

# VISIBILITY OF BUSINESS PROCESSES – AN INFORMATION PROCESSING PERSPECTIVE IN THE FINANCIAL SERVICES INDUSTRY

*Complete Research*

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## Abstract

*Business Process Management (BPM) has been an important research field for decades. Latest technological advances have increased the transparency that can be created over processes. Although associated to various advantages, organizations struggle to identify processes for which investments in visibility-creating technologies are profitable. Existing research has largely investigated the outcomes of IT investments in general. However, it remains vague how promising investments in visibility-creating technologies can be identified – especially in a process environment. To close this research gap the paper adopts the Information Processing View and applies a framework that determines the appropriate level of process visibility. We illustrate the applicability of the framework with two positivist, variance-theoretic case studies in the financial services industry. The results contribute to a better understanding how organizations can determine where and how to establish appropriate process visibility.*

*Keywords: Process Visibility, Business Process Management, Positivist Case Research, Financial Services, Information Processing View.*

## 1 Introduction

Business Process Management (BPM) has been an important research field for decades. It includes “methods, techniques and tools to support the design, enactment, management and analysis of operational business processes” (van der Aalst et al. 2003, p.1). Lately, new technological capabilities such as Business Process Intelligence (BPI), Business Activity Monitoring (BAM) or Complex Event Processing (CEP) have been leveraged in BPM. They mark an underlying trend towards “Intelligent Business Operations” (Gartner 2012). The respective systems foster to share, access and analyze process information in an operational decision making context – commonly referred to as ‘process visibility’ (Berner et al. 2012). Previous novelties and the speed of technological advance are challenging for organizations. Lacking experience makes it difficult to identify potential areas of use and assess the value added (Chen et al. 2012). Furthermore, the IT budget remains constant or even decreases in 55 % of the organizations (Capgemini 2013). As a result, organizations need to establish a careful assessment which processes can benefit from cost-intensive investments in visibility-creating technologies.

Existing literature has addressed investments in information technology (IT) in various ways (Kohli and Grover 2008; Soh and Markus 1995). In particular, studies have focused on their impact on the firm

performance and the underlying mechanisms how IT investments impact business value (Melville et al. 2004; Mithas et al. 2012; Weill 1992). More specifically, studies have also investigated the results of increased visibility and find improved performance, customer service, and decision making as an outcome (Barratt and Oke 2007; Klotz et al. 2008; Pidun and Felden 2012; Swaminathan and Tayur 2003). The outcomes of such IT investments in general and investments in visibility in particular have been extensively studied. However, little attention has been paid to the identification of promising investment areas for visibility-creating BPM solutions (Ohlsson et al. 2014). Thus, it remains vague how to identify the most promising processes for which enhanced visibility is required on the operational level. This leads to the following research question:

*How can the appropriate level of visibility be determined for processes in an empirical setting?*

To approach the research question, the paper presents a framework that evaluates the visibility requirements for processes and describes how the respective level of visibility can be established. This research intends to contribute to more thorough identification of processes that demand high visibility and shall provide guidance to practitioners for associated BPM investment decisions. The remainder of the paper is structured as follows. The next section introduces relevant theoretical background: Subsequently, hypotheses are formulated and a research model is derived. Section 4 provides a description of the research methodology. Next, section 5 describes the results of both case studies. Furthermore, a discussion provides a summary of the paper and outlines the limitations as well as contributions. We end the paper with some concluding remarks.

## 2 Theoretical Background

Extant research has investigated IT investments in various ways over the last decades. The majority of studies has focused on the impact of IT investments on business value (Melville et al. 2004; Mithas et al. 2012; Weill 1992). Various findings have been published in the overarching area of IT business value (Kohli and Grover 2008). While some studies indicate that IT investments create business value (Devaraj and Kohli, 2003; Santhanam and Hartono, 2003), others provide evidence that the value creation only occurs under certain conditions (Melville et al., 2004; Wade and Hulland, 2004). Further studies contribute to a more detailed understanding about the underlying nomological net how IT investments impact business value: In this regard, the impact of moderating factors (Devaraj and Kohli, 2002) and various manifestations of IT-based business value (Barua and Mukhopadhyay, 2000; Rai, 2006) have been identified. While the outcomes of IT investments have been extensively studied, it remains vague how promising investment areas should be identified – especially for visibility-creating technologies. Existing literature suggests an investigation at the process level, as IT affects this level most directly (Melville et al. 2004; Mithas et al. 2011).

The concept of visibility is well-established for processes in the area of supply chain management (SCM). It describes the sharing of information between partners in a supply chain – particularly for important activities and processes (Wang and Wei 2007). The degree of visibility depends on the level to which the accessible information is relevant, trustworthy, and timely (Barratt and Oke 2007; Wang and Wei 2007). SCM research recognizes visibility as essential for appropriate operational performance and process performance (Barratt and Oke 2007; Swaminathan and Tayur 2003). Besides SCM also lean production literature stresses the importance of making information visible to various stakeholders while process execution (Womack and Jones 2003). Amongst others visual controls can be used to create immediate transparency, which is important for the early identification of abnormalities (Shingo 1989).

