A Critical Investigation of Rationalities in Automation with BPM

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***Abstract*—Automation is considered a key component of the *Business Process Management* (BPM) discipline. Existing research within BPM considers the consequences and impacts of automation primarily in technical terms, and other disciplines, such as psychology, focus on individual implications. To facilitate a discussion of the long-term consequences and risks of automation initiatives within BPM and to characterize the discourse around automation in BPM, we draw upon Critical Theory and the notion of rationality. By reviewing how case studies justify, conduct, and evaluate automation initiatives, we identify rationalities present in existing papers and assess what implications are discussed and which are left out of the automation discourse. We observe that most papers are primarily justified with and focussed on performance improvements, and that potential implications from this focus, such as depersonalization and alienation, are almost invisible in the discussion. Based on this, we offer impulses for practitioners and researchers on how the discourse on automation and its risks can be broadened. Further, we contribute to the community by integrating concepts from Critical Theory.**

***Index Terms*—Business Process Management, Automation Effects, Rationality, Critical Theory**

I. Introduction

Automation is commonly defined as making machines, particularly computers, carry out tasks previously performed by humans [1]. Additionally, especially in light of big data and machine learning techniques, tasks not previously carried out by humans, e.g., because of non-feasibility, can be automated. Generally, the automation of work plays a key part in the management of organizations' business processes [2], and research on automation in business contexts has increased considerably in the last decade [3].

The *business process management* (BPM) discipline includes methods and tools to support the implementation and enactment of business processes, a core part of which aims at automating processes [2], [4]. This *process automation* can commonly take on two forms: the automation of process flows, or the automation of tasks themselves [2], [5]. The former is concerned with automating or orchestrating process flow (i.e., deciding which process task to execute next), handovers between tasks, allocating (human) resources to tasks, and handling business exceptions [2], [5], [6]; The latter focuses on automating concrete tasks of a process [5], [7], [8]. Automation fills a gradient from non-automated, i.e. work performed purely by humans, to fully automated, with any degree of division of labour between humans and automation tools [9]. Within BPM, the benefits of both task and process automation are typically seen along the process dimensions of cost, time, quality, and flexibility: Primarily, this includes a reduction in cost and increase in productivity [2], [4], [10] and an increase in process or product quality [2], [8] due to e.g. a higher degree of standardization and reduced errors. Finally, the potential to improve employee job satisfaction by reducing or eliminating trivial, monotone tasks also plays a role [8]. Beyond this predominantly technical perspective, research in other areas, e.g., human-automation interaction based on psychology, focuses primarily on the individual effects [11]. These include the challenges of acceptance of and trust in automation technologies [12], associated losses of work motivation, and possible reactance [13]. These effects are considered side effects for the individuals involved, despite the otherwise often successful automation of processes. Some of these effects, such as loss of competence or complacency, only develop through ongoing interaction and often growing dependence of users on automation technologies [14]. As a result, such negative effects for automation users are not recognized during the introduction and evaluation of process automation.

As seen in the different perspectives on automation, there is a noticeable gap in considerations of consequences and risks of automation from *within* the BPM discipline [11]. Accordingly, the need to import and merge methods and findings from other fields to complement perspectives of BPM has been underlined [15]. Therefore, to consider and better understand the effects of automation with BPM and the surrounding discourse in research, we draw upon critical research in information systems (IS) [16], [17]. Based on Critical Theory, which aims to reveal and challenge hidden or taken-for-granted assumptions [17], critical IS research aims to reveal hidden assumptions and interests that guide IS initiatives and their impact on organizations and social structures. Doing so allows us to take into account the broader impacts of automation with BPM and consider consequences that emerge directly from its mode of application. For this, we utilize the *rationality framework* for a critical study of information systems, which allows a classification of IS initiatives based on the assumptions and justifications underlying their application and intended use and enables considerations of implications

and risks based on them [18].

More detailed, we perform a structured literature review of automation case studies in the area of BPM and consider *rationalities* (i.e., logical grounds with which an automation initiative is justified and implemented) inhabited by automation initiatives, and investigate potential risks and consequences which occur due to the initiative's rationality. Further, we investigate whether papers considered in the review are aware of the risks associated with the rationality they display and which risks and implications are *left out* of the discourse. While rationalities in the area of BPM-motivated process automation might have been inferred based on the overall concepts and methods of BPM, this has not yet been done in a structured manner based on reported process automation initiatives.

Consequently, this work aims to address the following *research questions* (RQ):

RQ1: What are the main rational grounds for practically applied process automation in BPM as reported (directly and indirectly) in research studies?

RQ2: How are these reasons reflected upon in research and the scientific discourse, and in how far are limitations and risks related to them identified?

RQ3: How can practitioners and researchers broaden their view to assess the implications of process automation initiatives more comprehensively, taking limitations and risks previously not considered into account?

