Value Orientation in Process Management

Research Gap and Contribution to Economically Well-Founded Decisions in Process Management

Although all process management subtasks have matured since the 1990s, process management decisions are usually based on criteria that only partially comply with objectives in a market economy. Relevant insights of economic research with respect to value-based management appear to be hardly considered. This hypothesis is confirmed by explicating the research gap with regard to value orientation in process management. To bridge the gap between value-based management and process-oriented organizational design, economically well-founded objective functions are transferred to process management decisions.

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1 Motivation and Object of Research

More and more companies establish the role of a process owner at management level (BPM&O Architects GmbH 2009, p. 12), the majority of CIOs regard themselves as process owners (Witte 2010), and the continuous improvement of business processes has been taking a top position at CIO agendas for years (Capgemini 2006; Gartner 2010; Wolf and Harmon 2010).

The reason is that process orientation – a flow-oriented and hence cross-functional way of thinking (Ferstl and Sinz 2008, p. 136; Becker et al. 2008, p. 4) – has been central to organizational design at least since the 1990s. At that time already Hammer and Champy (1993) demanded that companies, in accord with their objectives, align more strongly with processes by using modern information and communication technology. At the same time, preliminary work on organizational theory (e.g., Nordsieck 1931; Kosiol 1976) was developed further in the German-speaking countries and approaches to process-oriented enterprise modeling as well as to application systems development were proposed (e.g., Ferstl and Sinz 1995; Scheer 1991; Österle 1995). Moreover, it was critically discussed whether process orientation is a fad or not (König 1996; Mertens 1996, 1997; Reiß 1997; Theuvsen 1996). All this promoted the shift from functional to process-oriented organization structures (Österle and Legner 1999, p. 333) – and thus the establishment and development of process orientation.

In this context, a process is an event-driven, self-contained, temporal, and logical sequence of tasks where goods and services are created or where the creation of goods and services is coordinated using resources (e.g., Ferstl and Sinz 2008, p. 136; Becker et al. 2008, p. 5; Davenport 1993; Vossen and Becker 1996). The created goods and services are supposed to provide customer value and thus to support the achievement of corporate objectives. Process management typically includes planning, control, monitoring, and improvement of processes by means of a cyclic sequence of multiple sub-tasks (Allweyer 2005, p. 91; Hammer 2010, p. 5). Accordingly, e.g. Bucher and Winter (2009) distinguish between (1) identification, definition, and modeling, (2) implementation and execution, (3) monitoring and control, and (4) continuous improvement. The terms business process and business process management are linguistic specializations that emphasize the direct link

to the creation of goods and services as well as the demarcation from other process types (e.g., support and management processes). This is what we have in mind whilst referring to processes and process management.

Despite limited conformity with the overall objective of shareholder value maximization as valid in the market economy (Mertens 1996, p. 447), process management decisions are usually based on qualitative and/or technical criteria – e.g., lead time, quality, productivity, workload – or on plausibility considerations (vom Brocke et al. 2009, p. 253; Jallow et al. 2007; Zhou and Chen 2003; Davamanirajan et al. 2006; Balasubramanian and Gupta 2005). The instruments used for process control (e.g., activity-based costing, Balanced Scorecard, Six Sigma, Total Quality Management, Lean Management, or maturity models) either focus on partial questions or have a qualitative connection with corporate objectives (Becker 2008; Töpfer 2007; Reckenfelderbäumer 2000; Kaplan and Norton 1996). Thus, process design alternatives can hardly be compared. An integrated analysis with other asset classes is impossible. Moreover, process optimization is often the subject "without full realization when a process is optimal" (Mertens 1997, p. 111, translated into English). However, the term process optimization commonly used in practice implicates a qualitative improvement in terms of "less badly" rather than a factual optimization based on an economically well-founded objective function. Instead of addressing the deficit of goal orientation, most work is concerned with functional and technical facets of process design (vom Brocke et al. 2009, p. 253).

