method approach by Gable (1994). We piloted the survey at the companies, testing whether the participants were able to understand and answer the survey correctly. Moreover, while not generalizable, the case study notes provide in-depth information for the interpretation of the quantitative results. Even though these information are valid only for the company where the study was conducted, they can serve for triangulation with the survey results. Section 3 combines findings from the survey with our notes from the case study.

## 2.4 Survey

Our survey is built from measures for maturity assessment in literature and informed by the case study. The questionnaire contains the following items. After starting with five demographic questions (e.g., industry, number of employees, etc.), four questions about BPM as a strategic asset are asked. Subsequently we addressed process documentation (five questions), definition of process goals (five questions), process controlling and reporting (six questions), and process improvement (two questions).

Wherever possible, the answers are formulated as a 5-point Likert scale (e.g., degree of agreement, degree of fulfilment). In other cases, the items ask for a yes/no answer or for an open text. The survey was originally in German and items were translated into English for this publication.

The survey was conducted anonymously and the questionnaire was implemented as an interactive PDF file that could be sent by pressing a button at the end. All terminology was explained by mouse-overs, to reduce subjective interpretations. The PDF was distributed via e-mail to 10,864 Bavarian SMEs in total 128 of which responded.

Responses were filtered for relevance, completeness and internal consistency. First, we checked whether the demographics actually fitted with the definition of a SME. Regarding completeness, we eliminated incompletely answered responses, e.g., when the survey was blank from some point on, as this would have distorted our analysis. The consistency check refers to the natural order of categories mentioned before. If a responder claimed to have established all measures of performance measurement without even defining processes at all, we removed the survey for lack of plausibility.

After filtering the responses for completeness and internal consistency, 114 responses remained for evaluation and built the basis for the interpretation and discussion in the next section. If logical dependencies among survey items reduced the number of relevant responses (e.g., “Is your companies process documentation organized in a process map: Yes or No” and “Does your process map show dependencies”), the size of the subset is noted.

#	Industry	Employees
A	Cereal R&D	20
B	Automatization machines.	240
C	Bottling machines	250
D	Car accessory	10
E	Electronics	230
F	Measurement instruments	50
G	Electric components	200
H	Fittings & couplings	120
I	Steel construction	25
J	Steel processing	150

Table 1. Interviewed companies

#	Category
0	Initial category
1	Processes are defined and documented
2	Roles and resources are defined and documented
3	Process goals are continually revised and communicated
4	Process performance is continually measured and evaluated
5	Processes are continually optimized

Table 2. Categories for the classification of maturity progress

The demographic distribution of responses is as follows. As to the number of employees, 65.2 % of the companies report to have less than 50, while the remaining 44.8% have more employees. The most represented industries are electrical & mechanical engineering (20.9%) as well as the service sector (20.0%). The persons who answered the survey are usually head or CEO of the company (77.2%) and BPM is part of their daily work (71.1%). The results and their interpretation are subjects of the following sections.

## 3 Results

### 3.1 BPM and Strategy

The first part of the questionnaire aims at discovering the value of BPM for the companies' strategy and accordingly for their top management. 31.3% of the companies evaluate BPM as very important, as contrasted with 37.4%, which rate BPM as not important for their strategic planning. This corresponds to the objectives that SMEs try to achieve with BPM. The objectives mentioned most frequently are standardization (91.5%), increasing productivity (89.6%) and quality management (87.7%) all of which put the emphasis on operational activities. On the contrary, the impact of BPM for the companies' strategy is not well developed: only a few companies use BPM to support in-/outsourcing decisions (31.1%) or for the application of new technologies (e.g., support of mobile processes; 33.0%). The commitment of top management for BPM is respectable, 53.9% rate a strong commitment, which reflects the widespread knowledge and use of BPM in the Bavarian SMEs. However, it seems that, foremost, BPM means standardization and cost reduction to top management, while they do not see the potential of the knowledge achieved by conducting BPM measures to support strategic planning.

From our preceding case study research, we found two examples, which provide possible reasons for the most frequently named objectives (quality management, standardization) for the use of BPM in SMEs. A certification according to ISO (International Organization for Standardization) standards was mandatory for some companies to prove a certain level of quality to their partners, e.g., suppliers and customers. In those cases, meeting the certification requirements was the main motivation for e.g., documenting a company's processes. The introduction of ERP systems was another reason for a detailed process analysis with the aim of selecting an appropriate ERP system or replacing the existing one.

