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Lameijer, B.A.; Boon, C.T.; van Dun, D.H.; den Hartog, D.N.

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Enabling and Inhibiting Leadership Behaviors in Continuous Improvement

Bart A. Lameijer, Corine T. Boon, Desirée H. van Dun, and Deanne N. den Hartog

***Abstract*—Leaders play a key role in continuous improvement (CI) implementations. However, the research on CI-enabling versus CI-inhibiting leadership behaviors remains fragmented. Our research reviews empirically validate and extend the understanding of CI leadership behaviors by examining low versus high maturity and capability building versus value maximization CI implementations. After providing a literature review focused on leadership behaviors that affect CI implementation processes, we did expert interviews to see whether informants recognized these behaviors. Then, we did a survey among 144 key informants to empirically validate the relative importance of CI leadership behaviors and the moderating effect of CI implementation archetype and maturity level. Robustness analyses comprised instrument variable-based endogeneity treatment and secondary data-based common method bias assessment. No overall direct relationship was found between *"command-and-control"* behaviors and CI implementation success, although these behaviors did have positive effects depending on the type of CI implementation. Also, *"inspirational role modeling, coaching, and empowering"* behaviors relate positively to implementation success, especially in low-maturity CI implementations, regardless of their archetype. Unexpectedly, *"serving"* behaviors were found to relate negatively to implementation success and were mostly relevant for low maturity and economically driven CI implementation archetypes. The results provide a prioritization of significant CI leadership behaviors and a novel measurement tool. We show how these leadership behaviors are contextually contingent upon different CI implementation situations. This mixed-methods study answers calls for more systematic scientific attention to the social components of CI implementation.**

***Managerial Relevance Statement*—The role of leadership in CI implementations is important. Our findings present the relatively most important enabling and inhibiting leader behaviors for CI implementation success. More specifically our findings show that different leader behaviors are most effective depending on the maturity and the type of CI implementation (economically driven versus focused on organizational development). In the early phases of CI implementation, "inspirational role modeling, coaching, and empowering" behaviors are advised. Surprisingly and contrasting common notion, "serving" behavior does not tend to be helpful. Especially in the early phases of CI implementation, it is crucial to actively lead. For the top-down and economically driven type of implementations, behaviors such as "driving/stimulating improvement" and "consulting, listening, and role-modeling" are most important. For the type of bottom-up and adaptive CI implementations "coaching and supporting" and "collaborating, involving, and role-modeling" are key. Overall the findings clarify the relative importance of leader behaviors for CI implementation, which facilitates the effective leadership of CI implementation efforts. Our findings can also help implementation leaders understand which behaviors work best when and help organizations in designing the selection and development of leaders in the CI context.**

***Index Terms*—Contingencies, continuous improvement (CI), leadership, lean, mixed-methods.**

I. Introduction

THE continuous pursuit of improvement and optimization of products and services in organizations is a dominant area of interest in both operations management (OM) practice and research and is an important factor in explaining organizational performance [1], [4]. The organizational capability of continuously improving is defined as "a company-wide process of focused and continuous incremental innovation" [2] and the creation of such a capability is facilitated by various continuous improvement (CI) methodologies that organizations adopt in their daily operations, such as Lean and Six Sigma [3]. While the various methodologies at the core of CI (Lean, Six Sigma, LSS, and Total Quality Management) were frequently treated as distinct, recent studies increasingly treat these methodologies as interchangeable or complementary [3]. The role of employee and management participation and commitment is central to research on CI implementation [4] as is the role of leadership in CI implementation processes to promote and manage quality prowess [5], [6]. For example, Forbes Insights reported a global study that found "active quality leadership" as one of the top ten priorities for companies striving for quality management prowess [1].

Leader behavior in the context of a CI implementation process is defined as "specific observable verbal and nonverbal actions of managers" [7]. Research to date has focused on the relationship between leadership and CI implementation, both at the aggregate level of (perceived) leadership styles [8], [9] and at the underlying level of observable specifical behaviors [10], [11]. Most research addressed how leadership styles and behaviors can help CI implementation through among others role-modeling (active participation in CI routines), verbal promotion of the importance of CI adoption for the continuity of the company (goal-alignment), providing clarity on expectations and rewards for employees participating in CI, and investing in resources

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Bart A. Lameijer is with the Section for Business Analytics, Amsterdam Business School, University of Amsterdam, 1018 TV Amsterdam, The Netherlands (e-mail: b.a.lameijer@uva.nl).

Corine T. Boon and Deanne N. den Hartog are with the Section for Leadership & Management, Amsterdam Business School, University of Amsterdam, 1018 TV Amsterdam, The Netherlands.

Desirée H. van Dun is with the Department of Management, Economics and Industrial Engineering, Politecnico di Milano, 20156 Milan, Italy.

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(e.g., IT systems, office appliances) needed for daily CI practice application [6]. Also, research has begun to explore the role of leadership in unsuccessful CI implementations, and this work addresses leader behaviors that impose overly strict employee control and limit creativity and the ability of employees to learn [6], [12].

Taken together, current research is starting to show which leader behaviors are *enabling* (i.e., promoting adoption and application of CI practices as a way of working) and which ones are *inhibiting* (i.e., discouraging adoption and application of CI practices) in the process of CI implementation. However, only a few studies simultaneously address both the enabling and inhibiting role of leaders. Also, typical leadership styles or behaviors are considered in isolation, thereby ignoring their relative importance. In addition, while CI implementations differ on several dimensions and different types of implementation likely call for different leader behaviors to be successful, contextual contingencies are scarcely addressed.

We propose that what constitutes enabling or inhibiting leader behavior may depend on the archetype of CI implementation (defined here as either "Theory E": economically driven versus "Theory O": organizational development focused) [14], [15], [16]. When CI implementation aims to achieve economic efficiency (i.e., Theory E), different leader behaviors are likely to be more effective than when CI implementation focuses on developing the organization and its people (i.e., Theory O). We also propose that what constitutes enabling or inhibiting leader behavior may differ depending on the level of implementation maturity [2], [10]. Although previous work has made some such suggestions, so far testing of these assumptions in the CI literature has been limited. Therefore, the overarching question we seek to answer is: *How is the effect of enabling and inhibiting CI leadership behaviors contingent upon CI implementation archetype and maturity level?*

In answering this question, we address recent calls for more systematic attention to the social components of CI implementation, specifically by considering theories from other disciplines (i.e., leadership and management) [17] from an "organizational transformation" perspective [18]. Our research objectives are threefold. First, we aim to clarify the relative importance of CI leadership behaviors by including a broad set of behaviors in one study. Second, we aim to offer a more comprehensive view of CI leadership behavior and we systematically build and test a model including both *enabling* and *inhibiting* leader behaviors for CI implementation. In doing so, we base ourselves on the few studies that make this distinction and suggest that leaders not only can positively but also negatively affect CI implementation. Third, we aim to go beyond previous studies by exploring and testing how leader behaviors differ depending on the archetype and maturity of CI implementation, which extends the current understanding of the role of contingencies in CI implementation success [19].

To reach these objectives, we applied a mixed-method study design. First, we review the literature in Section II. Then, to gain a deeper understanding of both *enabling* versus *inhibiting* effects of CI leadership behavior and the contingency factors at play, we conducted a qualitative study including expert interviews. Subsequently, a quantitative survey study was done to corroborate and generalize our findings, following the procedural guidance for scale-development research [20]. There we also tested the moderating role of archetype and maturity.

II. Literature Review

CI implementation processes are characterized as long-term investments toward a situation where incremental and ongoing process- and product and service improvement become an integral part of day-to-day operations that contribute to organizational performance [21]. Over the last decades, many case studies have been reported on the effects of such CI implementations on organizational performance [22], [23]. An often cited and essential factor in the effective guidance of CI implementation processes is employee and management involvement and commitment toward tasks and objectives [24], [25]. The importance of leadership and management commitment to the CI implementations' objectives and practices is recognized in Lean [26], Six Sigma [27], TQM [28], and Lean Six Sigma [29], to which we turn next.