IS research has transferred the SCM-specific visibility concept to a broader business process context (Klotz et al. 2008; Pidun et al. 2011). Balasubramanian and Gupta (2005) introduce a process visibility factor which “[...] measures the extent to which process states are visible to specific process stakeholders through process information reporting or recording” (p.686). More concretely, visibility is based on the sharing, analysis, and access of process information in an operational decision making context in real-time (Berner et al. 2012). Accordingly, visibility creates end-to-end transparency for

process instances potentially spanning across multiple applications, technologies, and organizations (Bhat and Goel 2011). From a technological perspective, BPM and associated system categories including BPI, BAM or CEP help to establish such visibility for processes (Graupner et al. 2014).

Research has identified various positive outcomes of visibility. Klotz et al. (2008) divide the positive outcomes to three distinct dimensions: recognition, facilitation, and enabling: First, visibility provides stakeholders with the recognition of statuses, problems, and responsibilities. Second, visibility fosters a system performance understanding and contributes to the facilitation of communication, feedback on performed activities, and improvements. Third, it seen as an enabler for decision making. More generally, visibility has been identified as essential for high process performance (Barratt and Oke 2007; Swaminathan and Tayur 2003; Zee and Vorst 2005). The increased information transparency improves operational performance, customer service, and solution development (Swaminathan and Tayur 2003). While the outcomes of visibility have largely been investigated in existing literature, the circumstances under which visibility is required remain vague. For a closer investigation of this objective, a research framework is introduced in the next section.

### 3 Process Visibility Fit Framework

To address the research objective, we ground the research framework in the Information Processing View (IPV). The IPV describes that organizations process information to reduce uncertainty and equivocality (Galbraith 1973; Tushman and Nadler 1978). While uncertainty is related to the absence of information, equivocality is linked to the existence of multiple and conflicting interpretations (Karimi et al. 2004). The IPV is a contingent theory and states that the requirements for information processing depend on the specific context (Daft and Lengel 1986). Effective information processing results from the fit between information processing requirements and capabilities (Premkumar et al. 2005; Tushman and Nadler 1978). As the creation of visibility requires the processing of information, the IPV marks a promising theoretical foundation for our research that studies which business processes desire enhanced visibility in daily operations. Figure 1 introduces the research framework (Graupner et al. 2014). The framework presents the determinants for process visibility requirements and process visibility capabilities. It hypothesizes that the fit between both constructs is decisive for the evaluation where organizations should exploit processes visibility.

In IPV-related literature information processing requirements are driven by the complexity of the task environment, the interdependence of the task environment, and the strategic importance of the underlying activity (Mani et al. 2006, 2010). In the following, these determinants are set into a process visibility-specific perspective which leads to the following three hypothesis:

- Hypothesis 1 (H1):** The higher the process intricacy, the higher are the process visibility requirements.
- Hypothesis 2 (H2):** The higher the process interdependence, the higher are the process visibility requirements.
- Hypothesis 3 (H3):** The higher the process importance, the higher are the process visibility requirements.

Besides information processing requirements, the IPV discusses the role of complementing capabilities. Information processing capabilities include information gathering, information analysis, and information dissemination (Egelhoff 1982). IT provides important technological support for the establishment of these capabilities (Premkumar et al. 2005). We set these capabilities into a process visibility-specific perspective leading to three hypotheses that explain how to establish process visibility:

- Hypothesis 4 (H4):** The higher the process information gathering of IT, the higher are the process visibility capabilities.
- Hypothesis 5 (H5):** The higher the process information analysis of IT, the higher are the process visibility capabilities.

**Hypothesis 6 (H6):** The higher the process information dissemination of IT, the higher are the process visibility capabilities.

According to the IPV, low or high information processing requirements as well as low or high information processing capabilities are not good or bad per se. The fit between both is decisive (Galbraith 1974; Tushman and Nadler 1978). This paper sets the finding into a visibility-specific perspective and considers fit as the deviation between process visibility requirements and capabilities. Accordingly, we apply the ‘fit as match’-conceptualization that is commonly established in IS (Strong and Volkoff 2010) and strategy research (Venkatraman 1989). This leads to the following hypothesis:

**Hypothesis 7 (H7):** The higher the level to which process visibility requirements are addressed by process visibility capabilities, the higher is the process visibility fit.