### 3.2 Process Purpose, Documentation, Quality and Capabilities

After the strategic perspective on BPM, the further items address the operational dimension. Items asked whether the processes achieve their goals and whether the goal is achieved reliably, a differentiation pointed at by company C. If the process runs through, it produces the expected results. However, lacking in overview, errors, e.g. delays, remain undiscovered until the customer reacts. Here, the process is not reliable. Figure 1 shows the respective results of the survey. The most frequent answer (36.0%) of the questions combined is that the processes generally achieve their goal and are mostly reliable as well. However, the number of companies considering their processes as generally failing (goal: not at all and occasionally: 7.0%) or mostly unreliable (10.5%) may, in total, be low. Nonetheless, it is still surprisingly high, considering that failing and unreliable processes most presumably have a strong negative impact on the company's performance.

In fact, in none of our case studies, we uncovered processes that predominantly failed or were predominantly unreliable. At company C, purpose achievement was rated high whereas the reliability was subject to improvement. The case study notes uncovered possible reasons: a high number of coordinative tasks ran over a very long period. It was prone to delays and other deviations, which went undetected over long periods of time. Also, the process was new and not fully established yet. Since the majority of tasks was performed by a small number of people, the company board did not consider any form of documentation necessary. Only when the project sizes and numbers increased, the need for change was perceived. In the BPM initiative, our process models made the process transparent, and the board realized that they had completely underestimated the complexity of the coordinative tasks in general. Further, the initiative uncovered many issues in detail that had never been communicated by the employees before, e.g., the lack of consistent data or diverging assumptions about the process in general. The board assumed that tackling these issues would improve the reliability greatly.

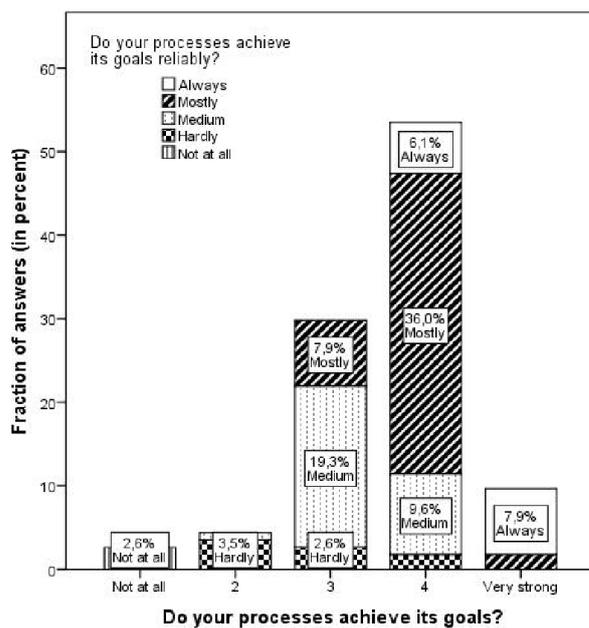


Figure 1. Goal achievement of processes

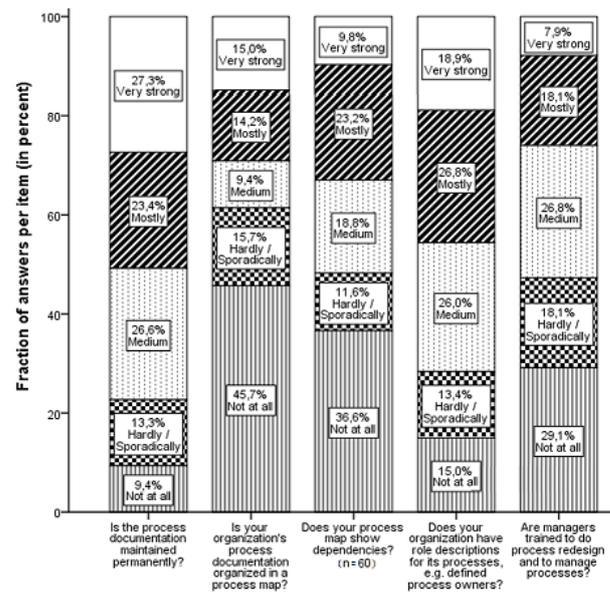


Figure 2. Documentation measures and capabilities

Figure 2 shows the results regarding process documentation and management capabilities. Less than a third (22.7%) of the participants declared to “not at all” or only “sporadically” update their documentation. We doubt that all of these companies fully realize the benefit and potential of BPM initiatives. It becomes evident that more advanced measures, e.g., the process map or role descriptions, are less frequently installed. The case study notes revealed possible reasons. Some of the companies had

installed a process documentation because important customers had urged them to do so. E.g., company J is a supplier for the automotive industry and is thus required to have an ISO certification and basic BPM measures installed. Still, BPM was essentially considered a costly nuisance. Hence the company had not trained any of their personel to perform BPM initiatives, was not willing to invest in BPM initiatives and maintained the least possible amount of documentation to sustain the certification. There were no attempts to manifest BPM as a means of improvement in any way. Other companies, e.g., company E, installed BPM staff out of their own motivation to improve processes. Thus, the persons involved implemented measures such as a process map being, in fact, well trained to do so.

