

Management control for process orientation: a systematic literature review of configurations and packages

Management
control for
process
orientation

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Received 28 November 2021
Revised 25 June 2022
3 December 2022
25 March 2023
Accepted 1 May 2023

Abstract

Purpose – Process orientation is important for improving organizational performance. The process view is considered a key enabler of digital transformation, and thus management control systems (MCS) are expected to incorporate this view. However, the existing body of knowledge is fragmented, as different process approaches are often considered independently following a reductionist view of control practices. This paper aims to provide recommendations for further research as well as guidance for practice by a systematic review of the state of research of MC for process orientation. It is based on both a comprehensive view to MC using an MCS package approach and a comprehensive view of process orientation.

Design/methodology/approach – A systematic literature review addressing major types of process orientation approaches was performed by applying the comprehensive MC framework of Malmi and Brown. The results were synthesized and propositions were developed.

Findings – All components of the MC framework, as well as MCS packages, are highly relevant for process orientation. Propositions regarding configurations of MC for process orientation show directions for future research. However, comprehensive considerations of packages and of individual components, especially cultural controls, remain scarce in the literature.

Originality/value – To the best of the authors' knowledge, this paper is the first of its kind to provide a comprehensive, structured overview of MC for process orientation, applying a nonreductionist view, based on an MCS Package approach, and consolidating the so far fragmented view of different process approaches.

Keywords Management control systems, MCS package, Process orientation, Horizontal organization, Lean, WCM, BPM, Literature review

Paper type Literature review

1. Introduction

Process orientation is key for innovative manufacturing approaches (Xu *et al.*, 2018) and the basis of service unit automation (Huang and Vasarhelyi, 2019). Consequently, the process view of organizations has attracted increasing attention in practice and research, in which “a central emerging theme is a focus on how organizations integrate activities across the value chain to support strategy that is customer-focused” (Chenhall, 2008, p. 518). Multiple



definitions of process orientation have emerged. Although some researchers emphasize the organizational component and refer to “internal or external hybrid” (Berry *et al.*, 2009), the term “process management” dominates in practitioner-oriented publications (Hammer, 2010). Early research regarding process topics originated in the context of world class manufacturing (WCM) (Ittner and Larcker, 1995; Chenhall, 1997). The lean concept emerged from WCM and was subsequently considered in process research (Kennedy and Widener, 2008). Later, horizontal organization (HO), an integrative approach (Chenhall and Moers, 2015), and the more general term “process orientation” (Kohlbacher, 2010) were introduced. We will use the term process orientation in this literature review.

The state of accumulated knowledge to date from literature suggests an important role of management control (MC) in process orientation (Hansen and Mouritsen, 2007). Recently, there has been increased interest in understanding the application of MCS in specific processes, such as new product development (Müller-Stewens *et al.*, 2020; Munck *et al.*, 2020; Pan Fagerlin and Löfstäl, 2020). Fulfilling the requirements for MC of this process requires appropriately designed MCS (Müller-Stewens *et al.*, 2020).

The relationship between process orientation and MC has been analyzed in management accounting research (Arai, 2021; Donnelly *et al.*, 2021; Grasso and Tyson, 2021; Chenhall and Moers, 2015; Fullerton *et al.*, 2013; Ferreira and Otley, 2009; Berry *et al.*, 2009; Chenhall, 2008). Publications in disciplines such as operations (Bellisario and Pavlov, 2018; Fullerton *et al.*, 2014), quality management (Eldridge *et al.*, 2014) and business process management (BPM) (Abeygunasekera *et al.*, 2018) also address this topic. However, there is a significant gap of knowledge. Specifically, there are two fundamental topics with need for further research: First, most of the publications focus on selected MC practices, i.e. a reductionist view is applied, and further relevant MC practices are not considered (Kastberg and Siverbo, 2013). It is mostly ignored how in a specific organization MC for processes, incorporating all MC practices, is configured. Publications with more comprehensive approaches are very limited and often refer to specific process approaches, limiting the generalization of the findings. From this arises the second topic in need of research. Previous studies generally focus on a single process orientation approach (e.g. lean) and do not consider the state of research on other process approaches. Calls for further research highlight the limitations of previous work (Ferreira and Otley, 2009). These calls also emphasize the importance of further research on MCS in horizontal organizational settings (Chenhall and Moers, 2015). The current literature confirms important fields in need of further research within the MCS for process context (Pan Fagerlin and Löfstäl, 2020; Arai, 2021) and also more general within the organizational context (Merchant and Otley, 2020).

Building up on this, the goal of this paper is to synthesize the current literature regarding MC and process orientation applying a comprehensive MC framework. Further, this paper’s synthesis incorporates all important process orientation approaches. For this purpose, a systematic review of the relevant academic literature is conducted. Literature reviews are essential for developing theory and for focusing on relevant areas of research (Webster and Watson, 2002). Here, we use a descriptive approach that relies on an existing MCS package framework for categorization and analysis. Based on the review, we develop a research framework for MCS packages for process orientation. The review seeks to answer three main questions:

- RQ1. What is the existing evidence base regarding MCS packages for organizations with a focus on process orientation?
- RQ2. Which MCS package components are used in organizations with a focus on process orientation?

RQ3. What is the relationship between the use of MCS as a package for process orientation and performance?

We contribute to the literature in several ways. First, we respond to the requests for further research on MC of processes (Ferreira and Otley, 2009; Chenhall and Moers, 2015; Donnelly *et al.*, 2021) by analyzing the present state in the MCS literature related to process orientation. Thereby, we provide a comprehensive, structured overview of MC for process orientation, applying a nonreductionist view based on an MCS Package approach. Furthermore, we consolidate the fragmented views of different process approaches in literature. To our best knowledge, this paper is the first to provide such an integrating view. Second, we identify areas that require further research and propose a research framework. Third, we answer to the request of Malmi and Brown (2008) and Bedford (2020) for further research on the configuration of MCS packages and on the relationships between MCS within such packages.

In Section 2, we provide the theoretical foundation and define the underlying concept of the literature review. Section 3 describes the methodology and is followed by the presentation of the results in Section 4. In Section 5, we discuss the findings and directions for future research. Section 6 concludes this study.

2. Theoretical and conceptual foundation

2.1 Concepts of process orientation

A process is defined as “an organized group of related activities that together create a result of value to customers” (Hammer, 2001, p. 53). The focus on processes in management has a long tradition originating in the production management approaches of Frederick Taylor and Henry Ford. A variety of approaches have been developed and used in practice (Armistead *et al.*, 1999). Definitions for these approaches are manifold, often varying and sometimes overlapping. These approaches can be allocated to different streams: European Foundation for Quality Management, total quality management (TQM) (Juran and Godfrey, 1998), business process reengineering (Hammer, 2010), six sigma (Pande and Neuman, 2005), WCM (Schonberger, 1996), lean management (Womack and Jones, 2003), BPM (Vom Brocke and Rosemann, 2010), horizontal organization (Ostroff, 1999) and team orientation (Ezzamel and Willmott, 1998).