The status quo is astonishing for several reasons: First, process management decisions usually imply investment projects with different risk/return positions and capital tie-up. They should be assessed by their very nature in terms of the risk/return effects on corporate objectives. Two examples: Suppose a bank were planning to outsource the digitization of incoming customer documents to multiple locations in Southeast Asia. At first, this promises a lower capital tie-up compared to an on-site solution. However, there is the systemic risk that due to political unrest the energy and telecommunications networks in Southeast Asia fail and paralyze the bank. Suppose a manufacturer of LCD displays planned to hedge against the increasing scarcity of resources – and thus against the respective long-term exponential and highly volatile short-term price trends (Buhl and Laartz 2008, p. 263). Despite high capital tie-up, at a first glance it appears reasonable to extend the production processes "upstream" by acquiring an indium mine. However, due to a lack of experience in primary production substantial process risks are inherent, which in the worst case may even overcompensate customary price fluctuations. Second, the need for designing processes according to their contribution to corporate objectives has been explicated repeatedly at an early stage (Kosiol 1976; Gaitanides 1983, pp. 34 ff.; Nordsieck 1972) and reaffirmed in the 1990s (Mertens 1996, 1997; Frese 1995, pp. 267 ff.). Third, the paradigm of value-based management is a theoretical framework accepted in economic research that enables to consistently valuate the risk/return effects of decisions across functional areas, hierarchy levels, and asset classes (Coenenberg and Salfeld 2007, pp. 3–13).

This suggests the hypothesis that *process management in general as well as the goal orientation of process management-related decisions in particular evolved almost independently of value-based management*.

The paper at hand examines this hypothesis and explicates the research gap with respect to value orientation in process management. Since the hypothesis can be confirmed, economically well-founded objective functions are transferred to process management decisions. The aim of this contribution is to bridge the gap between value-based management and process-oriented organizational design.

The remainder of the paper is organized as follows: Sect. 2 introduces the fundamentals of value-based management as theoretical foundation of the paper. It also operationalizes the concept of "value-orientation" by means of multiple requirements (Webster and Watson 2002, p. xiv). Section 3 provides information on the sample of process management publications based on which the research gap is explicated and the hypothesis can be confirmed. In Sect. 4, objective functions of value-based management are transferred to process management decisions. In Sect. 5, we critically reflect the results and show implications.

2 Value-Based Management – Fundamentals and Requirements

In economic research, value orientation has prevailed in principle as the guiding paradigm of corporate management (Schultze and Hirsch 2005, p. 1). Already in 1986, Rappaport (1986) laid the theoretical foundations, which have been extended by Stewart and Stern (1991) as well as by Copeland et al. (1990) a few years later (Coenenberg and Salfeld 2007, p. 3). The predecessors of the shareholder value, which to some extent represents a value-based derivative of Rieger's profitability idea (Rieger 1928), was already available in the German literature in the 1920s. Contrary to the prevailing opinion, Buehner (1997, p. 28) concludes that the above-mentioned theoretical foundations cannot be entirely new because of these early ideas.

The objective of value-based management as substantiation and further development of the shareholder value approach is the maximization of the long-term sustainable enterprise value as a guideline for all business activities (Coenenberg and Salfeld 2007, p. 3). The enterprise value is determined based on a company's discounted future cash flows (for more details on the limitations of cash flow analysis with regard to taxes, see Wagner 2009) and not as reporting date-related market value (market capitalization) subject to the fluctuations of the capital market (Rappaport 1986; Coenenberg and Schultze 2002). Cash flows result from cash inflows and outflows that reflect actual changes in the stock of a company's instruments of payment and therefore are independent of assessment rules.

Value-based management is compatible with the stakeholder value approach due to its long-term orientation (Danielson et al. 2008; Albach 2001). This also applies to a multi-perspective corporate management – such as required by Kaplan and Norton (1996) with the Balanced Scorecard and in most parts of the performance measurement literature (Horváth 2006; Reichmann 2006; Gladen 2008; Küpper 2005). The reason is that due to discounting the delayed payment effectiveness of non-monetary figures and leading indicators is considered at least indirectly in the decision-making process (Gneiser 2010, p. 96). Taking a short-term perspective as a basis, the approaches are usually not compatible.

Even in industry, value orientation is now established as primary vision, and value-oriented measures are an integral part of performance measurement (Coenenberg and Salfeld 2007, p. 3). However, this does (so far) not necessarily result in value-adding behavior of managers. One explanatory approach is the principal agent theory, which is concerned with the delegation of property rights in the context of contracts between principals and agents (here principal: shareholder; agent: manager). It is assumed that the agent maximizes his own utility, which is not necessarily in the interest of the principal. This may become manifest in so-called "overinvestment", meaning that the management makes unprofitable investments such as the acquisition of luxury office equipment (Perridon et al. 2009, pp. 538–555). Ultimately, we cannot claim value-based management to be implemented until all business activities on all hierarchy levels align with the objective of maximizing/increasing the enterprise value (Macharzina and Neubürger 2002; Drukarczyk 1997).