The remainder of this paper is structured as follows: First, in Sec. II, we present background and related work on implications of automations and the theoretical framework used for our analysis. In Sec. III, we elaborate upon the research method used in this work. Subsequently, in Sec. IV, we present the results of our analysis; we discuss our findings, address the research questions, and provide impulses to researchers and practitioners in the area of BPM and process automation in Sec. V. Finally, in Sec. VI, the work is concluded, and future work is provided.

II. Background and Related Work

In this section, we provide related work that assesses the implications of automation. Further, we introduce the theoretical framework used for our analysis.

A. Business Process Automation Effects

Pursuing operational efficiency has long been the driving force behind process automation, with the prevailing narrative emphasizing its potential to streamline operations and achieve significant cost savings. This perspective, largely supported by the literature, champions the transformative power of automation in elevating business productivity [19], [20]. However, this focus on efficiency often overshadows the broader impacts of automation, particularly on those who enact these processes [11]. Studies on human-automation interaction reveal that the effects of automation extend well beyond mere process enhancement, frequently impacting human participants in adverse and unintended ways, e.g., by leading to skill-decay [21], complacency [14], even partially increasing mental-workload [22]. Recognizing these effects is crucial for refining our understanding of automation's actual implications. By broadening our perspective to include these human-centric impacts, we can better assess the reasons for and methods of automation, ultimately leading to more thoughtful and inclusive approaches that consider both efficiency *and* the well-being of individuals involved.

More concretely, the effects of process automation on employees vary significantly, depending on the successful implementation of automation technologies and the workforce's capacity to adapt and integrate these systems into their daily workflow [23]. Process automation can alleviate the burden of mundane tasks when effectively executed, freeing up cognitive resources for more engaging and challenging work [24]. Yet, this positive outcome is not guaranteed. Automation introduces psychological challenges that can significantly impact employee well-being and performance. Skill decay, an overreliance on automated systems, and boredom stemming from passive monitoring roles are prominent issues [11], [25]. Furthermore, the effectiveness of *robotic process automation* (RPA) hinges on specific human expertise to account for the automation tools and outcome, highlighting the intricate balance between technological advancements and human skills [8], [10], [26], [27]. Resistance to change and the learning curve associated with new automated systems can further complicate process automation adoption and efficient utilization. The alteration of job profiles due to automating dull tasks introduces another layer of complexity, potentially evoking adverse reactions among employees [10], [28]. The dichotomy between automation's usefulness in high workload situations and the potential for skill loss underscores the complexity of integrating automation into the workplace [29]. Despite these challenges, the ultimate goal of automation should extend beyond mere cost savings, aiming to improve employee work life and conditions [28], [30].

Furthermore, the human implications of automation's reliability issues are significant and multifaceted. Data biases and system 'hallucinations' in generative AI tools can spread misinformation, eroding confidence in automation technologies and affecting the people who rely on them for accurate information and decision-making support [31]. This focus on large language models (LLMs) is particularly relevant for the study of process automation because LLMs are increasingly integrated into various automated systems, from customer service chatbots to complex decision-making processes in finance, healthcare, and logistics industries [32]. The ability of LLMs to understand and generate human-like text makes them powerful tools for automating tasks that require comprehension and synthesis of large volumes of information. However, their susceptibility to errors and biases highlights the need for careful oversight and robust validation mechanisms to ensure that automation enhances, rather than undermines, human decision-making [31]. These problems, exemplified by RPA implementation challenges, raise concerns about IT security and privacy and reflect on the potential for automating

inefficiencies and failing to meet expectations, directly impacting employees and organizational trust [33]. As decision-making increasingly shifts to automated tools, the responsibility landscape within organizations transforms, affecting roles, job security, and the perception of value in human versus machine contributions [34]. Acknowledging the limitations of LLMs in specific applications, such as programming, is vital for addressing issues like code inaccuracies, the generation of misleading outputs, and a general lack of situational awareness, all of which can have real-world consequences for the professionals involved [35]–[37]. This emphasis on the human side effects of automation underscores the need for a balanced approach that considers both the technical capabilities *and* the human factors at play.

In conclusion, the body of related work emphasizes the intricate nature of process automation, spotlighting the necessity for a comprehensive approach that merges technological progress with human factors. This section has shown that embedding process automation into business operations presents challenges that require careful consideration of its benefits, potential risks, and far-reaching consequences. Amidst a spectrum of viewpoints, the advocacy for a comprehensive perspective on process automation [38] stands out. It becomes crucial to approach process automation implementation with a balanced and thoughtful perspective, taking into account not only the immediate gains in operational efficiency but also the enduring effects on employees, the organization, and society as a whole [38].

B. Rationality Framework

As detailed above, considerations of automation impacts, also in the area of BPM, focus primarily on organizational and individual consequences. Therefore, to enable prudent process automation initiatives, we see a need to investigate the potential consequences of BPM-motivated automation further.