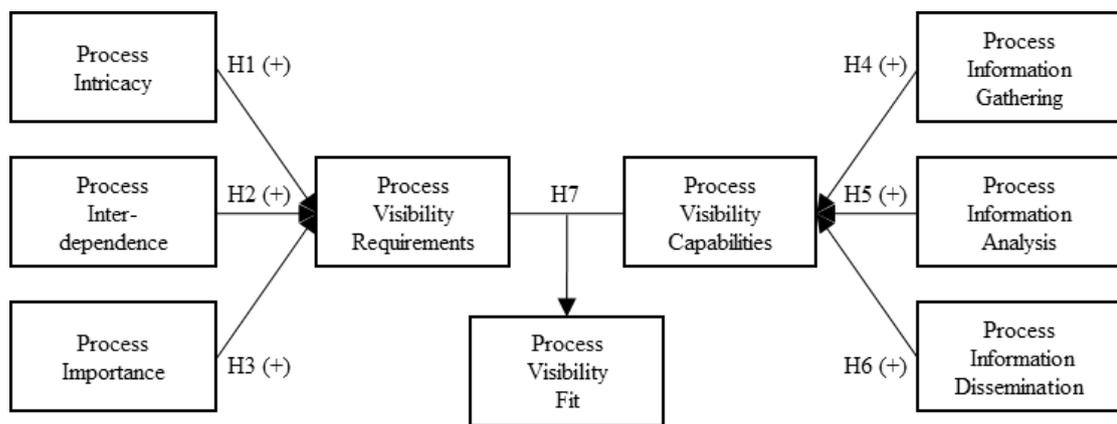


Figure 1. The Process Visibility Fit Framework (Graupner et al. 2014).

The fit between requirements and capabilities can follow nine distinct configurations (Figure 2). Three configurations refer to a match between requirements and capabilities. A match is achieved if process visibility requirements correspond to process visibility capabilities. In contrast, all other configurations reflect a mismatch. On the one hand, the requirements can be higher than the available capabilities (process visibility gap). As a consequence, low process performance and flaws in decision making might occur amongst others. On the other hand, the requirements can be lower than the existing capabilities (process visibility overload). In this case, organizations established too much process visibility. Amongst others, inefficient management of resources and decreased operational efficiency are possible consequences.

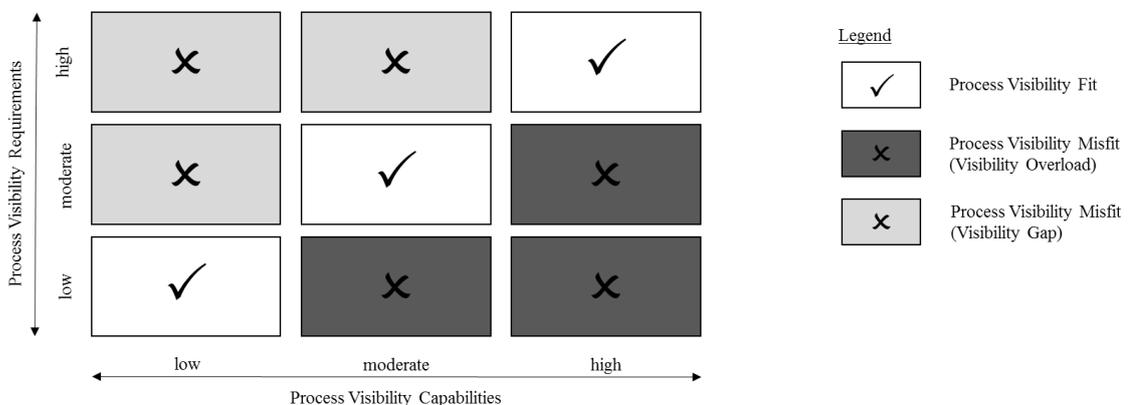


Figure 2. Assessment Matrix with Process Visibility Fit as Requirements and Capabilities Match.

## **4 Research Method**

### **4.1 Case Study Research**

In accordance with the empirical focus of the paper, our research uses a case study approach (Yin 2009). Especially such a qualitative research method is considered appropriate for examining the outlined theoretical frame, as the constructs and relationships would have been more difficult to access in a quantitative manner. In particular, the dependent variable ‘process visibility fit’ is challenging to measure quantitatively, as it is based on personal evaluations of the interviewees. In this regard, case study research is appropriate, as it does not force respondents into prespecified dimensions. It allows that the importance of each dimension emerges from the analysis of the interviews (Miles and Huberman 1994). Additionally, the qualitative approach leaves room for theory extension. Underlying issues and themes of broadly defined constructs as well as additional constructs that may complement the original framework can be identified. This is valuable for such a new research stream that sets the IPV into a visibility-specific perspective. Finally, understanding how organizations can determine where to exploit visibility for processes is often embedded in a complex natural setting which makes case study research suitable (Benbasat et al. 1987).

This paper adapts a positivist perspective for the development and assessment of the research model. Accordingly, data is collected and analyzed with regard to our theoretical foundation and the a priori set of constructs of the research model. Positivist case studies are suited to assess how well the theoretically grounded Process Visibility Fit Framework corresponds with the experiences of interviewees. In accordance with positivist research there is no attempt to reconstruct the meaning interviewees create (Dubé and Paré 2003; Klein and Myers 1999). The case study at hand can be considered as confirmatory, as theory development happened prior to empirical observations. The role of time and the sequence of events are not addressed in the research framework and thus also excluded from the scope of the study. Accordingly, the chosen approach is characterized as variance-theoretic.

A multiple case study approach is chosen to address the subtle pattern of process visibility (Benbasat et al. 1987; Miles and Huberman 1994). This approach can most likely observe process visibility requirements, process visibility capabilities and the fit between both constructs. Data is collected for two different processes within one organization. Each case is a separate test of the research model leading towards an analytic generalization (Yin 2009). All investigations occurred at a single research site to control for potential biases from organizational factors.