Consequently, it is not sufficient to consider the corporate value. A company must also be able to quantify the value contribution of individual business activities and assets as well as of their interactions. This likewise holds true for processes. If process management decisions are based on other criteria, this is not in line with value-based management.

In order to be "value-oriented" in an economically well-founded manner, a management concept has to meet the following requirements according to Coenenberg et al. (2003, p. 3f.):

(A.1) *Planning and control of value contributions*: On the one hand, decision alternatives must be assessed ex ante in terms of their expected contribution to the enterprise value (planning). On the other hand, it must be checked ex post whether the planned value contribution has been realized (control).

(A.2) *Future orientation, risk adequacy, and cash flow orientation*: Planning and control values must reflect the time value of money (A.2a) and the risk attitude of the decision makers involved (A.2b). Moreover, they must be based on cash flows (A.2c).

(A.3) *Goal orientation as regards the long term, sustainable increase of the enterprise value*: Planning and control values have to be logically related to corporate objectives, especially to the long-term, sustainable increase of the enterprise value.

(A.4) *Incentive compatibility and communicability*: Planning and control values are usually used to conduct behavior-controlling performance appraisals. Therefore, a management concept must be incentive-compatible and communicable. Incentive compatibility means that a management concept is suitable for being used in performance-based compensation, thus e.g. tamper-proof. Communicability is achieved when the indicators used are understandable for stakeholders and make up a transparent foundation for determining compensation.

(A.5) *Economic efficiency*: The costs resulting from the design and operation of a value-based management approach (e.g., for indicator and report definition, data collection, quality assurance, IT support) must be justified by the respective benefits.

3 Value Orientation in Process Management

3.1 Data Collection

To investigate the hypothesis stated above, we rely on a sample of research papers that have dealt with goal orientation in process management and/or with process management decisions. These papers must have been published in journals and conference proceedings during the past ten years. They were identified via a systematic database search, in the course of which publications were first assessed regarding their potential relevance by means of a particular search expression. After that, the result set was consolidated.

The following databases were searched: AIS Electronic Library (AISeL), EBSCOhost, EmeraldInsight, IEEEXplore, INFORMS, ProQuest, ScienceDirect, SpringerLink, and Wiley InterScience. If not or only incompletely covered, the following conference proceedings were added: Internationale Tagung Wirtschaftsinformatik (WI), Americas Conference on Information Systems (AMCIS), European Conference on Information Systems (ECIS), International Conference on Information Systems (ICIS), and International Conference on Business Process Management (BPM). From the authors' point of view, this data basis can be considered representative.

In proof of scientific recognition, potentially relevant publications had to be published in a journal and/or in conference proceedings that is/are included in the VHB-JOURQUAL2[1] ranking, the orientation lists for business and information systems engineering (BISE),[2] or the Social Sciences Citation Index.[3] Moreover, they had to meet the search expression *(("Process Management" OR "Process Modelling" OR "Process Design") AND ("Decision" OR "Objective" OR "Value" OR "Performance"))* or the German-language equivalent for at least one of the search fields title, abstract and key words. The localization of potentially relevant papers in process management in a broader sense is based on the first partial expression; the localization as regards goal orientation is obtained by means of the second partial expression. Classifying publications in terms of search fields is a frequently used approach (e.g., Becker et al. 2010; Farhoomand and Drury 1999; Schryen 2010). It leads to valid results if based on the previously mentioned search fields and a representative data basis (Steininger et al. 2009, p. 491). Due to the restricted functionality of some databases, the search fields and the search expression had to be partially limited (see Electronic Supplementary Material). According to the authors' appraisal, irrelevant publications have been sorted out in a multistage procedure. **Table 1** summarizes the criteria underlying the database search.

Admittedly, one could claim that database search cannot find all potentially relevant publications, for instance, because of a non-representative data basis, an inadequate search expression, or a too short search period. Moreover, the selection ultimately depends on the authors' subjective appraisal. Nevertheless,

[1] http://vhbonline.org/service/jourqual/jq2/.
[2] http://www.wirtschaftsinformatik.de/pdf/wi2008_2_155-163_mitteilg-wkwi.pdf.
[3] http://www.thomsonscientific.com/cgi-bin/jrnlst/jloptions.cgi?PC=J.

