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Exploring the Status Quo of Business Process Modelling Languages in the Banking Sector – An Empirical Insight into The Usage of Methods in Banks

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Abstract

There are many business process modelling languages (BPML) available on the market for business process modelling. To date, however, it remains unclear how satisfied institutions are with various modelling languages as there is a lack of studies on modelling and analyzing business processes. In order to provide a better understanding of this issue, an exploratory survey with a focus on the banking sector was conducted. Due to a structural crisis in the financial sector (esp. in Germany, where the market is seen as "over-banked" and "over-branched"), banks are currently forced to improve their business processes to save costs and work more efficiently. Thus, they focus on business process management (BPM) and in particular on the preliminary steps of business process modelling. In this paper, key findings from a survey are presented and discussed as a basis for a more sophisticated approach to business process modelling and analysis in the future and also as an insight into the state of the art of business process modelling in general.

Keywords

BPM, Banks, Business Process Modelling Languages, Empirical Research, Survey

INTRODUCTION

Process modelling and documentation is a way to capture the implicit process knowledge of an organization and document it explicitly in a (semi-)formal way. Models can be used e.g. as a basis for decisions on IT investments, reorganizations or the selection and implementation of information systems. They describe the logical sequence of activities in a business process, the resulting products, required resources and data, as well as organizational units (Lindsay et al. 2003).

According to Hung (2006), business process management (BPM) as a field of study is still in its infancy although there are studies for its usage in various sectors and industries. An effect of the popularity of process orientation, which can be noted in organizational practice, is that high efforts are being spent on the creation of business process models for the documentation and analysis of business processes (Mendling et al. 2009).

This article aims at providing an understanding of the status quo of BPM methods for business process modelling in banks. In particular, the banking sector is addressed, as many banks currently aim at industrializing their core banking processes (Wilken et al. 2008). Their need to model, document and analyse the process landscapes is omnipresent. Analysis purposes in banks include the optimization of business processes, compliance of processes with legal rules, management of (operative) risks in the process landscape, human resource requirements planning according to necessary capacities and skills for executing processes and product costing according to the process-oriented allocation of costs.

Although there are studies about the general usage of process models in banks (Drake et al. 2009) or the need for reorganization (Spath et al. 2008), there is hardly any empirical research on the usage of business process modelling methods in the banking sector. Hence, the state of the art of process modelling and especially process modelling languages in banks are analysed and interpreted. Furthermore, we identify, discuss and interpret recent drawbacks in BPM projects in the banking sector.

The paper is organized as follows. In section 2, recent findings from a literature review regarding the state of the art of business process modelling are discussed. Section 3 addresses the research and survey design and offers insights into the structure and intention of the underlying questionnaire. In section 4, general information on the

modelling projects of the participating banks are presented. In section 5, selected information from the underlying study is provided in detail, dealing with process modelling languages used in banks and their satisfaction with them. In section 6, a synthesis of the findings from the survey is provided and reflected. Finally, the research concludes with a summary of the research outcome and contributions to the body of knowledge regarding the research goal, a critical view on limitations of the research approach and with an outlook on future research topics derived from the findings.

LITERATURE REVIEW

Researchers have developed many modelling languages for the formal representation of business processes since the arrival of business information systems (Dumas et al. 2005). Most of these models are based on concepts found in Petri nets, which can be seen as an ancestor. Some prominent offspring are e.g. the UML activity diagram (Object Management Group 2005), the Business Process Modelling Notation (BPMN; Object Management Group 2006) or Event-driven Process Chains (EPC; Keller et al. 1992). These modelling languages are mostly flexible instruments to describe diverse processes in many different domains.