### **4.2 Case Selection**

The case studies are conducted in the financial services industry. The sector is highly regulated and thus characterized by structured decision making and predefined workflows. This high process orientation makes the financial services industry appropriate for our research. The organization under investigation provides financial services in the business-to-business area and has several decades experience. Its balance sheet volume exceeds 3 billion Euro. This paper considers the dunning process and the credit decision process in the investigation. The examination of these two processes cannot cover all nine configurations of the assessment matrix (Figure 2). However, the focus on only two processes is appropriate, as the paper aims to illustrate the applicability and usefulness of the Process Visibility Fit Framework. Both of the chosen processes are typical for daily operations and thus match the operational character of the Process Visibility Fit Framework. To ensure homogeneity and comparability, both processes share the same surrounding conditions: Process execution happens on-site, no parts of the process are outsourced to third-party providers, and common regulations are valid for both processes.

The first case study deals with the dunning process (Figure 3). Customers are reminded about their liabilities that are due and have not been paid yet. First, preparations are made that include the maintenance of customer data, the administration of certain customer-specific attributes, and the complete consideration of return debit notes. Next, the employees perform the dunning run and validate whether the

proposed items are plausible and correct. The postal sending of the dunning letters is conducted afterwards. Finally, post-processing work with time-intensive manual finishing is conducted. Steps include the agreement upon payment schedules or the resolution of other customer-specific issues.

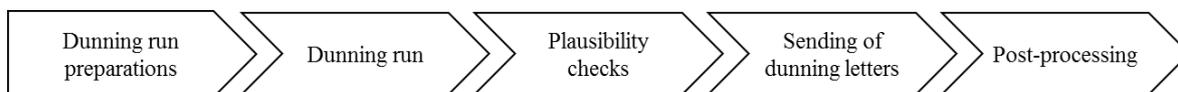


Figure 3. The Dunning Process.

The second case study refers to the credit decision process for requests with high nominal values (Figure 4). The objective of the process is the calculation of a default probability to decide on a customer’s financing request. First, the customer is analyzed based on various documents that the customer must provide. Documents include latest financial statements, a business assessment, a bank reference, documents of the financing object, and credit ratings. Additionally, complementary internal as well as external customer information is reviewed for negative characteristics. Next, specialists estimate the reutilization value of the object to be financed. To comply with national regulatory obligations, an assessment of borrower units has to be conducted. Therefore, the firm’s ownership structure is analyzed, which enables the financial services provider to aggregate credit risks on a corporate level. Furthermore, qualitative information of the customer’s industry sector is considered to properly assess risks connected to the economic situation of a specific industry. Finally, the credit consultant takes his credit evaluation. The decision is double-checked and a final credit decision is made, which can be positive, positive with obligations, or negative.

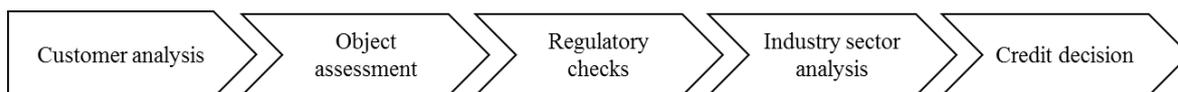


Figure 4. The Credit Decision Process.

### 4.3 Data Collection and Analysis Procedure

For the data collection a multiple informants design is chosen. It includes interviewees for each process (Miles and Huberman 1994; Yin 2009). This ensures that a comprehensive picture regarding the both processes is obtained and no key informant bias (Kumar et al. 1993) occurs. For each of the two processes interviews are conducted with the responsible manager of the process, a process worker that is involved in the daily execution, and the corresponding IT specialist. All interviews are based on an interview guideline that helps to gain information about the process in general and the constructs of the theoretical model in particular. More precisely, open-ended questions as well as structured survey instruments are included in the guideline. Whereas the former target at enabling a conversation and an open exchange with the interviewee, the latter focus on gathering quantitative indications that complement the qualitative data collection. All structured survey instruments are derived from existing literature in the IS domain. Slight changes in the guidelines are made to tailor the questions to the different interviewee backgrounds including business and IT personnel. In sum, six semi-structured interviews are conducted (Table 1). All interviews are conducted on-site, face-to-face, and in German language.

No.	Words (time)	Role	Process
1	3,754 (75min)	Process Owner	Dunning
2	4,069 (72min)	Process Worker	Dunning
3	2,481 (60min)	IT Specialist	Dunning
4	3,803 (75min)	Process Owner	Credit Decision
5	5,817 (146min)	Process Worker	Credit Decision
6	2,115 (53min)	IT Specialist	Credit Decision

Table 1. Overviews of Interviews.

All tape-recorded interviews are transcribed and aggregated into a case protocol which comprises 22,039 words. Next, the coding is conducted for the all interviews based on Krippendorff's (1980) approach for content analysis: First, text passages are assigned to one of the three second-order constructs (process visibility requirements, process visibility capabilities, process visibility fit). Second, the coded constructs are further broken down in their subcategories.

