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Exploring the path to success: A review of the strategic IT benchmarking literature

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ABSTRACT

Information technology (IT) organizations use strategic IT benchmarking (SITBM) to revise IT strategies or perform internal marketing. Despite benchmarking's long tradition, many SITBM initiatives do not reveal the desired outcomes. The vast body of knowledge on benchmarking and IT management does not help overcome the challenges of successful SITBM. We therefore synthesize the existing research on IT management and benchmarking into a concept relationship map and derive future research avenues. We find that there is much literature on how to obtain SITBM results. However, research does not explain how these results are transformed into outcomes – essentially the problem many practitioners struggle with.

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1. Introduction

Benchmarking has become an established approach for information technology (IT) organizations to assess their performance [3,17,48]. Key performance indicators (KPIs), such as IT costs per turnover or IT costs per employee, have found their way into most management accounting schemes used by IT executives [49,58]. External reference values for comparison with peers or alleged best practice companies are readily available for purchase from market researchers and analysts. In the past 15 years, IT benchmarking has become more sophisticated; it has moved from single cost KPIs to comprehensive assessments of an IT organization's strategic situation [42], including managerial aspects such as IT governance, processes, or elements of the IT strategy [1,5,61]. In research, such types of benchmarking have been summarized under the term “strategic benchmarking” [50]. Consequently, strategic IT benchmarking (SITBM) is a special type of strategic benchmarking

that encompasses a structured comparison of IT management to a peer group. As such, it differs from “classical” IT benchmarking approaches, which tend to focus on hardware and infrastructural improvements [48]. By contrast, SITBM has been used to find starting points to improve business-IT alignment [52], form a basis for developing or revising IT strategies [14,22,68], or do internal marketing [52,40,82]. It provides a high-level and cross-sectional analysis of the whole IT organization at a level of detail suitable for IT executives [3,11], while classical IT benchmarking is used to measure the performance of an IT organization's chosen domains longitudinally and in-depth (e.g., infrastructure, data center, or enterprise resource planning (ERP) systems).

While the relevance of strategic IT/IS assessments is still increasing (see, e.g., the panel at the Gartner CIO Summit 2013³ or recent publications [58,37]), benchmarking as one form of strategic assessment is still highly debated [42,30]. For example, Credit Suisse's chief information officer (CIO) argues against SITBM because “it is hardly adequate to show the value of the IT organization to the business” by means of an “isolated measurement” [104]. By contrast, Deutsche Bahn's CIO argues that SITBM is crucial to objectify the debate of prices versus IT value

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³ <http://www.gartner.com/technology/summits/emea/cio-executive-german/about.jsp>.

[25]. Studies on this controversy have shown that IT managers find it difficult to fully exploit the information being generated in their strategic benchmark endeavors [18,69]. However, as SITBM is typically expensive in terms of time and resources [22,36], non-usage of the results should be prevented. In the cases wherein it has been applied, IT benchmarking often provided benchmark reports; however, no further actions were taken based on the results [1,82,60]; thus not leading to the desired outcomes such as better business–IT alignment or an IT strategy revision. Successful SITBM, however, results in tangible projects and initiatives [5,52,9]; this has also been illustrated by the few known cases in which strategic benchmarking was successfully conducted [14,101]. Following this line of thought, it is important to understand that there is a difference between the success of a benchmarking project (including data collection and analysis) and that of benchmarking as a whole. A *benchmarking project* is successful if it makes recommendations for improvements. Accordingly, the benchmarking project team members are not accountable for the implementation (or success) of the recommended initiatives, as these initiatives are implemented as part of separate projects. By contrast, *benchmarking success* manifests not at the project level but at the organizational level [5,22]. Thus, we propose that *strategic IT benchmarking is successful if it provides useful information about an IT organization's strategic position that is translated into sustainable initiatives to improve this position*.

There is a vast body of knowledge on both general benchmarking and IT management in the scientific literature. Knowledge of strategic benchmarking and SITBM, however, is still scarce. Studies on IT benchmarking mostly focus on fairly technical issues (e.g., content or privacy). As SITBM poses specific challenges, it can only partly be explained by general benchmarking or IT management literature. First, only the analysis of the right issues allows organizations to gain improvements from their strategic assessments [34]. Second, despite increasing standardization and commoditization of the IT organizations, organizational structures and processes of various IT organizations still often differ remarkably, making it difficult to compare them [48]. Third, as the results of a SITBM have a long-term impact, they require a larger degree of organizational backing compared to that required for traditional price and service benchmarking [96].

By reviewing the literature on strategic and IT benchmarking and the literature in the broader fields of strategic IT management and benchmarking, we aim to provide the basis for a more theory-driven debate on SITBM success. We have three core research goals: (1) identify relevant concepts that influence the course of a SITBM project, (2) summarize the existing understanding of these concepts in a concept relationship map for SITBM success, and (3) derive a set of propositions on SITBM success and avenues for future research.

This paper is structured as follows. In the next section, we discuss the core foundations of SITBM. We differentiate it from other forms of (IT) benchmarking and embed it in the context of other strategic activities in IT organizations. In the third section, we introduce the research framework used to structure the review and analysis process. In the fourth section, we present our approach to literature selection and classification. In the fifth section, we perform an in-depth analysis of the current state of the art and, in the sixth section, synthesize it into a concept relationship map for SITBM success. The paper concludes with a discussion and research perspectives for SITBM success in the seventh section.

2. Foundations of SITBM

We rely on the scientific discourse of two adjacent research fields. On the one hand, we argue that a careful evaluation of general benchmarking knowledge allows for valuable insights,

especially regarding methodological facets. On the other hand, IT management represents the context in which SITBM is applied. It not only provides the content that SITBM should cover but also influences how SITBM can be applied. In the next two sections, we discuss SITBM from the perspective of these two adjacent research fields to lay our theoretical foundations.

2.1. Benchmarking perspective

Benchmarking is a continuous search for, and application of, better practices that lead to superior competitive performance [93]. Since benchmarking gained attention through the Xerox case [9,43], it has undergone several development stages. While early attempts were mainly product oriented, contemporary approaches are also applied to processes and strategies [5,36,55]. Definitions of strategic benchmarking vary. While Watson [93] orients his definition toward process benchmarking, Clayton and Luchs [14] focus on an assessment of general strengths and weaknesses as preparation for strategic planning. The most specific definition is provided by Drew [22], who maintains that “strategic benchmarking is used to compare organizational structures, management practices, and business strategies” (p. 428). We base our definition of SITBM on this understanding and define *strategic IT benchmarking as a structured comparison of IT management to a peer group with the objective of improving IT organizational and cost structures, IT management practices, business–IT alignment, and/or IT strategies*.

2.2. IT management perspective

As defined above, SITBM assesses IT management, which, in turn, provides the benchmarking-relevant context and content. The study of IT management therefore fosters our understanding of these facets and their influence on SITBM projects. Literature suggests that SITBM is most valuable when performed as part of the annual strategy process [93,92]. In this context, much is known about strategic IT/IS planning and implementation (e.g., [8,20,23,32,38,89]). However, there is still a lack of understanding of the activities and contingencies that precede formal planning [40,14]. While many researchers suggest analyzing an IT organization's external environment so as to contrast self-perception and external perception, they mostly focus on how to analyze the data, but not on how to obtain it (e.g., [41,42,33]). However, lack of information and knowledge about their own capabilities has been identified as a core problem of IT practitioners in strategic planning activities [64,73]. In addition, when acting as a consultant to the business [84], strategic planning processes of IT organizations are also becoming more complex [8,85]: IT executives are required to collect a much larger amount of information, interpret, and explain it, before they render decisions, develop implementation action plans, and set out to realize them. As a result, the usefulness and quality of the data used for situation and competitive analysis are of utmost importance to draw reliable conclusions for strategy formulation or revision. Considering SITBM as a method for obtaining comparisons with the external environment, we provide insights on how to gain such data for strategic planning.

3. Research framework

To better guide our review, we structured our literature review around a research framework. We considered previous reviews on benchmarking and performed a meta-review on these to gain a first understanding of the relevant categories for analysis. In doing so, we identified a relatively large number of benchmarking review articles – since 1995, seven of these articles have been published. Each of these reviews accounts for different aspects of the state of

Fig. 1. Research framework.

research. For example, Zairi and Youssef [102,103] discuss popular books, while Dattakumar and Jagadeesh [19] perform a high-level review of more than 350 research articles. While these reviews concentrate on a broad analysis of benchmarking literature, other reviews focus on specific topics such as (lack of) theoretical foundations of benchmarking [50,99], frameworks and approaches to benchmarking [5], or ethical and legal aspects of benchmarking [26]. These reviews provide a general structuring of research based on benchmarking.

Concerning discussions of benchmarking outcomes, various researchers stress the notion of contextual factors influencing the overall benchmarking process [1,99]. Further, Elnathan et al. [27] suggest a research framework consisting of antecedent variables such as the chosen benchmarking methodology, preliminary analyses or experiences, contextual factors such as the scope of benchmarking or partner structures, and outcome variables including improvement of financial and nonfinancial measures. Ramabadrnan et al. [74] structure their research on context-related and process-related factors similarly. Their core statement is that context factors influence the benchmarking process and thus also, indirectly, the outcomes of a benchmarking endeavor. Based on these considerations, we structure our review along four core categories: methodology, project, success, and contextual factors (Fig. 1).