In order to gain an overview of studies on the usage of business process modelling languages, highly ranked journals were initially screened. In accordance with vom Brocke et al. (2009), journal ranking lists were identified as a valuable starting point for a literature review since journal rankings are an approved way to ensure the quality of a given publication source. When striving for a relevant ranking, the VHB JOURQUAL2 ranking was chosen. The focus was on the JOURQUAL2 lists on IS Research and considered all articles from English speaking journals ranked from A+ to C, which were published between 2000 and 2008. Altogether, 15,116 articles were found. A keyword search for "process" on the article titles yielded 584 articles, of which only 37 articles turned out to be relevant to the actual topic of "business process modelling". Next to specific case study articles on process modelling, some of these authors try to provide solutions to the analysis of process models. For example, Melão and Pidd (2000) provide a framework as a basis for a discussion of the strengths and limitations of different modelling approaches used in the transformation of business processes. Glassey (2008) compares three process modelling techniques used in case studies. Sadiq and Orlowska (2000) analyse process models using graph reduction techniques. Other authors such as van der Aalst et al. (2007) or Krogstie et al. (2006) apply specific tools, frameworks and methods for process analysis and modelling. However, from an empirical standpoint, only little is said about the actual usage of models, such as in Ranganathan and Dhaliwal (2001) who come to the conclusion that companies in Singapore have a lack of human and financial resources, a lack of internal IT expertise and capabilities, and lack of a champion for BPR efforts. .

In a second step, various studies on the usage of business process modelling in general or with regard to individual modelling languages were identified outside the scope of the analysed journals. For example, Recker (2010) discusses the current struggle with BPMN and zur Muehlen and Recker (2008) look at the usage of modelling elements in 126 BPMN diagrams and come to the conclusion that only a small set of elements are most commonly used. We know that it is not possible to identify each relevant article although we spent a lot of effort in identifying related work. However, so far it was not possible to identify empirical studies that compare the usage of different process modelling languages and hence the satisfaction of its stakeholders with regard to modelling and analysis on a scientific basis.

In order to address this problem within a manageable study, we focused on the banking sector only. Studies indicate that there is currently a high need for extensively analysing business processes for multiple purposes, especially performance issues in the financial sector (Cocheo and Harris 2005, Papastathopoulou et al. 2001). Reasons for low performance of banks are long holding times of documents, a high diversity in processes, contract and product structures, as well as loops in processes. Various media breaks and the administrative exposure of customer oriented employees are further reasons for ineffectiveness (Rederer 2007). As a result, more than 70% of German banks intended to apply process modelling and reorganization in 2007 (Spath et al. 2007). This intention has become even more important due to the financial crisis. Hence, with this research on the state of the art of process modelling and analysis a contribution is not only made to improve the process management approaches in this sector, but also to process modelling in general.

RESEARCH AND SURVEY DESIGN

The study was designed as an exploratory survey to examine current methods used in banks for process modelling and analysis (Becker et al. 2010), while at the same time testing preliminary concepts (i.e. satisfaction with modelling methods) on this topic (Pinsonneault and Kraemer 1992). However, we did not aim at evaluating individual modelling notations, but our main interest was focused on the usage of business process modelling in banks and to gain a deeper understanding of this, we additionally asked for the notations in use. Based on a literature review in conjunction with several discussions with modelling and domain experts in the financial

industry, an initial set of questions was developed. The first questions were aimed at reflecting general demographic data on the survey participants (i.e. process modelling expertise). In addition, further questions were targeted at gathering case specific background information on business process modelling at the participants' banks. The survey was then tailored to provide detailed data on the methods and tools used for business process modelling and analysis, as well as the satisfaction with these. Finally, several questions regarding the overall satisfaction with the process models, resulting from process modelling projects in banks, and what banks would wish for the future, were asked.

The survey was pilot-tested with several banking experts, before the final online questionnaire was constructed. Several paths were implemented through the web-based survey in order to not lose participants due to unsuitable questions. On average, answering of the questions took about 15 minutes. Since access to the complete database of a renowned international consulting company, with a major focus on financial sector consulting that maintained high quality customer profile data, was given prior to the study, all 1,219 employee contacts in German banks, 655 in Austrian banks and 593 contacts in Swiss banks were invited to participate in the study. Although the potential sample size seemed quite large, an overall response rate of 4% could only be achieved. Possible reasons for this could be derived as follows: (a) e-mail invitations were used and not all e-mails could be delivered correctly; (b) in July many employees are on vacation, and (c) it was not possible to analyse the initial database in advance for employees with the necessary background knowledge on process modelling and activities concerning this in their banks, as this detailed information was missing in the customer profiles, so that many contacts on the level of CEOs etc. may have found the topic of the survey to be to specific to respond to it. Nevertheless, 97 respondents from small-, medium-sized and large banks, covering all 3 countries and ranging from universal to specialized banks, participated in the online survey. After the consolidation of questionnaires due to a lack of real process management project experience of some of the respondents, the data of 60 questionnaires was valid for further exploration. Although very few questionnaires were sent to multiple contacts, employed by the same bank, we only accepted one response per institution (preferably that of the BPM manager or department closest to BPM) and rejected any further returned questionnaires (the later had to be done for only four of the 60 participating banks). Thus, each response can be associated with one bank.