### 3.3 Process Controlling and Improvement

Further, the questionnaire focuses on process controlling and process improvement asking whether goals for processes are defined and aligned to the business strategy. 42.5% of the respondents state that process goals have been defined for the majority of their processes, in contrast to 30.1% declaring that they do not use process goals at all, or only rarely. Companies that widely use process goals mostly also link them to the business strategy. Still, the majority of companies with only few goals in place do not derive them from strategy although there is a broader distribution to be observed. In no case, company-wide use of process goals goes without anchoring them to strategy (see Figure 3).

To evaluate if process goals are reviewed and adjusted where necessary, we considered a subset of companies (n=98) that had defined goals in the first place. About 58% of these companies claimed to be doing this at least once a year (Figure 4). As goals serve as a benchmark for process performance, they should be communicated to and understood by everyone involved in the process. However, in 51.3% of the SMEs, goals are not or only partially known to the employees involved (Figure 4).

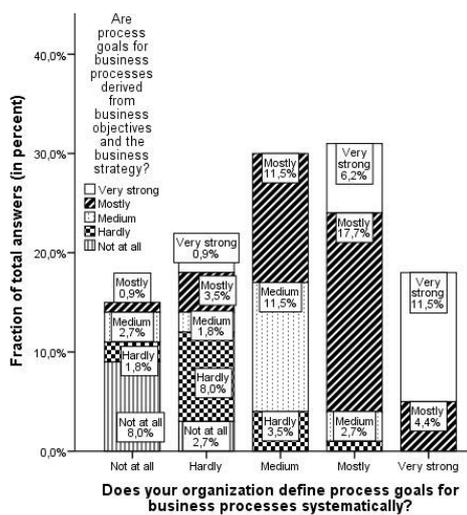


Figure 3. Definition of process goals

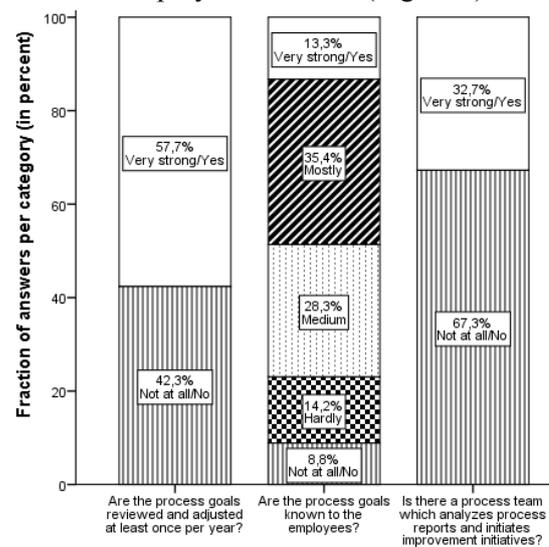


Figure 4. Process goals and organizational integration (n=98)

These results correspond to the findings in our previous case studies. Here, too, the majority of the companies defined process goals that were derived from strategy. However, checking the documents in company H, the last time they actually were updated had been 3 to 6 years ago. A regular review and an adaption to current requirements were missing. Also, it became apparent that employees involved in the process were not aware of the process goals, because these goals had not been communicated to them.

An important aspect relating to process monitoring and controlling is the operationalization of goals in terms of measurable performance indicators. As expected, a positive correlation between the determi-

nation of process goals and the use of process performance indicators was found. However, a considerable number of SMEs (21.9%) do not take advantage of process performance indicators at all. More than 42% have defined process goals for the majority of their processes but less than half of them have specified performance indicators to operationalize process goals. Most interestingly, even when the companies stated to have specified goals, for each business process, about 17.6% of them do not use any performance indicators whatsoever for measurement.

In addition, we asked which indicators SMEs usually employ for process performance measurement (Figure 5). By far the most important is “Adherence to schedule”, which is used either regularly or often by 69.3% of the companies. Most notably is the rare usage of cost and time indicators, which show, with 18.4% and 15.8%, the lowest values of regular usage and are never used by about 25% to 28% of the companies. This stands, to some extent, in contrast to the answers given regarding the organizations’ strategic objectives with productivity and cost transparency ranking relatively high. An example can be found in company G. After we introduced high quality process models as part of the BPM initiative, in the following workshop, also due to the rather small process size, a systematic measurement was easily derived.