A. Leadership in CI Implementations

Prior research has proposed and discussed several broad leadership styles as well as more concrete leader behaviors that are related to successful or unsuccessful CI implementation. Consistent with the first research objective, we started with a systematic literature review (SLR) and categorization process following procedural guidance from previous work [30]. We identified three types of research (see Appendix 1 in the Supplementary Material for a full report on the SLR procedure). First, early work that theoretically discusses possible relations of leadership theories and models to different CI methodologies. Second, research that qualitatively explores these relationships, and third, research that quantitatively evaluates the effect of leadership styles and/or behaviors. From 15 qualitative or quantitative research-based sources we found, we selected the 27 specific management behaviors that were shown to *significantly* relate to CI implementation processes (see Table I).

In our analysis of previous research, we distinguished three types of behaviors, which we preliminary categorize as: *command-and-control* (1–9), *inspirational, coaching, and empowering* (10–25), and *serving* (26–27). The first set of behaviors includes displays of rational persuasion and a performance orientation; these transactional behaviors were shown to contribute positively to CI implementation success. Other behaviors in this category that were seen to negatively affect CI implementation success are task monitoring and acting nonparticipatively and ruling. The latter type of behavior is focused on remaining in control and telling "subordinates what to do in a commanding way" [33, p. 482], which is why we labeled this behavior category "command-and-control." The second category incorporates a variety of transformational leader behaviors that are meant to inspire others, including being inspirationally appealing and intellectually stimulating [41]. Also, it involves coaching type of behaviors such as consulting and listening, as well as coaching and supporting. This category also includes behaviors that empower employees, including encouraging and promoting responsibility. Hence, we labeled this category of behaviors,

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TABLE I
LEADERSHIP BEHAVIORS SIGNIFICANTLY RELATED TO CI IMPLEMENTATION SUCCESS

Enabling (+) and inhibiting (-) leadership behaviors	Sources	Research type*		
		QL	QT	TH
1. Directing and steering (±)	[15[8], 31[2], 37[5]]	X	X	
2. Persuading rationally (+)	[24[7]]		X	
3. Behaving formally (+)	[33[6]]		X	
4. Performance orientating (+)	[33[6], 34[4]]	X	X	
5. Contingent punishing (+)	[28[3,4]]	X		
6. Task monitoring (-)	[12[2]]	X		
7. Non-participative and ruling (-)	[33[6]]		X	
8. Providing negative feedback (-)	[12[2]]	X		
9. Own position defending (-)	[12[2]]	X		
10. Inspirationally appealing (+)	[24[7], 28[3,4], 33[6], 34[4], 35[8], 36[1]]	X	X	X
11. Communicating and interacting (+)	[15[8], 10[7], 33[6], 35[8], 37[8], 38[1]]		X	X
12. Consulting and listening (+)	[12[2], 24[7], 33[6], 35[8]]	X	X	
13. Collaborating and involving (+)	[10[7], 24[7], 31[2], 35[8], 37[8], 38[1], 40[2], 41[8]]	X	X	
14. Driving/stimulating improvement (+)	[10[7], 11[8], 31[2], 33[6], 34[4], 35[8]]	X	X	
15. Intellectually stimulating (+)	[10[7], 28[3,4], 35[8], 36[1], 38[1]]		X	X
16. Role modelling (+)	[10[7], 28[3,4], 34[4], 35[8], 36[1], 38[1], 40[2]]	X	X	X
17. Coaching and supporting (+)	[10[7], 37[5], 35[8]]		X	
18. Training and developing (+)	[10[7], 31[2], 37[8], 40[2]]	X	X	
19. Ingratiating (+)	[24[7]]		X	
20. Recognizing contributions (+)	[10[7], 35[8], 36[1], 37[8]]	X	X	
21. Informing (+)	[10[7], 35[8]]		X	
22. Empowering (+)	[10[7], 35[8]]		X	
23. Encouraging (+)	[15[8], 36[1]]		X	X
24. Promoting responsibility (+)	[38[1], 40[2]]	X		X
25. Behaving fair and consistently (+)	[31[2], 38[1]]	X		X
26. Behaving humbly (+)	[10[7], 35[8]]		X	
27. Standing back (+)	[35[8]]		X	

* QL = Qualitative research, QT = Quantitative research, TH = Theoretical
[1] Theoretical research
[2] Qualitative research based on coded observations
[3] Quantitative research based on Transactional Leadership Theory [42, 43]
[4] Quantitative research based on Transformational Leadership Theory [44, 45]
[5] Quantitative research based on Situational Leadership Theory [46]
[6] Quantitative research based on Global Leadership and Organizational Effectiveness [47]
[7] Quantitative research based on Influence Behavior Questionnaire [48]
[8] Quantitative research based on various developed scales from previous research [49, 50, 51, 53]

which were all found to positively influence CI implementation success, as "inspirational, coaching, and empowering." Finally, the third category incorporates two additional behaviors from servant leadership [35], namely behaving humbly and standing back. We labeled this category "serving type behaviors."

Table I also reveals that most studies based their choice of leader behaviors on leadership styles such as transactional and transformational leadership [42], situational leadership [46], and servant leadership [54]. However, by predominantly relying on existing leadership styles and their comprising behaviors, other potentially relevant leader behaviors (that have not been acknowledged in the specific theory selected or only in other leadership models that were ignored in the CI literature) may be overlooked [98, p. 174]. Although many CI leader behaviors are acknowledged in the literature, we do not yet understand their relative importance due to the fragmented character of the research on CI leadership to date. Therefore, in the following, we will first qualitatively explore and validate which CI leader behaviors are perceived to be of importance. Then, in our quantitative study, we aim to confirm which leader behaviors are most enabling and inhibiting for CI implementation, thereby answering:

Research question 1: What are the most enabling and inhibiting leadership behaviors in organizational CI implementation processes?

B. Maturity in CI Implementation

CI implementation typically aims for the integration of CI methodology in daily operations. In such a situation,

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TABLE II
TYPOLOGY OF CI IMPLEMENTATIONS [14]

Duality	Economic value maximization (Theory E)	Organizational capability development (Theory O)
1. Purpose	Creation of economic value maximization by focusing on single valued objective functions	Organizational human capability building by focusing on organizational learning as driver for development
2. Leadership	Rationally led top-down leadership approach	Deep knowledge, inclusive and empowering bottom-up leadership approach
3. Focus	Changing formal arrangements such as the structure and systems (processes)	Changing socially constructed structure or culture of an organization
4. Planning	Programmatic episodic approach following the rationalization, revitalization and regeneration sequence of change	Emergent approach whereby organizational actors go through continuous and cumulative cycles of experimentation and learning without explicit a priori intentions
5. Motivation	Financial incentives are a motivator for people to drive change early in the change cycle to overcome organizational inertia	Financial incentives are deployed later in the change cycle, after the strategy definition and consensus process has been completed, to prevent unwanted emergent change
6. Consultant participation	External consultant driven change process as these bring in accumulated learning in the form of best practices	Internal consultants driven change process that lead organizational members through the process of analysis, redesign and change, as hereby the organizational learning capability is activated

the CI philosophy, principles, and practices are part of an organization's strategy, systems, and values [55]. CI maturity is typically reflected in the behaviors that organizational factors have acquired and embedded in the organization. With progression in maturity (i.e., an organization's ability to harness continuous improvement, at increasing levels [25, p. 1081]) comes performance improvement that can be local or organization wide, operational, or strategic. Different maturity levels may require different leadership behaviors. For example, some research works [8], [10], [16] explored how effective leader behaviors change over time in lean management implementation processes. The findings support the idea that different behaviors may be required in early or later stages and show how more guiding and explaining behaviors at the start change to more delegating behaviors later. However, research on this in the CI implementation context is limited. In classic leadership theorizing, leadership is also argued to be situationally dependent [56], [57]. For example, research [56] distinguished supportive from directive behavior and suggests that in the initial stages of employee development, more directive leader behaviors are effective. In more developed stages, the supporting and delegating behaviors are more appropriate. In initial stages of CI deployment where the philosophy, principles, and practices are new to most employees, more task-oriented and explanatory behaviors (such as providing direction and steering, and rational persuasion) are effective. When employees have gained more experience and knowledge, empowering behaviors may be more effective (such as consulting and listening, training, and developing behaviors). Therefore, going beyond the existing research, we explore and test whether CI implementation maturity levels affect which enabling or inhibiting leadership behavior is most effective.