While most of the participants worked in the process management department of their respective bank (45%), employees from other departments participated as well. The second largest group consists of participants from the organization department (17%), followed by controlling (13%) and the IT department (7%). The remaining 18% stated various other occupations like general management, sales, inhouse consulting or strategy, which could not be subsumed in the previous groups.

GENERAL REASONS FOR AND DEGREE OF MODELLING PROJECTS

In the survey, we presented various reasons for being involved in BPM initiatives and asked the participants to assess the importance of these reasons on a 6 point Likert scale, ranging from very important (1) to very unimportant (6). These reasons are aligned along typical aspects of BPM projects, beginning with process documentation, followed by process monitoring and analysis and process optimization. Bank-specific aspects like compliance and risk form a supplementary group. To ease the characterization of the participants, we clustered the banks with respect to their ratings using agglomerative clustering. The results can be found in figure 1, in which the mean ratings for each of the reasons and each of the clusters is given.

Consistent with general studies on banks, which see business process improvement among the top priorities of banks (Spath et al. 2007), we found that a large group of participants consistently perceives reasons corresponding to process improvement to be highly important (clusters two and three in Figure 1). Banks of cluster four tend to rate some aspects less important, but still, they assign high ratings to business process reengineering, harmonization of processes and IT integration. This cluster also rates compliance and risk aspects rather high compared to other aspects, which demonstrates interest in this topic. Nevertheless, compliance and risk aspects are also rated very high by the other major clusters two and three. Aspects regarding process documentation receive rather low ratings by most of the banks. Exceptions to this rule are the eight banks of cluster three. Process monitoring and analysis, only referring to activity-based costing and benchmarking aspects, are considered to be of subordinate importance by our participants. Clusters one and five contain only five banks in total and are therefore not discussed.

Only two participating institutions stated that they had already modelled their entire business processes. As certainly not all institutions aim at modelling all of their business processes, the banks were also asked for the percentage of activities that should be or should have been modelled. Comparing the as-is state against the to-be state it can clearly be seen that banks are not only still behind their process modelling goals, but the majority of banks (61%) wants to model more than 70% of their entire process landscapes. In opposition to this the majority of the banks (53%) have modelled less than 50% of their process landscape. This is rather interesting as it demonstrates that, despite of the effort, many banks aim at documenting a large share of their processes. 93% of

the participating banks document their processes in both their back-office (i.e. credit processing, payments, call center) and middle-office (i.e. risk and compliance management etc.) activities. The front-office (i.e. sales and client counselling) currently seems to be least popular for modelling applications with only 44 corresponding answers. Possibly this is due to the fact that back offices and also middle offices are highly standardized (due to the focus on certain scope of products and to legal restrictions) and thus it is easier to capture and reorganize processes. On the contrary, front office activities are usually less standardized as they offer many individual services for their clients with non-linear activities (i.e. counselling and contract signing or direct contract signing or multiple counselling sessions and still no contract signing etc.) and use many alternative workflows for the same processes.