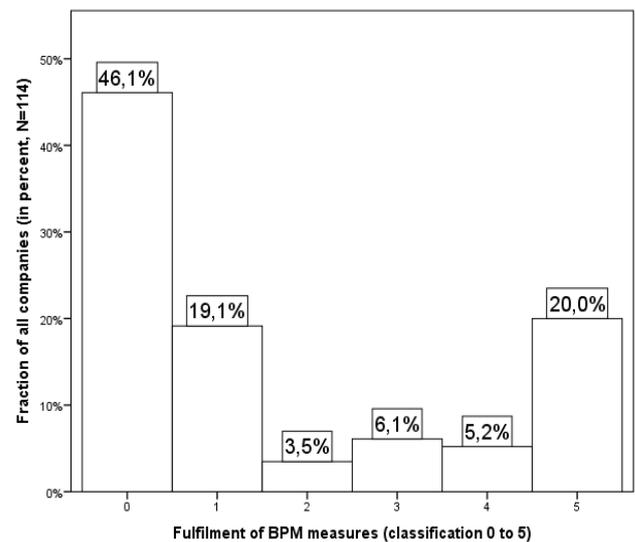
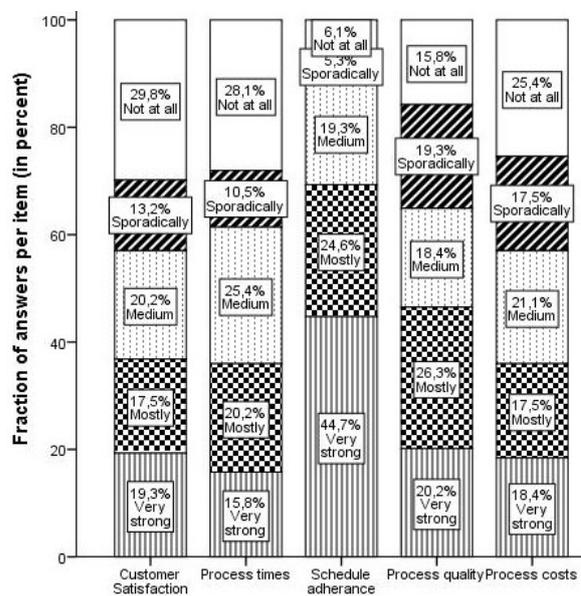


Figure 5. PPM indicators used by SMEs

Figure 6. Overall classification of SMEs

To exploit the maximum possible benefit from BPM, it is crucial not only to collect measurements but also to establish a reporting system and analyse the data for active process controlling. For that purpose, it is necessary to regularly assess deviations from planned performance targets, identify and analyse their causes, and initiate corrective actions. 31.9% of the SMEs stated to be performing these tasks continually or very often whereas a similarly sized group made up of 38.9% of the companies never or only rarely do so. Altogether, 27.2% of the respondents have available a full or almost complete process reporting system whereas for a bigger share of companies (43.9%) reporting is either non-existent or only exists in a rudimentary form. A positive example in this regard was company E. They installed a completely automatized IT system for performance measurement providing regular performance reports to the management. This allowed a strict monitoring and quick reaction to occurring problems. Driving factors for this initiative were the available BPM capabilities and the management interest in BPM.

Regarding the domain of process improvement, we asked the SMEs if they regularly assessed the potential for improvement and actively search for measures to enhance existing processes. As the results show, most of them fall into the two categories of companies that do so occasionally (34.8%) or at frequent intervals (27.7%). At the top end, we found 10.7% of the SMEs having implemented a constant

identification and assessment of process improvement possibilities. On the other hand, there is a considerable group of companies for which process improvement is not part of their BPM approach (15.2%) or only plays a minor role (11.6%). Comparing these results to other items shows a considerably lower number of companies that can rely on a previously conducted analysis for process improvement. For example, of those companies engaged in process improvement quite regularly, less than half of them (48.8%) have systematic data (e.g., target deviations, root cause analysis, etc.) available as a basis for taking decisions. Regarding the organizational integration, only 32.7% have put a designated process team in place, which is responsible for analysing process reports and initiating improvement activities (Figure 4). This clearly indicates that the majority of SMEs neglect a clear allocation of tasks as well as the corresponding competences, which are necessary to effectively carry out process improvement initiatives.

### 3.4 Overall evaluation

After interpreting the items in detail, we cover the overall results. We use the order of the categories to classify the companies (see Table 2). A company's class is the highest class the items of which have been fulfilled for at least 50%, due to the nature of the survey targeting the overall BPM. Probably, a company will not implement the whole set of measures even for the least important auxiliary business process. The classification shows the fulfilment of BPM measures while considering these conditions.

Figure 6 shows how many companies reached the respective category. Surprisingly, the majority of answers tend towards the borders. First, 46.1% of the companies reside in category zero. Hence, they reportedly document very little, if at all. Our case study notes show that company J is an example of this observation. Mostly, their employees are involved in the manufacturing process, which is determined by the manufacturing necessities. However, due to changing markets, the time and flexibility of their design and tender process (designing the customized component and calculating a tender for the production) came into focus. The company has about ten employees covering this process among others. By their own account, the existing process documentation written to acquire a certification is not related to the actual process. In fact, the involved personnel know their own tasks very well but only have an abstract notion of the overall process. Nonetheless, our case study notes show that, a process model covering the entire process reveals several possibilities to increase the flexibility and performance of the process. As a consequence, the head of the company considered modelling very useful. However, since the employees have neither the time nor the capabilities, they do not plan to conduct further BPM initiatives.