To better understand the implications of IS initiatives, Cecez-Kecmanovic et al. [18] propose the *rationality framework for a critical study of information systems*. The framework, which is rooted in critical IS research [16], differentiates types of *rationalities* (i.e., logical grounds given to explain actions that achieve desired ends [18]) of IS initiatives, such as automating a specific process. According to the framework, IS initiatives are implemented in organizations based on certain logical explanations and justifications, i.e., a certain rationality that classifies the *why* and the desired ends of the initiative. Through this initiative, the prevalence of the corresponding rationality type is increased in the organization, leading to potentially undesired consequences. An increase in a rationality type is also referred to as *rationalization* [39]. As depicted in Fig. 1, the concrete rationalities are derived from two dimensions.

First, the underlying *ontological assumptions* behind the rationality are differentiated, i.e., what actors consider to be *subject to* rationalization. Concretely, what actors (e.g., CIOs or process managers of a certain business process) view as being impacted by an initiative can be either the

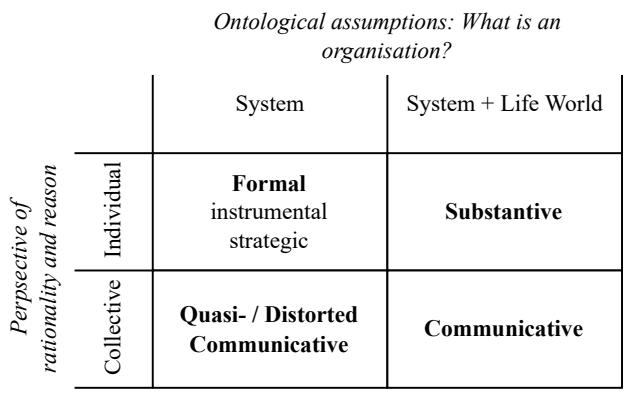

Figure 1. Rationality framework for a critical study of information systems, adapted from Cecez-Kecmanovic et al. [18].

organization as a *system*, which consists of *physical* artefacts and facilities, processes and structures, or the organization as a physical system *and* the *shared social* structures and social and organizational activities of its members (i.e., the life world, consisting of shared values, norms, subjective experiences) [18].

Second, the *perspective on reason and rationality* is differentiated into two possible perspectives. In the context of IS initiatives, the perspective relates to how actors create and obtain knowledge about the organizational situation and how the means and ends of an initiative are determined (for more background, see [39]). In the *individual* (subject-centered) perspective, means and ends are determined based on dominant individual interests. In the *collective* (inter-subjective) perspective, on the other hand, means and ends are agreed upon collectively between individuals [18]. Consequently, along the two dimensions of ontological assumption and the perspective of rationality and reason, the framework identifies the following four rationality types:

Formal rationality: Actors follow individual interests, and their interventions aim to achieve predefined ends, disregarding the intervention's significance to or impact on the values of others (e.g., of workers within a business process or of interaction partners). *Instrumental* formal rationality means that actors determine means using *technical* knowledge, and *strategic* formal rationality means that actors strategically influence other rational actors. The benefits of formal rationality lie in its potential to improve or optimize metrics and processes, especially in systems where physical factors dominate, e.g., in robotic assembly lines. However, potential issues lie in disregarding the values and interests of those affected, e.g., employees or customers. These issues can lead to undesired social consequences, such as an increase in depersonalization or alienation [18].

Substantive rationality: Actors aim to achieve certain ends within the organization and its surrounding life world, taking into account the physical world *and* (assumed) shared values, norms, and subjective experiences. This, in contrast to formal rationality, allows actors to achieve overarching goals based

on shared value positions (e.g. when employees agree with management that a new information system is necessary for reaching a goal they share). However, the subject-centred perspective on reason brings the risk that actors disagree about their interests, ends and values that concern the shared objective and social worlds. This has the potential to cause conflicts or disagreements on values and objectives. Such a disagreement may be hidden, causing actors to engage in counterproductive behaviour, such as employee sabotage, instead of addressing the disagreement [18].

Communicative rationality: A shared understanding is developed through communication, with which actors achieve a consensus of means and ends. It enables a cooperative interpretation of a problem. It is suited to address the issues of substantive rationality, as it can assist members of an organization in reaching agreements and coordinating actions. However, the process for communicatively reaching agreements/understanding can be limited, e.g. by an asymmetry in power (e.g., when decision-makers can disregard interests), competing interests, or unequal access to resources/information (e.g., when management is aware of potential uses of a system against the employees' interest, but the employees are unaware of this potential) [18].