All research procedures aim to ensure validity and reliability (March et al. 1991; Yin 2009). Construct validity is achieved by the data collection from multiple informants including business and IT personnel. The instances of the theoretical constructs (low, medium, high) are determined for each process and thus provide a basis for literal and theoretical replication. Conclusions whether a construct is rated low, medium or high are based on interview statements. The first two authors coded the transcripts independently from each other for this purpose. In case of mismatches between both authors the respective parts of the transcript were discussed together. If no common understanding could be gained after a discussion, the third author called in as a referee. To avoid biases that result from the self-reported answers of interviewees (eg. for the construct 'process importance') the authors paid attention whether the explanations of the interviewees are comprehensible and underlined with specific reasons. In addition, external validity is guaranteed by a theoretical replication strategy. Theoretical replication describes the selection of multiple cases that vary in terms of expected outcomes (Yin 2009). For the research at hand the data collection considers processes with different expected configurations of process visibility fit and misfit. Finally, internal validity is ensured by pooling over observers and analyses that include pattern-matching and explanation-building approaches (Miles and Huberman 1994). Reliability is achieved by the use of case study protocols. We obtain the characteristics of independent and dependent variables from the same interviewees. To prevent a potential common method bias (Podsakoff and Organ 1986), our research design considers the guideline proposed by Chang et al. (2010) and incorporates a mixed order of interview questions.

## 5 Results

### 5.1 Dunning Process

The results of the empirical assessment of the Process Visibility Fit Framework are presented in the following. The respective evaluations refer to process visibility requirements, process visibility capabilities as well as the fit between both. All findings are backed with quotations from interviews.

For the assessment of process visibility requirements we consider all three dimensions including process intricacy, process interdependence, and process importance. First, the dunning process is characterized by a low level of intricacy. In this respect, interviewees report that the process is not time-critical and only executed once a week. The process is highly standardized and its inherent steps are pre-defined. Changes in the process are rare and little exceptions for this standardized procedure exist.

*“Problems that we cannot solve directly are rare [...] The process and its inherent steps are well-defined. Changes in the process happen very infrequent.” (Process Worker)*

*“Generally, the activities and methods are identical for all mandators and accounting areas.” (Process Manager)*

*“The IT system supporting the dunning run does not know any variation in the process. There is only one standard dunning run. Occasionally, single dunning letters are produced for single debtors. [...] However, the criticality of the account receivable determines whether or not a single dunning letter is produced.” (Process Manager)*

Second, process interdependence was regarded moderate for the dunning process. Process workers share links to different functional units along the firm's entire value chain. For instance, the dunning process requires accurate customer master data as input. In this regard, dependencies to other units exist that ultimately determine the quality of the master data used in the dunning process. Besides the consumption

of data as input, interdependencies also arise from the output of the dunning process. The results of the dunning run are also used by other organizational units and suppliers.

*„I would say that we are pretty much governed from outside. All [input] data and all information is recorded from other departments. Of course, we have requirements towards those departments. A good example is the valuta. Currently, it is possible to create an account receivable without any valuta. Although this has no implications for them [the other departments], a missing valuta means that the item is due immediately within the dunning process.” (Process Worker)*

*„Currently, we are a highly demanded department, as we can provide lots of information regarding the customer.“ (Process Manager)*

*„Customers are strongly involved in the dunning process. However, also suppliers are involved, if they resume warranty for the financed object and thus need to be informed about the dunning of the customer.” (Process Worker)*

Third, the dunning process is characterized by a moderate level of importance. Although the dunning process is not considered as a core process for a financial services provider, there are implications for the business. In this regard, the dunning process supports operations by collecting accounts receivable. Furthermore, an erroneous shipping of dunning letters can negatively impact the customer relationship.

*„During the development of new financial products the dunning process is considered as an elementary component for product processing.” (Process Worker)*

*„We also receive customer complaints because of unjustified dunning letters. Accordingly, the importance of the dunning process should not be neglected.“ (Process Manager)*

Concluding all evaluations, the dunning process has moderate visibility requirements. The interviews indicate that intricacy is low, interdependence is moderate, and process importance is moderate.

Besides visibility requirements, the case study interviews evaluate the corresponding process visibility capabilities. In this regard, we have focused on the previously mentioned dimensions: process information gathering, process information analysis, and process information dissemination. First, process information gathering capabilities are considered low for the dunning process. The gathering of relevant data is not conducted in a timely manner and thus not accurate. Accordingly, dunning letters may be sent although the respective account receivable is not open any more. Furthermore, interviewees complain that the respective pieces of information are not consolidated across various IT systems. As a result, process workers have to consult two different information systems during process execution to establish visibility across the whole customer engagement.

*“That is always different. We get the relevant data [about received payments] with one day delay. Accordingly, on unfavorable calendar days a huge gap between receipt and processing of the payment exists. [...] During the execution of the dunning process no further information can be integrated. All payments administered in the responsible systems for the dunning process are recognized. However, payments that are administered in other systems may be missing. A more timely procedure could ensure that between execution of the dunning run and the preparation of the dunning letter, the account receivable is still open.” (Process Worker)*

*“Currently, we have to use several information systems to get all required information. That is because the leading IT system shows only the current receivables that are due and not the total engagement of the customer.” (Process Manager)*

Second, process information analysis capabilities are moderate for the dunning process. The IT system provides little automated analysis capabilities in the process environment. Interviewees stress that process execution could be facilitated through the provision of such automated analyses. As of now, the majority of analyses needs still be conducted manually which is not desirable for process workers.