In this review, we focus on process approaches that are associated with MC and allow an organization to design, model, execute, monitor and optimize processes in an ongoing way. Therefore, optimization methods such as business process reengineering and six sigma are excluded from our analysis. In addition, quality approaches focused solely on assessment are not considered. Thus, we consider process orientation/process organization/horizontal organization, WCM (including, e.g. TQM), lean management, BPM and team/lateral. The key characteristics of the selected process orientation concepts are summarized in Figure 1.

2.1.1 Process orientation/process organization/horizontal organization (HO). Horizontal organization is an organizational form that is characterized by a horizontal, process-oriented view of a company (Chenhall, 2008). Key principles include organization around cross-functional core processes, process owners who will take responsibility for the core process in its entirety, the application of teams, the use of IT to deliver the value proposition to the customer, the measurement of end-to-end performance and a corporate culture that focuses on continuous improvement. Applying these principles can significantly improve the coordination of all participants and thus allow the organization to increase its focus on the delivery of value to customers (Ostroff, 1999). The concept of a horizontal organization was

Process approach / Key features	Process Orientation/ Process Organization/ Horizontal Organization	World Class Manufacturing (WCM)	Lean-Management	Business Process Management (BPM)	Team/ Lateral
Industry	cross-industry	manufacturing	manufacturing/ cross-industry	cross-industry	cross-industry
Scope	management of (core) processes	ongoing optimization	reduction of waste	management of processes	alignment of units/work across units
Approach	top down process view	combination of methods/ principles	philosophy/ often optimization	process view (often bottom up)	philosophy/ method

Figure 1. Key characteristics of the selected process orientation concepts

Source: Authors' own creation

originally described by [Ostroff \(1999\)](#) and [Ostroff and Smith \(1992\)](#). We also allocate to this category of the literature papers that address process orientation and process organization topics ([Kastberg and Siverbo, 2013](#); [Kohlbacher and Gruenwald, 2011](#); [Škrinjar and Trkman, 2013](#)), as these authors' understanding of process orientation is similar to that of [Ostroff \(1999\)](#). The concept of "process orientation" has been defined and used by several authors ([Kohlbacher and Gruenwald, 2011](#)).

2.1.2 World class manufacturing. WCM was defined by [Schonberger \(1996\)](#) and is an umbrella term for different organizational approaches that have the common objective of optimizing manufacturing units. WCM emphasizes industrial production. Several other approaches, such as TQM, just-in-time (JIT) and lean, are subsumed under the concept of WCM. Many of these approaches originated in Japan and were transferred to Western countries. Although the term "process" is not in the foreground, most of these approaches are based on a process view. Among the different approaches included in WCM, "lean" has become very popular, even in nonmanufacturing units ([LaGanga, 2011](#)). Consequently, we will discuss lean management as a separate category of process orientation.

2.1.3 Lean management. Lean management dates to the Toyota Production System introduced in the 1950s, which was analyzed in Western publications ([Womack and Jones, 2003](#)). It was popularized under the name "lean" and is now also applied in administration and the service industry. Although not immediately obvious, lean is a process-focused approach ([Grasso, 2005](#)).

2.1.4 Business process management. BPM encompasses several processual approaches with different definitions ([Houy et al., 2010](#)). The core of BPM is a tool-based approach, in contrast to the focus on the organization in the horizontal organization. IT-driven tools such as process modeling software, process KPIs and workflow engines are important components of BPM. However, this approach shifts toward horizontal organization as the focus on organizational aspects increases.

2.1.5 Team/lateral. The team/lateral process orientation literature encompasses papers investigating lateral relationships within an organization and/or specifically dedicated to teams. Lateral relationships are highly relevant for process orientation, as the process view is a specific lateral mechanism. Team-based approaches ([Ezzamel and Willmott, 1998](#)) are

also relevant as another form of lateral mechanism. [Ostroff \(1999\)](#) explicitly described the importance of teams for the horizontal organization.

2.2 Management control systems

Management control systems (MCS) have been defined in divergent yet overlapping ways. Starting with the fundamental works of Walker ([Zeff, 2008](#)) and [Anthony \(1965\)](#), the term MCS has referred to systems for effectively and efficiently obtaining and using resources to accomplish the organization's objectives. Subsequent works by various authors further advanced the definition and meaning of MCS. The term "management accounting" is similar in meaning to MC and is mainly used by American accounting scholars ([Strauss and Zecher, 2013](#)).

This field of research initially focused on individual MC practices, but eventually two quite independent literature streams addressing MC as a system (MCS) or MCS as a package evolved. An MCS package comprises the complete set of control practices, regardless of any interdependencies. The goal of studying MCS as a package is to provide a holistic view of the use of MCS practices. By contrast, studies of MC as a system consider practices that are interdependent and design choices that take these interdependencies into account. This also means that an MCS package can be composed of a set of MCS plus additional MC practices ([Grabner and Moers, 2013](#)). While some authors recommend adopting an MCS approach before addressing the entire control package of an organization ([Grabner and Moers, 2013](#)), others prefer starting with an MCS package approach, especially when there is little empirical or theoretical knowledge ([Bedford et al., 2016](#)).

For the purposes of this systematic literature review, we require an MCS framework as a basis to synthesize the state of research. The MCS framework must fulfill several key requirements. First, the focus should be on a complete set of MC practices rather than individual MC practices, i.e. a nonreductionist approach should be adopted, as supported by previous research ([Kastberg and Siverbo, 2013](#)). Second, although the interdependencies of specific MC practices are relevant, initially the entire process control environment should be prioritized. Third, a broad scope of controls should be taken into consideration. While much control-related research is focused on accounting-based controls, other controls, e.g. cultural controls, are also relevant. A broad perspective is especially important for studying processes ([Pan Fagerlin and Löfstäl, 2020](#)). For example, the horizontal organization concept emphasizes culture ([Ostroff, 1999](#)). Several frameworks are described in the literature, with two of them allowing comprehensive considerations and taking culture into account ([Strauss and Zecher, 2013](#)), the performance management system by [Broadbent and Laughlin \(2009\)](#) and the MCS package approach by [Malmi and Brown \(2008\)](#).

For this literature review we chose the framework of [Malmi and Brown \(2008\)](#), as all requirements are fulfilled and key characteristics such as a broad understanding of MC, the definition of different control approaches such as cybernetic, cultural and administrative controls as well as a correspondence to [Simons \(1995\)](#) lever of control approach ([Strauss and Zecher, 2013](#)) fit well with our intention.

Malmi and Brown defined MCs as practices, values and other features put in place by management to direct employee behavior. They subsequently labeled individual MCs as MC practices ([Bedford et al., 2016](#)), a definition also used in this paper. Accordingly, [Malmi and Brown \(2008, p. 291\)](#) proposed a conceptual framework for MCS packages that "provides a sufficiently broad, yet parsimonious, approach for studying the phenomenon empirically." Their framework consists of five types of controls (i.e. MCS package components): planning, cybernetic, rewards and compensation, administrative and cultural controls ([Figure 2](#)).