The *SITBM methodology* category contains three subcategories. First, it deals with process models, that is, the structure of a benchmarking endeavor and various role definitions. Second, we extended our analysis of methodology to include instruments for SITBM. Instruments comprise questionnaires and other tools used to collect information for benchmarking. Third, peer group subsumes matters of choice and fit of the organizations used for benchmarking.

Following the methodological decisions that determine the general setup, the *SITBM project* category comprises two subcategories representing the core phases of a benchmarking process: data collection and analysis. The dynamics of these phases are crucial for the quality of results in strategic IT management projects [68]. We therefore analyze the two subcategories of data collection and analysis specifically toward understanding how their dynamics contribute to the quality of the SITBM results, an important precondition for its success.

The category *SITBM success* contains one subcategory focusing on improvement initiatives based on the results of the benchmarking process. Typically, this set of initiatives is agreed upon during an IT organization's strategic planning phase.

Finally, the category *SITBM contextual factors* deals with aspects that might influence the course of an SITBM endeavor (e.g., available resources or project prioritization). In an attempt to better understand benchmarking processes, researchers have

recently focused on the identification and better understanding of contextual factors (e.g., [69,74]). By including this category into our analysis, we not only aim to present an evaluation of context factors discussed in earlier reviews in the light of newer insights, but also provide researchers with a better understanding of the more recent developments in this field.

4. Research method

Our research objectives are threefold and include identifying the current state of knowledge in the field of SITBM success, structuring this knowledge into a concept relationship map, and deriving a set of research propositions. In doing so, we seek to elucidate on SITBM success beyond mere issues of process models and identify future research opportunities. We conducted a structured literature review considering these goals. Such a literature review helps aggregate and facilitate current knowledge as a basis for building new insights [79,90,91]. Methodologically, we rely on established guidelines for reviewing and synthesizing literature [16,28,57,94]. As introduced earlier, we focus our literature review on the two research streams: benchmarking and IT management. Reviewing the general benchmarking literature allows us to summarize the basic constituents of benchmarking and to theoretically conceptualize their impact on strategic situation analysis in IT. Further, a review of the literature on IT management makes it possible to frame strategic benchmarking as a tool in IT management and offers different lenses on our research question [87]. Other more distant research streams (e.g., performance measurement systems or competitive intelligence) might also provide valuable insights. The goal of our research, though, is to focus on SITBM in a narrow sense.

4.1. Literature selection

We considered eight journals listed in the AIS Senior Scholar's Basket of Journals,⁴ the top journals in this discipline, as the basis of our review. In addition, we extended this list with further well-established IS journals for IT management and two major international IS conferences [57]. The journals were identified based on their mission statement and their position in the VHB Jourqual 2.0 ranking for ISs and information management.⁵ To keep the number of journals manageable, we only included the top 20. Finally, we added domain-specific journals for benchmarking, which we identified based on our personal experience in the field

⁴ <http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=346>.

⁵ <http://vhbonline.org/service/jourqual/jq2/teileranking-wirtschaftsinformatik-und-informationsmanagement/>.

Table 1

Covered IS journals and conference proceedings.

Journals	<p><i>AIS Senior Scholars' Basket of Journals:</i> European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of the Association of Information Systems, Journal of Management Information Systems, Journal of Strategic Information Systems, Journal of Information Technology, MIS Quarterly <i>Established journals for IS and strategic IT management that were also included:</i> Business & Information Systems Engineering, ACM SIGMIS Database for Advances in Information Systems, Information & Management, IEEE Transactions on Engineering Management <i>Further domain-specific journals:</i> Benchmarking: An International Journal, International Journal of Operations & Production Management, Long Range Planning</p>
Conferences	International Conference of Information Systems, European Conference of Information Systems

[91]. The complete list of journals and conferences analyzed is provided in Table 1.

We started our literature review by searching article abstracts, titles, and keywords for the strings “(IT OR IS) benchmarking,” “strategic AND benchmarking,” “benchmarking success,” “(IT OR IS) management AND (assessment OR measurement),” and “strategic (IT OR IS) management AND content.” While a database search may have resulted in a larger number of potential articles, we wanted to control for the quality and relevance of the papers from the beginning [79]. In addition, backward search assured that we would not miss relevant articles published in other journals [91,94]. We did not include a formal time restriction in our search and included all papers that were published until January 2014. The selected studies were directly checked for their relevance concerning fit with our research framework. For example, we included papers that reported on cases of benchmarking or strategic positioning and planning in IT organizations as well as those dealing with the respective success factors or methodological aspects. Conference papers were only considered in cases in which the findings were not published in a subsequent journal article. In addition, we added seven books we considered to be relevant to our inquiry based on their frequency of citation in research papers.

Finally, we had 155 publications as the basis for a more detailed analysis. Two of the authors discussed the relevance of each publication and eventually agreed on 47 publications for further consideration. For example, we included all papers that introduced instruments for strategic assessments (e.g., strategic benchmarking or IT/IS assessments) as these provided insights on the content and design criteria for SITBM instruments. Furthermore, papers dealing with the benchmarking process were included, while those on the process of strategic IT/IS planning were only included if they provided insights on the dynamics and the process of strategic situation analysis. Papers dealing with different types of IT/IS strategies, for example, and their impact on IT's value contribution were not included on account of not dealing with the benchmarking process or its relevant content. During in-depth analysis of these publications, eight further articles were identified that were considered relevant, thus leading to a total of 55 publications.

4.2. Literature classification

Our classification of the literature covers three complementary facets: (1) historical and temporal aspects, (2) concept identification and analysis, and (3) concept mapping and proposition development.

In our analysis of the *historical and temporal aspects*, we identified only one publication before 1991 [9] which is also often regarded as the first core publication on benchmarking. Concerning relevant publications on IT management, we identified no publication relevant for our inquiry before 1991. This could be explained twofold. First, research on content of IT management mainly focused on technical issues such as infrastructure or applications and is generally regarded as outdated today [88]. Second, research on strategic processes in IT organizations

only began to shift its focus toward process-related success factors at the beginning of the 1990s [88,77]. Fig. 2 provides an overview of the identified publications in 5-year intervals.

Fig. 2 shows a peak in benchmarking publications from 1996 to 2000. During this period, most process models for benchmarking were published in response to an increasing number of failing benchmarking projects. However, around the turn of the millennium, it appeared that more and seemingly better process models were not the key to benchmarking success. Since then, the number of publications (especially with respect to process models) decreased and researchers have shifted their focus toward factors beyond process models. Before 2000, many papers were conceptual in nature; however, the number of empirical publications increased afterward. The number of identified publications on IT management remained fairly stable over time.

Beyond historical and temporal distribution, we explicitly focused our analysis on the history of SITBM by including various articles on the historical development of benchmarking and their implications for strategic benchmarking [42,50,2]. The long time period of analysis (starting in 1989) in our study allowed us to trace concepts relevant to SITBM back to the beginning of benchmarking. For example, some success factors suggested by Camp [9] have later been shown to be only relevant for specific forms of the benchmarking process [62], while the relevance of context factors was highlighted for strategic benchmarking [22,12].

For our *concept identification and analysis*, we employed a two-stage process to systematically categorize the final list of papers. In the first stage, we performed a concept-centric analysis [94] around the categories of SITBM shown in Fig. 1. We used the qualitative data analysis software Atlas.ti to conduct a bottom-up classification based on open coding [98]. In doing so, we refined our initial categories and identified additional concepts. The final concept list is given in Table 2; the classification of the publications according to these concepts is depicted in Tables 3–6. In the second stage, we extended and refined our initial research framework by mapping the newly identified concepts to the framework's general process (see Fig. 1).

Apart from the identification and classification of relevant concepts, we specifically focused on two additional aspects. First, we wanted to gain a deeper understanding of the nature of the

Fig. 2. Overview of the identified articles by publication year.

Table 2

Identified concepts for the categories from our research framework.

Category	Identified subcategories and corresponding concepts ^a
SITBM methodology	Process models, Design, Quality criteria, Instruments, Content
SITBM project	Design, Quality criteria, Peer group
SITBM success	Data collection, Data collection techniques, Data analysis, Analysis techniques
SITBM contextual factors	Initiated improvement initiative(s) Top management support, Previous benchmarking experiences, Benchmarking team characteristics, Relevant stakeholders, Involvement of stakeholders, Cultural factors, Fear of sharing information, Resistance to change, Project-related behavior of stakeholders, IT strategy process integration

^a Every concept was sorted to the respective category from Fig. 1.

relationships between the concepts. For example, instead of merely searching for evidence that top management support is relevant in the SITBM context, we aimed at understanding how its effect actually unfolds [98]. Second, in light of the process depicted in our research framework, we were particularly interested in the transitions between an SITBM project's phases, that is, how the SITBM setup is transferred into the actual benchmarking project, how the project generates results, and how these results are transformed into outcomes. The analysis and classification of the papers were initially performed by one researcher and then reviewed by at least one additional researcher.