Table 1 Criteria of the literature analysis

Criterion	Characteristic
Database	AIS Electronic Library (AISeL), EBSCOhost, EmeraldInsight, IEEEXplore, INFORMS, ProQuest, ScienceDirect, SpringerLink, Wiley InterScience
Supplemented proceedings	Internationale Tagung Wirtschaftsinformatik (WI), Americas Conference on Information Systems (AMCIS), European Conference on Information Systems (ECIS), International Conference on Information Systems (ICIS), International Conference on Business Process Management (BPM)
Search fields	Title, abstract, keywords[a]
Search expression	(("Process Management" OR "Process Modelling" OR "Process Design") AND ("Decision" OR "Objective" OR "Value" OR "Performance"))[a]
Search period	2000–2010

[a]If specifiable (see Electronic Supplementary Material)

there are several advantages: First, the degree of replicability and inter-subjective verifiability is high. Second, the search results are complete with respect to the underlying criteria. Third, the probability of identifying previously "unknown" publications is increased. Since this paper does not intend to exhaustively explore the state of the art, but to collect a sample, the benefits outweigh the drawbacks in the authors' opinion.

3.2 Data Analysis

The sample contains eleven publications. **Table 2** shows to what extent they meet the requirements of Sect. 2. Since (A.4) and (A.5) are not inter-subjectively verifiable, only (A.1) to (A.3) are considered. This sharpens the paper's focus as (A.1) to (A.3) are the core requirements of value-based management. In the following, the research gap is explicated and the hypothesis from above is examined. As recommended by Webster and Watson (2002, p. xvi), the analysis is structured along the requirements.

To (A.1) *Planning and control of value contributions*: Only Thomas and vom Brocke (2009) as well as vom Brocke et al. (2010) deal explicitly with value orientation. In none of the contributions, risk and return measures are integrated to a value contribution and used as decision criterion in this form. Also other publications using risk and return measures do not integrate them to value contributions. In addition, all publications – if assessable – take on an ex ante perspective, i.e. they either relate to decisions taken at design time or to forward-looking decisions in the context of continuous process control. No publication takes on an ex post perspective according to which the realization of planned values is reviewed and, if necessary, corrective measures are triggered. Therefore, this requirement is considered unfulfilled.

To (A.2a) *Future Orientation*: Eight publications do not deal with future impacts of process management decisions. Linderman et al. (2005) indirectly deal with this issue by taking long-term average costs into account. Thomas and vom Brocke (2009) as well as vom Brocke et al. (2010) observe a multi-period planning horizon via a complete financial plan. Since they do not discount periodic payment surpluses, the time value of money is not considered. This requirement is therefore considered partially fulfilled.

To (A.2b) *Risk adequacy*: Five publications do not deal with risks in the context of process management decisions. Lee et al. (2005) explicitly point to the importance of process risk analysis. In Thomas and vom Brocke (2009), process risks can be taken into account – as can be seen in the example –, but they are not explicitly addressed in the proposed approach. In addition to a variety of other process measures, Balasubramanian and Gupta (2005) suggest the delay caused by human intervention as risk. Thus, they consider a specific risk type. Bai et al. (2007) refer to three recognized risk measures, namely expected loss, value-at-risk and conditional value-at-risk. Linderman et al. (2005) and vom Brocke et al. (2010) include probabilities assigned to previously defined scenarios or events. Thus, they consider the uncertainty of process management decisions. The probabilities are used to calculate the expected costs and/or cash flows and are not complemented by risk measures. Thus, the respective decision rules (if available) are only suitable for risk-neutral decision-makers (see Sect. 4). No publication incorporates a risk calculus that goes beyond the expected value, quantifies risks, and can be integrated with return measures to value contributions. Overall, the requirement is partly fulfilled.

To (A.2c) *Cash flow orientation*: Five papers either exclusively consider non-monetary measures or suggest a general approach regardless of any concrete measures. Lee et al. (2005) explicitly point to the importance of monetary measures. Bai et al. (2007) as well as Linderman et al. (2005) consider only costs or cash outflows. It should be noted that measures of cost and management accounting are in general valuation-dependent and therefore less suitable for assessing the effects of process management decisions than cash flows (for more details, see Coenenberg et al. 2009). Vergidis et al. (2007) also include the process execution time. Positive monetary process effects have not been taken into account so far. Thomas and vom Brocke (2009) as well as vom Brocke et al. (2010) use cash inflows and outflows on multiple planning and/or aggregation levels (process action level, budget level, corporate level). They meet the requirement of cash flow orientation.