The second most frequented class, class 5 with 20.0% of the companies, includes companies that continuously optimize their processes and have implemented the measures from the previous classes as well. An example for class 5 is company E. While we were revising the process model for the product design, we realized that the company is highly process driven. They perform continuous monitoring and the feedback is used for optimization. Asked for the reasons of the high degree of BPM involvement, the head of quality referred to the complexity of their processes. The product design combines mechanical engineering, optical engineering (i.e. optical lenses and sensors) and software development as well as a large amount of external regulatory demands and engineering tools and processes for mass production. Since the company does not outsource any steps, they need BPM to deal with the immense complexity. While the company had already implemented most of the known BPM measures, they were still interested in further methods and techniques to increase the efficiency of their processes.

Third, about 19.1% of the companies reports' are classified as class 1, having a process documentation. Even though the example from class 0 showed that realistic process models are no mandatory requirement for a certification, the certification was the initial motivation for company G to document their processes. The models were further used to define the responsibilities of the employees and monitor their delivery. However, responsibilities and roles from a process perspective (e.g., process ownership etc.) were not defined, since that concept was not known to the company. The existing documentation

was created with MS Visio flowcharts and e.g., routing constructs of modelling languages (e.g., OR, XOR, AND connectors) were omitted. We revised the models introducing a proper control flow and important milestones. Now using the model, the company showed great interest in introducing further BPM measures, especially a process performance measurement.

Last, only few companies fall into classes 2 to 4. Reflecting our previous experience and our notes, we found a possible explanation for this distribution. While class 2 can already be achieved with few measures (i.e., process documentation), achieving class 3 to 5 requires continuous efforts. BPM initiatives are either done with as little effort as possible, for which they seldom produce a proper documentation and remain at the initial level. This is sometimes the case if initiatives are conducted for certification purposes only, for example. However, when the initiatives are actually considered beneficial, e.g., due to complexity issues, a proper BPM with the necessary resources is installed. In this case, due to the small structures of the SMEs, the effort to implement the additional measures from class 4 and 5 is manageable. A closer look at class 5 reveals that the majority of companies score 50% to 65% of the items in class 5 (39.1% of the companies in class 5). A higher effort is assumingly not warranted for.

Our results differ strongly from the prior studies by (Harmon and Wolf, 2014) and (Bruckner-Kley et al., 2014, Minonne et al., 2011). There, companies were predominantly categorized to either level 2 (Harmon and Wolf, 2014) or level 2-3 (Bruckner-Kley et al., 2014, Minonne et al., 2011). We argue that this is due to vastly different methods and subjects, which make a comparison of the results very difficult. For example, Bruckner-Kley et al. (2014) and Minonne et al. (2011) ask one single question only to identify the BPM maturity level of their subjects. We argue that this very abstract question (almost) encourages uncertain answers regressing to the mean. (Harmon and Wolf, 2014) conclude that level 2 is the dominant maturity level since, overall, the answer “occasionally” was the most frequent answer. In our study, each subject is classified individually based upon a large set of questions (see section 2.2.). Last, our study focuses SMEs in Bavaria, whereas the other studies have no such focus. In summary, the results of the two previous studies cannot be compared with ours in a meaningful way.

## 4 Discussion

The integration of the results of our survey and multiple case studies puts us in a position to evaluate the status quo of BPM adoption in Bavarian SMEs in general, and to identify motivations and reasons that help to explain the results observed. In this section, we discuss the main findings in a broader perspective. First of all, the overall results provide a divergent picture regarding the adoption of BPM in Bavarian SMEs. As highlighted in section 3.4, there is a notable cluster of companies that are clearly dedicated to BPM and have implemented most of the relevant BPM measures. This shows that it is indeed possible for SMEs to comprehensively adopt BPM. However, the vast majority reaches only lower levels of BPM adoption. It is an interesting question whether those companies do not see any benefit from adopting BPM given their concrete situation or if they are actually willing to adopt BPM but struggle with the realization for various reasons.

Thus, we discuss the issues regarding the adoption of BPM on the basis of our previous findings in more detail. We link these findings to possible reasons, and compare them to the requirements of the maturity levels. Hence, we are able to derive propositions, which enables practitioners to define next steps to possibly arrive at a higher maturity level or solve individual problems, and define requirements for BPM research focusing on SMEs. Table 3 gives an overview of the propositions. The columns in Table 3 show the observations, starting points and the derived propositions, and the rows are grouped to the domains that we identified among the observations: scientific foundation, strategy, implementation of BPM measures, and organizational embedding. In the following, each of these domains is explained.