As a result of this classification, we are able to (1) identify concepts that extend and refine our initial research framework and (2) identify and analyze their relationships. This allows us to engage in *concept mapping and proposition development*, the third facet of our literature classification. The key aspect of this facet is the development of a concept relationship map, that is, a graphical depiction of the relationships between various concepts. In this map, we go beyond drawing arrows between concepts by expressly labeling these arrows to represent the conceptual logic for their linkages we identified in the literature. This concept relationship map is subsequently introduced as the result of our content analysis (Fig. 3).

Table 3

Concept matrix: SITBM methodology category.

Citation	Process models		Instruments			Peer group
	Design	Quality criteria	Content	Design	Quality criteria	
Alshawaf et al. [3]			x		x	
Alshawi et al. [4]			x			
Anand and Kodali [5]	x	x				x
Bhutta and Huq [7]	x	x				x
Camp [9]	x	x			x	x
Carpinetti and de Melo [10]	x					
Chang and King [11]			x	x	x	
Chen [12]	x			x	x	
Chen et al. [13]			x			
Clayton and Luchs [14]	x	x				
Cragg [17]			x		x	
Dong et al. [21]			x	x		
Drew [22]	x					x
Elmuti and Kathawala [26]	x					x
Elnathan et al. [27]						x
Fitoussi and Gurbaxani [29]			x			
Fuerstenau [30]			x	x	x	
Galliers [31]			x			
Gleich et al. [35]	x			x		
Gregory et al. [37]			x			
Hinton et al. [39]						x
Hong et al. [42]					x	
Kardaras and Karakostas [45]			x			
Kerschbaum et al. [46]				x	x	
Krcmar [48]			x		x	x
Kütz [49]			x			
Lacity and Hirschheim [52]						x
Legner [55]	x	x		x	x	x
Maleyeff [62]						x
Mentzas [63]			x			
Mocker and Teubner [66]			x			
Moriarty and Smallman [67]		x				x
Müller et al. [69]	x	x			x	x
Newkirk et al. [70]		x	x			
Ohinata [71]	x					x
Panagiotou [72]						x
Ramabadran et al. [74]						x
Rehäuser [76]	x					x
Riempp et al. [78]			x		x	
Saunders and Jones [81]			x			
Serafeimides and Smithson [85]			x		x	
Smith and McKeen [86]			x		x	x
Ward and Peppard [92]		x	x			
Watson [93]	x	x				x
Zairi [101]	x	x				x

Table 4
Concept matrix: SITBM project category.

Citation	Data collection	Data analysis
	Data collection techniques	Data analysis techniques
Ahmed and Rafiq [2]		x
Anand and Kodali [5]		x
Camp [9]	x	x
Chen [12]	x	x
Elnathan et al. [27]	x	
Fuerstenau [30]		x
Gleich et al. [35]	x	x
Legner [55]	x	x
Maleyeff [62]		x
Moriarty and Smallman [67]		x
Müller et al. [69]	x	
Rehäuser [76]	x	x
Ward and Peppard [92]		x
Watson [93]	x	x
Zairi [101]		x

Further, we also used axial coding for a larger understanding of the network of concepts and derive a set of research propositions [98,65]. Apart from stating the propositions based on the above-mentioned relationships, (i.e., arrows indicating the conceptual logic), we also proposed specific constructs and effects which may be considered for rigorous testing in future research. Thus, our study not only synthesizes and integrates the current state of SITBM research, but also proposes a way forward. This in turn also supports studies on SITBM research, particularly for developing a theory of benchmarking [67] and SITBM.

Where previous research was still too vague to formulate sound propositions, we formulated areas that are still open to future research. While the current state of SITBM research does not (yet)

Table 5
Concept matrix: SITBM success category.

Citation	Success-initiated improvement initiatives
	Camp [9], Clayton and Luchs [14], Drew [22], Elmuthi and Kathawala (1997), Lacity and Hirschheim [52], Müller et al. [69], Ohinata [71], Ramabadran et al. [74], Watson [93], Williams et al. [96]

lend itself to the development of a seamless nomological net, the directions for future research can help generate additional insights to help close current gaps in research and weave together all concepts relevant to describing and explaining SITBM's process and success.

5. Content analysis

We derived several new concepts for our initial categories (Fig. 1) based on our bottom-up classification (Table 2). In this section, we discuss the state of research regarding every identified concept and outline its association with other concepts. Based on the literature, we first formulate relationships to be applied in our initial framework of the concept relationship map (Fig. 3). Second, where possible, we introduce the propositions developed based on these relationships to illustrate the contribution of different concepts to SITBM success.

5.1. SITBM methodology

A major portion of the identified literature deals with methodological questions, that is, process models, benchmarking instruments, or peer groups. Bottom-up analysis revealed several sub-concepts for each of these three concepts. An overview of the classification results of all publications from the “SITBM

Table 6
Concept matrix: contextual factors.

Citation	Top management support	Previous benchmarking experiences	Benchmarking team characteristics		Cultural factors			IT strategy process integration
			Relevant stakeholders	Involvement of stakeholders	Fear of sharing information	Resistance to change	Project-related behavior of stakeholders	
Adebanjo et al. [1]	x		x		x			
Bhutta and Huq [7]				x				
Camp [9]	x							
Chen [12]								x
Chen et al. [13]				x				
Clayton and Luchs [14]	x							x
Doherty et al. [20]				x				x
Drew [22]	x				x	x		x
Earl [23]	x			x			x	
Elmuti and Kathawala [26]	x				x	x		x
Elnathan et al. [27]	x	x				x		
Galliers [31]								x
Hinton et al. [39]				x	x	x		
Krcmar [48]		x						
Lacity and Hirschheim [52]					x			x
Lederer and Sethi [53]	x							x
Legner [55]	x							
Lin et al. [58]		x						x
Mentzas [63]			x	x				
Moriarty and Smallman [67]	x	x						
Müller et al. [68]				x			x	x
Müller et al. [69]	x			x		x	x	x
Ohinata [71]	x		x					
Ramabadran et al. [74]	x	x					x	
Rehäuser [76]	x	x				x		
Ruohonen [80]			x					
Segars and Grover [83]				x			x	x
Serafeimides and Smithson [85]						x	x	
Ward and Peppard [92]	x							x
Watson [93]	x							x
Williams et al. [96]	x	x		x		x

Fig. 3. Concept relationship map for SITBM success.

methodology" category is given in Table 3. As displayed in Fig. 1, the three concepts underlying SITBM methodology form the SITBM setup that has to be agreed upon at the start of the project (e.g., [69,9,101,96,93,55,12]). Hence, the first four relationships for our concept relationship map can be formulated as follows:

- R1: The chosen process model is part of the SITBM setup.
 R2: The chosen instrument is part of the SITBM setup.
 R3: The chosen peer group is part of the SITBM setup.
 R4: The SITBM setup has to be agreed upon at the start of the SITBM project.

In the following sections, we will outline how the underlying concepts of SITBM methodology contribute to our understanding of the role of methodological quality in SITBM endeavors and clarify their constituting quality characteristics. Especially regarding the latter, a systematic delineation has been called for in previous research [67].

5.1.1. Process models

Design: A large portion of benchmarking research focuses on process models, particularly on matters of process design (i.e., phases and role models) and quality criteria for process models. The probably most popular benchmarking model is the approach adopted by Camp [9], which consists of four main phases: (1) planning, (2) analysis, (3) integration, and (4) action. Other approaches range from very slim (e.g., Drew [22] with only five steps) to very detailed (Anand and Kodali [5] suggest 54 steps). In the early years, there was broad consensus among researchers that a well-chosen benchmarking process is among the most important preconditions of successful benchmarking [67]. In addition, there was evidence that an inappropriately chosen process hinders the success of a benchmarking initiative (e.g., [14,2]). As a result, many researchers proposed new process models in response to unsatisfactory benchmarking endeavors, as reflected in the large number of process models initially depicted [1]. Although the importance of process models for benchmarking success has been relativized in the recent years, it can still be argued that a high-quality process model contributes to the quality of the benchmarking results.

Quality criteria: In our literature analysis, we were able to identify two quality criteria of benchmarking process models. The first one is *simplicity*: The detailed layout of the chosen process is less important than the degree to which the chosen process is understandable for the relevant stakeholders [100]. Therefore, Elmuti and Kathawala [26] call for simple, easy-to-understand benchmarking processes by emphasizing that “the structure should not get in the way of the process” (p. 232). In particular, inexperienced benchmarking teams tend to struggle if the process model is too complex [27,74].

The second quality criterion is *adaptability*: Watson [93] states that “it’s important to understand that each benchmarking study does not have to complete the entire sequence of steps proposed [...]. The models should be viewed as a guide to learning [...]” (p. 65). Hence, even a widely accepted benchmarking approach might have to be adapted to fit the specificities of a certain organization [14]. Adaptability has also been addressed by other benchmarking researchers [55,7] as well as those from the field of IS strategizing [92,70]. These researchers stress the relevance of feedback loops to continuously learn from the benchmarking/strategy process and adapt it accordingly over time. To sum up, there is no one-size-fits-all process, especially not in strategic benchmarking. Besides, the objectively best process model might be useless if it is not understandable or meaningful to the benchmarking team members. Hence, simplicity and adaptability are the defining characteristics of process quality. Summing up these insights, we propose:

- P1: The higher the quality of the process model, the higher the quality of the SITBM results.