To (A.3) *Goal orientation as regards the long-term sustainable increase of the enterprise value*: Seven publications do not consider the goal orientation as regards the long-term sustainable increase of the enterprise value. Balasubramanian and Gupta (2005) as well as Neiger and Churilov (2004) encourage such a goal orientation explicitly. Thomas and vom Brocke (2009) as well as vom Brocke et al. (2010) use cash inflows and outflows at process action and budget level to calculate measures such as return on investment (ROI) and total cost of ownership (TCO) at corporate level. Although involving periodic performance measures, they conduct a comprehensible aggrega-

Table 2 Assessment of the process management publications contained in the sample

Publication	Goal orientation or basic idea	Requirements of a value-based management concept (relevant extract according to Sect. 2)				
		Planning and control of value contributions (A.1)	Future orientation (A.2a)	Risk adequacy (A.2b)	Cash flow orientation (A.2c)	Goal orientation towards the long-term, sustainable increase of the enterprise value (A.3)
Bai et al. (2007)	Quantitative identification of optimal positions in process models for the implementation of control mechanisms	No integration of risk/return measures, ex ante assessment	Nonexistent	By means of the risk measures: value-at-risk, Conditional value-at-risk as well as expected loss	Merely costs	Nonexistent
Balasubramanian and Gupta (2005)	Quantitative assessment of process design impacts based on a set of indicators	No integration of risk/return measures, ex ante assessment	Nonexistent	Indirectly by means of risk of delay caused by human intervention	Merely nonmonetary indicators	Nonexistent, development encouraged
Lee et al. (2005)	Proposition of an approach for assessing alternative process designs based on soft-computing approaches	No integration of risk/return measures, ex ante assessment	Nonexistent	Only mentioned, not implemented	Only mentioned, not implemented	Nonexistent
Linderman et al. (2005)	Quantitative determination of an optimal strategy for quality assurance and processes maintenance by minimizing the total expected costs	No integration of risk/return measures, ex ante assessment	Indirectly by means of average long term costs, no discounting	Consideration by expected costs based on probabilities	Merely costs	Nonexistent
Lu and Botha (2006)	Qualitative conceptual framework of process indicators and relevant drivers	No integration of risk/return measures	Nonexistent	Nonexistent	Mostly non-monetary indicators, costs	Nonexistent
Neiger and Churilov (2004)	Formal-logical approach to goal-oriented process modeling	Cannot be assessed, ex ante assessment	Focus on general procedure	Focus on general procedure	Focus on general procedure	Only addressed, not specified
Nurcan et al. (2005)	Proposal of a formal approach with focus on a goal-oriented process modeling	Cannot be assessed, ex ante assessment	Focus on general procedure	Focus on general procedure	Focus on general procedure	Nonexistent
Soffer and Wand (2007)	Proposal of a formal approach for the validation of interacting process models	Cannot be evaluated, ex ante assessment	Focus on general procedure	Focus on general procedure	Focus on general procedure	Nonexistent

Table 2 (*Continued*)

Publication	Goal orientation or basic idea	Requirements of a value-based management concept (relevant extract according to Sect. 2)				
		Planning and control of value contributions (A.1)	Future orientation (A.2a)	Risk adequacy (A.2b)	Cash flow orientation (A.2c)	Goal orientation towards the long-term, sustainable increase of the enterprise value (A.3)
Thomas and vom Brocke (2009)	Proposition of a value-based and conceptual approach for the development of service-oriented architectures using process models	Explicitly addressed, no integration of risk/return measures, ex ante assessment	Consideration of several periods, but no discounting (complete financial plan)	Basically considerable (example), but not made explicit	Consideration of cash flows	Restricted to ROI[a] and TCO[b]
Vergidis et al. (2007)	Proposal and evaluation of a formal framework for optimizing process models based on process cost and cycle time	No integration of risk/return measures, ex ante assessment	Nonexistent	Nonexistent	Only costs and processing time	Nonexistent
vom Brocke et al. (2010)	Increase of "process efficiency" through cost reduction and revenue growth	Explicitly addressed, no integration of risk/return measures, ex ante assessment	Consideration of several periods, but no discounting (complete financial plan)	Probabilities of Process events	Consideration of cash flows	Restricted to ROI[a] and TCO[b]

[a]ROI = Return on Investment

[b]TCO = Total Costs of Ownership

Table 3 Economically well-founded objective functions

Tax perspective	Decision situation		
	Certainty	Risk	
		Risk-neutral decision makers	Risk-averse or -seeking decision makers[a]
Before taxes (bt)	NPV_{bt}	$E(\widetilde{NPV}_{bt})$	$\phi(\widetilde{NPV}_{bt})$
After taxes (at)	NPV_{at}	$E(\widetilde{NPV}_{at})$	$\phi(\widetilde{NPV}_{at})$

NPV = Certain present-value payment surplus; $\widetilde{NPV}$ = Stochastic present-value payment surplus (random variable); Φ = Preference function

[a] A preference-based valuation is assumed

tion across multiple planning levels. The requirement is partly fulfilled.