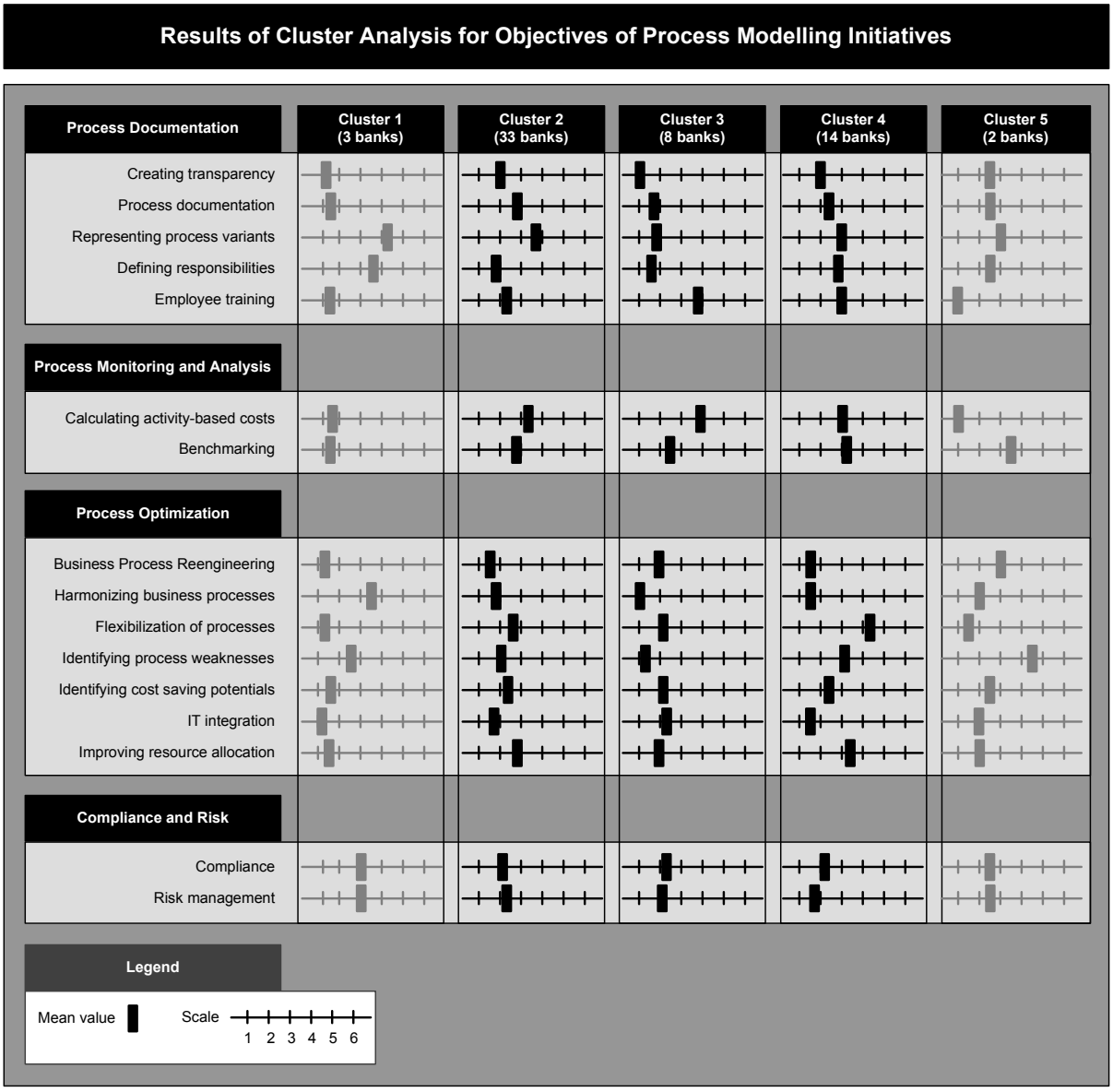


Figure 1. Rating of importance for being involved into BPM initiatives by clusters of banks

ANALYSIS OF USED PROCESS MODELLING LANGUAGES

General Findings and Analysis

There is a large number of modelling languages available on the market that are used in process modelling projects. As BPMN is the most widely accepted modelling language at the moment, there was a high expectation to receive many votes for BPMN and a certain variety of less distributed other languages in use. However, it turned out that the most popular method, used by 45% in Germany, Austria and Switzerland is the Event-driven Process Chain (EPC). This may be due to the national focus of the study as the EPC originally was invented in Germany. With 23% of the participants, the Business Process Modelling Notation (BPMN) nevertheless seems

to be a very widespread and accepted method as well, although a much higher market share was expected upfront. In addition, also UML activity diagrams, originating from software engineering practices, were also observed to be used quite frequently with 12 positive answers. Very surprising was to unveil that many banks claimed to have developed their own process modelling languages. 30% of all respondents reported that they modelled processes with a proprietary notation developed in-house. This finding can be due to the fact that banks may have already considered minor changes to standard process modelling languages as new proprietary notations, and that they are not very satisfied with the standard existing notations.