Planning establishes goals as an *ex ante* form of control and focuses on nonfinancial plans. Cybernetic controls comprise budgets and financial/nonfinancial/hybrid measurement systems. Rewards and compensation are another type of control in the framework. Regarding administrative controls, Malmi and Brown (2008) explicitly mentioned the horizontal effects of governance. Also, organizational structure is defined as an administrative control, as it can be changed by management. Processes and standard operating procedures are mentioned as an example for policies and procedures. Finally, cultural controls complete the framework as broad yet subtle controls.

Various theoretical approaches have been used in MCS research to date (Strauss and Zecher, 2013), with contingency theory being important and much used (Merchant and Otley, 2020). Here, we apply an MCS Package approach and thus the theoretical foundation is configuration theory (Bedford and Malmi, 2015; Bedford et al., 2016; Bedford, 2020). The configuration approach builds on contingency theory. But instead of abstracting on a limited set of topics of interests, configuration theory is focused on synthesizing broad patterns and grounding past gains into descriptions (Meyer et al., 1993). Applied to our topic, this means that we structure the existing literature using the MCS package framework, present the current state of research and derived from this, present propositions that have the character of patterns in the sense of configuration theory.

2.3 Previous reviews of the relationship between process orientation and management control

In addition to brief review sections in some of the papers analyzed in the present review (Kastberg and Siverbo, 2013; Fullerton et al., 2013), previous literature reviews have addressed process orientation and MC (Table 1). However, only the review by Bellisario and Pavlov (2018) comprehensively considered an MCS package for process orientation. Bellisario and Pavlov applied the PMS framework of Ferreira and Otley to conduct a systematic review of research on performance management in lean manufacturing organizations. Although they restricted their focus to research on lean and 84% of their sources were from an operations management background, the framework they applied includes MCS components similar to those in Malmi and Brown’s model. One of their main findings is that key practices are located at the operational level.

Cultural Controls						
Clans		Values			Symbols	
Planning		Cybernetic Controls				Reward and Compensation
Long range planning	Action planning	Budgets	Financial Measurement Systems	Non-Financial Measurement Systems	Hybrid Measurement Systems	
Administrative Controls						
Governance Structure		Organization Structure			Policies and Procedures	

Figure 2. MCS package framework of Malmi and Brown

Source: Malmi and Brown (2008, p. 291)

Author	Publication	Journal	Key findings
Bellisario, A. Pavlov, A.	Performance management practices in lean manufacturing organizations: a systematic review of research evidence	<i>Production Planning and Control (2018)</i>	Systematic review of research regarding performance management in lean manufacturing organizations using a PMS framework. Key practices are located at operational level
Abeygunasekera, A. W.J.C. Bandara, W. Wynn, M. Yigitbasioglu, O.	Nexus between business process management (BPM) and accounting A literature review and future research directions	<i>Business Process Management Journal (2018)</i>	Dearth of work that ties the disciplines of BPM and accounting. The focus of the literature reviewed is primarily on performance measurement
Chenhall, R.H. Moers, F.	The role of innovation in the evolution of management accounting and its integration into management control	<i>Accounting, Organizations and Society (2015)</i>	Overview regarding recent developments in this topic (e.g. general theorizing regarding how a MCS might operate within horizontal organizations that aim to ensure innovation)
Choong, K.K.	Are PMS meeting the measurement needs of BPM? A literature review	<i>Business Process Management Journal (2013)</i>	PMS has failed to fulfill the measurement requirements of BPM
Yadav, N. Sagar, M.	Performance measurement and management frameworks: Research trends of the last two decades	<i>Business Process Management Journal (2013)</i>	Trends in performance measurement
Sinnl, T. vom Brocke, J.	Culture in business process management: a literature review	<i>Business Process Management Journal (2011)</i>	Culture is still a widely under-researched topic in BPM
Sanchez Gonzalez, L. Ruiz Gonzalez, F. Piattini Velthuis, M.	Measurement in business processes: a systematic review	<i>Business Process Management Journal (2010)</i>	Only a small percentage of the existing business process measures have been empirically validated
Berry, A.J. Coad, A. F. Harris, E.P. Otley, D.T. Stringer, C. Chenhall, R.H.	Emerging themes in management control: A review of recent literature Accounting for the horizontal organization: A review essay	<i>The British Accounting Review (2009)</i> <i>Accounting, Organizations and Society (2008)</i>	Interaction with traditional MCS important. More research needed Overview regarding relevance and current status of research. Management accounting innovations have not had any significant effects on Horizontal Organization
van Veen-Dirks, P.	Management control and the production environment: A review	<i>International Journal of Production Economics (2005)</i>	Limited and inconclusive evidence on the extent to which organizations have aligned MCS with the production environment
Chenhall, R.H.	Management control systems design within its organizational context: findings from contingency-based research and directions for the future	<i>Accounting, Organizations and Society (2003)</i>	Importance to analyze horizontal links

Source: Authors' own creation

Table 1.
Previous literature
reviews

Other reviews considered partial aspects of MCS packages for process orientation. [Chenhall \(2003\)](#) analyzed the findings of contingency-based studies that derived propositions relating MCS to the organizational context. Regarding processes, he analyzed MCS, WCM and organizational structures (e.g. organic/mechanistic structures). In a later essay, Chenhall outlined the relevance and status of research on accounting for horizontal organization ([Chenhall, 2008](#)). [Chenhall and Moers \(2015\)](#) subsequently provided an overview of recent developments on this subject. They emphasized more general theorizing on how MCS might operate within horizontal organizations to ensure innovation. Among other topics, [Berry et al. \(2009\)](#) analyzed the relationship between MCS and new forms of organization:

It is a perspective that has led to calls for management control researchers to pay more attention to lateral relationships, which involve co-operation and coordination amongst managers at similar levels of the hierarchy. ([Berry et al., 2009](#), p. 8)

Several reviews have focused on the cybernetic controls component of MCS packages. [Choong \(2013\)](#) provided a systematic review of the use of performance measurement systems for BPM. A key finding was that these systems fail to fulfill measurement requirements. [Yadav and Sagar \(2013\)](#) also provided an overview of performance measurement. They identified trends, such as the utilization of systems and simulation techniques. A review by [Sánchez González et al. \(2010\)](#) examined measurement and found that only a small percentage of existing business process measures have been validated empirically. Another literature review identified a dearth of work linking the disciplines of BPM and accounting, as the reviewed literature reviewed primarily focused on performance measurement ([Abeygunasekera et al., 2018](#)).

Among reviews of the cultural controls component of MCS, [Sinnl and vom Brocke \(2011\)](#) analyzed research on culture in BPM. Their review “provide[d] evidence that culture is still a widely under-researched topic in BPM” ([Sinnl and vom Brocke, 2011](#), p. 357) and offered a framework on culture’s role in BPM. [Van Veen-Dirks \(2005\)](#) addressed the relationships of elements of the production environment with aspects of MCS and revealed limited and inconclusive evidence on the extent to which organizations align MCS with the production environment.