A question worth paying attention to is whether SMEs draw on the broad **scientific foundation** that exists in the BPM domain. For example, do they utilize established concepts and approaches that have already proven their usefulness for the intended purposes? To our surprise, when we initially asked the

case study participants which one of the manifold BPM approaches they use, all of them replied that they do not adhere to a special one. Rather, they developed a company-specific ad-hoc procedure that worked for their individual purposes. This, in turn, leads to problems such as an incomplete or inconsistent BPM implementation, which are reflected in the survey results, too. For example, we found companies extensively measuring the performance of their processes but never using the gathered data for process controlling activities (see section 3.3). The same is true for the documentation of business processes where well-known modelling languages (e.g., EPC, BPMN) are not used but, instead, self-designed graphical representations. Together with a missing awareness of quality requirements, this leads to a process documentation that is not appropriate for many BPM related topics. In summary, we found that, for SMEs in Bavaria, the orientation on existing BPM approaches and instruments is rather low. This may involve the danger that some extra effort is necessary for the implementation and that the resulting BPM is less effective in the end as common best practices are not exploited (see Table 3).

The interplay between BPM and business **strategy** is an interesting topic. This more prominent relation covers the contribution of business strategy for the definition of business and process goals. Our investigations reveal a mostly consistent derivation of process goals. However, the operationalization of those goals by means of performances indicators is not done consistently in many SMEs. As a result, the defined performance indicators are aligned to the process goals to a limited extent only and do not fully reflect the business strategy (see section 3.1 and 3.3). A possible reason disclosed in the case studies is a lack of communication, which is why employees are simply not aware of the strategic goals. Further, SMEs avoid monitoring the performance of their employees. In either case, the results indicate that SMEs do not use the potential of BPM to pursue long-term goals. They rather monitor their production to prevent deviations from schedule or quality problems, which may be subject to a contractual penalty. Interestingly, certifications (e.g., according to DIN EN ISO 9001) are often not considered as a chance to adopt BPM but are rather regarded as a duty, which has to be fulfilled in some way or other. We have observed that some companies hold the certificate, even though their process documentation was mostly not up-to-date and its quality on a low level. The potential of BPM for strategic purposes, such as processes for mobile business or in-/outsourcing decisions, is mostly overlooked by SMEs. They rather perform BPM on an operational level and regard strategic planning as a separate task. The missing linkage is reflected in e.g., the use of performance indicators being inconsistent to the business strategy (see section 3.3). Thus, the achievement of strategic objectives cannot be measured by means of BPM. Hence, we found that SMEs often lack an appropriate instrument to review and adapt their strategic focus. Another point is that the use of performance indicators does not only enable to measure the current performance of business processes, but also allows to rate the possible process performance in the near future by using techniques of mathematical forecasting and simulation (see Table 3).

Another issue relates to the **implementation of BPM measures** where we differentiate three aspects that we could observe in the course of our study: (I) the degree of fulfilment of BPM measures, (II) the consistent implementation across different categories, such as strategy, documentation, PPM, etc., and (III) the pervasiveness in the company with regard to complete process coverage. In general, we found that only a small group of SMEs adopted BPM measures to the full extent (see section 3.4). The majority selectively implements measures to fulfil a current demand. In this context, process documentation takes a special position as it is often introduced only to fulfil certain requirements for e.g., ISO certifications. We also found that BPM measures are inconsistent with each other since they were introduced in isolation without following a systematic approach. Hence, e.g., process targets do not match the strategic goals and extensively gathered data is never used for process controlling (see section 3.3). The main reason for that is the absence of an employee who is solely responsible for BPM tasks. Further, poor communication and information sharing encourages the emergence of isolated measures. With regard to pervasiveness and process coverage, our results show that SMEs in Bavaria mostly focus on single processes when implementing BPM measures (see section 3.2 and 3.3). Though it might be a sensible approach to focus the efforts on important key processes, an over-excessive concentration may cause

problems. Since we found that most companies do not describe the interdependencies among their processes (e.g., by depicting them in process maps), mismanagement and high coordination efforts are the consequences. As a general view on business processes is not available for managers, overall management control and alignment to strategy becomes difficult (see Table 3).