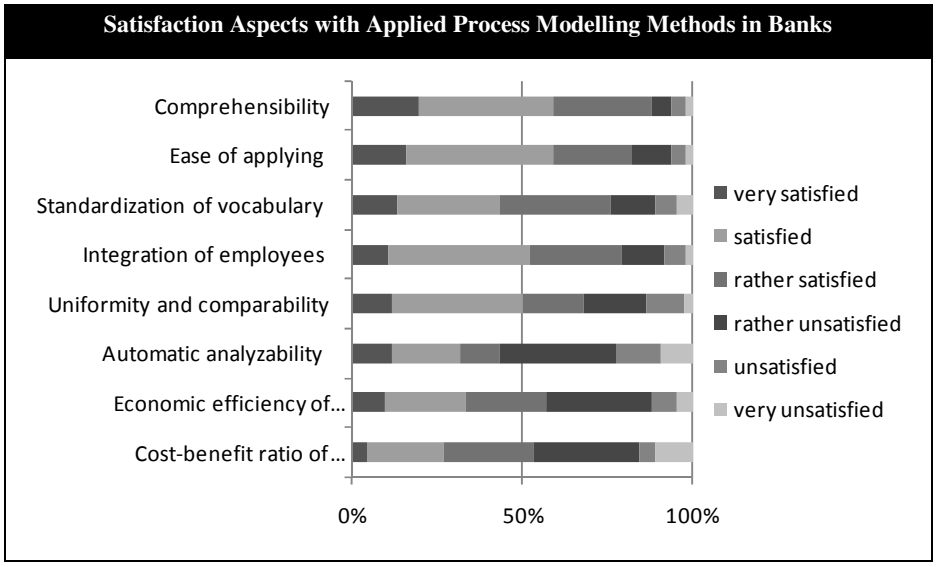


Figure 2. Rating of satisfaction with aspects of languages

The participants have also been asked to state their personal satisfaction with the modelling languages they use with regard to certain aspects. From the answers, it became apparent that most banks were generally satisfied with the properties of their methods except for the possibilities of supporting business process analysis. Also, the satisfaction with the cost-benefit ratio of both model creation and maintenance was rather low (cf. Figure 2).

Regarding the mix of methods used by banks, it was observed that 57% of the participating banks only used a single method, 17% of the banks combined two methods and 15% of the banks used a combination of three or more methods for business process modelling. Thus it seems that there is no single method addressing all the needs of banks across all departments.

In-depth Analysis of Selected Issues

These general findings led to the question, whether or not there is a favoured language for the modelling of business processes in banks among the participants of the study. Thus, the overall satisfaction of banks with their modelling languages, with regard to the purposes they pursued in their BPM projects, was analysed with respect to the single languages. The satisfaction with the modelling languages was measured on a 6-point ordinal Likert scale ranging from very satisfied (1) to very unsatisfied (6). All 60 banks gave responses to this question, so that there were no missing values. Regarding the used modelling language, each bank was asked to name the languages in use. Since BPMN, EPC and UML were the most frequently used languages the comparison was restricted to only these three and all other banks, not using any of them, were combined into a single group containing 20 banks.

To evaluate the impact of the mix of languages on the satisfaction with them, a multinomial logistic regression was conducted. Computations were done with the Statistics Toolbox of Matlab 2009b using an ordinal model, since the responses to the satisfaction-question clearly have an ordinal nature. In addition to the predicted probabilities, nonsimultaneous 95% lower and upper confidence bounds were also computed. Given these general settings two slightly different regressions on the basis of the data set were applied. The first regression measured the impact of the entire mix of languages on the satisfaction and thus used all three indicator variables as predictor values, while the second analysis aimed at measuring the individual impact of each modelling language on the satisfaction. Consequently, a regression was done for each of the languages using only the one corresponding binary variable as the predictor value. The results of the first analysis can be found in table 1 and 2, the results from the second analysis are depicted in table 3 and 4.

One finding from the first analysis is that, given that the bank uses none of the selected languages, the probability that banks are satisfied is rather high. The estimated probabilities for being very satisfied (1), satisfied (2), or rather satisfied (3) together amount to more than 90% of the probability mass. Even when only considering the lower bounds on these probabilities, they still amount to almost 50%.