*„There is no structured possibility to assess if irregularities exist. That needs to be done based on the interpretation of the employees.“ (Process Manager)*

*„In this regard, there are some reports and analyses that relate to the information associated to the dunning process. I see our requirement fulfilled to a large extent in this regard. However, there is definitely information that we can only determine manually. For instance, the analysis to discover “repeaters“ [customers that are dunned more than once] would be very helpful and could be integrated in the credit decision process.“ (Process Manager)*

Third, interviewees report a moderate level of process information dissemination. Employees report that they can access the relevant information across various systems. Timely provision is ensured in this regard. However, proactive dissemination of actionable information is rarely provided, as not all information is visible to every stakeholder involved in the process. For instance, employees who depend on the results of the dunning process do not have direct access to the respective information.

*“Altogether, all systems can provide the information very promptly. Particularly, the leading system for the dunning process offers a timely provision of the required process information.“ (Process Manager)*

*“Access to the relevant information systems is ensured for employees in our department who are directly involved in the process execution. However, employees who are indirectly involved in process execution do not have easy access, as they lack insight to the respective information systems.“ (Process Manager)*

*“The uniformity lacks, as the information in the various tools are disseminated in different ways.“ (Process Manager)*

Concluding the evaluations of all dimensions, the dunning is characterized by moderate visibility capabilities. The interviews indicate that process information gathering is low, process information analysis is moderate, and process information dissemination is moderate.

Overall, the framework suggests a process visibility fit for the dunning process. Interviewees report that the visibility requirements are moderate and associated visibility capabilities are moderate as well. Accordingly, the level of visibility capabilities is generally sufficient to address the corresponding process visibility requirements. Due to the process visibility fit massive investments in visibility-creating technologies are not recommended.

## **5.2 Credit Decision Process**

This section outlines the evaluation results for the credit decision process. To evaluate the process visibility requirements, the assessment considers all three dimensions including process intricacy, process interdependence, and process importance. First, the credit decision process is characterized by a high level of intricacy. It necessitates process participants to consider various facets of the customer, the object to be financed, and other environmental factors contributing to the credit rating. In addition, various regulatory obligations have to be fulfilled which result in additional process steps and ultimately increase process complexity.

*“[The Process] is not easy to understand, it is complex. There are many things which need to be considered. The relevant activities are not trained within a month. The training of credit consultants [= process workers] is a half to a whole year – and that’s not without reason!“ (Process Manager)*

*“[Complexity results from] the many factors that must be considered during process execution. Each business is completely different, since each customer and each object is evaluated differently.“ (Process Worker)*

Second, the credit decision process is characterized by a high level of interdependence. The credit decision can only start, if all relevant documents are available and previous processes have been completed. Data quality generated by previous processes is decisive as the credit decision requires accurate customer master data. There are various stakeholders for the credit decision process. They include customers, sales and partner banks (handing over credit requests for decision) as well as risk management (assessing the risk of the credit portfolio and covering the risk with equity) or further operating units (responsible for the processing of the approved request).

*“The relevant stakeholders for the credit decision process are sales, partner banks, customers as well as internal divisions such as risk management. Of course, the first three stakeholders are interested in a fast processing. However, we are obligated to act within the guidelines of risk management and fulfill all regulatory requirements.” (Process Worker)*

*“We are relatively fast and can decide [...], if all information is available. A big bottleneck are external rating agencies, as up to three working days are scheduled until a rating is available.” (IT Specialist)*

Third, the credit decision process is characterized by a high level of importance. As evaluated by the interviewees, credit approvals or disapprovals refer to the core business of a financial service provider. The credit decision has implications for the firm’s competitiveness. As it affects the customer directly, high quality and fast decisions are important in the process. Additionally, the process has high relevance from a regulatory perspective. It is subject to various regulations that the legislative authority provides. All of them must necessarily to be fulfilled to complete a credit decision.

*„[The importance of the process is] high, as we have to meet our sales promise regarding a fast credit decision [...]. Generally, the customer holds another offer [...] and if the decision takes too long at our organization, the customer simply closes the deal with the competitor.“ (Process Manager)*

*“Without the fulfillment of regulatory requirements in the course of the credit decision process, the transaction cannot be closed.” (Process Worker)*

Concluding the evaluations of all dimensions, the credit decision process has high visibility requirements. The interviews indicate that complexity is high, interdependence is high, and process importance is high. In one interview the process worker summarizes the situation as follows:

*“[The credit decision process is] complex as it is highly individual, is highly dependent from other organizational units, and is important due to the required fulfillment of legal obligations” (Process Worker)*

In the following, we assess process visibility capabilities for the credit decision process. For the assessment we adapt the previously described dimensions of process information gathering, process information analysis, and process information dissemination. First, process information gathering capabilities are considered low for the credit decision process. Up to ten different information systems are involved in process execution. However, each system only collects information for a specific area. A common gathering that exceeds these silos does not exist. Consequently, process workers need to gather and integrate the relevant information manually from the various systems.