Overall, previous reviews have paid little attention to MCS packages for process orientation and instead examined specific MCS components or process orientation approaches, with a clear focus on cybernetic controls. Thus, there is a need for a comprehensive review incorporating all process orientation concepts and all types of MCS controls.

3. Method

We conducted a systematic literature review based on the steps described by [Tranfield et al. \(2003\)](#). This method was chosen for three reasons. First, it is a systematic and transparent approach. Second, it has become a standard approach and was used in various review papers on various topic and is highly cited. Third, it was already applied in literature reviews in the field of MC ([Strauss and Zecher, 2013](#)).

To ensure completeness, keywords were comprehensively defined, suitable databases were selected and an additional search based on cross-references was performed. First, a comprehensive keyword setup comprising 16 search combinations was developed. This differentiated but partially overlapping approach (e.g. “management control” and “management accounting”) was designed to ensure completeness. The keywords for “process orientation” were defined based on the underlying process orientation approaches described above. For the keywords for “MCS,” we focused on the terms “management

control” and “management accounting.” Search strings consisted of one keyword for process orientation and one keyword for MCS combined using the syntax <AND>.

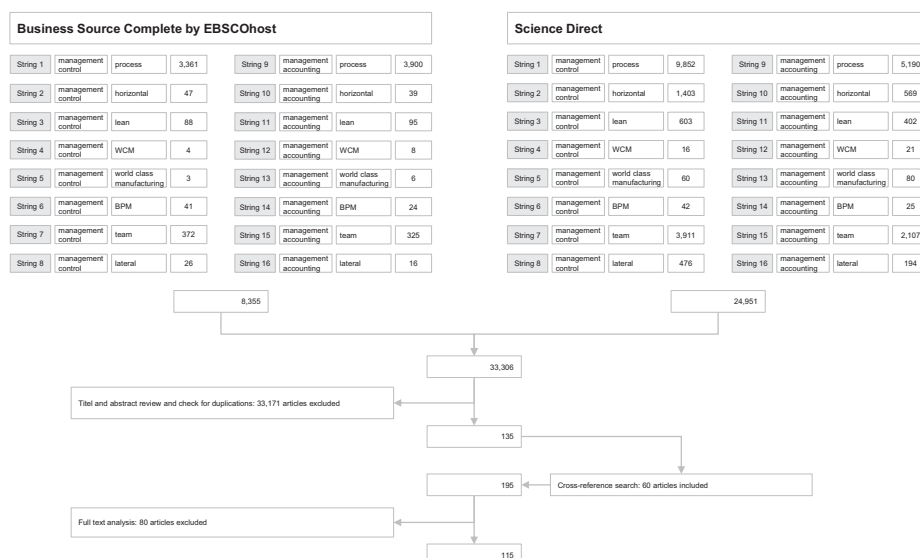
As a suitable database, we selected Science Direct, which the provider describes as the leading platform of peer-reviewed scholarly literature. We also chose Business Source Complete (EBSCOhost), which, according to a statement from the Directory of Open Access Journals (DOAJ) cited on the EBSCO website, generates more referrals to DOAJ than any other online platform.

In the next step, we specified the screening criteria for the database search. We chose a timeframe of 42 years, from 1980 to 2021. The year 1980 was chosen as the starting point because the concept of WCM was first introduced in the literature in the early 1980s. Only articles published in the English language in scholarly (peer-reviewed) academic journals were retained. The entire search procedure is illustrated in [Figure 3](#).

The initial database search returned 33,306 hits. We then excluded duplicates and reviewed the title and abstracts to assess fulfillment of the screening criteria. Papers with a different understanding of process (e.g. process in the understanding of process industry) and papers with no direct focus on process orientation and/or MCS were excluded. This step eliminated 33,171 articles. An additional 60 publications were identified through manual screening of the references of the hits (i.e. cross-referencing).

Full-text analysis of the remaining articles excluded another 80 articles. The remaining 115 articles were categorized by title, author, year of publication, journal, journal ranking, industry, research location, research method, process orientation type, MCS practice(s) covered, applied theory and focus on performance using a data extraction form ([Tranfield et al., 2003](#)). We read all 115 articles in their entirety and used the MCS package framework of [Malmi and Brown \(2008\)](#) as the analytical framework.

We applied the constant comparison technique to identify important topics and concepts within the literature. To synthesize the results, all articles were individually coded for



Source: Authors' own creation

Figure 3. Search procedure

content and analyzed in relation to one another. According to Rowe (2014), synthesizing includes summarizing numerous research findings using a novel interpretation.

4. Results

4.1 Descriptive analysis

The following analysis and discussion are structured according to the framework of Malmi and Brown (2008). Following our research questions, we review and discuss the current state of key topics, summarize the findings in the form of propositions and examine critical issues which also includes the identification of topics requiring further research.

For each article, in addition to basic data such as author(s), year of publication, journal and journal ranking, we list the process approach, the research method applied, the MCS package component(s) considered, the theory applied, and if necessary, the focus on performance [1]. The largest share of papers (37%) originates from a WCM context, followed by papers with a focus on BPM (19%) and lean (16%). Papers from team/lateral and process orientation/process organization/HO account for 15% and 13%, respectively (Table 2).

As WCM is focused on manufacturing, most of the papers deal with manufacturing settings. Although process topics have been discussed for many decades, we found that the first paper was published in the late 1980s. The first peak in the number of published papers occurred in the mid/late 1990s and continued until the mid 2015s. Subsequently, a decline in publications can be observed. However, exclusively in 2021 we identified 5 publications, all from the lean context. While the earliest papers are related to the WCM context, the focus in later years shifts toward other approaches. The application of process orientation has moved beyond manufacturing and is now relevant in most industries. However, we did not find any papers focusing on recent process topics such as robotics process automation or innovative manufacturing approaches based on digital transformation. As these approaches are rapidly increasing in importance for companies (Xu *et al.*, 2018; Huang and Vasarhelyi, 2019), we expected current publications in the context of MCS.

The identified papers were published in 36 journals. Three journals dominated, including two in the field of MC: *Accounting, Organizations and Society* (21), *Management Accounting Research* (16) and *Business Process Management Journal* (16).

Most of the papers analyzed (Table 3) are based on surveys, followed by case studies. Reviews and essays on specific topics are also prevalent (labeled as “other”). A large proportion of surveys are related to WCM, lean and process orientation/process organization/HO.

From the articles considered, 57 specify the underlying theoretical approaches. While in total 29 different theories could be identified, 27 articles are based on contingency theory. Other theories are rarely used. Different industries are considered in the articles, with an emphasis on manufacturing (59 papers), followed by cross-industry. There is a bias in geographical focus toward Anglo-Saxon countries (67 papers).