Quasi-communicative rationality and *distorted communicative rationality:* These are deviations from a communicative rationality. Distortions occur either purposefully or accidentally, e.g., by actors pretending to act communicatively to achieve a common understanding while, in fact, acting strategically to achieve system-oriented success or by actors unintentionally exerting influence over others. This enables strategic action (with the associated risks) while only pretending to inhabit a collective perspective. Alternatively, communicative rationality may only be achieved partially due to factors limiting the possibility of reaching a mutual understanding, such as a lack of shared background knowledge [18].

As argued in [18], this framework allows an understanding of organizational and social implications by enabling an understanding of the effects that the use of information systems in organizational settings has on the rationalization of these organizations. Different rationalities have different risks or benefits regarding their associated consequences. Hence, in the subsequent analysis of process automation applied with BPM, we adopt this rationality framework as the theoretical foundation for assessing and discussing existing contributions that describe initiatives which apply automation in the context of business processes. Further, we aim to investigate their inherent rationalities and the considerations of resulting implications. Thus, we aim to shine a light on the discourse around BPM-related automation.

III. Research Method

To answer the research questions outlined above, we conducted a *systematic literature review* (SLR) following the eight-step method of [40].

For the *purpose* of this SLR, we aimed to identify all peer-reviewed papers that, within the context of BPM, apply automation or analyse applications of process automation within organizations, published from 2013 – 2023. Constraining the search this way brings three main benefits: Firstly, we identify those approaches that are relatively recent and coherent in their techniques, expected goals and justifications — since business research on automation has increased considerably in the past ten years [3], the techniques and goals may have changed as well, compared to previous research streams. Secondly, we believe that we are better able to draw meaningful conclusions and implications from rationalities furthered through automation within one discipline, instead of considering multiple disciplines with different underlying rationalities and assumptions. Thirdly, it allows us to investigate practical applications of automation rather than theoretical considerations.

For the *protocol and training* step, we identified and recorded articles and reasons for inclusion or exclusion. The *search* was conducted using five scientific databases (ACM, IEEE Explore, Science Direct, SpringerLink, Web of Science). As to the search terms, we used "case study", "field study" and "report" to identify papers that report practical applications, and "automation" and "automate" to find instances of automation techniques. With "BPM" and "Business Process Management", we aimed to find all contributions that explicitly relate to the field of BPM. Additionally, SpringerLink was limited to the disciplines of BPM and Business Information Systems. The resulting search string *"(case study OR field study OR report) AND (automation OR automate) AND (BPM OR Business Process Management)"* was applied in all five databases to the full-text, abstract, and metadata search, where applicable. We also filtered for publication dates between 01/01/2013 and 11/10/2023. Further, we added [41], [42] as sources for relevant papers, recognizing their strict editorial review process, despite not employing a traditional peer review. In these two works, real-world cases of BPM being applied and evaluated in organizations are reported, thus making them a thematic fit and relevant for our analysis. We added them to our corpus of potentially relevant papers and screened and assessed them accordingly.

Comprising the *practical screen*, we defined a set of *inclusion* (IN) and *exclusion* (EX) criteria. Following the purpose described above, we sought to include only papers that practically apply and evaluate process automation (IN1) on/within one or more business processes in a *real-world* organisation (IN2) in *explicit* reference to BPM (IN3), published in the past ten years (IN4). Those papers that are not written in English (EX1), are not peer-reviewed, besides [41], [42] (EX2), do not apply process automation in a real-world organization (EX3), or lack a BPM context in their application of process automation and do not explicitly refer to the BPM discipline (EX4) were excluded. The screening step was divided between the main author and the second author, who both verified each other's screening. Conflicting views regarding inclusion/exclusion decisions were resolved in a discussion.

How the number of papers developed during the search and screening of the *quality appraisal* step, as well as an additional *forward-backward* (FW-BW) search and an addition based on

expert knowledge, is displayed in Fig. 2 from left to right. Overall, we found 30 relevant papers out of a total 416 papers which we considered.

For *data extraction*, we followed a deductive, qualitative approach, informed by the rationality framework described in Sec. II-B. Besides meta information such as the domain in which process automation was applied and the authors' affiliation (from academia, industry, or both), we aimed to capture information that pertained to the rationality type furthered by the automation case studies. This includes 1.) information on the reasons given by the paper for implementing process automation; 2.) expected and observed outcomes; 3.) who implemented the automation and who was affected by it, and 4.) whether those that were affected by the automation were involved in its implementation, and how. In the first iteration, the set of studies was divided between all authors, each of whom extracted the relevant information. The main author validated the extraction, and differences were resolved in a discussion.