Research question 2: What are the most enabling and inhibiting leadership behaviors in different stages of organizational CI implementation processes?

C. CI Implementation Archetype

The rationale for implementing CI varies. Therefore the comprehensiveness or scale of CI implementations varies. Existing typologies typically distinguish between CI as an operational improvement methodology focused on short-term economically driven process improvement gains including efficiency (Theory E [58]) and a more holistic strategic initiative designed to embed CI in an organization's systems and shared values and develop the people working within this system (Theory O [59]) (see Table II). This latter type of CI implementation aims to develop CI capabilities that imply many organizational factors contribute

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to the continuous pursuit of improvement of company products, processes, and services. Exact definitions and characteristics of CI implementations are rare, and prior research concluded that most empirical studies to date fail to recognize this Theory E and O difference [25], [60].

When it comes to CI implementation archetypes, six general dualities that characterize implementation processes can be distinguished [14]. Table II describes the Theory E and Theory O sides of each of these dualities in the context of CI implementation. Dualities are to various degrees opposite pulls that may work against one another in change processes. By focusing on one end of a duality continuum in the organizational change effort, tension may arise on the other end. Balancing them requires explicit leader decision-making.

Research to date has not examined how CI implementation archetype affects which leader behaviors are enabling or inhibiting, although reference has been made to the importance of Theory E and O when it comes to leadership behaviors [16]. Short-term economically driven process improvement gains-driven CI initiatives may require leaders to take a more "hard approach to change" [61, p. 239] adopting more formal, performance oriented, and directive behavior to ensure goal realization. In contrast, more holistically designed initiatives with the intention to embed CI in an organization's systems and shared values may benefit more from "soft" employee-empowering and developing leader behaviors. Given that CI implementations can be different in nature and either focus more on an economic value maximization or a wider organizational capability development effort, there is reason to believe that the optimal approach to leadership differs between these two archetypes. Therefore, we explore which leadership behaviors are most enabling or inhibiting for short-term value maximizing (Type E) versus organizational capability building (Type O) archetypes of CI implementation.

Research question 3: What are the most enabling and inhibiting leadership behaviors in different archetypes of organizational CI implementation processes?

III. Study Overview

The literature review revealed that the current state of the research on CI leadership behavior can be seen as [62] "intermediate"; the majority of articles on this topic were published over the past decade and research methods vary from purely qualitative to quantitative (see Table I). Also, the available studies (see Table I) suggest a large variety of different leadership behaviors as well as possible broad leadership styles that might help explain effective CI leadership behavior. Researchers suggest that a mixed-methods design including both qualitative and quantitative methods fits such an intermediate "state of prior theory and research" [62, p. 1160]. Mixed-methods studies, such as we present here, aim to lead to a provisional theory that "integrates previously separate bodies of work" [62, p. 1160].

We adopted a comprehensive mixed-methods research approach at the individual and organizational level as a unit of analysis, inspired by the proposed sequence of scale-development research activities [20]. Fig. 1 visualizes the consecutive qualitative and quantitative research activities. First, during the qualitative part of the research, we engaged with experts from practice to better understand which CI leadership behaviors typically affect CI implementation processes. The resulting list of behaviors served as the basis for the subsequent quantitative study. The goal was to corroborate and provide more conclusive and generalizable evidence. In this phase, a large group of key informants from the field were asked for their perceptions of CI leadership behaviors and the contingency factors at play. The two sequential studies are discussed as follows.

IV. Qualitative Study

A. Research Design

Consistent with the second and third research objectives, and building on the literature review presented in Section II-A and Appendix 1 in the Supplementary Material, we continued with qualitative expert consultation to further synthesize, validate, and complete the set of potential enabling and inhibiting CI leadership behaviors.

B. Expert Interview Sample

A total of 11 CI professionals with extensive experience in CI implementation from various industries were interviewed (see Appendix 2 in the Supplementary Material). These CI experts were professionals with CI (program) management and consulting, coaching and training experience, and in most cases both (i.e., having interchangeably worked as manager or consultant). As our objective was to make generalizations about theory rather than populations, nonprobability heterogeneous purposive sampling was used to select CI experts from the authors' CI program university alumni networks in The Netherlands [63]. That is, we aimed for variation in the experts' organizational contextual experience in order to compare and generalize findings. The ultimate selection of 11 CI experts was based on the principle of saturation, thus new CI experts were interviewed until the available responses recorded were no longer complemented, contradicted, or nuanced by the newly recorded responses [63].

C. Data Collection

Before the interviews were held, the interview protocol was piloted with three CI experts from the ultimate sample, which led to the finetuning of the protocol (e.g., addressing question clarity and sequence). Consequently construct validity was enhanced by the development of handouts comprising visual presentations of the list of CI behaviors from the literature (see Table I), CI implementation archetypes (see Table II), CI maturity levels (based on [25]), and CI implementation results, that were presented to the interviewees. Finally, measurement reliability was improved by ensuring that the interviewer, after each question, summarized the response and asked for additional clarifications from the interviewee to ensure complete and correct answers and interpretations.

Semistructured, open-ended question interviews were conducted using the interview protocol in Appendix 3 in the Supplementary Material. The interviews were comprised of two parts: 1) factual questions to obtain information on professionals' CI implementation experience; and 2) questions related to respondents' opinions about both enabling and inhibiting

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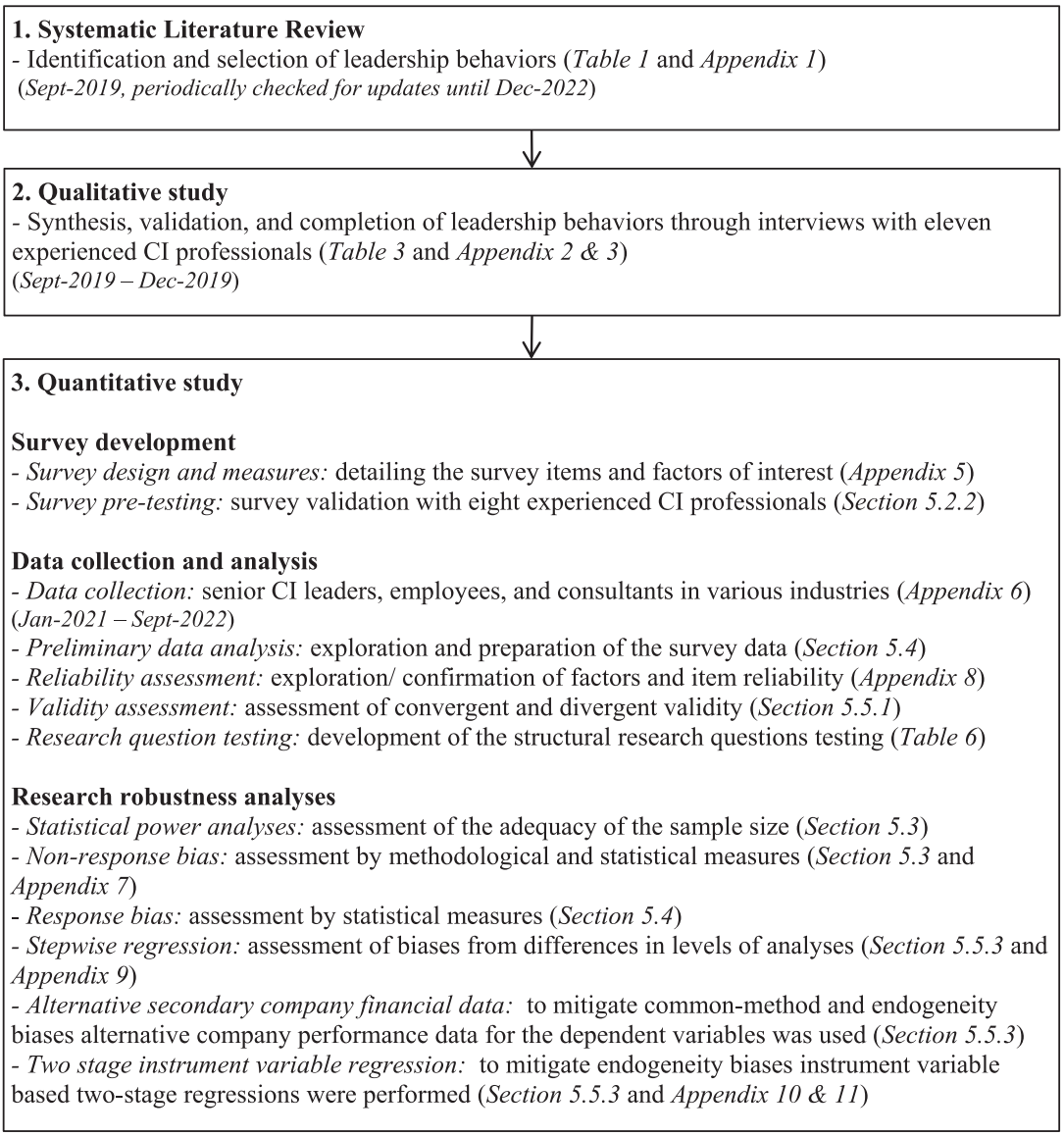