5.1.2. Instruments

The underlying instruments are an integral part of every benchmarking study, reflecting the study’s structure and focus [30,9,55]. Further, they contribute to validity, reliability, and comparability of the benchmarking results [17,10].

Content: Most of the studies on instruments for SITBM deal with the content to be benchmarked. For example, as Gimbert et al. [34] argue, instruments used in a strategic context must

cover the core domains of an organizational unit and structure these domains in a way that allows for strategic analysis (e.g., using appropriate measures). Consequently, we included not only publications that deal with benchmarking instruments, but also those that analyze and structure the domains of IT management. Altogether, there is considerable research on the content of IT management and its structures that can be used as the basis for SITBM instruments (e.g., [11,37,92,85,13,66]). Some researchers argue for coverage of costs and structures of the most important IT products and services [81]. Others stress that information about an IT organization's core processes and structures (e.g., architecture or sourcing processes) should also be included [17,14,78].

Instrument design: Different types of benchmarking instruments are available, such as questionnaires, interview guides (typically used as part of site visits), or discussion and moderation guides (e.g., used in focus groups and panels) (see also [35]). Questionnaires are generally employed in strategic benchmarking [12]. These assure that relevant data are comprehensively collected – a facet especially relevant in strategic contexts [81,78,86]. In addition, questionnaires ensure anonymity [9]. While anonymity is often an issue in benchmarking, it is particularly relevant in strategic benchmarking, because companies do not want to provide information to their competitors directly [72]. We identified only seven publications on the concrete design of benchmarking instruments [11,30,55,12,35,21,46], among which, only three deal with instruments in an IT management context. The most comprehensive instrument has been introduced by Chang and King [11], whose objective is to assess the performance of the IS function. By contrast, the works of both Fuerstenau [30] and Legner [55] are not focused on a broad assessment of an IT organization, but rather on an assessment of the enterprise architecture and governance [30] or on the benchmarking of IT-supported processes [55], respectively. However, both works may be used as a basis for studying instruments in SITBM.

Quality criteria: Prior research has identified three quality criteria for strategic benchmarking instruments. The first is *careful quantification*. The benchmarking instrument needs to assure that the data from different organizations can be compared. This is achieved by providing all participants with precise operationalizations and definitions of the relevant data [86,39]. While in a statistical perspective, operationalizations should be as precise as possible, in practice, a tradeoff is needed between the level of definition detail and compactness: a very detailed measure (e.g., cost breakdown) may allow for precise peer group comparisons, but is hardly manageable for the persons collecting the data [3,9,27].

The second quality criterion is *contextualization*, that is, enhancing the competencies of the instruments used in strategic benchmarking for collecting contextual information. Contextual information has been shown to facilitate better interpretation of the results [86] as it helps in understanding the reason for obtaining certain results. [69,39]. Few authors even argue that many of the problems ascribed to unsuitable peer groups are actually problems of the lack of contextual information [14,72].

The third quality criterion is *content fit*, that is, the instrument used in SITBM must cover the relevant content of IT management discussed earlier [42,11,70]. In this regard, Smith and McKeen [86] observed that IT managers often collect irrelevant information, because they revert to “what can be measured, rather than what should be measured” (p. 21). Regarding the quality of the resulting strategic insights, however, there is no difference between gathering no information and collecting strategically irrelevant information [34].

In summary, benchmarking instruments fulfilling the three discussed quality criteria have a positive impact on the quality of the benchmarking results: Careful quantification contributes to

reliability and comparability of the data, contextualization increases validity and comparability, and content fit assures validity of the results. The quality of the results obtained contributes to more substantial data analyses [2], and, eventually, to the overall outcomes of the benchmarking endeavor [69]. It can, hence, be derived:

P2: The higher the quality of the instrument, the higher the quality of the SITBM results.

5.1.3. Peer group

The peer group comprises the group of companies to which the company conducting the benchmarking process is compared. Questions of suitability and comparability of the benchmarking peer group have been the subject of various investigations (e.g., [22,9,67]). Research has often found a positive influence of a suitable peer group on the quality of the insights gained from a benchmarking [69,62] process. Some authors even argue that peer group quality is a key success factor in IT benchmarking [48,74]. If the benchmarking team members are disinclined to being comparable to the peer group or at least being able to derive insights regarding their potential future strategy, they probably will also not put much effort into transforming the SITBM project's output into outcome. Consequently, we maintain that:

P3: The higher the quality of the peer group, the higher the quality of the SITBM results.

Many companies want to compare themselves to competitors with a similar strategic environment [72]. Conversely, many companies leading in their group want to retain this position and therefore do often not want to share their sensitive strategic information with competitors [26]. However, the probability of uncovering practices that lead to superior performance is much higher while considering companies external to the own industry [22,9]. In addition, benchmarking against a top-class IT organization might result in a feeling of “doing everything wrong” and, consequently, may leave the benchmarking IT unit in a state of helplessness, thus hindering the success of the benchmarking project [52]. Consequently, building a suitable benchmarking peer group can be challenging. Therefore, companies performing an SITBM either only compare themselves to chosen partner organizations, or revert to huge benchmarking clearing houses, such as Gartner, which provide benchmarking data from companies in different industries. A third possibility is to form a benchmarking consortium of companies that are similar enough to provide useful insights [22,27,76]. Altogether, we hold that a well-balanced peer group structure comprising some competitors and some moderately similar companies from other industries is one characteristic of peer group quality.

Research and practice have also not yet found answers on how to determine the optimal peer group size [27]. The recommended sizes of peer groups reported in our literature pool range from two [93], over 10 [12], to more than 20 organizations [78]. While many CIOs strive for maximizing the peer group size, it has been shown that there is a diminishing marginal utility with an increasing number of benchmarking partners: efforts related to coordination and fitting of instruments into the specific contexts of the various IT organizations (organizational and cost structures) tend to rise exponentially with peer group size [76]. Such contextual fitting, in particular, is, however, crucial to prevent “apples to oranges comparisons” [62]. In summary, although past research has provided several explanations and recommendations for feasible peer group approaches, many practitioners still feel uncomfortable when it comes to questions of comparability [69,27]. As a result, the chosen peer group approach remains a source of pitfalls in SITBM and a barrier to success that needs to be overcome.

Finally, and to loop back to our overarching category of SITBM methodology, we can aggregate the findings of the three concepts such as process model, instrument, and peer group into one additional relationship for our concept relationship map:

R5: The employed SITBM methodology determines the validity and reliability of the SITBM results.

5.2. SITBM project

Studies mostly deal with specific tools and techniques with regard to the project category of SITBM (see Table 4). Only few publications extend their analysis toward contextual factors that influence the course of data collection or analysis (these publications are discussed in the category of contextual factors).

5.2.1. Data collection techniques

Data collection techniques include the methods used for collecting benchmarking data. They mostly comprise unilateral data collection (public domain information, i.e., no partners are involved), site visits, surveys, or focus groups [9,27,76]. In this regard, they must not be confused with instruments for benchmarking. Instruments provide guidance regarding the necessary content that must be collected and its operationalization. Data collection techniques, however, involve the applications of these instruments. These are relevant because they form the basis for data analysis. If the data collected are deficient or incomplete, the data analysis phase may result in misleading or even wrong results. Accordingly, we derive our sixth conceptual relationship:

R6: The data collection should provide high-quality data for the data analysis.

Several different instruments such as questionnaires and interviews may be involved during data collection. Elnathan et al. [27] carried out a detailed investigation of various data collection techniques. Their recommendation is to conduct site visits, because the insights gained from this technique allow for more substantive analyses than other techniques. However, they also acknowledge that whenever anonymity is a crucial concern, unilateral approaches or surveys are to be preferred. As a result, in many strategic benchmarking projects, surveys or consortia with anonymized data gathering are used [42,69,12]. Watson [93] has proposed one of the most comprehensive approaches to strategic benchmarking. He suggests a multi-method approach involving questionnaires as the core data collection instrument along with a systematic search for secondary data and interviews with chosen stakeholders for better contextual information. By contrast, Zairi [101] presents the benchmarking process of a company conducting a strategic benchmarking that focused solely on an anonymized assessment of key success factors and practices. A mixed approach was described by Gleich et al. [35]. The companies the authors described in the benchmarking process knew about each other, but the extensive data collection and analysis is performed by an independent third party who anonymized the gathered insights afterward. In summary, regardless of the respective approach to data collection, authors in our literature pool suggest that while anonymity is an issue in strategic benchmarking, it should not hinder collection of contextual information as the latter leads to more substantive data analysis. Thus, we propose:

P4: The more contextual information collected with the chosen data collection technique, the more substantive the data analysis.

Several authors studying the benchmarking process argue that data analysis needs more scrutiny than data collection

[67,71]. This finding is consistent with the results of Anand and Kodali [5], who found that of 35 prominent benchmarking models, only 37% deals with matters of data collection in greater detail. By contrast, researchers from strategic planning in IT organizations indicate that the method adopted for data analysis during strategic situation analysis is less significant than that for data collection [37,92]. Strategic benchmarking is a tool to generate data during IT/IS strategizing. Hence, it seems reasonable that similar effects may also play a role here. However, current research does not allow for definite statements on these effects. This suggests that the data collection phase needs more attention in benchmarking research.