The following can be stated: All examined papers advance the knowledge as regards their respective research question. As far as the findings related to value-based management are concerned, all requirements are not or partially met – except for cash flow orientation (A.2c). Cash flow orientation is totally fulfilled by two contributions. The most advanced contribution regarding all requirements is vom Brocke et al. (2010). There is an overall research gap with respect to the integration of risk/return measures to value contributions (A.1), the control of process management decisions by ex post analyses (A.1), the consideration of the time value of money through discounting (A.2a), the consideration of non-risk-neutral decision makers (A.2b), the usage of cash flows instead of measures from cost and management accounting (A.2c) as well as the explicit goal orientation towards a long-term sustainable enterprise value as top measure (A.3).

As outlined in the introduction, it is now comprehensible that the findings of value-based management have hardly been included in process management decisions. Thus, the hypothesis from above can be regarded as confirmed.

4 Transfer of Economically Well-Founded Objective Functions to Process Management Decisions

To bridge the gap between value-based management and process-oriented organizational design, we transfer economically well-founded objective functions from value-based management to process management decisions.

Process management decisions generally imply investment projects which have to be assessed in terms of their contribution to the enterprise value. It is important to determine and to implement the process design alternative with the highest value contribution. For this purpose, however, knowledge of all relevant payment surpluses is required. Since those are highly uncertain in practice, it is reasonable by means of a "difference investment appraisal" to measure the much more easily determinable process-specific changes in payment surpluses (Perridon et al. 2009, pp. 59–63). A cash flow consisting of certain periodic changes in payment surpluses is denoted as $(X_1, X_2, X_3, \ldots, X_T)$. A cash flow consisting of certain stochastic periodic changes in payment surpluses is denoted as $(\tilde{X}_1, \tilde{X}_2, \tilde{X}_3, \ldots, \tilde{X}_T)$ (with T as planning horizon). Furthermore, we refer to payment surpluses for simplification reasons.

Depending on the tax perspective (before and after taxes) and on the decision situation (certainty and risk with risk-neutral, -averse or -seeking decision makers), **Table 3** shows which objective function process management decisions should be based on in terms of value-based management. The importance of tax calculations for economic evaluation at corporate level and at individual level is no longer questioned today (Warneling 2004, pp. 1–4). Economic decisions should, in principle, be based on an after-taxes valuation calculus. The before-taxes perspective is shown as it is still common practice. It also constitutes useful heuristics if the expected bias caused by tax effects is not far too high. In case of certainty or risk-neutral decision makers, the (expected) present value of the process-specific cash flows is a reasonable decision criterion (Laux 2007, pp. 215–240). In case of risk aversion – which characterizes both typical decision situations as well as the behavior of investors in general (von der Schulenburg 2005, p. 216; Klir and Wierman 1998, p. 2) – the value contribution has to be used. Under some conditions, the value contribution can be expressed at corporate level by means of a so-called preference function as the risk-adjusted and expected present value of the stochastic process-specific payment surpluses (Faisst and Buhl 2005, pp. 406–410). Theoretically, this holds true for risk-seeking decision makers as well, which however is economically irrelevant in general.

In case of risk-averse decision makers, the question arises under which conditions and how a preference function can be used to determine the value contributions of process design alternatives while preserving optimality. A general approach is presented by Häckel (2010). According to this, a risk measure (e.g., variance) has to be identified that enables to quantify the risk of individual process design alternatives as well as the risk at corporate level. In addition, a risk-based capital allocation principle (e.g., the covariance principle) is needed which distributes the risk at corporate level to process design alternatives considering diversification effects. Finally, we need a function that aggregates the expected present values of the stochastic cash flows and the risk contributions created by risk allocation to value contributions. This approach is independent of whether we have an ex ante decision support or an ex post process monitoring. However, some risk-based capital allocation principles are better suited for an ex ante decision support, while others are more suitable for an ex post process monitoring. An overview of risk measures and risk-based capital allocation principles can be found, for example, in Albrecht and Koryciorz (2004).