4.2 Coverage of management control systems package components

First, we examine whether the literature addresses all MCS package components of the framework of Malmi and Brown (2008), including the relevance of each component in the context of process orientation. Our findings show that all MCS package components are covered in the analyzed literature (Table 4). By far, the component with the greatest coverage is cybernetic controls (89 papers), consistent with the literature’s observation regarding the key role of cybernetic controls in MC for process orientation (Kastberg and Siverbo, 2013). Our findings confirm that cybernetic controls are the key control practice in

Contents	1981–1985	1986–1990	1991–1995	1996–2000	2001–2005	2006–2010	2011–2015	2016–2020	2021	Total
Category 1 Process orientation/ process organization/HO	0	1	0	0	1	6	6	1	0	15
Category 2 WCM	0	0	10	13	12	6	1	1	0	43
Category 3 Lean	0	0	0	1	0	3	6	3	5	18
Category 4 BPM	0	0	0	4	4	2	8	4	0	22
Category 5 Team/lateral	0	0	1	5	1	4	6	0	0	17
Total	0	1	11	23	18	21	27	9	5	115

Source: Authors' own creation

Management
control for
process
orientation

Table 2.
Process approaches
and year of
publication

all process orientation approaches. In addition, administrative controls are covered in papers from all process approaches, although they are considered less often than cybernetic controls. Compared with cybernetic and administrative controls, cultural controls are significantly underrepresented. This is remarkable, as culture is considered an important element for gaining benefits from process-oriented approaches. Accordingly, [Simml and vom Brocke's \(2011\)](#) call for research on cultural controls remains valid. Few papers consider rewards, and most such articles are part of the WCM context; none focus on horizontal organization. Finally, planning is the subject of only 14 papers.

The following proposition summarizes the research findings relating coverage of MCS package components:

P1. Successful process orientation requires all MCS package components to be applied.

In summary, the included studies confirm the relevance of all MCS package components for process orientation. However, the unequal distribution of publications among the components suggests a need for further research on those MCS package components that have received little or no attention.

4.3 Coverage of management control systems packages

We now examine the extent to which the included papers consider multiple MCS components in the context of a package. Our findings indicate that there is little consideration of comprehensive, four- or five-component MCS packages for process orientation ([Table 5](#)). The few such articles are mainly from a manufacturing context and

Table 3.
Distribution
regarding
methodology

Contents	Survey	Labor. exp.	Field study	Case study	Other	Total
Category 1 Process orientation/ process organization/HO	7	0	0	3	5	15
Category 2 WCM	27	1	1	12	3	44
Category 3 Lean	9	0	0	7	2	18
Category 4 BPM	4	1	2	7	8	22
Category 5 Team/lateral	5	3	2	2	5	17
Total	52	5	5	31	23	116

Note: Multiple methods per publication possible
Source: Authors' own creation

Table 4.
Coverage of MCS
package components

Contents	# of MCS Package components covered in the papers				
	Planning	Cybernetic	Reward	Cultural	Administrative
Category 1 Process orientation/ process organization/HO	5	14	0	3	9
Category 2 WCM	3	33	10	9	15
Category 3 Lean	2	16	5	9	10
Category 4 BPM	4	15	5	3	9
Category 5 Team/lateral	0	11	4	7	4
Total	14	89	24	31	47

Source: Authors' own creation

cover different process orientation approaches. A key finding from these publications is that the successful implementation of process approaches is supported by an MCS package that incorporates four or five components. This insight is mostly the result of case study research (Jazayeri and Hopper, 1999; Kennedy and Widener, 2008; Pan Fagerlin and Löfstål, 2020; Armistead *et al.*, 1999), but the three survey-based papers reach the same conclusion (Grasso and Tyson, 2021; Fullerton and McWatters, 2002; Škrinjar and Trkman, 2013). The case studies and survey-based research include three publications from lean, two each from the WCM and the BPM contexts and one from the process orientation/process organization/HO context. The benefits of MCS packages with multiple components appear to be valid for different process approaches.

A key publication covering all five MCS package components is that of Kennedy and Widener (2008). Building on an *ex-ante* developed framework and its application within a case study, they investigate a comprehensive control framework consisting of all five package components. The framework incorporates lean accounting and control practices resulting from a lean manufacturing initiative. Kennedy and Widener (2008) identify direct relationships between the lean initiative and all MCS package components as well as numerous intervening and bidirectional relationships within the control framework. Two limitations of this paper are worth noting. First, it highlights the special importance of lean accounting practices as a mediator of control practices. However, this finding is limited to the lean context, as traditional accounting practices in the case study company were developed into lean-specific ones, such as value stream costing. Second, it does not consider performance effects.

Other papers confirm the key finding that a comprehensive MCS package positively impacts the application of the specific process approach. Specifically, the findings of Jazayeri and Hopper (1999) regarding the design of a comprehensive control package within a WCM initiative are similar to those of Kennedy and Widener (2008). However, the two studies differ in the design and significance of accounting-based control practices. Jazayeri and Hopper (1999) describe a case in which accounting practices remained unchanged during the introduction of the WCM approach, whereas Kennedy and Widener (2008) consider extensive changes in traditional accounting.

The two case studies from the BPM context not only confirm the importance of comprehensive MCS packages including four or five components but also offer additional findings. The distinctive feature of the article by Armistead *et al.* (1999) is the development of an organizational framework for BPM consisting of, among other elements, the MCS package components planning, cybernetic, cultural and administrative controls. Furthermore, the authors describe interrelations between the components. However, the

Contents		# of package components				
		5	4	3	2	1
Category 1	Process orientation/process organization/HO	0	1	4	5	5
Category 2	WCM	0	2	2	17	22
Category 3	Lean	2	1	5	3	7
Category 4	BPM	1	1	3	1	16
Category 5	Team/lateral	0	0	2	5	10
Total		3	5	16	31	60

Source: Authors' own creation

Table 5.
Distribution of
process approaches
and number of MCS
package components

findings are not based on the continuous analysis of a single case but are derived from multiple cases. In contrast to papers that consider entire process programs of a company, [Pan Fagerlin and Löfvstål \(2020\)](#) refer to a specific case within the product development process. The authors find that both formal and informal control practices are used within the MCS package.

Survey-based studies provide similar results for the relationship between implementation of the respective process approach and application of a comprehensive MCS package ([Grasso and Tyson, 2021](#); [Fullerton and McWatters, 2002](#); [Škrinjar and Trkman, 2013](#)). Unexpectedly, [Fullerton and McWatters \(2002\)](#) find a negative relationship between employee understanding of the firm's overall strategic plan and the degree of JIT implementation. The study by [Škrinjar and Trkman \(2013\)](#) also stands out, as it considers four components with a focus on process orientation/process organization/HO in the banking sector, i.e. a nonmanufacturing industry.

Other articles do not consider four- or five-component MCS packages for process orientation but still provide insights into packages in a process context. Building on [Kennedy and Widener \(2008\)](#), [Fullerton et al. \(2013\)](#) and [Fullerton et al. \(2014\)](#) offer evidence on the relationship between lean manufacturing implementation and MCS package components. [Fullerton et al. \(2014\)](#) document that the extent of lean manufacturing implementation is associated with the use of three lean management accounting practices from one MCS package component (cybernetic) and that these practices are related in a systematic way. Furthermore, the authors conclude that lean manufacturing practices also indirectly affect operations and financial performance through specific lean management accounting practices. An explicit package consisting of cybernetic, administrative and cultural controls is considered by [Kristensen and Israelsen \(2014\)](#), who show that lean is a set of multiple control forms that complement each other within a package to enhance performance. Kristensen and Israelsen provide evidence that increasing the average level of control forms increases performance and that this effect is even greater if the control forms are balanced at the same level, i.e. complementary.