Fig. 1. Applied sequence of the mixed-methods research activities.

leader behaviors in three *separate* phases: first, the effect of the leadership behaviors in general and their effects on CI implementation success; Second, how this differs per archetype of implementation (i.e., Theory E/ O); and third, how this differs per phase (i.e., maturity).

Finally, qualitatively obtaining data from multiple interviewees poses an inherent vulnerability as information retrieval and assessment are subject to researcher biases [64]. The strategy to mitigate these vulnerabilities is for one the design of a systematic approach for the collection and documentation of data. Therefore, the interviewers took elaborate notes to be able to reconstruct and resolve differing researchers' interpretations of the responses obtained.

D. Data Analysis

The interviewers transcribed and coded the interview data following prescriptions for thematic analysis [65]. The coded information was stored in a spreadsheet database to allow for accurate and imitable data analysis [66] and facilitated the assessment of the saturation criterion (see Section IV-B.).

E. Results

Table III presents the coded results of the interviews and reveals the behaviors that were mentioned most and least. The "1a. enabling" and "1b. inhibiting" columns present the frequency of mentioning behaviors without considering the effect of the contingency factors (i.e., archetype and maturity). The columns "Theory E/O" and "Maturity" present the frequency of mentioning behaviors, specifically considering each separate contingency factor (see Appendix 4 in the Supplementary Material for the elaborate results). Each of the behaviors in Table III was mentioned by at least one interviewee, which indicates the high practical validity of the initial collection of leader behaviors. The most frequently mentioned enabling behaviors are coaching

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TABLE III
FREQUENCY OF 28 BEHAVIORS RELATED TO CI IMPLEMENTATION SUCCESS MENTIONED BY INTERVIEWEES

		1a. Enabling	1b. Inhibiting	Content analysis based supplementary interview quotes
1.	**Directing and steering**	5	11	*"Too much or too chaotic inhibits"*
2.	Persuading rationally		2	-
3.	Behaving formally		9	*"Not open for feedback and advice"*
4.	**Non-participative and ruling**		13	*"Not open for change"*
5.	Performance orientating	3	3	*"Too many expectations inhibits"*
6.	Task monitoring		10	*"Micromanaging"*
7.	Providing negative feedback	1	4	-
8.	Contingent punishing		9	-
9.	**Own position defending**		11	*"Not taking responsibility"*
10.	**Inspirationally appealing**	13	3 [a]	*"Telling the change story"*
11.	*Resilient and adapting*	2	1 [a]	*"Newly identified behaviour"*
12.	Communicating and interacting	9	4 [a]	*"Explaining rationale and objective"*
13.	Consulting and listening	9		-
14.	Collaborating and involving	5		-
15.	Driving/stimulating improvement	12		*"Promoting root-cause finding"*
16.	Intellectually stimulating	1		*"Providing short-term priorities"*
17.	Role modelling	11	2 [a]	*"Promoting learning behaviour"*
18.	**Coaching and supporting**	18	2 [a]	*"Project facilitating"*
19.	Training and developing	4	1 [a]	-
20.	Ingratiating	4		*"Showing appreciation for people"*
21.	Recognizing contributions	11	1 [a]	-
22.	Informing	3		-
23.	Empowering	9		*"Collaboration promoting"*
24.	Encouraging	3		-
25.	**Promoting responsibility**	14		*"Accountability promoting"*
26.	Behaving fair and consistently	8	4 [a]	-
27.	Behaving humbly	2	1	-
28.	**Standing back**	1	11	*"Being invisible inhibits"*

Notes: [a]Inhibiting in case the behavior is absent. The bold-faced behaviors were related most often to CI implementation success. The italic behavior (no. 11) was introduced by some interviewees. Behaviors 1-9 fit the *command-and-control* cluster, behaviors 10-26 the *inspirational, coaching, and empowering* cluster, and behaviors 27-28 are more *serving*.

and supporting, promoting responsibility, and inspirationally appealing. The most frequently mentioned inhibiting behaviors are directing and steering as well as being nonparticipative and ruling. The conclusions based on the expert interviews are in line with the findings from our literature review (see Table I). In addition, the experts identified one new behavior, namely: *"being resilient and adapting"* (nr. 11).

When looking at the distinction between CI inhibiting and enabling type behaviors, a clear separation between clusters of similar inhibiting behaviors (behaviors 1–9, 27–28, i.e., more *command-and-control* and *serving* respectively) and enabling behaviors (behaviors 10–26, i.e., more *inspirational, coaching, and empowering*) emerged. Several of those behaviors are clearly perceived as most enabling or inhibiting, e.g., behaviors 1, 4, 9, 10, 18, 25, and 28 in Table III; these signal the most dominant leader behaviors of the previously identified clusters (*command-and-control*; *inspirational, coaching, and empowering*; and *serving*).

The more elaborate results in Appendix 4 in the Supplementary Material also suggest that whether a leader's behavior is enabling or inhibiting may be context-specific. The enabling leader behaviors (10–26) are considered most enabling primarily in Theory O implementations (e.g., collaborating with employees, coaching and encouraging employees, etc.). Also, the in general seen as inhibiting command-and-control type leader behaviors are considered most inhibiting for Theory O implementations (e.g., behaving formally, and being unpredictable when it comes to rewarding or punishing employees). Some of these behaviors were even considered potentially enabling for Theory E implementations (e.g., clearly directing and steering, focusing on performance outcomes). This may also explain the varying results of these behaviors in previous studies given that some studies

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identified certain command-and-control behaviors as inhibiting, whereas others were found to enable CI implementation success (see Table I). Finally, in the interviews, the difference in enabling or inhibiting leadership behaviors between CI implementation phases was not clearly observable, despite the extensive experience of the interviewees (see Appendix 2 in the Supplementary Material).

Next, the resulting list of leader behaviors was examined in our subsequent quantitative study, including the behaviors from the literature and the newly identified behavior *"being resilient and adapting."* As follows, we describe how these behaviors were operationalized in a survey instrument and how the three research questions were examined in that study.

V. Quantitative Study

A. Research Design

The intermediate results and the leader behaviors identified in the qualitative research phase served as the basis for the quantitative study. Consistent with the second and third research objectives, the purpose of this second study is to further examine the comparative effects of leadership behaviors via empirical key-informant survey research.