5.2.2. Data analysis techniques

Once collected, benchmarking information is analyzed and evaluated using various methods and tools. Numerous techniques are available for benchmarking data analysis, which have received considerable attention in research; gap analysis is most commonly applied [5,101,55]. However, gap analysis alone is not sufficient for successful benchmarking [9,27]. Instead, additional information is needed to foster contextualization and help explain the gap [69,55]. As a result, many different data analysis approaches have been suggested as an extension to the classical gap analysis. For example, Ahmed and Rafiq [2] suggest a data analysis approach that integrates several established analysis techniques such as gap analysis, balanced scorecards, and analytical hierarchical process. Chen [12] suggests an extension of gap analysis called “strategic matrix” that links an organization’s core competencies to its benchmarking ratings, with the aim of providing better and ranked inputs for strategic planning. Apart from gap analysis, other approaches such as data envelope analysis [67], statistical process control [62] or modifications of process cost accounting [35] for systematic analysis of processes, and dependency analysis for structured examination of capabilities and organizational structures [30] are available. Altogether, we formulate the next relationship for our concept relationship map as follows:

R7: The techniques employed in data analysis produce the SITBM results.

Several quality criteria for data analysis techniques in SITBM can be derived. First, specific analysis objects (e.g., cost structures, processes, or capabilities) require specific analysis techniques that adequately account for the data peculiarities. Thus, the assessment of different kinds of analysis objects necessitates the use of different data analysis techniques that should adequately account for the respective data specifics. Hence it can be derived:

P5a: The better the employed data analysis approach handles the specific requirements of different types of analysis objects, the higher the quality of the SITBM results.

Second, the results of the analysis should be presented in a management-oriented way to directly support the forthcoming strategic planning [58,96]. In this regard, the strategic matrix introduced by Chen [12] is a promising approach, but dashboard-like charts have also been suggested [93,35]. Altogether, it can be stated:

P5b: The more management-oriented the results of data analysis are presented, the higher the probability that results are actually used in the subsequent strategic planning.

5.3. SITBM success

For successful SITBM, the results of the data analysis have to be transformed into actions. These actions reflect in a new or revised

IT strategy, that is, a set of short-term and long-term initiatives to improve the IT organization's strategic position [14,93]. Our review showed that studies dealing with success of benchmarking are scarce. Only ten publications were identified (see Table 5), wherein the authors have realized that methodological factors alone are not sufficient to explain the success of the SITBM project. They also indicate that several contextual factors influence the overall outcomes. However, as observed by many of these researchers, the studies lack a deeper understanding of the overall impact of these factors on the SITBM project (e.g., [69,96,74]).

5.3.1. Initiated improvement initiatives

Researchers in the identified publications have reached consensus regarding the criteria for successful SITBM (i.e., a set of initiatives to improve the current strategic position) and often provide various success factors. For instance, Clayton and Luchs [14], discussing a strategic benchmarking success story, suggest that strategic benchmarking should always be integrated with strategy revision and be considered as a starting point for further increasingly in-depth analyses of the identified problem fields. In addition, they strongly focus on methodological facets, that is, the overall process and the content captured in this case. Few others focus on specific facets such as team characteristics [71] or cultural aspects [52,96,26]. Yet, regarding an understanding of the effects of various aspects on the whole benchmarking process, the authors mentioned mostly focus on the identification of the facets, but do not link them to the whole benchmarking process or investigate their effects in depth. Only four of the 10 publications attempt to understand successful benchmarking holistically.

Drew [22] was one of the first to realize that explaining successful benchmarking requires a sound understanding of the effects of various success factors along the whole benchmarking process. He revealed the following success factors: external forces (e.g., industry standards or hostile competitive environments) and internal barriers (e.g., lack of time and resources) that impact the execution of the project, as well as culture- or methodology-related aspects (e.g., resistance to change or inappropriate peer group) that hinder the implementation of the learnings from the benchmarking. However, Drew's focus was on uncovering these facets. Accordingly, he left their specific effects open for future research. Ramabadran et al. [74], building on this idea, surveyed how factors related to project team behavior during data collection and data analysis as well as partner characteristics influence satisfaction with benchmarking results and success. While they found a positive impact of partner characteristics and project behavior on result satisfaction, they did not find a correlation between these aspects and benchmarking success.

These two publications use a confirmatory survey approach. The authors of the third publication on SITBM success use an exploratory qualitative approach. Müller et al. [69] propose a benchmarking success model that links various contextual factors such as top management support, culture, or process integration to methodological variables. Leaning on IT/IS strategy research, they suggest that various psychological effects during benchmarking have to be triggered for success. In this regard, they suggest stakeholder commitment as a key trigger for these effects. Nevertheless, they leave a detailed analysis of their proposed mechanisms open for future research.

Finally, in the most recent publication, Williams et al. [96] perform a literature review to identify barriers to benchmarking and potential solutions to overcome these. They identified two barriers relevant for benchmarking success namely inertia impeding pursuit of new practices and concerns regarding specific impacts of implementing new practices. The recommendations of Williams et al. to overcome these barriers are, first, to involve the relevant stakeholders from the beginning and address their

reservations. Second, they argue that a sound benchmarking methodology will help lowering resistance to change. Further, they suggest that future benchmarking may be regarded more positively by the organizational stakeholders when previous benchmarking projects are positioned as success stories and supporters are rewarded. Nevertheless, the analysis in this publication focuses on aspects that precede the benchmarking process. The dynamics of the project phase are not subject of their investigation.

To sum up, considering the overall process for SITBM success, we find that only two of four publications attempt to understand how various effects during project execution lead to benchmarking success. As both publications focus on different aspects and obtain different results, we are not yet able to formulate any generalized statement, proposition, or relationship on the mechanisms that facilitate the transformation of SITBM results into outcomes. In our concept relationship map (see Fig. 3), we therefore left the respective arrow empty and placed a question mark there instead.

5.4. Contextual factors

Previous research has identified a variety of different contextual factors that influence the course of an SITBM initiative (see Table 6). Contextual factors cover a wide range of concepts that are relevant before or during a benchmarking project. For this review, we have concentrated on concepts named more than once in our literature pool. While few barriers to success such as lack of top management support as well as integration into IT strategy processes have received considerable attention (e.g., [22,53,39]), publications dealing with cultural or team factors are rather sparse and fragmented. For instance, of the 11 publications dealing with stakeholder involvement, only four focus on the benchmarking process (whereas only the works of Müller et al. [69] and Ramabadran et al. [74] suggest the nature of the involvement).

5.4.1. Top management support

Top management support refers to the extent to which management supports a project with resources, clearly communicates its objectives, and stresses its importance [69]. Top management in a SITBM project is most often represented by the CIO, but IT's middle management might also be involved [80]. Looking at the reviewed literature, top management's role has been the most considered context factor that influences the success of benchmarking initiatives (e.g., [14,74,71]) and of the IT strategic process (e.g., [23,53,63]).

Without the availability of sufficient resources for a project and appropriate prioritization, the project members might not put the required effort into the collection and analysis of the benchmarking data. Such behavior often results in invalid or unreliable "guesstimates," ([93], p. 49) or causes stagnation of the whole project [96]. We therefore add an additional relationship to our concept relationship map:

R8: Top management support grants resources and priority for the data collection.

Many survey respondents, as expected, cite lack of top management support as one of the most important reasons for the failure of the benchmarking project (e.g., [1,22,39]). Camp [9] even holds that "[t]here is no more crucial indication of potential for success in benchmarking than strong, concerted, and interested support by management" (p. 35). By contrast, Lederer and Sethi [53] found that while top management is a necessary antecedent to successful strategic planning in IT organizations, it is not sufficient.

This finding is confirmed by other more recent studies, which indicate that the often used formula “more top management support = better results” is not fully correct [23,53]. However, while the role of top management for SITBM success might have to be considered in a more differentiated way, researchers agree on its general relevance for smooth execution of a benchmarking project and its resulting positive, moderating impact on the quality of the benchmarking results. We thus propose:

P6: The higher the degree of top management support, the higher the impact of the data collection results on the quality of the SITBM results.

5.4.2. Previous benchmarking experiences

Project members can have a certain level of routine that helps them overcome potential pitfalls and problems [48,58]. Previous experiences shape the way projects are conducted. In our review, this concept was mentioned in seven publications. The respective authors argue for including experienced benchmarkers in the project team because they positively influence project's progress. However, the importance of benchmarking experience depends on the chosen peer group approach. For example, performing strategic benchmarking using the partner-based approach requires more experience because companies must act very autonomously in finding suitable partners, developing instruments, and conducting the process [27,76]. Accordingly, we formulate:

R9: Previous benchmarking experiences prevent pitfalls and problems during the SITBM project.

Yet, this concept's explanatory value has been disputed. Recently, Lin et al. [58] were able to provide statistical evidence on the relationship between organizational maturity and the ability to successfully perform complex strategic IT/IS assessments. By contrast, Krcmar [48] argues that experience is valuable in IT benchmarking, but not crucial: many inexperienced companies use IT benchmarking as a means for performance evaluation along a defined performance standard (the benchmark) rather than for best practice derivation; the former requires much less experience than the latter. Further, Ramabadran et al. [74] only found marginal correlations between benchmarking experience and efficiency and effectiveness of the benchmarking process. An explanation for this result has been provided by Moriarty and Smallman [67] who observed that many inexperienced benchmarkers hire experienced consultants to guide the benchmarking process. This is especially true for strategic benchmarking [58,71]. The issue of experience therefore remains relevant, but becomes less critical. Altogether, we propose:

P7: The higher the level of previous benchmarking experience, the higher the likelihood of achieving SITBM success.