	Observation	Reason/Starting Point	Propositions
Scientific Foundation	Established BPM approaches not implemented	Complexity of single BPM approaches; lack of BPM knowledge and manpower	Development of BPM approaches and trainings adapted for SMEs; usage of best practices
	Well-known modelling notations not used; missing quality requirements for documentation; self-designed graphical representation for processes visualization	Lack of modelling skills; lack of manpower; expensive BPM tools; missing awareness for the benefits	Development of and participation in BPM trainings; affordable BPM tools
Strategy	Mismatch of used performance indicators, process goals and strategic objectives	Lack of communication between management and employees; avoidance to measure performance	Consistent delineation of performance indicators from the strategy; establishment of a comprehensive measurement and reporting system; raise awareness for strategic benefits and of long-term planning
	Poor quality of process documentation due to external requirements (e.g., certifications)	Missing awareness for the benefits of process documentation and qualitative benefits of certification	Raise awareness for the qualitative benefits of certification; participation in modelling trainings; raise awareness for the benefits of process documentation; rigorous certification audits
	Development of business strategy on basis of BPM not performed;	BPM only performed on an operational level; strategic planning as a separate task; poor operationalization of process goals to performance indicators	Raise awareness for the contribution of BPM to strategic planning; participation in BPM trainings on methodological knowledge; usage of BPM for forecasting to review and adapt the strategy
Implementation of BPM measures	Selective or isolated implementation of BPM Measures	BPM is used to cover current needs; fulfillment of certain requirements; established BPM approaches not used; lack of manpower; no definition of responsibilities; poor communication/ information sharing	Participation in method trainings; awareness for benefits of a consistent, integrated BPM approach; creation of a holistic view on diverse BPM measures
	Focus on single business processes	Short-term and problem oriented focus; no process map showing interdependencies	Participation in method trainings; awareness for benefits of holistic BPM approaches; definition of responsibilities for a comprehensive BPM
Organizational embedding	Lack of anchoring BPM in the organization: -limited use of BPM measures for decision making -limited process improvement or process redesign possibilities -limited reporting of performance achievements	No clear role definitions; no employees with main topic BPM; not sufficient resources; lack of communication; lack of employee skills regarding BPM	Establishment of roles and provision of sufficient resources; organizational embedding of measurement and reporting system; communication of goals and achievements

Table 3. Derivation of propositions

A further issue that we found important in the SME domain is the missing **organizational embedding** of BPM. Many companies do not provide sufficient resources, first and foremost staff, for BPM activities, and clear definitions of roles (e.g., process owner etc.) are also scarce (see section 3.2). Whereas in large companies there usually are positions dedicated to BPM topics, smaller-sized companies of focus on operational daily business. During all of our on-site visits, we never met any employees whose main

task was BPM. Mostly, it was the quality manager who had been assigned the additional responsibility for this topic, and only a small number of SMEs have process teams to discuss problems and develop measures for improvement. In case BPM standards or requirements are defined, they are poorly communicated in most SMEs (see section 3.3). As a consequence, e.g., process goals defined by the management are unknown to those employees working in the respective processes. On the other hand, process reporting, which is supposed to provide decision makers with relevant data (e.g., process performance measures), is poorly implemented, too. This may cause wrong decisions both at the operational and the strategic levels. Another problem SMEs struggle with is the lack of BPM knowledge and qualified personnel. In particular, we found the quality of the process documentation at a rather low level. Other companies having successfully implemented a PPM do not succeed in drawing the right conclusions from it as they were not trained in redesigning business processes (see Table 3).

The deficits are also a great challenge for scientists since all the itemized problems can be supported by methods, techniques and tools that have already been available for a long time. Further, there is a tremendous amount of scientific literature in which, mostly based on the design science research method, the development and the evaluation of these BPM methods, techniques and tools are described. The fact that many practitioners do not use them, although they are available and have proven to be useful according to the relevant literature, indicates either a knowledge gap or a lack of willingness. The latter contradicts the contribution described in scientific BPM literature and can be interpreted as a request to scientists to develop new or update existing methods, techniques and tools that are more suitable for everyday routines of SMEs. We see our research as a starting point to investigate the usefulness of the available BPM methods, techniques and tools and to bring them more in line with the needs of SMEs. The former, namely the knowledge gap, motivates to develop further possibilities to train managers in BPM to close the said gap. However, it has to be considered that managers nowadays are confronted with a tremendous amount of BPM courses with different emphases and in different learning settings. Therefore, the reasons of this knowledge gap should be closely investigated, and new training possibilities need to be developed that are explicitly in line with the needs of the employees in SMEs.

## **5 Conclusion**

In this paper, we assessed the state of BPM adoption in Bavarian SMEs. A mixed method approach combines the results of 10 in-depth case studies with 114 responses of a survey. Considered together, they uncover the state of adoption regarding measures about BPM and strategy, purpose achievement and reliability, documentation, capabilities, performance management and redesign. This assessment shows potentials for improvement left untapped, together with possible reasons.

On the base of the identified reasons, we developed our main contribution, next to the results of the survey and the case studies (research question 1 and 2), namely propositions for practitioners and propositions for researchers (research questions 3). These propositions expectedly improve the BPM adoption and thus support the competitiveness of SMEs. In this regard, we answered the three research questions defined in the introduction (a summary of which is shown in Table 3).

Still, our work is not without limitations. First, the interpretation of the case studies, though conducted by two researchers and discussed in a group of four, leaves room for subjectivity. They have to be cross-verified by the results of the survey. Another limitation originates from the selection of participants. As they were contacted at random, it is possible that only those companies responded that had a particular interest in implementing BPM measures. In the light of the previous discussion, companies without any interest in BPM at all might contribute to the size of category 0 (see section 3.4).