B. Survey Development

1) Survey Design and Measures: In developing the survey (see Appendix 5 in the Supplementary Material for the complete survey), we aimed for a balance between creating a short survey (to enable higher response rates) and sufficiently robust measures with multiple items per factor.

a) CI leadership behaviors: For each of the 28 behaviors of interest (see Table III), we formulated one item including two descriptive examples. For most items, these examples were (based on) existing scales (see Appendix 5 in the Supplementary Material for per-item references). For example, for *"task monitoring,"* based on [12], we added "closely monitored status and progress of CI implementation task execution" as a descriptive example. Only for *"resilient and adapting,"* these examples were self-developed. The 28 items ask explicitly for the degree of observed or applied CI leader behaviors (non-self-report) of the manager(s) at the level that was most engaged in the implementation process (i.e., the manager(s) directly overseeing the operational activities and workforce subject to the CI implementation initiative) and are assessed on a five-point scale ranging from 1 (never observed) to 5 (very often observed) to aid reliable respondent assessments and continuous and likely normally behaving response data [67]. To ensure valid recollection, we encouraged respondents to consider their experiences in the recent past (i.e., < 3 years).

b) CI implementation maturity: The maturity of CI implementation was operationalized following the evolutionary model of CI behavior (see [2] and [25]). This model distinguishes five separate levels of maturity, each characterized by characteristic behavioral patterns. Respondents were asked to select the maturity level (one out of five) that best suited their recent situational experience.

c) CI implementation archetype: The archetype of CI implementation was measured through items on the six dualities that characterize the "Theory E: economic value maximization" and "Theory O: organizational capability development" type of organizational change processes [14] (see Table II). For each duality, respondents chose which of two statements (one fitting Theory E and the other fitting Theory O) best fit with their case.

d) CI implementation success: There are many reports on operational performance improvements resulting from CI implementation. To operationalize CI implementation success, we relied upon a set of ten performance indicators, measured on a five-point scale ranging from 1 (much worse) to 5 (much better) compared to pre-CI implementation [55]. To check the robustness of our results (triangulation), we merged our survey data that contained company identifying information ($n = 69$) with secondary company financial data, which is further elaborated in Section V-E3.

e) Control variables: Several control variables were added. Firm size (in number of employees) was included as this may influence leadership styles [44]. Industry- and within-firm function type was added as control as these have different system complexities that can affect CI implementation performance [68]. Finally, average respondent CI implementation experience was added to control for potential unfamiliarity or confirmation bias.

2) Pretesting: After designing the survey, it was pretested by eight CI professionals for validity, clarity, and user friendliness (i.e., response bias mitigation) based on the principle of saturation [63]. The research team amended, added, and clarified several items to mitigate participant error, participant bias, observer error, and observer bias [69]. Amendments comprised further clarification of the introductions per construct (i.e., improved definitions of helping/enabling versus hindering/inhibiting leader behavior, CI maturity levels, and archetypes). In addition, we included nonmandatory responses (questions 3, 7, 9, 10) and the ability to obtain the study results. The final survey had two parts: one to collect the demographics of the respondents such as position and industry of experience. The second section collected data on the variables of interest. The data were collected in multiple countries; therefore, the survey was available in both Dutch and English (with versions created via the standard translation—back translation method [70]).

C. Survey Sample Selection and Sample Description

To enhance research validity, we applied a "key informant approach" (i.e., we preferred fewer but better-informed respondents with specialized knowledge about the focal phenomena over more but less knowledgeable respondents), following previous OM research [71]. Respondents were selected based on their CI methodology competency (minimum of six training days) and dedication to CI implementation (at least 25% of their work week). The 860 purposively selected respondents were further vetted in terms of function and tenure and were selected via the authors' university CI program alumni networks to minimize selection error and assure experienced and

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knowledgeable respondents [20]. This resulted in an initial sample of 192 senior and medior CI consultants, managers, and professionals, mainly from manufacturing, (financial) services, and public administration sectors, based in Western Europe (see Appendix 6 in the Supplementary Material). After data preparation, 48 incomplete responses were deleted. Imputation of missing values for less than 5% of the remaining sample using single regression imputation in IBM AMOS 28 was performed [67], resulting in 144 usable responses (17% response rate) for data analysis.

1) Sample Statistical Power Analysis: Statistical power analysis was performed (both a priori and post hoc) to determine the adequacy of the ultimate sample size for detecting the effects that have our interest within the targeted population (Type II error). The chosen composite modeling-based parameter settings comprise the number of predictors (28 items divided over ultimately five factors, see Section V-D and Appendix 8 in the Supplementary Material), the desired statistical power (0.80, following commonly accepted rule-of-thumb) [72], the probability (α) level of the effects to be tested (0.05, following commonly accepted rule-of-thumb), and finally the effect size (ρ) to be detected (0.20, medium) [73]. A priori statistical power computation in the *G∗power* package yields a required sample size of n = 142, and a post hoc statistical power parameter of 0.81 (based on n = 144), making the sample size adequate in terms of volume to be able to detect effects, assuming that these are present in the targeted population [73].

2) Nonresponse Bias: In collecting the main data via Qualtrics between January 2021 and September 2022, several measures were taken to mitigate nonresponse bias [74]. First, a prolonged period of data collection was taken, in which, after two bulk invitations, two reminders per round of invitations were sent. Second, pretests of the survey were executed to assure clarity, interpretability, and multimedium functioning. Third, we assured confidentiality, made the personal identifying questions optional and offered to share the results afterward. Finally, mean score comparisons of 1) complete and incomplete responses on CI implementation success and respondent descriptives, and 2) early and late responses on CI implementation success, CI maturity, CI archetype, and all CI leadership behavior factors revealed that nonresponse bias risks could be considered negligible [75] (see Appendix 7 in the Supplementary Material).

D. Data Exploration and Factor Preparation

To explore the data and determine the factors in the data, a series of principal component analyses (PCA) and normality and reliability tests were done. To explore commonality in factor loadings of the 28 behavior items and assess sampling adequacy, PCA (varimax rotation) was conducted (see Appendix 8 in the Supplementary Material). With a Kaiser–Meyer–Olkin (KMO) measure of 0.90, the sampling adequacy was good, signaling a high consistency of correlation patterns between the items, making subsequent factor analysis feasible [76]. Factor analysis revealed the existence of five clusters (latent factors) of leadership behaviors, which were labeled according to their content and inspired by transactional, transformational, and servant leadership theory (see also Section VI). The two emerging factors that together formed the command-and-control type behaviors were labeled as *"command-and-control (neutral)"* and *"command-and-control (negative)."* The inspirational, coaching, and inspiring type behaviors were divided into an *"inspirational role-modeling"* and a *"coaching and empowering"* factor. Finally, we formed one *"serving"* factor.

The average reported CI implementation maturity was 2.40 (49% reported level 2: structured CI and 28% reported level 3: goal-oriented CI). The data for CI implementation archetype, comprising six nominal variables (propositions per duality), were transformed into one composite discrete factor (range 0–12) by adding and subtracting counted values for each of the six dualities to base number 6, whereby for each selected Theory E = −1 and for each Theory O = + 1. On average, Theory O was experienced the most (6.10), predominantly expressed in the dimensions "motivation" and "consultant participation."

For CI implementation success, PCA was applied for confirmation of the ten five-point scale items (see Appendix 8 in the Supplementary Material). The KMO measure (0.83) signaled high sampling adequacy [76]. Also here, factor loadings below 0.5 were eliminated (the item for "innovation") [67]. Interestingly, the average reported improvement of errors and defects (4.13) and process lead times (4.08) were the highest; improvement of innovativeness (3.47) and profitability (3.44) were the lowest.

For each of these latent factors, items with loadings below 0.5 were eliminated (poor contribution to measuring the latent factor of interest) [67]. Finally, the item data were tested for nonnormality to facilitate reliable claims beyond the scope of our sample. Both kurtosis and skewness values were within acceptable ranges (kurtosis +/− 3, skewness +/− 3), and Cronbach's alpha values were satisfactory (> 0.7) (see Appendix 8 in the Supplementary Material) [67].

Finally, common method bias (CMB) was evaluated through procedural and statistical methods, comprising 1) survey pretests to avoid ambiguity [77] and 2) the use of secondary-dependent variable data [78]. CMB due to the data gathering technique was assessed using Harman's single factor test, resulting in low explained variance (31.30%). Common latent factor analysis in IBM AMOS 28 was performed and revealed that the variance explained by a common latent factor is approximating 0.00%, suggesting the distorting effect of CMB is minimal [79].

Second, response bias was assessed statistically, in addition to the procedural methods described in Section V-B2. A total of 23 responses came from respondents from three companies working in similar contexts (e.g., operations, sales). The three groups with at least five respondents (to allow for accurate statistics) were analyzed for differences in group variances (ANOVA), showing a just-significant difference in the evaluation of CI implementation success between the three groups ($p = 0.09$). This corroborates reporting consistency between respondents from similar company contexts, mitigating response bias concerns.