In the second iteration, each category was refined, extended, and abstracted. Doing so, we differentiated the key motivation for applying automation along *system* and *life world* (i.e., mainly physical goals that view the organization as a system or also goals that include the shared life world of its members). We also differentiated between *top-down* (as the management drives the automation, workers are only passively –if in any way– included in the automation process), *bottom-up* (as the workers initiate and drive the automation, management supports it), and *hybrid* (when automation is jointly driven by management and the workers are actively engaged in the automation implementation) automation approaches. Based on what was measured and what outcomes were expected and observed, we determined the type of *evaluation* (consisting mainly of employee interviews or KPI-based assessments), which we further classified into either *technical*, when KPIs were considered, or *social*, when, potentially in addition to KPI considerations, employee interviews and surveys were performed. Regarding the discussion of potential risks in the paper, we focussed on whether, beyond technical challenges of the process automation initiatives, organizational and social/societal risks were discussed, and extracted and grouped types of risks accordingly. In this step, each of the authors was assigned a category to refine, extend, and abstract, after which the main author validated the results, and reached a consensus with all authors in case of differences.

In a third iteration, we deduced the *type of rationality* underlying the process automation initiatives based on the rationality framework. By considering the type of motivation and object of evaluation as approximators for the underlying *ontological assumptions* (i.e., either considering the organization as a system only, or also including the shared life world of its members), and deriving the *perspective of rationality and reason* from the automation approach (i.e., whose perspectives and interests were considered, with top-down approaches corresponding to an individual perspective, bottom-up approaches to a collective one, and hybrid approaches to potentially either), we were able to infer the rationality type present in each paper. In the case of ambiguities (e.g., when the object of evaluation of a study was related to a system view, while the motivation included the life world, or the automation approach appeared to inhabit a mixed perspective on reason and rationality), we inferred that two rationalities were partially applicable, since the rationality framework also explicitly states that the differentiation is not always clearly visible [18]. Further, if papers were unclear regarding their ontological assumptions or perspective of rationality and reason, we assumed, as far as the descriptions permitted, a system-individual, i.e., formal, rationality. We base this assumption on the fact that BPM has traditionally been understood to be a primarily top-down management activity [43]. Additionally, for maintaining methodological rigour, methods for elicitation of user requirements or employee involvement would need to have been reported in the studies. The third step was performed by the main author and validated by the second author, who discussed cases of disagreement to reach a consensus.

Finally, we collect the resulting data in the form of a concept matrix [44], which represents the *synthesis* step. The subsequent section, in which we provide our findings, constitutes the *written review*.

IV. Results

In the following, we present our findings regarding the rationalities and characteristics of the automation case studies. Table I provides a summarized version of the resulting concept matrix. A full version of the concept matrix is available online[1], in addition to a bibliography of all relevant studies and a coding table that describes the data extraction and synthesis in more detail. Generally, we investigated case studies from a wide range of domains, such as manufacturing, health care, finance, telecommunication, and insurance.

A. Motivation

In terms of motivation, we see that the majority of papers (19 of 30, i.e., almost two-thirds) describe the main reasons for motivation in system terms, mainly concerned with physical artefacts, processes, and factors. For instance, [45] motivates the automatization of a sterilization process in a healthcare setting primarily via a reduction in cost. 11 papers, on the other hand, also include aspects that concern the socio-cultural life world of the respective organization's members, such as improved workforce conditions [46], addressing a shortage of skilled workers [47], or an increase in (customer) satisfaction [48].

B. Automation Approach

11 papers apply automation clearly in a top-down manner. For ten further papers, where the exact application is unclear, we assume, as argued above, an individual perspective on reason and rationality and hence a top-down approach. Consequently, in more than two thirds of the papers, we identify top-down approaches to automation. Eight papers appear as

[1]https://doi.org/10.6084/m9.figshare.25265416 [Accessed: 29/07/2024]

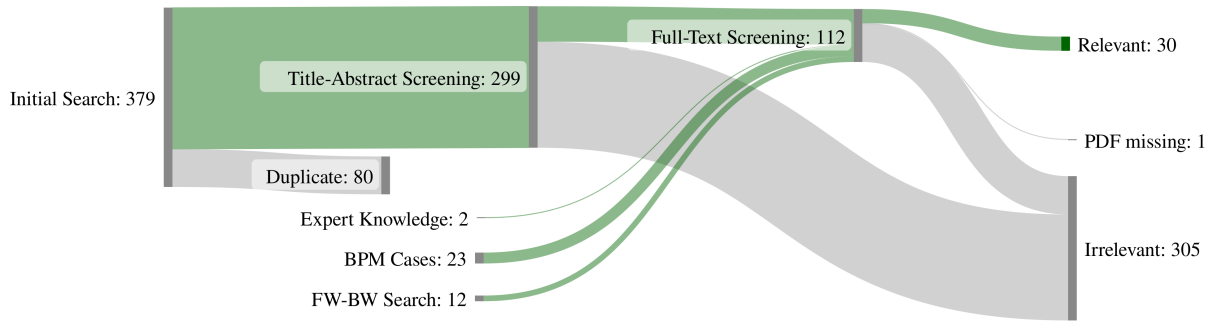

Figure 2. Search process for relevant studies on process automation with BPM.