5.4.3. Benchmarking team characteristics

Two concepts were identified with respect to team characteristics in benchmarking: First, a select few publications investigate the *relevant stakeholders of SITBM*. Second, a number of studies deal with *stakeholder involvement in benchmarking projects*. While the effects and relationships discussed in the literature are fragmented, the following relationship can be derived from benchmarking and IT management research:

R10: Benchmarking team characteristics have an impact on the acceptance of the SITBM results.

Relevant stakeholders: Literature shows that having the “right” stakeholders involved in the benchmarking positively influences the overall project progress [96,74,71]. In our literature pool, however, only four publications investigated relevant stakeholders of SITBM. Benchmarking teams comprise representatives from management, internal employees, and process owners, a few internal as well as external customers and suppliers, and sometimes also external benchmarking experts [1,71]. The study of the stakeholder groups identified for IT strategy processes reveals a similar situation. Ruohonen [80] identified three core stakeholder groups in IT strategy planning: top management (including the representatives of company management), the user management group (including core representatives of the business units), and the IT/IS management group (including the CIO and the IT organization's middle management). While Mentzas [63] identified the same groups, he also suggested including issue-specific experts for specific organizational domains as well as external experts, especially during situation analysis and strategy conception.

Stakeholder involvement: Researchers argue that high involvement of the relevant stakeholders is positively associated with the success of strategic initiatives and benchmarking. However, in benchmarking research, the importance of stakeholder involvement has only recently been the subject of in-depth investigations [69,96]. This is remarkable as Hinton et al. [39] already observed that both practitioners and researchers lack understanding of the relevance and effects of stakeholder involvement in benchmarking projects. In the publications in the IT management stream, we found evidence that approaches to IT/IS strategic planning that focus on actively incorporating all relevant IT stakeholders result in highest acceptance of the strategy [20,23,83]. This incorporation is particularly important during the strategic situation analysis and strategy conception phase [68,63]. Chen et al. [13], building on the work of Earl [23], also stress this notion by maintaining that the target of the IT strategy process should be “a shared view regarding the role that IS plays within the organization” (p. 241). This target can only be achieved by incorporating all relevant stakeholders into the strategy process. The role of stakeholder involvement in SITBM can thus be explained based on the findings from benchmarking and IT management research:

P8: Involvement of relevant stakeholders positively influences the acceptance of the SITBM results.

5.4.4. Cultural factors

Although culture's importance on organizational undertakings is widely acknowledged [41], this aspect has to date widely been neglected in benchmarking research. Only a few researchers deal with cultural facets, and even fewer study the influence of cultural factors on the benchmarking process in any detail. While the understanding of cultural factors is limited, our review identified three key concepts: fear of sharing information, resistance to change, and stakeholders' project-related behavior.

Five papers report on *fear of sharing information* with partner organizations or benchmarking clearing houses [7,13,51,81,11]. While such fears may seem prohibitive to engage in SITBM to begin with, many IT organizations are mandated by the company's management to do so. In such a situation, benchmarking teams might provide only rough approximations or even tampered data, thus leading to untrustworthy results [52]. A solution to this dilemma has been promoted by Elmuti and Kathawala [26] who recommend not sharing any sensitive strategic information and to see strategic benchmarking not as a means to spy on benchmarking partners, but to gain mutual benefits. However, many companies still worry and revert to consortia or clearinghouses, as noted earlier. We therefore propose:

R11: Fear of sharing information impacts the quality of the SITBM results.

Fear of sharing information, if present, will negatively impact the quality of the SITBM result. We thus propose:

P9: The higher the fear of sharing information, the lower the quality of the SITBM results.

The second cultural barrier to successful SITBM is *resistance to change*. Several IT executives use SITBM as a means to justify their costs or to prove their team's efficiency. In both cases, there is little willingness to initiate actions based on the benchmarking results [51,81]. Similar observations can be found in research on IS evaluation [85]. However, it has been shown that benchmarking is an inadequate marketing instrument [6] – if an IT organization is perceived to have low performance or low business–IT alignment, a positive benchmarking report will not change this perception [52]. By contrast, only concrete improvement initiatives are an adequate means to address such negative perceptions [68,12], especially in the long run [93]. There is also evidence that many executives doubt the results of benchmarking [13,81], especially when they contradict their own perceptions [26]. Finally, fears related to unintended consequences of implementing benchmarking outcomes (e.g., job or reputation loss) have been identified [96]. Altogether, we derive:

R12: Resistance to change hinders the initiation of improvement initiatives.

P10: The higher the resistance to change, the lower the SITBM success.

Closely related benchmarking studies have only recently started to investigate approaches to overcome resistance to change. We have summarized these approaches under the third cultural concept: *stakeholders' project-related behavior*. Directness and quantity of communication between the project stakeholders as well as the nature of team members' interaction seems to influence project progress and overall satisfaction with the project output [69,74]. IT management researchers have also long identified the supremacy of open-minded, change-oriented, and learning-oriented approaches to strategic planning [68,23,83]. However, benchmarking research still lacks understanding on how such participative approaches may help overcome resistance to change and foster SITBM success. In this regard, the three benchmarking publications we identified arrive at different results. On one side, Ramabadrán et al. [74] found that high communication levels during a benchmarking project are associated with overall satisfaction with the benchmarking results, but not with benchmarking success. However, Müller et al. [69] found that the participative leadership styles increase SITBM success. In light of the findings in IT management studies, we lean toward the latter and argue:

R13: Stakeholders' project-related behavior should be participative in order to increase the satisfaction with the SITBM results.

Accordingly, derive a respective proposition:

P11: The more participative stakeholders' project-related behavior, the higher the satisfaction with the SITBM results.

In summary, while studies increasingly investigate cultural factors in benchmarking and SITBM projects, there is still no consistent body of knowledge. As culture has been shown to be an important driver of project outcomes generally [24], more research on this facet is needed.

5.4.5. IT strategy process integration

The likelihood of successful SITBM is increased when the project is integrated into the processes of strategic IT management. Following top management support, the concept of IT strategy process integration is the second most regarded contextual factor in SITBM projects (e.g., [58,14,22,12,26]). Integration in this context means that the SITBM project should be performed as part of the strategic situation analysis and needs to be completed before strategic planning [58,93]. Strategic benchmarking is valuable during this step, because it evaluates strategically relevant information against an IT organization's competitive environment [14], fostering inside-out and outside-in analysis [12]. Strategic benchmarking thus facilitates the exposure of an IT organization's strengths and weaknesses and assures that the resulting strategy does not lose focus on the external environment. In addition, a few cases have shown that an SITBM endeavor that is completed too late to provide input for the strategy planning, or that is not integrated into the strategy process, is unlikely to result in any outcome [11,14]. Consequently, we derive:

R14: IT strategy process integration increases the probability of initiation of improvement initiatives after completion of the SITBM project.

P12: The better the IT strategy process integration, the higher the SITBM success.

6. Synthesis and discussion

The objective of our research is to understand which and how concepts influence SITBM success. A systematic analysis of the existing research provided valuable insights into the concepts relevant for SITBM success. Several insights can be drawn from our review. First, the existing research provides information on potential success factors for SITBM. For instance, abundant research is available on methodological quality as an important precondition of successful SITBM. In addition, some contextual factors such as top management support and integration in strategy processes have received considerable attention in previous studies. Second, although much of this research has found its way into practice, SITBM initiatives still often fail. Studies report that although practitioners know various aspects relevant to successful SITBM initiatives, they do not fully understand how and when they should address them [7,13,81,53].

To this end, our results offer an overview of the relevant factors related to SITBM success. Through our concept relationship map (Fig. 3), we provide insights into how and why these interact. Table 7 summarizes the propositions derived from these relationships.

Reflecting on our insights from the previous sections, the summary of the current state of discussion on SITBM also allows us to compile a list of research gaps in places where the nomological net our propositions suggest is not yet complete. SITBM methodology, for example, is one of the most commonly investigated success factors. Beyond peer group aspects, we have identified a large number of studies concerning process design and its various quality criteria. The focus of most of the resulting process models is on planning the benchmarking study and analyzing the data technically (i.e., a listing of steps and description of tools). Based on the results of our review, however, we believe that many practitioners would also benefit from prescriptions related to behavioral aspects of the benchmarking processes. Consequently, future researchers may want to move one step ahead by not only describing the activities to be performed, but also their methodology.

Previous studies provide an understanding of the content and the quality criteria relevant for instruments for (strategic) IT benchmarking, and the impact of these instruments on the quality of the benchmarking results. At the same time, however,

Table 7

Summary of the relationships and propositions derived from the literature review.