Table 1. Estimated probabilities for satisfaction levels predicted by all languages

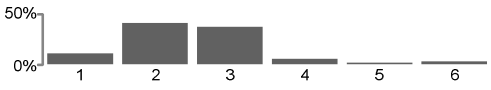
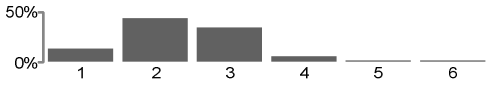
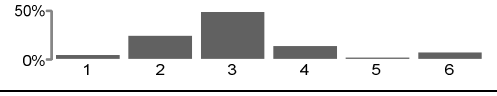
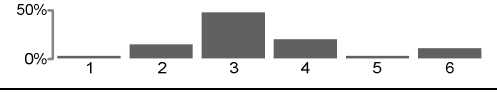
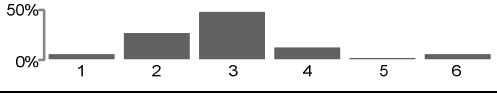
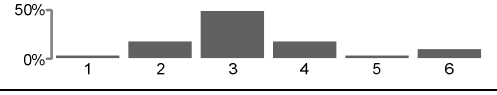
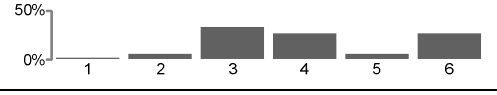
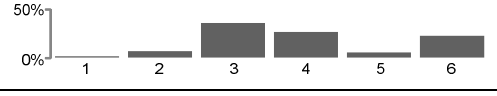
Languages	Satisfaction						Graphical illustration of distribution
	1	2	3	4	5	6	
others only	11,01	41,77	38,04	6,01	0,71	2,46	
BPMN	13,04	44,50	34,76	5,07	0,60	2,04	
EPC	4,18	24,07	49,44	13,79	1,83	6,68	
UML	2,32	15,36	47,84	19,90	2,97	11,60	
BPMN + EPC	5,02	27,30	48,54	12,01	1,55	5,58	
BPMN + UML	2,80	17,86	49,07	17,93	2,57	9,77	
EPC + UML	0,83	6,21	33,07	27,27	5,48	27,14	
BPMN + EPC + UML	1,01	7,40	36,40	26,65	5,04	23,50	

Table 2. Lower / upper confidence bounds of probabilities for satisfaction levels predicted by all languages

Languages			Satisfaction						Bound
BPMN	**EPC**	**UML**	**1**	**2**	**3**	**4**	**5**	**6**	**95%**
others only			0,18 21,83	25,00 58,54	23,00 53,09	0,17 11,85	0,00 2,21	0,00 5,66	low up
BPMN			0,00 28,76	24,26 64,73	13,79 55,74	0,00 11,45	0,00 1,94	0,00 5,25	low up
EPC			0,00 9,09	9,87 38,28	35,23 63,66	2,95 24,63	0,00 5,48	0,00 14,14	low up
UML			0,00 5,93	0,00 31,66	31,46 64,22	2,77 37,04	0,00 9,08	0,00 26,32	low up
BPMN + EPC			0,00 12,35	5,15 49,44	32,94 64,14	0,00 24,92	0,00 4,92	0,00 13,74	low up
BPMN + UML			0,00 7,22	0,00 36,73	34,00 64,15	1,03 34,82	0,00 7,97	0,00 23,08	low up
EPC + UML			0,00 2,31	0,00 14,68	9,42 56,72	9,10 45,44	0,00 16,09	0,00 55,95	low up
BPMN + EPC + UML			0,00 2,86	0,00 17,97	10,95 61,86	8,40 44,90	0,00 14,99	0,00 51,92	low up

Another observation that can be made is that, in the first analysis, the satisfaction seems to be high for banks in which BPMN is in use, while it seems to be low for banks using UML. To confirm this belief a second analysis was conducted. Table 3 indicates that the probability for being satisfied is highest if BPMN is used and lowest if UML is used. Thus, BPMN has the most positive effect on the level of satisfaction. Being satisfied, when BPMN is in use, is more likely than if not, and being unsatisfied, if BPMN is in use, is more unlikely compared to not using BPMN. In case of applying UML, this relation is exactly contrary. Similar to UML, but not that as straightforward, is the result if EPC is used.