Table I
SUMMARIZED CONCEPT MATRIX, PROVIDING THE DISTRIBUTION OF THE MOST IMPORTANT CONCEPTS ACROSS ALL RELEVANT PAPERS

Moti-vation		Automation Approach				Evaluation Type				Object of Evaluation			Rationality Type(s)						Related Risks Discussed?		
System	System + Life World	Top-Down	Hybrid	Bottom-Up	N/A	KPIs	Interviews, Surveys	Both	N/A	System	System + Life World	N/A	Formal	Formal/Quasi-Communicative	Formal/Substantive	Substantive	Substantive/Communicative	Communicative	Yes	No	Partially
63.3%	36.7%	36.7%	26.7%	3.3%	33.3%	50%	23.3%	20%	6.7%	56.7%	36.7%	6.7%	40%	6.7%	16.7%	10%	13.3%	13.3%	23.3%	63.3%	13.3%

hybrid approaches, meaning that both management interests and employee input are considered in the implementation, whereas, notably, only one work seems to inhabit a bottom-up perspective. In [49], a process automation initiative is reported as being instigated and steered by an employee, with requirements elicited directly from multiple stakeholder groups. Generally, however, neither the origin of the authors (i.e., whether the authors report only academic affiliations, industry affiliations, or both), nor the overall motivation seem to correlate with the chosen automation approach.

C. Evaluation

For evaluating the process automation initiatives, we observe that 14 of 30 papers exclusively utilize KPIs (i.e., indicators that evaluate the initiative in system terms). Six combine KPIs and interviews/surveys, and seven exclusively conduct interviews/surveys. In two cases, the exact evaluation was not reported. Consequently, only around one third (11) of the papers investigate the initiative in terms that include both the organization as a system and its members and their shared socio-cultural life world. 17 papers, on the other hand, exclusively evaluate the process automation initiative with a system perspective. As to the outcome, almost all papers exclusively report positive results. Notable exceptions are two papers, where no evaluation outcome is provided, and [50], where the KPI of process agility did not improve. Further, mixed results are reported in only four studies (e.g., [51], where the overall throughput was improved, but the case duration did not change).

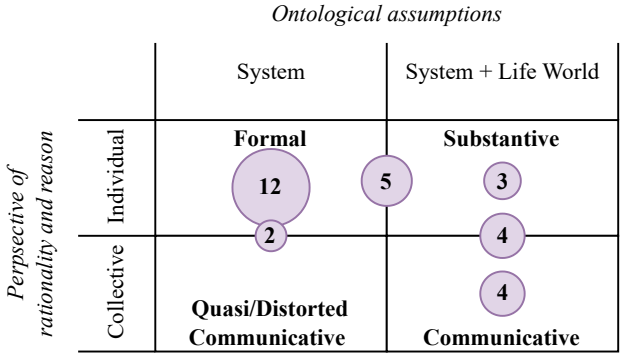

Figure 3. Distribution of prevalent rationalities identified in the investigated case studies.

D. Rationality Types

Based on our analysis of the rationalities exhibited by the case studies, further illustrated in Fig. 3, we see a focus on formal and substantive rationalities. Notably, we observe an exclusively formal rationality 12 times, and additionally five times blended with a substantive rationality. For example, [52]

is motivated in system terms exclusively but is also evaluated regarding the shared life world; therefore, we infer a mixture of the two rationalities applicable to this study. Thus, more than half of the case studies investigated contribute, to some extent, to an increase in formal rationality. However, we would like to point out that some rationalities are not inherently superior to others – in certain settings, formal rationalities are beneficial and appropriate [18].

An exclusively substantive rationality is observed only three times; however, we observe four occurrences mixed with a communicative rationality. As one example of this, [53] reports an initiative initiated by management officials but involved selected workers in the initiative, i.e. a hybrid automation approach is applied. This hints at some degree of collective reason, but since not all workers are involved, it appears limited; hence, we infer a blended rationality. Moreover, we inferred a purely communicative rationality only four times. Finally, we observe two instances of partially formal, partially quasi-communicative rationality. Concretely, [54] reports that multiple stakeholders were involved in shaping the process automation initiative; however, some seemed to mistrust process changes and thus the process automation initiative, thereby hinting at difficulties in achieving a shared understanding and a potentially *quasi*-communicative rationality. However, since the extent of stakeholder involvement is not directly reported, a partially formal rationality also seems applicable. Notably, there appears to be no clear correlation between the process domain or process type, meaning that initiatives appear to inhabit a certain rationality in a way that is not determined by their application context.