*“A total of 10 systems are [included in process execution]: Total exposure system, contract management system, archiving system, post-offer processing system, automatic credit decision system, balance sheet analysis, credit reporting system, consolidated database of the Bundesbank, industry information system and document repository.” (Process Worker)*

*“I have to integrate the relevant information myself. Each involved information system gives me the information I need. Each involved system considered separately is able to collect and*

*integrate the required information. Only the integration of information from all systems involved in the process must be done by myself.” (Process Worker)*

*“The required information is gathered upon my desk. Most involved systems have only supportive character.” (Process Worker)*

Second, process information analysis capabilities are low for the credit decision process. On the one hand, analytical synthesis of information for decision making is barely available during process execution. With the exception of one system conducting a balance sheet analysis, the credit decision process largely depends on the manual analysis performed by process workers. In this regard, little analytical support is provided for all relevant legal and internal obligations. On the other hand, analytical capabilities also lack from a process management perspective: The process manager can identify bottlenecks and judge the actual staff utilization as well as the efficiency and effectiveness of the credit consultants' work only by intuition. No IT functionalities are implemented that provide this information.

*“[Deviations from typical credit applications] cannot be identified automatically. It's all about personal commitment. It is pretty wicked, when you consider that no such system has the questioned capabilities.” (Process Manager)*

*“The system does not set the different pieces of status information [of the credit decision steps] into relation to each other. There is only the possibility to look it up.” (Process Manager)*

*“I can only judge based on my intuition or the information I receive from my staff how the current process performance looks like. I have no structured analysis option.” (Process Manager)*

Third, interviewees report a low level of process information dissemination. The dissemination of status information is available only for basic cases. In this regard, an automated e-mail notification is sent to process participants once a credit request is finally approved. However, statuses of intermediate steps are not distributed in a proactive manner. They need to be recorded manually and can only be looked up in excel lists. Examples include notifications about missing documents or intermediate results cannot be sent automatically. In such cases the process workers have established time-consuming manual workarounds to contact the relevant process participants. Besides missing information, process participants also criticize the integrity and consistency of process information dissemination. In this regard, the same information is accessible in more than one IT system and the actual value may differ between systems. Process workers need to decide based on experience which of the many systems to trust for a specific piece of information.

*“We currently maintain the process status in an Excel list. Only the final status is communicated to the process participants involved.” (Process Worker)*

*“If I do not specifically look for it, I get no information. I need to search for negative payment information of the customer. This means there is no proactive notification.” (Process Worker)*

*“It would be important if we are made aware of events in the process environment.” (Process Manager)*

Concluding the evaluations of all dimensions, the credit decision process is characterized by low visibility capabilities. The interviews indicate that process information gathering is low, process information analysis is low, and process information dissemination is low. In one interview the process worker summarizes the degree of visibility as follows:

*“Due to the fact that we need 10 systems, it is difficult to constantly maintain a high level of process visibility. The current functions of information systems allow only the result of the credit decision to be documented and communicated. All process steps in between are not very transparent.” (Process Worker)*

A comparison of process visibility requirements and process visibility capabilities for this example suggests a misfit. Whereas the visibility requirements were evaluated high by participants, the corresponding visibility capabilities were assessed low. Accordingly, the Process Visibility Fit Framework suggests a process visibility gap. Interviewees confirm this and wish a closer integration of systems, proactive dissemination of status information, more guidance within the respective process and more analytical support functionalities to increase the efficiency and effectiveness of operational decision making.

## 6 Discussion

Current novelties in BPM increase the visibility of business processes by enhancing the sharing, access, and analysis of process-related information. This goes along with an increasing number of technological capabilities and IT budgets that remain constant or decrease in the majority of organizations (Capgemini 2013). As a result, organizations have to prioritize IT investments carefully. This paper addresses the aforementioned gap and empirically tests the Process Visibility Fit Framework (Graupner et al. 2014). The results of a qualitative study at a German financial services provider illustrate that the framework can detect misfits between process visibility requirements and process visibility capabilities and thus, identify promising areas for visibility creating investments. The results illustrate that the Process Visibility Fit Framework and the associated assessment matrix identify processes that benefit from visibility investments (Figure 5): The first case study reveals a visibility fit which is in line with the fact that interviewees do not report major points of dissatisfaction. For the dunning process, moderate visibility requirements match with moderate visibility capabilities. Accordingly, investments in visibility-creating technologies are not recommended. In contrast, the evaluation for the second case study detects a visibility gap. While the visibility requirements are considered high for the credit decision process, only low visibility capabilities are established. Investments in visibility are essential to improve the overall process performance that may include a higher throughput speed and a lower error frequency.