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TABLE IV
DESCRIPTIVE STATISTICS AND CORRELATIONS OF THE RESULTING FIRST-ORDER FACTORS

First order factor	Mean	S.D.	Min	Max	1	2	3	4	5	6	7
1. Command-and-control (neutral)	3.24	0.85	1	5							
2. Command-and-control (negative)	1.96	0.80	1	5	-.10						
3. Inspirational role-modelling	3.39	0.77	1	5	.60***	-.16					
4. Coaching and empowering	3.39	0.74	1	5	.54***	-.15	.83***				
5. Serving	2.98	0.91	1	5	.40***	-.01	.65***	.67***			
6. CI implementation maturity	2.34	0.87	1	5	.42***	.07	.42***	.43***	.35***		
7. CI implementation archetype	6.10	2.71	0	12	-.06	-.09	.24***	.21**	.20**	.00	
8. CI implementation success	3.84	0.49	3	5	.41***	-.09	.39***	.30***	.19**	.43***	-.06

Pearson correlation is significant at the 0.05 level (**) or 0.01 level (***) (2-tailed) (n = 137)

E. Model Development and Results

The final step of factor validity assessment was performed in the confirmatory factor analysis (CFA) model specification and optimization sequence, where both convergent and discriminant validity of the scales were assessed and optimized, and finally, structural regression (SR) model testing was performed [67]. Structural equation modeling was selected for its ability to 1) observe the latent leadership categories while also 2) observe the importance of leadership behavior (item) by their factor loadings, and 3) control for covariance between leadership behaviors (items) and control variables in latent leadership category formation and effect interpretation [67].

1) Confirmatory Factor Analysis Model Development: CFA model identification and convergence using maximum likelihood analysis was achieved after 12 iterations. No negative eigenvalues nor Heywood cases were detected [80]. Assessment of normality led to the deletion of seven observations that were farthest from the centroid of the sample to assure reliable inferences beyond the scope of the sample, leaving a total sample of n = 137. Convergent validity assessment and modification indices reveal several items eligible for elimination due to low explanatory power ($R^2 < 0.5$, see Appendix 8 in the Supplementary Material: CFA) and high covariance with several items (indicated by "+" in Appendix 8 in the Supplementary Material). Discriminant validity checks revealed a high correlation between factors 3 and 4 "inspirational role-modeling"- and "coaching and empowering" behavior (0.83) (see Table IV).

This correlation can be explained by the theoretical connection between the two factors that, when combined, strongly resemble *transformational leadership*, which consists of the subdimensions of charisma/idealized influence, inspirational motivation, intellectual stimulation, and idealized influence [81], [82]. Model comparison whereby these factors were fixed as perfectly correlated however significantly deteriorates model fit. As a solution, a second-order latent factor was introduced for these two factors, thereby ensuring good discriminant validity for all of the factors (< 0.85 correlated) [67].

IBM AMOS 28 modification indices revealed several items with high covariance, especially for the error terms of the two highly correlated factors and the interfactor leadership behavior items. Multivariate kurtosis (nonnormality of data) remained relatively high. To compensate for the risk of nonnormality, bootstrapping was performed (200 samples) and resulted in a good final CFA model fit (see Table V).

2) Structural Regression Model Development: Subsequent to CFA model fit, a SR model was developed to test the hypothesized direct relationships by constraining nonhypothesized relations and comparing model fit. CFA-SR model comparison reveals a significant loss of fit ($\chi_D{}^2 = 123.03$, df = 1, $p = 0.00$), showing weak support for the SR model. Subsequent SR model identification and optimization indices signaled additional covariances between several leadership items.

Control variables for CI professionals' experience and firm size (both ranging 1–4; see Appendix 6 in the Supplementary Material) were added. Model comparison (i.e., control variables constrained) yielded nonsignificant deterioration of model fit ($\chi_D{}^2 = 0.49$, $p = 0.48$), and regression results revealed no significant relatedness of these control variables to CI implementation success (see Table VI). For the function of employment (executing versus administrative), model comparison initially yielded significant model deterioration ($\chi_D{}^2 = 16.19$, $p = 0.09$) with constrained regression coefficients, although further exploration did not corroborate this finding (i.e., constrained structural means and covariances) [67]. For industry type (manufacturing versus services), model comparisons (constrained regression coefficients) did not yield significant deterioration, which implicates no significant differences of results between both groups.

The SR model revealed a relatively high explained variance ($R^2 = 0.417$; Table VI). Comparison of model-observed and implied correlations revealed residual correlations below or close to 0.10 for all items except for the item "level of customer satisfaction" in the CI implementation success factor, which was accordingly removed [67].

Model 1 presents *only direct* relationships. Command and control behaviors (both neutral and negative) are weakly negative and not significantly related to CI implementation. Inspirational role-modeling, coaching, and empowering behaviors have a large positive and significant association with CI implementation. Serving behavior shows a marginally significant negative association with CI implementation success. In addition,

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TABLE V
MODEL FIT STATISTICS

Model fit statistics	Recommended	Final CFA model	Final SR model[1]
Chi-square (χ^2)	-	431.937	473.499
Degrees of freedom (DF)	-	411	457
P-value	> .05	.229	.287
RMSEA	< .05	.019	.016
RMSEA LO	< .05	.000	.000
RMSEA HI	< .10	.037	.034
CFI	> .90	.991	.993
R^2 (Squared Multiple Correlations)		-	.417

[1]Covariances are added where these follow the questioned relations in the conceptual model (n = 137)

TABLE VI
DIRECT AND MODERATED EFFECT RESULTS

Leadership behaviours	Model 1 Direct effects		Model 2 Low maturity		Model 3 High maturity		Model 4 Theory E		Model 5 Theory O	
Constant	-	-	-	-	-	-	-	-	-	-
Factor 1: *Command-and-control (neutral)*	.12	(.12)	.09	(.08)	.22	(.10)	.12	(.11)	.24**	(.08)
Factor 2: *Command-and-control (negative)*	.16	(.07)	.14	(.06)	.19	(.08)	.29**	(.09)	.07	(.06)
Factor 3-4: *Inspirational role-modelling, coaching, and empowering*	.70**	(.19)	.54**	(.14)	.32	(.24)	.65**	(.23)	.34**	(.14)
Factor 5: *Serving*	-.49*	(.18)	-.33**	(.08)	-.11	(.12)	-.38*	(.12)	-.11	(.08)
CI implementation maturity	.27**	(.06)								
CI implementation type	-.10	(.02)								
Firm size	.01	(.06)								
Practitioner experience	.06	(.05)								
Observations	137		88		49		54		83	
R^2	.417		.189		.134		.298		.219	
χ^2	473.499		7.919				7.515			
Degrees of freedom	457		6				6			
P-value	.287		.244				.276			
RMSEA	.016		.049				.043			
CFI	.993		.993				.995			

Standardized regression weights, standard errors in parentheses, two tailed significance at the 0.10 level (*) or 0.05 level (**) (2-tailed) (n = 137)

CI implementation maturity is indeed significantly and positively related to implementation success. For the implementation archetype (Theory E/O), no significant relationships were found.

Next, moderation was tested by consequent composite factor moderation (interaction) modeling, for which grouping variables were computed for both CI maturity (separating level < 2 structured CI and below, and > 3 goal-oriented CI and above) and CI archetype (separating Theory E and O) [67]. Table VI presents the difference in leadership behavior factor effects on implementation success, moderated by either implementation maturity or archetype. The moderation results (see Table VI) revealed that neutral command-and-control behaviors (F1) only had an enabling effect in Theory O implementations, and negative command-and-control behaviors (F2) only had an effect in Theory E implementations. Inspirational role-modeling, coaching, and empowering behaviors (F3-4) showed the largest enabling effects in low CI implementation maturity and Theory E contexts, and more moderate enabling effects were found in Theory O contexts. Serving behaviors (F5) were inhibiting, only when maturity is low, and in Theory E contexts.

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3) Robustness Analyses: The variables of interest are observed at the individual (i.e., CI leadership behavior) and aggregated organizational level (i.e., CI implementation success, maturity, and type) as a unit of analysis, raising concerns over attenuation of individual-level over organizational aggregated level correlation due to measurement error. Therefore, three composite factors multiple (stepwise) regression models were devised (control variables only, inclusion of organizational level factors, inclusion of individual level factors) to control for organizational level effects and isolate the unique contribution of the individual level factor [83] (see Appendix 9 in the Supplementary Material).