Looking at the author affiliations of each case study (indicating whether the authors had an academic affiliation, industry affiliation, or both) and the corresponding rationalities, we observe that only two papers exclusively have industry affiliations. For these two studies, we observe a formal and a partially formal rationality. Further, almost half of the case studies with exclusively academic affiliations (i.e., six of 13) exhibit a *non-formal* rationality, while for two thirds of case studies with academic *and* industry affiliations (i.e., ten of 15), we indeed observe *formal or partially formal* rationalities. Table II illustrates this further.

Table II
RATIONALITY TYPES PER AFFILIATION

Rationality Type	Academia	Industry	Both
Formal	5	1	6
Formal/Quasi-Communicative	1	1	–
Formal/Substantive	1	–	4
Substantive	1	–	2
Substantive/Communicative	3	–	1
Communicative	2	–	2
Total	**13**	**2**	**15**

Since many papers are unclear to the extent with which authors were actively participating in initiating and shaping automation initiatives, we could only speculate in how far authors and their background affect the rationality of automation initiatives. However, we can indeed see that studies with industry affiliations tend more towards formal and partially formal rationalities.

E. Risks of Rationalities

Regarding discussed risks, two-thirds of the papers (i.e., 20) discuss risks beyond technical considerations and include organizational, social and ethical concerns in their discussion. For example, seven studies discuss the risk of not achieving the desired *outcome* and functionality, and the automation implementation failing. For instance, [46] describes how a failure of the implementation would severely impact the organization and lead to a "standstill" [46]. However, only 11 studies consider at least to some degree risks related to the rationality furthered by the reported process automation initiative (cf. Sec. II-B). For example, [55] discusses risks regarding employee acceptance, which are connected to a substantive rationality that we identified in the study. Interestingly, those papers in which we identified a formal rationality (also the most prevalent rationality in general) most often do not discuss organizational, social, individual and ethical risks at all (six out of 12 times). If risks are discussed, they usually pertain to *acceptance and opposition* of and to automation, mainly related to a substantive rationality [18]. Issues such as alienation and bureaucratization, a disregard for values, or power asymmetries that hinder communicatively reached agreements are *not* considered. Only in one instance are ethical considerations outlined as necessary, hinting at the risk of control and depersonalization [56]. Table III shows the categories of risks beyond technical aspects we identified in the investigated studies.

Table III
RISKS BEYOND TECHNICAL CHALLENGES DISCUSSED IN CASE STUDIES

Risk Category	Risk	Count
Social/Societal	Acceptance and Resistance	16
	Labour Welfare, Job Loss, Inequality	6
	Knowledge Loss and Fragmentation	3
	General Ethical Issues	1
	Privacy Violations	1
Organizational	Outcome: Failure, Functionality	7
	Scoping of Automation Initiative	2

Consequently, there appears to be a mismatch between the risks perceived as noteworthy and subsequently discussed in the papers and the risks that emerge due to the rationalities we see inhabited by the case studies. Furthermore, the mitigation of employee resistance and a lack of employee acceptance are mostly (i.e., 13 out of 16 times) discussed in strategic terms (e.g., [57] states that making employees *understand* the benefits of an initiative helps to reduce resistance). On the other hand, three studies argue that direct employee *participation* is needed to overcome resistance instead of just making employees align with the initiative for their own good. Nonetheless, active *change management* seems to have been identified as contributing to addressing resistance and acceptance in more than half of the initiatives.

V. Discussion

Having investigated BPM-related automation case studies for the rationalities they exhibit and the related risks, we discuss the findings in light of our research questions.

A. RQ 1 — Rational Grounds for Process Automation

As to the rational grounds for applying process automation, more than half of the papers present a formal rationality, focussing on primarily improving metrics and processes according to technical or strategical knowledge. To some degree, a shared value position that automation is beneficial for multiple involved stakeholders appears to be behind initiatives, while only occasionally is automation applied as the result of a cooperatively reached agreement and shared understanding. This supports the observation that BPM is primarily concerned with improvements of KPIs and is commonly considered to be related to top-down management [43], also in practical applications.

B. RQ 2 — Reflection of Risks

We observe that a wide range of case studies is aware of organizational, social and ethical challenges related to automation of and within business processes. However, discussions of risks related to the rationality present in the work are much rarer. Some issues, such as alienation and a disregard for individual interests, are not at all taken into account. Further, the studies did not consider a range of effects from automation literature, such as boredom and skill decay. This underscores the necessity of expanding the conversation regarding the consequences of process automation initiatives; it also emphasizes the advantage of incorporating perspectives from various disciplines to illuminate diverse approaches for evaluating the effects of automation.