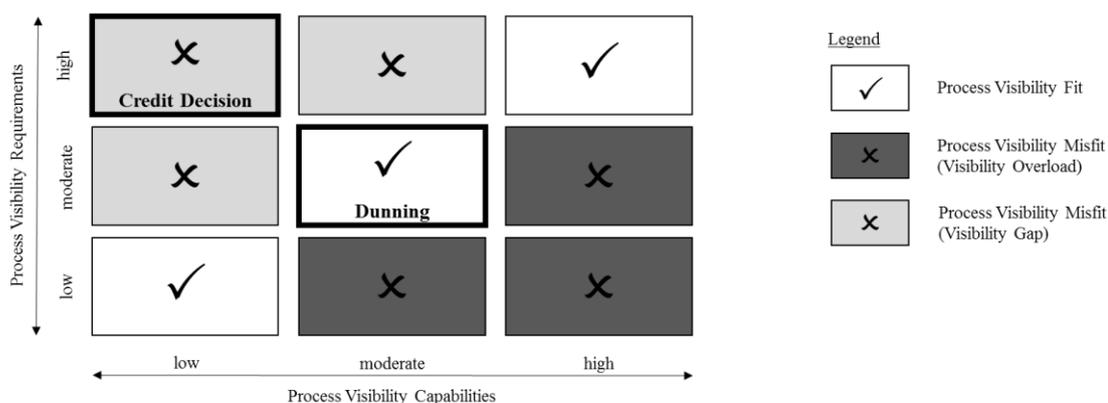


Figure 5. Process Visibility Fit Assessment for Dunning and Credit Decision Process.

This paper makes important theoretical contributions. While existing research has focused on the outcomes of IT investments in general and IT-enabled visibility in particular, the identification of promising investment areas has barely been investigated – especially in the BPM domain. Our research contributes to the identification of appropriate investment areas for visibility-creating technologies in the process context. In this regard, we address the call for a more value-driven approach for investment decisions in the BPM context (Afflerbach et al. 2014; Ohlsson et al. 2014). In addition, this paper enlarges the body of knowledge related to the IPV. We are the first who apply the IPV to the process level and thus assess visibility at the level where it is best observable. Finally, the two provided process scenarios illustrate the applicability of our framework.

Although the results stem from thoroughly conducted qualitative research, this paper is subject to specific limitations: First, it takes the IPV as theoretical lens and derives all constructs from this foundation. Future research can consider complementary theories and include further factors that impact investment decisions. Exemplary factors may include the strategic fit of the investment, the current process performance, and the process maturity. Second, our investigation only covers two out of nine possible visibility configurations. Future research can address this issue and include a complete set of all nine configurations for the investigation. Third, the paper focuses on the financial services industry and chooses a single-site research design. Although this approach is selected for various outlined reasons, future research can further increase the generalizability of our results by testing the framework with a more diverse set of industries, organizations, and processes. In this regard, processes that span across multiple departments or even organizations are especially promising for an investigation. A quantitative study using an online survey for data collection may be appropriate to collect data across industries, organizations, and processes. To measure the constructs, future research can build upon the construct operationalization of Graupner et al. (2015) that is also integrated in a web-based visibility fit assessment tool (see: <http://eris-vm08.uni-mannheim.de/provis/provis.html>). Fourth, the current paper takes a variance-theoretic perspective. Future research may choose a process-theoretic view to assess the visibility fit over time. In this regard, the framework can identify processes with a visibility gap in an initial step. Once the proposed investments have been carried out, the framework can be used for another visibility assessment. As a result, the significance of the framework for investment decisions can be validated.

Our findings provide various implications for practice. Practitioners can apply the framework for more objective investment decisions in the area of BPM. The application of two exemplary processes from the financial services industry illustrates the usefulness of the framework: First, the framework is especially valuable to identify processes with visibility misfits. As mentioned above, a web-based tool based on the predefined constructs is available for practitioners. It provides a convenient way for the visibility assessment of business processes. Second, practitioners can use the framework to derive measures that close visibility gaps. In this regard, software packages that provide capabilities to gather, analyse and disseminate process information are particularly relevant according to the framework.

## **7 Conclusion**

Latest technological advances have increased the transparency that can be created for processes. While the variety of BPM solutions in the market is constantly increasing (Gartner 2012), organizations have to cope with constant or even decreasing IT budgets (Capgemini 2013). To take reasonable investment decisions, organizations need to identify processes that benefit most from such visibility-creating technologies. To address this research objective, the paper validates a framework that is theoretically grounded in the Information Processing View. The framework assesses the fit between process visibility requirements and capabilities to identify processes that benefit most from enhanced transparency. More specifically, investments in visibility-creating technologies are beneficial if visibility requirements exceed visibility capabilities. For the process visibility requirements the evaluation considers the sub-dimensions process intricacy, process interdependence, and process importance. Process visibility capabilities are determined by process information gathering, process information analysis, and process information dissemination. The empirical analysis is based on qualitative research with two case studies in the financial services industry. The results illustrate the applicability of the framework and reveal that visibility gaps are decisive determinants for associated investments. The first case study investigates the dunning processes and finds a visibility fit in the evaluation. In contrast, the second case study considers the credit decision process and reveals a visibility gap due to high visibility requirements which are linked to low visibility capabilities. From a theoretical perspective, this paper contributes to a better understanding where and how to establish appropriate visibility for processes. To the best of our knowledge we are the first who take an information processing perspective and assess visibility-creating technology investments at the process level. From a practical perspective, organizations can identify processes with visibility gaps and prioritize investments in visibility-creating capabilities accordingly.

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