In the case of risk, each process design alternative creates a stochastic cash flow which consists of stochastic, periodic payments surpluses. Those surpluses, in turn, consist of stochastic cash inflows (e.g., for returns from sales transactions) and stochastic outflows (e.g., for improvement measures contained in the

process design alternative and for process operations). Usually, there are intertemporal dependencies among the periodic payment surpluses that can be expressed, for instance, by means of covariances or correlation coefficients (Bamberg et al. 2004). To valuate such cash flows, several approaches in value-based management exist with the "risk-premium approach" and the "certainty equivalent method" as main representatives (Steiner and Bruns 2007, p. 250).

According to Bamberg et al. (2004), the first-mentioned approach belongs to the practitioner rules. Here, decision makers aggregate the stochastic, periodic payment surpluses to periodic expected values and discount them based on a risk-adjusted interest rate (see formula (1)) (Steiner and Bruns 2007, p. 250).

$$\sum_{t=1}^{T} \frac{E(\tilde{X}_t)}{(1+i+z)^t} \tag{1}$$

with
$E(\tilde{X}_t)$ expected payment surplus in period t;
i – risk free interest rate;
z – risk premium.

The theoretically well-founded certainty equivalent method is often preferred in science (Timmreck 2006, p. 45; Bamberg et al. 2006). Here the decision makers aggregate stochastic periodic payment surpluses to a stochastic present value and determine its certainty equivalent. The certainty equivalent represents that amount of money creating the same subjective utility for the involved decision makers as the stochastic present value (Laux 2007, pp. 215–240; Bamberg et al. 2006; Häckel 2008). In the case of an exponential Bernoulli utility function and a normally distributed stochastic present value, the value contribution of a process design alternative can be expressed by means of the following preference function the certainty equivalent of the utility function (Laux 2007, p. 227) (here an example for after taxes):

$$\phi(\widetilde{NPV}_{at}) = E(\widetilde{NPV}_{at}) - \frac{\alpha}{2}\sigma^2(\widetilde{NPV}_{at}) \tag{2}$$

with
$E(\widetilde{NPV}_{at})$ expected cash flow present value;
$\sigma^2(\widetilde{NPV}_{at})$ variance of the stochastic cash flow present value;
α risk aversion parameter (with $\alpha > 0$).

According to the central limit theorem, the stochastic, periodic payment surpluses are (approximately) normally distributed for sufficiently many process instances (Bamberg et al. 2009, p. 130) and can be aggregated to a normally distributed cash flow present value (Bamberg et al. 2009, p. 111). In principle, so-called demand or capacity risks have primary importance (e.g., due to market or market success fluctuations and the availability or flexibility of possibly fixed production factors). The fact that such risks can be assumed to be (approximately) normally distributed supports the approach of assuming an (approximately) normally distributed stochastic cash flow present value in process risk modeling – even if some process risks (e.g., operational risks) usually do not follow a normal distribution. Nevertheless, one should be aware of the fact that due to the wide variety of process risks and the application of estimation procedures, the assumed and/or estimated normal distributions may be relatively broad. Then there is the risk that one decides ex ante to the best of one's knowledge, but has to adjust the processes later again if significantly different results than expected have been realized ex post. However, it is important to consider these ex ante expectations in order to prevent making avoidable mistakes in addition to inevitable ones.

In sum, the objective functions in **Table 3** support making process management decisions within a (decentralized) company while taking into account the decision situation and the tax perspective – both in an economically well-founded way and compliant with the paradigm of value-based management. In particular, they help close the research gap as regards the core requirements of value orientation (A.1) to (A.3) (see Sect. 3.2).

5 Summary, Implications, and Outlook

This paper investigated the hypothesis that process management in general and the goal orientation of process management decisions in particular developed almost independently of the findings of value-based management. For this purpose, a sample of process management publications was collected that dealt with goal orientation in process management and/or process management decisions during the past ten years. These publications were analyzed with respect to multiple requirements that operationalize the concept of "value-orientation" in an economically well-founded manner. As there is a research gap with regard to most requirements, the hypothesis from above may be considered as confirmed with respect to this sample. For this reason, economically well-founded objective functions have been transferred to process management decisions in order to bridge the gap between value-based management and process-oriented organizational design.

To be "value-oriented" in an economically well-founded manner, a management concept has to be suitable for the planning and control of value contributions. In addition, planning and control values have to be future-oriented, risk-adequate, and must be based on cash flows. They have to refer to the enterprise value, to be incentive-compatible and communicable. Finally, a management concept has to meet the requirement of economic efficiency.