Second, to analyze the results' robustness, three SR composite factor models with alternative dependent variables for CI implementation success (i.e., company performance) were tested. To do so, the survey data (with company identifying information and subsequently merged financial performance data; n = 69) was merged with five-year based (2017–2021) per-company regression slope coefficients. For this, we took the natural logarithm (to account for asymmetry) of three company financial performance ratios (return on assets [ROA] and return on equity [ROE] as a proxy for overall efficiency, and operating profit margin [OPM] as a proxy for operating efficiency) [84] from the Orbis database [85]. Model fit for all three models was good (*Ln*ROA: $\chi^2 = 6.17$, $p = 0.29$, RMSEA = 0.06, CFI = 0.99 | *Ln*ROE: $\chi^2 = 5.59$, $p = 0.35$, RMSEA = 0.04, CFI = 0.99 | *Ln*OPM: $\chi^2 = 7.04$, $p = 0.22$, RMSEA = 0.08, CFI = 0.99). The regression results for ROA confirmed all leadership behavior effects (*Ln*ROA – (leadership behavior factor) F3-4: $\beta = 0.82$, P = 0.01∗∗ | *Ln*ROA – F5: $\beta = -0.36$, $p = 0.07*$). For ROE and OPM, the effects were confirmed partly (*Ln*ROE – F3-4: $\beta = 0.62$, $p = 0.06*$ | *Ln*OPM – F3-4: $\beta = 0.67$, $p = 0.03**$).

Finally endogeneity, or the correlation between the models' error term and its regressors, typically leads to inaccurate estimations due to omitted variable bias. First, given the heavy-tailed symmetrical distributions of the modeled variables and to approach an estimate (as the error term is typically unobservable) for endogeneity concerns the monotonic Spearman rank correlation between the regressors and the residual variance is assessed [86], signaling no correlations (see Appendix 10 in the Supplementary Material). Second, the variable for CI implementation maturity was taken as an instrument variable, as it proved to be significantly related to CI implementation success but uncorrelated with all three measures of firm performance (ROA/ROE/OPM), (thereby meeting the "relevancy condition," i.e., being correlated with leadership behaviors but not to firm performance) [87]. Three instruments variable-based generalized method of moments models were fitted and assessed on model fit (Wald-Chi square) and instrument variable adequacy (orthogonality: GMM C statistic χ^2 test) (see Appendix 11 in the Supplementary Material) [88]. All three models confirm the results, despite the fact that one model, for ROE, yielded insignificant model fit. Of course, our attempt to methodologically check for endogeneity is based on assumptions and will not completely rule out its potential perturbing influence [87], [89].

VI. Discussion and Future Research Directions

In this section, we discuss the findings derived from our mixed-methods research, and how these advance existing theories about effective leadership in the context of CI implementation.

A. Command-and-Control Behaviors and Transactional Leadership Theory

First, the mainly insignificant results for command-and-control behaviors (both the neutral and negative types) at first glance seem inconsistent with the qualitative study results. The interview results predominantly emphasized the inhibiting role of *excessive manifestation* of such behaviors, particularly in Theory O type implementations (see Table III). Only a few interviewees identified direct positive effects of behaviors such as directing and steering and showing a performance orientation, although overly directive behaviors were suggested to result in inhibiting effects. Our survey findings also showed that command-and-control type of behaviors can have *positive* effects, depending on whether the implementation is driven by economic value maximization (Theory E) (CI implementation success – F2: $\beta = 0.29$, p = 0.03∗∗) or organizational capability development (Theory O) (CI implementation success – F1: $\beta = 0.24$, p = 0.09∗) (see Table VI).

This may be explained by *transactional leadership*, which is grounded in the idea that employees' task execution is an (economic) transaction or exchange, implying that employees should be directed (with clear expectations) and rewarded (or even punished) depending on how they execute the task [81], [82]. In this line of reasoning, more negative behaviors in this factor such as "being nonparticipative and ruling" and "contingent punishing" could (temporarily) be acceptable, especially when CI implementation is driven by managers' economic value maximization ideas (Theory E). Although any coercive behaviors must be adopted with extreme caution, these behaviors indeed might fit a situation in which a company is going through, for instance, a major cost-cutting exercise [90], which is a motivation for some organizations to adopt CI with an economic value maximization approach.

In addition, these behaviors are often combined with other, more inspirational behaviors [90], which might make these behaviors somewhat less problematic. In Theory E archetype implementations, one could possibly expect potentially higher levels of employee resistance to change due to the less empowering and inclusive design of the initiative [14]. Nevertheless, a leader's negative command-and-control behaviors could be (temporarily) accepted to achieve the joint cause of re-establishing a company's financial health and create a clear sense of urgency for improvement, and, therefore, CI implementation. Hence, whereas negative behaviors as described above have even been observed in the lean-exemplar company Toyota [91], it might be that these behaviors are only acceptable in a Theory E archetype of implementation and in case they are combined with other more positively balanced behaviors.

In addition, more neutral transactional behaviors such as "directing and steering" and "task monitoring" could be functional

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to build organizational capabilities (Theory O), which, among other behaviors, also requires leaders' provision of clear directions and feedback to employees. Work on transactional leadership suggests that effective leaders clarify performance expectations and help employees develop through their interventions in case mistakes occur [82]. As such, these neutral command-and-control type behaviors support employees' learning process and capability development in the sense that they provide relevant information and insights to employees to develop themselves in their profession, and they provide the structure needed to perform.

Previous studies found that especially in early CI (or lean) maturity stages, leaders adopted task-oriented behaviors, such as monitoring and evaluating as well as getting and giving information to followers [10]. Thus, in line with previous literature and transactional leadership principles, we found that neutral command-and-control behaviors can be associated with CI implementation success in case of Theory O archetype of CI implementations. Future longitudinal process research could examine nonlinear relationships to better understand if there is an optimal point at which the different types of command-and-control behaviors enable successful CI implementation, and whether short- and long-term effects of such behaviors differ.

B. Inspirational Role-Modeling, Coaching, and Empowering Behaviors and Transformational Leadership Theory

Both the qualitative and the quantitative study findings pointed to the enabling role of inspirational role-modeling, coaching, and empowering type behaviors. The most impactful behaviors are (based on Table III and Appendixes 4 and 8 in the Supplementary Material):

1) "communicating and interacting" (i.e., sharing the need and rationale for the initiative);

2) "empowering and responsibility promoting" (i.e., motivating to participate);

3) "driving and improvement stimulating" (i.e., motivating to reveal problems and search for root causes, encourage learning);

4) "coaching and supporting" (i.e., facilitating people and initiatives where needed);

5) "role modeling" (i.e., "walking the talk" and demonstrating learning behaviors);

6) "contributions recognizing" (i.e., showing appreciation and creating a safe learning climate).

As mentioned in Section V-E1, these behaviors align with *transformational leadership theory*, which has been associated with continuous improvement initiatives before (see Table I [9], [12], [92]). Transformational leaders provide their employees with values-driven inspiration, motivation, stimulation, and consideration in order to ensure their identification with the collective, shared value internalization, and self-efficacy [93]. Our findings show that these behaviors are enabled mostly in low-maturity situations, and in Theory E implementations. By detailing the conditions under which these leader behaviors are most effective, the findings from earlier work [9] are furthered (i.e., the indirect effects via "respect for people").

The conditional effects could be explained by the fact that transformational leaders are able to inspire their employees (for instance by effective change story-telling) and facilitate employees' active participation in training and development to prepare them for (continuous) change. Yet, this also suggests that once the CI effort is sufficiently mature, it becomes more motivating and empowering in itself (as shown by the weaker coefficient in high-maturity implementations, Table VI). Similarly, a Theory E-driven implementation may be less intrinsically motivating to employees, and therefore provides more need for leaders to positively affect employees through inspirational motivation and empowerment. This is in line with the *substitutes for leadership theory* which suggests an interaction between leader behavior and the context [94], [99], which can compensate for one another. However, previous CI and lean leadership research referred to the role of contingencies in the adoption process [19], [92], the idea of substitutes for leadership has been an absent notion thus far.