Relationships	<i>SITBM methodology:</i>
	R1: The chosen process model is part of the SITBM setup.
	R2: The chosen instrument is part of the SITBM setup.
	R3: The chosen peer group is part of the SITBM setup.
	R4: The SITBM setup has to be agreed upon at the start of the SITBM project.
	R5: The employed SITBM methodology determines the validity and reliability of the SITBM results.
	<i>SITBM project:</i>
	R6: The data collection should provide high-quality data for the data analysis.
	R7: The techniques employed in data analysis produce the SITBM results.
	<i>Contextual factors:</i>
Propositions	R8: Top management support grants resources and priority for the data collection.
	R9: Previous benchmarking experiences prevent pitfalls and problems during the SITBM project.
	R10: Benchmarking team characteristics have an impact on the acceptance of the SITBM results.
	R11: Fear of sharing information impacts the quality of the SITBM results.
	R12: Resistance to change hinders the initiation of improvement initiatives.
	R13: Stakeholders' project-related behavior should be participative in order to increase the satisfaction with the SITBM results.
	R14: IT strategy process integration increases the probability of initiation of improvement initiatives after completion of the SITBM project.
	<i>SITBM methodology:</i>
	P1: The higher the quality of the process model, the higher the quality of the SITBM results.
	P2: The higher the quality of the instrument, the higher the quality of the SITBM results.
	P3: The higher the quality of the peer group, the higher the quality of the SITBM results.
	<i>SITBM project:</i>
	P4: The more contextual information collected with the chosen data collection technique, the more substantive the data analysis.
	P5a: The better the employed data analysis approach handles the specific requirements of different types of analysis objects, the higher the quality of the SITM results.
	P5b: The more management-oriented the results of data analysis are presented, the higher the probability that results are actually used in the subsequent strategic planning.
	<i>Contextual factors:</i>
	P6: The higher the degree of top management support, the higher the impact of the data collection results on the quality of SITBM results.
	P7: The higher the level of previous benchmarking experience, the higher the likelihood of achieving SITBM success.
	P8: Involvement of relevant stakeholders positively influences the acceptance of the SITBM results.
	P9: The higher the fear of sharing information, the lower the quality of the SITBM results.
	P10: The higher the resistance to change, the lower the SITBM success.
	P11: The more participative stakeholders' project-related behavior, the higher the satisfaction with the SITBM results.
	P12: The better the IT strategy process integration, the higher the SITBM success.

knowledge of the activities necessary to design respective artifacts is fragmented (e.g., [30,21]). Several instruments for benchmarking are available in practice. However, the ongoing discussions in practice and research regarding the validity of these existing benchmarking instruments indicate that much effort has to be made to study the development of valuable instruments for SITBM.

Another field that remains open for future research is the SITBM project category. Researchers have a good understanding of various tools and techniques to perform data collection and analysis, particularly concerning the data analysis phase. By contrast, most of the success factors for SITBM currently identified by previous research do bypass the project phase. In this regard, publications focus on aspects that precede the actual project (e.g., planning process integration, assuring top management support, fear of sharing information, choice of a sound methodology). However, few findings indicate that significant effects toward SITBM success are triggered during the data collection phase (e.g., [96,74]). These findings seem even more relevant in light of IT management and project management research that stresses the relevance of linking antecedent factors and the project success dimension through group- or individual-level concepts (i.e., the individuals acting in a project) (e.g., [37,95,97]). For example, an increasing number of project management researchers transfer concepts from work motivation (e.g., [15,47,59]) to project management research to better understand how individuals can be committed to a course of action also beyond the boundaries of a single project (e.g., [33,44,56]). We feel that future SITBM research could benefit from incorporating these concepts because it is important to sustain the results for benchmarking projects.

Looking at the result perspective (i.e., the transition between the SITBM project and SITBM success in Fig. 3), we find that

research does not yet provide definite answers as to how and under what conditions the results are transformed into actual outcomes (i.e., initiated improvement initiatives). For long, researchers considered improved quality of the benchmarking results as the most important antecedent of SITBM success. However, since the turn of the millennium, this position has relativized. Researchers started investigating the result perspective beyond quality and introduced concepts such as satisfaction and acceptance of results. Nevertheless, findings are vague or “inconsistent. For example, researchers investigating the overall satisfaction with the output obtained contradictory results regarding its relevance [69,74]. Furthermore, with regard to acceptance of benchmarking results, we found that researchers are still speculating on its formation and effects [42,67,54]. Building upon suggestions of few benchmarking authors (e.g., [69,96]) and findings from IT management (e.g., [20,64,75]), we hold that the investigation of satisfaction with and acceptance of benchmarking results seems to be a promising route toward a better understanding of successful SITBM. Researchers may particularly explore how both concepts differ in their effects and if one of them has a stronger impact on success than the other.

Beyond these aspects concerning benchmarking results, few researchers have started to address the phenomenon of failing transformation by investigating SITBM success holistically. In doing so, they have uncovered a variety of new concepts, which are, however, mostly on a conceptual level, yet, and require more research as well as empirical grounding (e.g., [96,67]). Nevertheless, the findings suggest that our concept relationship map (Fig. 3) is not yet complete: Additional concepts may emerge and the existing concepts may have to be split or merged.

Regarding contextual factors that influence the success of SITBM, we identified two promising avenues for future investigation. First,

Table 8

Research on SITBM success: status and future research opportunities.

Field of research	State of discussion	Future research opportunities
1. SITBM processes	<ul style="list-style-type: none"> Vast amount of research on process models Focus of process models is on preparing benchmarking and analysis techniques 	<ul style="list-style-type: none"> Include prescriptions related to behavioral aspects of benchmarking processes Move one step forward by not only describing which activities have to be performed (i.e., what), but also how they have to be performed
2. SITBM instruments	<ul style="list-style-type: none"> Few publications on the design of instruments Instruments are criticized for lacking quality 	<ul style="list-style-type: none"> Conceptualization and development of instruments or artifacts for SITBM
3. SITBM project	<ul style="list-style-type: none"> Good understanding of various tools and techniques to perform data collection and analysis Data collection has received less attention than data analysis Current success factors (and respective propositions) for SITBM do not link to the project phase, but mainly focus on aspects preceding the actual project In the data collection phase, it is indicated that significant effects toward SITBM success are triggered No group or individual-level concepts have been discussed by prior benchmarking research – in project management research, such concepts link antecedent factors with success 	<ul style="list-style-type: none"> Put more effort on understanding the psychological effects of the data collection and analysis phases beyond tools and techniques Investigate the social dynamics of the project phase (i.e., group- and individual-level concepts) Transfer knowledge from research on strategic IT management, project management, or commitment and work motivation to understand these social dynamics
4. SITBM results	<ul style="list-style-type: none"> SITBM results of higher quality do lead to success with higher probability Researchers started investigating the result perspective beyond quality and introduced concepts such as satisfaction and acceptance of results Findings on the role of result acceptance or satisfaction are still vague or inconsistent 	<ul style="list-style-type: none"> Investigate the effects of satisfaction and acceptance of results toward successful SITBM Contrasting the impact of quality, acceptance, and satisfaction with SITBM results to determine if one of these concepts may overcome the challenge of transforming results into improvement initiatives
5. SITBM success	<ul style="list-style-type: none"> Successful SITBM results in further initiatives The transformation of the results into such initiatives does not always work in practice Researchers have only recently started to address the phenomenon of failing transformation First attempts to better understand the transformation are still on a conceptual level 	<ul style="list-style-type: none"> Search for further uncovered factors that influence SITBM success and explore their effects Test and evaluate the effects of various success factors on an SITBM project
6. Stakeholder involvement during benchmarking process	<ul style="list-style-type: none"> Involvement is positively associated with the success of strategic initiatives and benchmarking Involvement seems to trigger various (psychological) effects toward SITBM success Research on the forms and effects of stakeholder involvement in benchmarking is still in an early phase 	<ul style="list-style-type: none"> Develop different role and cooperation models for SITBM Explore the effects of different kinds of involvement in a SITBM project as a whole and on its success Investigate the relation to the project-related behavior of the stakeholders (see also next)
7. Project-related behavior of stakeholders	<ul style="list-style-type: none"> Nature of interaction of team members seems to influence the progress of the project and overall satisfaction with the project output There is not yet a consistent body of knowledge on behavioral aspects 	<ul style="list-style-type: none"> Investigate how different identified behavioral aspects have an impact on progress of the project and perception of the SITBM results Consolidate the various suggested concepts

previous studies have concluded that stakeholder involvement is positively associated with the success of strategic initiatives and benchmarking (e.g., [37,7,63]). However, we can only speculate on the mode of involvement, and how strong this involvement should be during which phases of the benchmarking. Consequently, future research should not only explore the effects of different kinds of involvement in a SITBM project, but also develop different role and cooperation models for SITBM. Another interesting field of research could be to investigate the linkage between stakeholder involvement and stakeholder communication and interaction during a SITBM. While both concepts have been treated relatively independent from each other in previous research (e.g., [85,74,39]), it seems reasonable that they are at least related to each other. We identified the behavior of the stakeholders as also the second promising research avenue with regard to the contextual factor category. As of now, various different concepts regarding behavioral aspects have been proposed and explored by previous researchers. However, different parts of this research are rather fragmented; there is not yet a consistent body of knowledge. Consequently, future researchers may want to put more effort in investigating how, for example, directness and quantity of communication between the project stakeholders influence progress of the project and perception of the SITBM results. Further, the different suggested concepts may have to be consolidated and their underlying “conceptual essence” extracted.