Process management decisions made on the basis of the proposed objective functions are well-founded in terms of investment and decision theory. Moreover, they support the objective of sustainable growth in enterprise value. Given a consistent implementation of value-based management, their effects can be valuated using the same criteria as for other assets. This enables to assess a company's overall asset portfolio and strengthens the link between economic research and process-oriented organizational design.

It has to be critically stated that the results indeed contribute to an economically well-founded and value-based goal orientation in process management and/or process management decisions from a theoretical point of view. Nevertheless, the transfer into practice is anything but trivial. For instance, it is demanding to operationalize the proposed objective functions for specific use cases, to estimate stochastic cash flows, their distribution parameters, and interactions. Moreover, it is difficult to assign cash inflows according to their origination as well as to determine the risk attitude of the involved decision makers. From an information technology perspective, it is challenging to provide a consistent data base and to integrate this data base into the existing landscape of decision support systems. Beyond process management, the key challenge remains to consistently implement a value-

based management concept in all functional areas, hierarchy levels, and asset classes. It particularly falls to practice and BISE research to take up those challenges in the course of joint future (research) projects.

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Abstract

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Value Orientation in Process Management

Research Gap and Contribution to Economically Well-Founded Decisions in Process Management

There is no doubt that at least since the 1990s process orientation has evolved into one of the central paradigms of organizational design. Since then, all process management subtasks have matured. Process management decisions, however, lack economic foundation. They are usually based on qualitative or technical criteria or on plausibility considerations that do not necessarily comply with typical objectives in a market economy. Consequently, design alternatives are hardly comparable and an integrated valuation of a company's assets is impossible. The status quo is astonishing for several reasons: First, process management decisions usually imply investment projects with different risk/return positions and capital tie-up. Second, the need for designing processes according to their contribution to corporate objectives has been explicated repeatedly. Third, the paradigm of value-based management is an accepted theoretical framework from economic research that enables to consistently valuate the risk/return effects of decisions across functional areas, hierarchy levels, and asset classes. This suggests the hypothesis that process management in general as well as the goal orientation of process management decisions in particular have evolved almost independently of value-based management. In the paper at hand, this hypothesis is confirmed based on a sample of process management publications. We therefore explicate the research gap as regards value orientation in process management. In order to bridge the gap between value-based management and process-oriented organizational design, we transfer economically well-founded objective functions to process management decisions.

Keywords: Process management, Business process management, Value-based management, Value-oriented process management, Value orientation, Decision theory, Risk/return management

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Value orientation in process management

Research gap and contribution to economically well-founded decisions in process management

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Appendix (available online via http://springerlink.com)

Table A-1 Search fields and search expressions by databases

Database	URL	Search fields*	Search expression
AIS eLibrary	http://aisel.aisnet.org	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”)
EBSCOhost	http://search.ebscohost.com	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
EmeraldInsight	http://www.emeraldinsight.com	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
IEEEXplore	http://ieeexplore.ieee.org	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
INFORMS	http://pubsonline.informs.org	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”)
ProQuest	http://proquest.umi.com/login	T + A	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
ScienceDirect	http://www.sciencedirect.com	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
SpringerLink	http://www.springerlink.de	T + A	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")
Wiley InterScience	http://www3.interscience.wiley.com	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”) AND ("Decision" OR "Objective" OR "Value" OR "Performance")

* T = Title, A = Abstract, K = Keywords

Table A-2 Search fields and search expressions by conferences

Conference	URL	Search fields*	Search expression
AMCIS	http://aisel.aisnet.org;	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”)
WI	http://aisel.aisnet.org (until 2007), http://www.wi2009.at/ (for 2009)	T + A + K	(“Prozessmanagement” OR “Prozessmodellierung” OR “Prozessgestaltung”)
ECIS	http://aisel.aisnet.org (until 2005), http://is2.lse.ac.uk/asp/aspecis/default5.asp (since 2006)	T	(“Process Management” OR “Process Modelling” OR “Process Design”)
ICIS	http://aisel.aisnet.org	T + A + K	(“Process Management” OR “Process Modelling” OR “Process Design”)
BPM	http://www.informatik.uni-trier.de/~ley/db/conf/bpm/index.html	T	(“Process Management” OR “Process Modelling” OR “Process Design”)

* T = Title, A = Abstract, K = Keywords