Results and limitations lead to further research. First, the study was conducted in Bavaria and needs to be extended to structurally different regions. In that context, further case studies may sustain or contradict the present results. Last, in future work, we will implement and evaluate the propositions in order to verify their relevance and extend their number.

## References

- Bruckner-Kley, E., Kykalová, D., Pedron, C., Luternauer, T. and Keller, T. (2014). Business Process Management 2014 - Status quo und Perspektiven eines ganzheitlichen Geschäftsprozessmanagements. vdf Hochschulverlag. Zürich.
- Chong, S. (2007). Business process management for SMEs: an exploratory study of implementation factors for the Australian wine industry. *Journal of Information Systems and Small Business*, 1 (1-2), 41-58.
- Dallas, I. and Wynn, M. T. (2014). Business Process Management in Small Business: A Case Study. Ed.). *Information Systems for Small and Medium-sized Enterprises*. Springer. 25-46.
- DESTATIS (2015). Report no. 52111-0003. DESTATIS Genesis-Online, <https://www-genesis.destatis.de/genesis/online/link/tabellen/52111-0003> (Last access: 30.03.2016),
- Gable, G. G. (1994). Integrating case study and survey research methods: an example in information systems. *European journal of information systems*, 3 (2), 112-126.
- Goes, P. B. (2013). Editor's comments: commonalities across IS silos and intradisciplinary information systems research. *MIS Quarterly*, 37 (2), iii-vii.
- Hammer, M. (2010). What is Business Process Management? (Brocke, J. v. and Rosemann, M. Ed.). *Handbook on Business Process Management 1 - Introduction, Methods, and Information Systems*. Springer. 3-16. Berlin, Heidelberg.
- Harmon, P. (2010). The Scope and Evolution of Business Process Management. (vom Brocke, J. and Rosemann, M. Ed.). *Handbook on Business Process Management 1*. Springer. 37-81. Berlin Heidelberg.
- Harmon, P. and Wolf, C. (2014). The State of Business Process Management 2014. 17.11.2015.
- Huysmans, P. and De Bruyn, P. (2013). A Mixed Methods Approach To Combining Behavioral And Design Research Methods In Information Systems Research. *European Conference on Information Systems Utrecht, NL*.
- Kohlbacher, M. (2010). The effects of process orientation: a literature review. *Business Process Management Journal*, 16 (1), 135-152.
- Kolář, J. (2014). The Adoption of Business Process Management in Small and Medium Enterprises. Faculty of Informatics. Masaryk University.
- Komus, A. (2011). BPM Best Practice - Erfolgsfaktoren der Prozessorientierung. (Komus, A. Ed.). *BPM Best Practice - Wie führende Unternehmen ihre Geschäftsprozesse managen*. Springer. pp. 3-57. Heidelberg.
- Minonne, C., Colicchio, C., Litzke, M. and Keller, T. (2011). Business Process Management 2011 - Status quo und Zukunft: Eine empirische Studie im deutschsprachigen Europa. vdf Hochschulverlag. Zürich.
- Minonne, C. and Turner, G. (2012). Business Process Management—Are You Ready for the Future? *Knowledge & Process Management*, 19 (3), 111-120.
- Paulk, M. C., Curtis, B., Chrissis, M. B. and Weber, C. V. (1993). Capability maturity model for software, Version 1.1. Software Engineering Institute.
- Roeser, T. and Kern, E.-M. (2015). Surveys in business process management – a literature review. *Business Process Management Journal*, 21 (3), 692-718.
- Rosemann, M. and vom Brocke, J. (2010). The Six Core Elements of Business Process Management. (vom Brocke, J. and Rosemann, M. Ed.). *Handbook on Business Process Management 1 - Introduction, Methods and Information Systems*. Springer. 107-122. Berlin, Heidelberg.
- Schmelzer, H. J. and Sesselmann, W. (2008). *Geschäftsprozessmanagement in der Praxis: Kunden zufrieden stellen-Produktivität steigern-Wert erhöhen*. Hanser Verlag.

- Söllner, R. (2014). Die wirtschaftliche Bedeutung kleiner und mittlerer Unternehmen in Deutschland. *Wirtschaft und Statistik*. Statistisches Bundesamt (Federal Bureau of Statistics), Wiesbaden.
- Trkman, P. (2010). The critical success factors of business process management. *International Journal of Information Management*, 30 (2), 125-134.
- Van Looy, A., De Backer, M. and Poels, G. (2011). Questioning the design of business process maturity models. 6th SIKS/BENAIIS Conference on Enterprise Information Systems (EIS-2011), p. 51-60,
- Venkatesh, V., Brown, S. A. and Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS quarterly*, 37 (1), 21-54.