Table 3. Estimated probabilities for satisfaction levels predicted by single languages

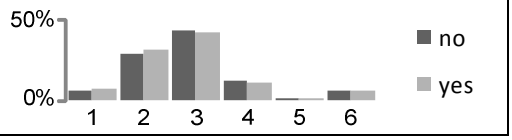
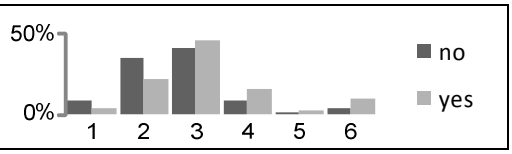
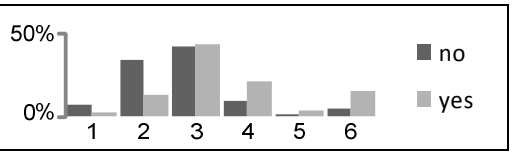
	Satisfaction						
	1	2	3	4	5	6	Graphical illustration of the distribution
BPMN							
no	6,49	29,51	43,56	11,91	1,70	6,83	
yes	7,24	31,51	42,65	10,93	1,54	6,12	
EPC							
no	8,77	35,81	40,95	8,83	1,18	4,46	
yes	4,12	22,32	46,10	15,68	2,33	9,46	
UML							
no	7,84	34,20	43,16	9,14	1,19	4,48	
yes	2,12	13,45	43,84	21,49	3,54	15,57	

Table 4. Lower / upper confidence bounds of probabilities for satisfaction levels predicted by single languages

	Satisfaction						Bound
	1	2	3	4	5	6	95%
BPMN							
no	0,12	17,21	30,84	3,38	0,00	0,19	low
	12,86	41,80	56,27	20,44	5,04	13,47	up
yes	0,00	12,87	28,33	0,65	0,00	0,00	low
	16,04	50,16	56,98	21,22	4,75	13,74	up
EPC							
no	0,24	21,09	27,88	1,60	0,00	0,00	low
	17,30	50,53	54,03	16,07	3,52	9,38	up
yes	0,00	9,36	32,77	4,34	0,00	0,09	low
	8,86	35,27	59,43	27,01	6,87	18,83	up
UML							
no	0,44	21,13	30,35	2,08	0,00	0,00	low
	15,23	47,27	55,97	16,20	3,56	9,28	up
yes	0,00	0,29	27,56	5,34	0,00	0,00	low
	5,20	26,61	60,11	37,63	10,60	32,32	up

A third finding is that the number of different methods used by banks does not seem to have an effect on the satisfaction, as it is indicated by table 1. Apart from banks using only BPMN and nothing else, there is no significant difference between banks, focusing on one language only, as compared to banks, using multiple languages in combination.

AN EXPLORATORY SYNTHESIS: REFLECTIONS ON THE KEY FINDINGS

A number of exploratory key findings were identified regarding process modelling, as well as with respect to process modelling languages used in banks. The first and most important reason, why banks get involved in process modelling activities, is business process reengineering. This is currently especially crucial as banks need to save and reduce costs in the financial crisis and seek for ways to restructure their processes to be more efficient, to improve customer satisfaction at lower process costs and to reduce the time required to finish processes. Due to the fact that banks deal with immaterial products and process a huge amount of information every day, IT integration is another frequently mentioned reason for conducting business process modelling projects. Building and maintaining a large, integrated IT architecture, is a very complex task, which cannot be fulfilled without knowledge of the processes that the systems should support. Other statements of the banks saying that harmonization of business processes or the creation of transparency in the process landscape are significant reasons to engage in business process modelling are also in line with the characteristics described above.