In addition, inspirational role-modeling, coaching, and empowering behaviors only showed a moderate relationship with CI success in the case of a Theory O implementation. The literature reviewed suggested the overall positive effects of these behaviors, and we assumed them to be particularly supportive in Theory O implementations. Substitutes for leadership theory might also explain this moderation effect: In Theory O implementations, the focus is not only on leader behaviors but *also* on developing and possibly changing the organizational culture to support the implementation [14]. Thus, leadership is one of many factors that facilitate this change process. Leadership does not stand in isolation and is mentioned as one of the various "soft" practices that support CI implementation, in addition to, among others, training employees and establishing cooperative supplier relationships [95]. As such, a strong organizational culture for CI, as fostered in Theory O implementations, may form a (partial) substitute for the effect of leader behavior, thereby nuancing prior findings about the absence of organizational culture effects [9]. Given that we have not specifically measured this, we encourage future studies to examine this assumption.

C. Serving Behaviors and Servant Leadership Theory

The more passive serving behaviors were found to inhibit successful CI implementation. The label for this set of behaviors was inspired by the *servant leadership style* [53], which formed the basis for the studies on which the measurement items in this factor were based (see Table I). Our findings thus contrast previous studies that have positively associated servant leadership with CI implementation, proposing that servant leaders "can more effectively account for the workers' needs and perspectives, especially their viewpoint about the changes introduced by continuous improvement activities" [92, p. 10]. Also, general leadership studies have primarily focused on the positive outcomes of servant leadership [96].

Instead, our study shows that these positive results might not generalize across contexts given that these serving behaviors are mostly inhibiting when CI maturity is low as well as in Theory E archetype implementations. This is in line with other research which found that delegating type behavior is less important in initial CI implementation phases [32]; instead, in this initial phase, leaders must be more guiding and explaining. Indeed, our

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findings suggest that in the early phases of CI implementation, it is crucial for leaders to be actively leading the endeavor. This effect becomes less strong in higher maturity situations. Indeed, leadership that is deemed more servant in terms of humility or standing back—or even more passive laissez-faire leadership [97]—might signal a lack of taking leadership responsibility and a lack of providing guidance or care for employees and their needs. In addition, in Theory E archetype implementations, serving behaviors might be counterproductive in creating economic value maximization because establishing more formal structures and systems (see Table II) requires direction from leaders in a more top-down fashion. Indeed, related work showed the effectiveness of more top-down leadership behavior in the initial stages of a lean healthcare adoption which required the hospital-wide adoption of CI infrastructure [16].

Also, although behaving humbly has been mentioned previously as an important behavior for CI leaders [10], [35], other research has identified humility values of lean leaders as negatively related to lean team effectiveness [5]. Thus, our study quantitatively confirms the proposed negative effects of leader humility on CI (see [5]). Nevertheless, the fact that CI leaders' fair and consistent behavior had negative implications does contrast with findings that lean leaders who value treating others fairly were more effective (see [5], [31], [38]). Future research could thus explore these somewhat counterintuitive findings.

D. Summary of Theoretical Implications

Our study shows that several specific behaviors that fall under the transformational leadership style (vis-à-vis all the behaviors associated with this leadership style) seem to especially enable CI implementation success. In contrast, specific more transactional command-and-control behaviors are only enabled for CI implementations under specific conditions. More absent or servant behaviors can form inhibiting leadership behaviors, contrary to what previous studies have suggested [10], [35]. By considering a broader set of behaviors simultaneously, this research has synthesized, deepened, and specified the theoretical debate surrounding effective CI leadership, paving the way for more insightful and practice-relevant OM research. This is in line with the "fuller full-range of leadership theory" [13], and addresses the complex nature of effective leadership in CI implementation. Indeed, linking the OM and organizational behavior domains will benefit the smooth implementation of dominant OM paradigms, including CI, in organizations, as called for by several researchers [17]. We also question—in our view—at times overly positive display of specific servant leader behaviors. Our study shows that servant leadership might not always be effective. Hence, future research could study the contingencies under which servant leadership is more or less effective, including when there are possible counterproductive effects.

VII. Conclusion

This research contributes to the empirical understanding of leader behaviors in CI implementations. Specific contributions include identification of the positive effect of *"inspirational role modeling, coaching and empowering"* behaviors, and detailing the circumstances in which these behaviors have the strongest effects. In addition, for *"neutral and negative command and control"* and *"serving,"* we showed contingency factors affecting their enabling or inhibiting effects on CI implementation success.

A. Limitations and Future Research

While our study is based on multiple methods, the quantitative part of the study has a compact sample size (n = 144) [67]. However, the power analysis suggests it is sufficiently large and the data collected is continuous, approximated normal distribution patterns, and the questioned associations are all linear, making a smaller sample size more adequate [67]. Second, the ultimate model fit was good, and given the degree of knowledge and specific CI experience of the respondents, the validity of our data should be relatively high, allowing for more reliable statements despite a smaller sample size. Also, the survey sample-based findings were corroborated and validated by the interview results. Future research into better understanding the dynamic nature of the leader behaviors on CI implementation success could consider larger samples, which allows for the assessment of the behaviors under different contingencies.

In addition, although we carefully constructed valid measurement instruments, relying on perceptual experts and key-informant data induces the risk of misinterpretations. Despite the vast array of mitigatory measures, the perturbing influence of such biases cannot be fully excluded. Follow-up studies could, therefore, include more direct behavioral observational measures such as those presented in [6], while also taking into account contingency factors such as CI maturity and CI implementation type. Next, the acceptance of command-and-control behaviors is likely to differ across country cultures. This study was done in countries relatively low in power distance. In cultures high on power distance, strong and commanding leader behavior is typically more expected and accepted. Such behavior is part of paternalistic leadership, a hierarchically oriented style where the leader provides strong direction and guidance and shows benevolence and care. Subordinates are expected to be loyal and obey the leader [100]. Thus, in high power distance CI implementation contexts, the role of command-and-control behaviors may remain more positive over time. Future research could assess this. Finally, future research based on experimental designs is advised to more rigorously examine the causality between manifested behaviors and their effects.

B. Managerial Implications

How can our findings inform managers in CI implementations? First, CI implementation leaders are advised to demonstrate *"inspirational role modeling, coaching, and empowering"* behaviors, and focus specifically on

1) sharing the need and rationale for the CI initiative;
2) motivating employees to participate;
3) motivating employees to reveal problems and search for root causes and encourage learning;
4) facilitating people and projects where needed;
5) "walking the talk" and demonstrating learning behaviors;

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6) demonstrating appreciation and creating a safe learning environment.

Adopting these behaviors is especially important in the early phases of CI implementations. In top-down and economically driven CI program implementations, behaviors such as *"driving/stimulating improvement"* and *"consulting, listening, and role-modeling"* are more important. It can help managers to understand when which types of behaviors are likely to enable or inhibit to adapt their behavior accordingly.

Second, managers in Theory E type CI implementations could possibly temporarily adopt *"(negative) command and control"* behaviors to enforce CI implementation. Such behavior might fit managers' need to deal with potentially higher levels of employee resistance to change given the less empowering and inclusive design of such initiatives. Yet, awareness that these behaviors can be detrimental if not offset by positive behavior is needed. Also, first trying neutral command and control is advisable, and these behaviors are to be avoided when there is an intent to develop the organization and take a more long-term or continuous learning approach to CI implementation. In bottom-up and adaptive, organizational development-oriented implementations, *"coaching and supporting"* and *"collaborating, involving, and role-modeling"* carry the most weight in achieving CI success. Managers are advised to adopt *"neutral command and control"* behaviors and provide clarity and direction in Theory O context initiatives (i.e., less structured and rigidly designed). Finally, *"serving"* behavior does not tend to help. In CI change processes, leaders should not passively stand back or be humble but actively lead the implementation. Especially in early phases, it is crucial to (pro)actively lead the endeavor and take leadership responsibility. These insights are not only of use to CI implementation leaders but also to their organizations to help select, train, and coach leaders to adapt their behavior to the demands of the specific context and phase they are in.

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