The following proposition summarizes the research findings relating coverage of MCS packages:

- P2. Multiple MCS package components in organization with a focus on processes, working together as a package, are beneficial for the realization of process orientation.*

In summary, previous research shows that there is a relationship between process orientation and the application of comprehensive MCS packages consisting of multiple control components. These MCS packages can include all five components, and all control elements are important for the process approaches. This finding applies not only to lean but also to WCM, BPM and process orientation/process organization/HO, further underscoring the suitability of [Malmi and Brown's \(2008\)](#) MCS package approach for process orientation. However, this stream of the literature remains relatively small, with a maximum of three papers identified for each process approach. The focus on manufacturing and the associated dominance of specific, usually shop-floor-related control mechanisms give rise to very one-sided findings.

4.4 Specific management control systems package components

4.4.1 Cybernetic controls. We first consider cybernetic controls. One key finding is the importance of cybernetic controls within the process context. Three main, partly contradictory findings on the design of cybernetic controls for process orientation are

identified. First, some articles highlight the importance of cybernetic controls without distinguishing between financial and nonfinancial value dimensions (Bronzo *et al.*, 2013; Kohlbacher and Reijers, 2013). Second, other articles explicitly identify both financial and nonfinancial controls (Arai, 2021; Grasso and Tyson, 2021; Fullerton *et al.*, 2013; Netland *et al.*, 2015). Third, a significant number of articles emphasize nonfinancial cybernetic controls as an important design feature (Ittner and Larcker, 1995; Kastberg and Siverbo, 2013; van der Steen and Tillema, 2018).

There may be several reasons for these differences. In the articles that do not differentiate between financial and nonfinancial controls, e.g. Kohlbacher and Reijers (2013), the survey designs focus on measuring process performance; other financial aspects are of secondary importance. By contrast, the papers that highlight both financial and nonfinancial controls, e.g. Arai (2021), explicitly emphasize the importance of specific financial control variables alongside nonfinancial control variables in the context of lean programs. Financially focused practices include lean-specific value stream costing (Fullerton *et al.*, 2013), a mapping of the financial effects of lean measures in the MCS (Netland *et al.*, 2015) or standard costing (Grasso and Tyson, 2021). Finally, the papers that explicitly underline the importance of nonfinancial variables and describe their prominent importance in the respective process orientation approach do not preclude the existence and use of financial variables: “These recommendations do not necessarily imply that firms should de-emphasize traditional management accounting practices when implementing the new systems” (Ittner and Larcker, 1995, p. 3). For example, Kastberg and Siverbo (2013) describe the application of process-focused cybernetic controls in addition to traditional accounting-based controls in hospitals; in both applications, nonfinancial controls provide a foundation for mastering events.

The following propositions summarize the findings related to cybernetic controls:

- P3.1. Nonfinancial performance variables are essential for process focused cybernetic controls.
- P3.2. Specific financial performance variables complement nonfinancial indicators in a process approach.

In summary, the specification of cybernetic controls depends on the particular company context, which may explain the different findings in the literature. For generalization, this topic should be in the focus of further research.

4.4.2 Administrative controls. Administrative controls are less frequently studied in the literature than cybernetic controls, and combinations of the two controls are most prevalent. Papers in this category cover all process orientation topics and consider different forms of administrative control [see Malmi and Brown (2008) for a differentiation of administrative controls in organizational structure, policies/procedures and governance structure]. Some papers consider process ownership, a specific form of organizational design and structure (Bronzo *et al.*, 2013; Kohlbacher and Reijers, 2013; Kastberg and Siverbo, 2013). Policies and procedures are described as another form of administrative controls by Donnelly *et al.* (2021), Soltani *et al.* (2010) and Müller-Stewens *et al.* (2020) and governance principles can also be found (van der Meer-Kooistra and Scapens, 2008; Pan Fagerlin and Löfstål, 2020). Although various types of administrative control are covered in the literature, most papers consider only selected types. Research with a comprehensive focus on this control form is limited to an article by Pan Fagerlin and Löfstål (2020), who consider individual forms of administrative controls such as the assignment of responsibilities, the definition of authority structure and the specification of procedures.

The following propositions summarize the findings on administrative controls:

P4.1. Process ownership fulfills an important task in the MC package.

P4.2. Policies and procedures (e.g. standard operating procedures and clearly structured processes) fulfill an important task in the MC package.

P4.3. Process governance principles fulfill an important task in the MC package.

The existence body of knowledge regarding administrative control practices for process orientation, especially in a comprehensive view, is still very limited.

4.4.3 Rewards. Rewards are seen as important for the successful realization of process orientation approaches (Chenhall, 2003; Ittner and Larcker, 1995; Jazayeri and Hopper, 1999; Fullerton and McWatters, 2002). Several articles find that the reward system is adapted to the goals of the process approach. Some highlight team-based instead of individual goals (Jazayeri and Hopper, 1999), whereas others identify stronger incentives for cooperation between all parties (Drake *et al.*, 1999). In addition to these basic observations, Ittner and Larcker (1997) report that rewards and compensation do not directly improve performance but enable other practices. They also find that the effects of rewards and cybernetic and administrative controls differ between the automotive and computer industries. Netland *et al.* (2015) find that reward, cybernetic and administrative controls are positively associated with more extensive lean implementation. However, for rewards, this association is valid only for nonfinancial approaches.

The following proposition summarizes the findings on rewards:

P5. Rewards assume a key function for the realization of process orientation.

While it is undisputed that rewards play an important role in process orientation, further research is needed on how they work.

4.4.4 Culture. The MCS package component culture is highly relevant for process orientation (Grasso and Tyson, 2021; Sinnl and vom Brocke, 2011; Kohlbacher and Reijers, 2013) but significantly underrepresented in the literature. Kohlbacher and Reijers (2013) illustrate the meaning of cultural controls. Based on survey data, they find that a better alignment of culture with the process approach leads to better outcomes, including customer satisfaction, delivery reliability and profitability. Insights into the characteristic attributes of culture that positively impact performance in a process context are provided by recent work of Cadden *et al.* (2020). The authors find that, among other aspects, procedurally focused and market-oriented cultures and cultures that focus on softer dimensions are beneficial in the lean context.

The following proposition summarizes the research findings related to culture:

P6. Culture aligned with the process approach is a key driver for better outcomes.

Studies regarding culture in a process context are rare, pointing toward opportunities for future research.

4.4.5 Planning. Although planning is the least analyzed component, it is covered by important quantitative research. Chenhall and Langfield-Smith (1998) examine how a combination of (process-oriented) management techniques and MC practices (planning and cybernetic) enhance the performance of organizations under selected strategic priorities. Their findings underline the importance of strategic planning to ensure a holistic approach to coordinating management accounting practices. Cua *et al.* (2001) investigate three specific WCM practices simultaneously with the goal of identifying differences in their implementation between high- and low-performing manufacturing plants. Their framework incorporates MC practices (planning, cybernetic and cultural) labeled as human- and

strategic-oriented common practices. Their analysis shows that these MC practices significantly explain differences in plant performance.