> *Exploratory Key Finding 1: BPM projects in banks are mainly driven by the purpose of reengineering the process landscape and supporting business processes with IT. However, many banks pursue a number of parallel goals – from simply documenting the process landscape to even harmonizing the process landscape – when starting BPM projects.*

The abundance of modelling reasons exhibited by the participants is also a possible explanation, why so many banks use several methods. As using different methods increases the modelling project complexity, it may be assumed that using such a variety of different methods can be a reason for dissatisfaction with the methods used for the BPM project itself. However, it was not possible to identify a significant impact of the number of methods used on the satisfactions with those methods. Nevertheless, banks were not satisfied with their modelling languages on many criteria apart from pure modelling aspects. This is especially true for banks using standard modelling languages like EPC and UML and partially true for banks using BPMN. Furthermore, a high dissatisfaction with analysis capabilities of the resulting process models, as well as regarding the economic efficiency of process model creation and the cost-benefit ratios of process model maintenance was observed. Many banks even tried to compensate a lack of appropriate modelling languages for their multiple purposes by developing proprietary modelling methods (as stated by 30% of the participants in the survey).

> *Exploratory Key Finding 2: Many banks are unsatisfied with modelling languages apart from modelling aspects – especially when it comes to analysis purposes. As a consequence of inappropriate methods, relatively many banks even design their own proprietary modelling notations.*

Regarding modelling method enhancements, banks had a number of suggestions for aspects they wanted to combine with their process modelling activities. They frequently suggested that they wanted to model risk aspects (including risk measures) along with internal control aspects (control processes for handling certain risks), as well as business continuity aspects ("emergency" processes that are executed in case standard processes fail – i.e. due to an IT system breakdown) in their process models. In addition, they stated that they also wanted to reflect on regulatory compliance and internal operational guidelines or codes of practice aspects when documenting their process landscape. Hence, complementing (operational) risk management and business process compliance activities with the help of business process modelling projects was also frequently considered to be very important for engaging in process modelling projects. This seems reasonable in Germany, Austria and Switzerland, as there are many regulatory requirements with which banks must comply. Especially due to Basel II, many banks also have to tackle the problem of dealing with operational risks, which are directly connected to the different business processes. Currently, both regulatory requirements and risk modelling were thus seen to be highly relevant and upcoming aspects concerning future process modelling activities.

> *Exploratory Key Finding 3: Many banks strive for bank-specific aspects to be included in their business process models – especially concerning the annotation of risks and regulatory requirements – when being asked about current drawbacks of process modelling languages.*

CONCLUSION, LIMITATIONS AND FURTHER RESEARCH

With the ambition to provide empirical evidence on business process modelling, data from a first exploratory survey among 60 banks was presented. This exploratory study aimed at finding out if existing approaches to process modelling languages serve banks right. Besides the presentation of empirical data, the main contribution to the body of knowledge can be seen in guidance for future projects in the banking sector and as a solid basis for the further evolution of current process modelling languages to include bank-specific aspects (i.e. operational

risks and regulatory compliance aspects) or the development of new bank-specific process modelling languages, which focus specifically on the needs and special process-oriented modelling interests of banks.

The most important findings of the data analysis and interpretation were the following:

a) BPM projects are often driven by many parallel purposes, even though business process reengineering seems to be the core purpose.
b) Many banks are unsatisfied with their modelling methods in use and several banks have even developed own proprietary notations.
c) Banks, using standard modelling techniques like EPC and UML, are more unsatisfied than banks using other, more rare and specialized techniques.
c) Methods desired by banks also include aspects that are of special importance to banks (e.g. risk management and regulatory compliance).
d) Points of dissatisfaction with modelling methods are seen especially regarding automatic analysis and optimization abilities, but even also regarding economic efficiency of process model creation and the cost-benefit ratio of process model maintenance.
e) Banks have an interest in a bank-specific modelling language to support their special requirements (e.g. wherefore several banks have also started to develop their own proprietary business process modelling notations).

In light of the amount of data received and the explorative nature of the survey, the findings presented in this may not be representative at this stage. Furthermore, even though representatives from different types of banks, located in three different countries, were surveyed in the study, there are several limitations of the approach presented. First of all, the study is limited to the German speaking world only. It is not clear if other cultural spheres are at a different status quo in terms of process modelling and analysis, as well as regarding methods used for this. In addition, with a response rate of 4% and 60 participating banks, the study can only serve as a first exploratory insight and leaves room for larger, multi-national studies.

With regard to the key findings, future studies should focus on analysing the specific requirements of banks for process modelling and analysis methods (esp. business process modelling languages / notations), in order to adapt existing methods or engineer new methods that are specific focussed on the needs of the banking sector and help to positively influence the satisfaction with business process modelling found in banks.

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