Table 8 provides a summary of these proposed opportunities for future research and compares them to the current state of the respective discussion in SITBM research.

7. Summary

In this paper, we performed a literature analysis on the concept of SITBM success. We found that traditional process models for benchmarking focus on hard methodological factors and tend to neglect the soft contextual ones. We addressed this gap by suggesting a concept relationship map that not only incorporates these hard factors into the benchmarking process, but also provides guidance on the effects of soft aspects. In doing so, we contribute to research and foster a comprehensive understanding by synthesizing the existing SITBM literature. Moreover, we provide a conceptual model of SITBM success and derive a set of propositions from it. We also shed light on the as-yet-unanswered question of how an SITBM output is transformed into an outcome. Together with future research weaving together the as yet incomplete nomological net we propose through our proposition, our work can thus lay the foundations for a theory of SITBM success.

Bearing these contributions in mind, it is also important to mention our study's limitations. First, the literature search and classification process involved might be biased owing to our choice of keywords and the focus on domain-specific and top IS journals, as well as the subjective interpretations and preferences that influenced paper selection and classification. Thus, we cannot rule out that some publications that other researchers may deem as relevant were not considered here. We also decided to intentionally exclude some related studies such as (strategic) performance measurement or competitive intelligence in order to keep the amount of research investigated focused and manageable. Therefore,

we would encourage researchers to include these aspects in future studies. Second, we have not included the analysis of ontological and methodological constituents of benchmarking. Hence, we cannot rule out that some links between the concepts in our concept relationship map would be different, if ontological and methodological assumptions of the different authors were analyzed in depth. We believe that a more in-depth analysis of these aspects is a promising avenue for future research. While a few authors have already made attempts in this direction (e.g., [67,51]), their findings suggest that past researchers are often silent on their ontological and methodological positions. Consequently, we encourage future researchers to perform a thorough investigation of this topic using a substantial ontological and epistemological framing. Further, future researchers may also want to reflect our findings in the light of emerging or changing IT practitioner dispositions. Given that the publications our synthesis is based upon are often also silent on this issue, including it here would be beyond the scope of what our review is able to achieve. Hence, in our analysis, we do not analyze how and why practitioners may choose a specific SITBM setup or how and why specific contextual factors develop before and during the benchmarking. Nonetheless, future research should also investigate assumptions and predispositions of relevant actors involved in the benchmarking, as these may have nuanced, complex, and conceptual effects on the overall course and success of an SITBM. Despite these limitations, we believe that our insights build upon a sound theoretical grounding and that we did not overlook critical aspects. We believe that future researchers and practitioners will benefit from our work in sustaining and further developing SITBM in organizations.

Appendix A

A.1. Descriptive analysis

We used a classification scheme that builds on the classification scheme of other reviews in the information system (IS) field

[90,105]. For classification of the papers, we first studied the abstracts to identify the object of analysis and then analyzed the remainder of the paper to determine the unit of analysis, research method, and processes of data collection and analysis. Not all classification criteria applied to all publications. In these cases, we used 'n/a' (not applicable). An overview of the analysis results is given in Fig. A1.

Classification of the publications with respect to object of analysis revealed that most publications deal with benchmarking methodology and strategic IS planning (28 publications), while only eight deal with benchmarking success. Similarly, only a few publications deal with IT benchmarking or IT/IS evaluation (12 publications). Of the 21 publications in the IT management domain, only four papers specifically investigate the content of IT/IS strategy (others focus on IT/IS evaluation and the IT/IS strategy process). However, many authors concerned with strategy processes in IT organizations implicitly address questions of IT/IS strategy content. The smallest portion of the selected publications deals with the analysis of the adoption of benchmarking in different industries or organizational units.

The majority of the selected publications analyze phenomena at organizational or project level (27 and 19 publications, respectively). Publications that address the organizational level predominantly focus on either the impact of benchmarking on organizational improvements or that of an IT organization's strategy processes on the resulting IT strategy (i.e., the *what*). Concerning the project level, researchers mainly address the steps involved in benchmarking or strategic planning, and potentially also contingency factors that influence the course of these undertakings (i.e., the *how*). A few publications focus on the development or application of artifacts (either in a benchmarking or IT management context). Concerning the individual level (i.e., the individuals acting in a benchmarking or strategy project), no papers were identified.

Fig. A1. Classification of identified publications.

We identified a fairly balanced methodological mix in the selected literature. The largest portion of papers used empirical research approaches to address their research objectives with single case and survey research is the most adopted empirical approaches. We also identified a remarkable number of conceptual studies. Apart from these, several works used mathematical modeling, design science, action research, or other qualitative approaches involving Delphi studies or focus groups.

Interviews and questionnaires represent the dominant data gathering techniques in our literature pool. However, observations are also used recently. Few studies use focus groups, documents, or Delphi studies as data sources. Regarding data analysis, many

papers used exploratory analysis techniques such as exploratory factor and cluster analysis or exploratory qualitative analysis techniques. We also identified six publications that employed descriptive analysis techniques, while 11 publications did not provide any information on their data analysis approach. Only three papers used regression analysis, while other techniques such as structural equation modeling or variance analysis are under-represented in the sample.

A.2. Classification of identified papers

Table A1

Classification of selected literature concerning object and unit of analysis.

	BM Adoption	(Strategic) BM Methodology	IT Benchmarking	BM Success	IS Evaluation	IS Strategy	Strategic IS Planning	Organization	Project	Artifact
Adebanjo et al. [1]	x							x		
Ahmed and Rafiq [2]		x								x
Alshawaf et al. [3]			x							x
Alshawfi et al. [4]			x					x		
Anand and Kodali [5]		x							x	
Bhutta and Huq [7]		x							x	
Camp [9]		x							x	
Carpinetti and de Melo [10]		x							x	
Chang and King [11]					x					x
Chen et al. [13]						x				x
Chen [12]		x						x		
Clayton and Luchs [14]		x						x		
Cragg [17]			x							x
Doherty et al. [20]							x	x		
Dong et al. [21]			x							x
Drew [22]				x				x		
Earl [23]							x	x		
Elmuti and Kathawala [26]				x					x	
Elnathan et al. [27]				x				x		
Fitoussi and Gurbaxani [29]		x						x		
Fuerstenau [30]		x								x
Galliers [31]						x		x		
Gleich et al. [35]		x							x	
Gregory et al. [37]						x		x		
Hinton et al. [39]	x							x		
Hong et al. [42]	x							x		
Kardaras and Karakostas [45]							x	x		
Kerschbaum et al. [46]		x								x
Krcmar [48]			x					x		
Kütz (2009)					x			x		
Lacity and Hirschheim [52]				x				x		
Lederer and Sethi [53]							x	x		
Legner [55]		x							x	
Lin et al. [58]					x			x		
Maleyeff [62]		x							x	
Mentzas [63]							x		x	
Mocker and Teubner [66]						x				x
Moriarty and Smallman [67]		x							x	
Müller et al. [68]							x		x	
Müller et al. [69]				x					x	
Newkirk et al. [70]							x	x		
Ohinata [71]				x					x	
Panagiotou [72]		x						x		
Ramabadrán et al. [74]				x					x	
Rehäuser [76]		x							x	
Riemp et al. [78]						x		x		
Ruohonen [80]							x	x		
Saunders and Jones [81]						x		x		
Segars and Grover [83]							x	x		
Serafeimides and Smithson [85]						x			x	
Smith and McKeen [86]						x		x		
Ward and Peppard [92]							x	x		
Watson [93]		x							x	
Williams et al. [96]				x					x	
Zairi [101]		x							x	

Table A2

Classification of selected literature concerning research methods.

	Case Research (single / multiple)	Conceptual Research	Survey	Mathematical Model	Other qualitative approaches	Design Science	Action Research	Commentary	Delphi Study	Documents	Focus Groups	Interviews	Observation	Questionnaire	No Information	Cluster Analysis	Descriptive Analysis	Factor Analysis	Qualitative Analysis	Regression Analysis	No Information	Other
Adebanjo et al. [1]			x											x			x					
Ahmed and Rafiq [2]		x																				
Alshawaf et al. [3]					x							x						x				
Alshawfi et al. [4]								x														
Anand and Kodali [5]		x																				
Bhutta and Huq [7]	x														x							x
Camp [9]	x														x							x
Carpinetti and de Melo [10]	x														x							x
Chang and King [11]			x										x					x				
Chen et al. [13]			x											x				x				
Chen [12]	x														x							x
Clayton and Luchs [14]	x														x							x
Cragg [17]	x											x							x			
Doherty et al. [20]			x											x								
Dong et al. [21]				x																		
Drew [22]			x											x								
Earl [23]	x											x							x			
Elmuti and Kathawala [26]		x																				
Elnathan et al. [27]		x																				
Fitoussi and Gurbaxani [29]			x	x									x					x				x
Fuerstenau [30]						x									x						x	
Galliers [31]		x																				
Gleich et al. [35]							x														x	
Gregory et al. [37]	x								x			x	x						x			
Hinton et al. [39]			x											x				x				
Kardaras and Karakostas [45]		x																				
Kerschbaum et al. [46]				x																		
Krcmar [48]		x																				
Kütz (2009)		x																				
Lacity and Hirschheim [52]	x											x							x			

Table A2 (Continued)

[illegible]

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