The following proposition summarizes the research findings related to planning:

P7. Strategic planning ensures comprehensiveness regarding management accounting practices.

In general, evidence regarding planning is insufficient, and further research is warranted.

4.5 Accounting-based controls vs dedicated operational controls

A recurrent finding in the literature is that dedicated operational controls (also known as “lean controls”) are more relevant than traditional accounting-based controls, which are typically focused on functional units, for process orientation (Bellisario and Pavlov, 2018; Kastberg and Siverbo, 2013; Van der Steen and Tillema, 2018). There are concerns that process orientation is often unsupported by the traditional MCS and may even be counteracted by these vertical controls (Chenhall, 2008; Ferreira and Otley, 2009; Kastberg and Siverbo, 2013). Accordingly, advocates of process orientation oppose functional MCS methods. In addition, many established MCS methods with a process focus (e.g. activity-based costing) are not viewed as supportive of process orientation (Chenhall, 2008). Such concerns seem to be confirmed by Kastberg and Siverbo (2013), who find that organizations have developed nonfinancial cybernetic controls focused on processes to complement their traditional functional-focused budgeting and target setting.

Jazayeri and Hopper (1999) also document a decline in the use of traditional accounting department instruments after the introduction of a WCM approach as the source and application of specific information changed to the operational unit. Despite these changes, the accounting department remained responsible for budgets. Van der Steen and Tillema (2018) provide case studies of three subsidiaries of different multidivisional organizations that illustrate that existing accounting-based controls can severely constrain the application of lean. They propose several ways to mitigate the constraints that can arise from incompatibilities between accounting-based controls and lean. Recent research, on the other hand, shows differentiated findings (Grasso and Tyson, 2021; Nielsen *et al.*, 2021). In a survey from the lean context, Grasso and Tyson (2021) found that traditional accounting practices do not hinder lean initiatives.

The following propositions summarize the research findings on accounting-based controls vs dedicated operational controls:

P8.1. Operational controls take over the main task concerning control.

P8.2. Accounting-based controls still have an important function and can complement operational controls.

In summary, the literature on traditional accounting-based controls in the context of process orientation reveals a differing picture. However, most of these publications come from a lean and WCM context with a strong manufacturing background. More research based on other process approaches and considering nonmanufacturing contexts is needed.

4.6 Relationship between the use of management control systems as a package for process orientation and performance

Our third research question addresses the relationship between the use of MCS as a package for process orientation and performance. Performance is a common theme, both in early and

recent publications. Of the 115 papers, 58 deal with the relationship between MC and performance. Thereby, performance is viewed in a differentiated manner, three main performance categories can be distinguished.

Operational performance (14 papers), also referred to as operations performance, is focused on primarily by articles originating from the lean context (Arai, 2021; Donnelly *et al.*, 2021; Kristensen and Israelsen, 2014; Fullerton *et al.*, 2014), a few articles originate also from BPM (Sonnenberg and vom Brocke, 2014), PO/HO (Münstermann *et al.*, 2010) and WCM (Daniel and Reitsperger, 1991). This category comprises process execution parameters from the shopfloor such as cycle times, machine setup times or delivery performance.

The organizational performance is, opposite to this, not focused on the detailed execution of processes but refers to the performance of business units. Performance indicators considered include sales, profit, cost figures and also customer satisfaction and quality. A uniform definition of this category cannot be identified. Publications with a focus on organizational performance represent the majority with 31 articles. Many of the articles are drawn from the WCM context (Baines and Langfield-Smith, 2003; Chenhall, 1997), also publications from all other process categories are frequently represented.

Finally, financial performance is considered in 13 papers. In some of them as the sole performance variable (Fullerton and Wempe, 2009), in others, as an additional variable alongside operations performance (Fullerton *et al.*, 2014) or organizational performance (Rowe *et al.*, 2008).

The selected performance dimensions also have an impact on the design of the MCS Package.

In the case of the operational performance dimension, the cases and surveys described use, e.g. shopfloor approaches such as visual performance measures (Fullerton *et al.*, 2014; Arai, 2021). Organizational performance, on the other hand, uses team-related rewards with a focus on nonfinancial and financial performance measures (Lind, 2001).

The papers see a positive correlation between the design of the MCS package for processes and performance (across all categories). In a review of studies describing this relationship, Kastberg and Siverbo (2013) state that Ittner and Larcker (1995), Chenhall (1997), Sim and Killough (1998) and Scott and Tiessen (1999) find that process orientation supported by cybernetic controls with nonfinancial measures linked with rewards improves performance. This finding is confirmed by Baines and Langfield-Smith (2003), Bronzo *et al.* (2013) and Kohlbacher and Reijers (2013), who focus on three-component MCS packages. Positive performance effects from a both financial and nonfinancial performance orientation as well as the importance of culture are described by Grasso and Tyson (2021). Kristensen and Israelsen (2014) show that different control forms within a package have a balanced complementary, synergetic effect on performance rather than purely additive (incremental) effects.

The following proposition summarizes the research findings relating performance:

P9. The use of an MCS package for processes improves performance.

While research regarding these topics is promising, so far only a limited set of MCS package components have been evaluated.

5. Discussion and future research

5.1 Theoretical contribution

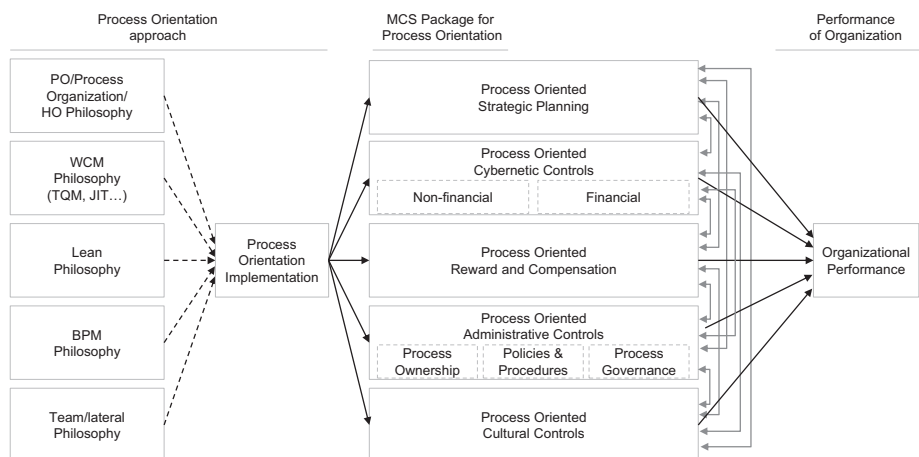
This systematic literature review provides several theoretical contributions. We synthesized the literature and developed propositions. This reveals, in the sense of the configuration

theory, patterns which are valid for MCS for processes. First, we propose that multiple MCS package components in organizations with a focus on processes, working together as a package, are beneficial for the realization of process orientation. This is true for a variety of process approaches, as supporting articles were identified in the lean, WCM, BPM and process orientation/process organization/HO contexts. Regardless of the specific process approach successful process orientation requires all MCS package components to be applied. Combining these MCS package components facilitates the implementation and realization of the benefits of the respective process approach.

By confirming the relevance of MCS package approaches for process orientation, this review provides a basis for further research. Future directions include the configuration of MCS packages and the relationships between individual practices or systems within a package. Recent research has called for in-depth studies of MCS to better understand MC combinations (Bedford, 2020).

We propose a research framework (Figure 4) that builds on the suggestions of Malmi and Brown (2008) for guiding research on MCS packages. In a specification of Malmi and Brown's framework for process orientation, we have integrated the propositions relevant to this topic. Central to this framework is a complete MCS package for process orientation consisting of MC practices from all package dimensions. Process-specific features such as process ownership are integrated. The basis for the framework is the applied process orientation approach and its method of implementation. We incorporate organizational performance as the outcome.

As a second theoretical contribution, our literature review presents the state of research on individual MCS package components. We suggest propositions for all five components. While all five components are highly relevant, the findings show a clear dominance of cybernetic controls in the literature, as this component is considered in all papers covering three or more MCS package components. As a cornerstone of MCS research (Simons, 1995; Chenhall, 2003), cybernetic controls also represent the basis of any MCS package for process orientation.



Source: Authors' own creation

Figure 4. Research framework

Third, this review shows that the finding expressed by some authors that accounting-based controls can have a subordinate or even counterproductive role for process orientation is not confirmed by recent studies. Finally, we provide a detailed look at the topic of performance in the context of processes and show a differentiated view of the term.

5.2 Practical implications

Our findings indicate that organizations that are successful in applying a process approach also develop and use a specific MCS package for process orientation. Several recommendations for practice can be derived from our review. First, companies applying a process approach should develop a suitable MCS package. The design of the MCS package should start by considering the process focus in strategic planning to ensure the alignment of all MCS package components. Within cybernetic controls, goals for processes are defined and measured. A suitable incentive system aligns employees' behavior with the process goals. Specific elements of administrative control, such as process responsibility and governance principles, further direct employee behavior.

Second, organizations with a process orientation should pay special attention to culture (Grasso and Tyson, 2021; Kohlbacher and Reijers, 2013). The sustainable implementation of process orientation requires the establishment of thinking in processes among employees. This is particularly important because companies are typically structured along functional lines. If all employees adopt a process view in their day-to-day business, a successful implementation of a process orientation can be facilitated.

A third recommendation derived from this review is a collaboration between the company's existing accounting-based controls and dedicated, operational controls. Managers should ensure that the optimal target design for MCS packages is aligned with the company's overall perspective on fulfilling all control requirements.

5.3 Future research

Three main directions for future research emerge from this systematic literature review. First, the existing knowledge base on MCS packages in the context of process orientation must be extended. In particular, more research is needed on MCS packages with multiple components. A comprehensive MCS package framework like that of Malmi and Brown (2008) is a suitable conceptual basis for ensuring that all MCS package components are considered and for understanding the interactions between individual MCS package components. Further research on individual MCS package components is also needed. In particular, differences in the importance of financial performance measures have been reported for cybernetic controls. Future research should address these factors in a structured way to obtain universally valid findings. The other package components should also be further investigated. Administrative controls should be considered in a more systematic way, and organizational structure, policies/procedures and governance structure elements must be viewed in a differentiated manner. In the case of rewards, the effects of financial versus nonfinancial rewards must be considered more closely, analogous to cybernetic controls. Findings so far indicate high importance of culture for processes. The current state of knowledge should be validated by further research; a focus on concrete examples in certain contextual situations could provide important insights. Extension of the body of knowledge is also recommended for planning, as this component is the least covered in the literature. The effects of entire MCS packages should be considered to further analyze the role of traditional accounting-based controls vs dedicated operational controls.

Second, we also recommend applying a more comprehensive process orientation approach. Most of the articles included in this literature review are in the context of

manufacturing with WCM and lean process approaches. Current requirements such as end-to-end process views, automation and digitalization (Xu *et al.*, 2018) require a more comprehensive view, e.g. horizontal organization and BPM. As many of these approaches also incorporate lean, previous research on lean can be incorporated. In addition, the integration of process orientation and industry type is very important for understanding the wider context in research on MCS (Kastberg and Siverbo, 2013). The significance and mode of implementation of process orientation may vary depending on the specific organization, for example, whether process orientation is used by a small- or mid-sized company or a large firm, for all or part of the value chain (e.g. in the supply chain), or only on the shop floor level or as a corporate approach. Future research should consider the influence of such contingencies on process orientation and MCS.

Third, there is an urgent need for research on MCS packages for innovative process approaches. In previous studies, there has been no consideration of recent process topics such as robotics process automation or innovative manufacturing approaches with a core focus on digitalization. The importance of these approaches in the context of processes is high and growing (Xu *et al.*, 2018; Huang and Vasarhelyi, 2019). Innovative, digitally enabled manufacturing approaches can be used as an example to illustrate this importance. A key feature of these approaches is that production processes are digitally supported using various technologies, including robots and artificial intelligence. The operation of such digitally enabled processes requires the collection of detailed information for use in decision-making. Possible approaches to this could be the use of workflow management systems (Xu *et al.*, 2018). A greater focus of research on these possibilities for the specification of cybernetic controls is needed.

6. Conclusion

Process orientation is an increasingly important approach for many organizations. Accordingly, it can be expected that MCS also incorporates a process view. As the existing body of knowledge on this subject is fragmented, the intention of this paper was to provide recommendations for further research as well as guidance for practice by a systematic review of the state of research. For this purpose, both a comprehensive view of MC using an MCS package approach, and a comprehensive view of process orientation were applied.

Several theoretical implications are derived. The key finding is that multiple MCS package components in organizations with a focus on processes, working together as a package, are beneficial for the realization of process orientation. For guiding research on this topic, a research framework was proposed. Furthermore, a high relevance of all five MC components was found, with a clear dominance of cybernetic controls. The previously expressed opinion of some authors that accounting-based controls play only a minor role was not confirmed. Regarding performance in the context of processes this review provides a more nuanced view.

Several implications for practice could be identified. We found that organizations with a successfully applied process orientation also develop and use a specific MCS package for process orientation. Importance should be paid to the creation of a process culture. Finally, an alignment between a company's existing accounting-based controls and dedicated, operational controls should be ensured.

A possible limitation of this review could be due to the relatively low number of articles identified for key topics. Articles with a focus on four or five MCS package components are still limited. Future research should include more MCS packages with multiple components as well as specific, individual MCS components. Also, we recommend applying more comprehensive process orientation approaches such as BPM and the horizontal

organization. Finally, there is a need for research on MCS packages for innovative process approaches in the context of digital transformation.

Note

1. A complete list of all papers included is available on request.

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