C. RQ 3 — Impulses for Researchers and Practitioners

Having investigated studies of process automation with BPM regarding their rationality and their considerations of automation risks, we see the following *impulses* (I) for researchers and practitioners in the field of BPM, summarized in Table IV: First, in light of the prevalence of a formal rationality in case studies with and without practitioner involvement, we see the main potential in broadening the evaluation of automation in moving beyond KPIs, where appropriate. This evaluation could also involve stakeholders that are directly affected by the automation initiative without having been involved in the implementation (I1). Second, ensuring that means and ends are agreed upon discursively between all stakeholders (as far as is feasible and possible) is also beneficial; doing so could contribute to an increase in communicative rationality, which in [18] is linked to low staff turnover, high employee cooperation and a well-perceived company culture (I2). Third, by including considerations not just in terms of technical challenges but also broader social implications, a more holistic assessment of process automation initiatives appears feasible, both in research and in practice (I3). Fourth, reflecting on whose interests are considered, how means and ends are determined, and, especially for practitioners, whether explicitly taking up another rationality may be more applicable when facing a process automation initiative appear as a good strategy to encounter undesired consequences of automation. The use of the *rationality framework*, as shown, can help uncover the associated risks (I4). Similarly, we have illustrated how the framework allows researchers to report more critically on potential implications of conducted process automation initiatives based on the associated rationality. Doing so would contribute to a broader discourse on process automation (I5). Moreover, a considerable research contribution could be achieved by conducting longitudinal studies that explicitly target long-term social consequences of BPM-motivated process automation, something the studies identified in this SLR did not do (I6). Finally, as seen in the number of studies in which central aspects were unclear and insufficiently detailed, we would like to encourage more rigorous and detailed reporting regarding automation case studies, their objectives, motivation, and implementation (I7).

Table IV
Impulses for researchers and practitioners in the area of process automation and BPM

I1	Move beyond KPIs when evaluating process automation initiatives
I2	Facilitate a discursively reached agreement on means and ends of the process automation initiative between stakeholders
I3	Include broader social implications when assessing process automation initiatives
I4	Drawing on the rationality framework, assess the feasibility of taking up another form of rationality, and actively encounter associated risks
I5	Consider the underlying rationality and associated implications when reporting on process automation initiatives
I6	Empirically investigate the long-term impact of BPM-motivated process automation, especially regarding the risks related to the concept of rationalities
I7	Transparently report objectives, motivation, and implementation of process automation initiatives

Increasingly, the BPM field is aware of a need for taking the perspectives of employees and workers into account when developing and implementing BPM initiatives (see, e.g., [58], [59]). The seven impulses may offer a sense of direction on *how* this can be researched and achieved for process automation initiatives while being aware of unintended potential consequences based on underlying rationalities.

D. Threats to Validity

There are several threats to the validity of our findings. First, papers may obfuscate details, e.g., regarding motivation and employee involvement, to provide more "acceptable" grounds for automation. Therefore, deriving the rationalities actually inhabited by case studies might be difficult due to purposefully distorted reporting. However, we can nonetheless derive a rationality based on what was deemed reportable by the authors or the outlets, which also pertains to the discourse on process automation. Second, the difference between what authors report and what has been implemented is, in some studies, unclear. Still, we analyse how the justification of

process automation in organizations is described in the studies; this similarly hints at rationality and allows an analysis of the overall consideration of automation implications. Third, our search focussed on papers that explicitly position themselves as real-world case studies, field studies, or reports. This may have caused us to miss papers that apply and evaluate process automation in a practical manner, without using these terms. By conducting our search using not only abstract and metadata searches, but also with full-text searches, as well as conducting a forward-backward search, we aimed to address this issue. While the number of 30 relevant papers for the last decade may appear surprising, we attribute this partly to the fact that many papers we screened out conducted case studies in *synthetic* settings instead of real-world organizations (see [58] for a discussion of this phenomenon). Fourth, as described above, our focus on BPM-related automation may have missed out on papers that used different terminologies or concepts for automation. However, we argue that as a consequence, our findings are not invalidated by other studies of other disciplines on process automation (which do indeed exist), but instead are concentrated on process automation approaches which explicitly position themselves in relation to the BPM discipline. This is also related to a question of coverage contra feasibility of SLRs [60]. Finally, the subjective nature of our data extraction and synthesis might have introduced inaccuracies. However, we adequately addressed this risk by utilizing a rigorous protocol and validating our analysis.

VI. Conclusion and Future Work

To conclude, we have analysed BPM-motivated process automation initiatives for *why* automation is applied. Drawing on Critical Theory and the notion of rationality, we have shown that currently, a focus lies primarily on top-down initiatives aiming to improve performance measures, hence inhabiting a formal rationality. Initiatives that target shared value positions or cooperation with which means and ends are determined discursively are less common. Further, we have illustrated how organizational, social, and ethical risks related to process automation initiatives are discussed. Some concerns, directly related to why automation is applied, remain infrequently or not at all considered. Still, we see that automation is applied due to its potential to improve business processes, their performance, as well as working conditions. Apart from these results, we have aimed to contribute to the research community by using Critical Theory for assessing process automation. In doing so, we have enabled more holistic considerations of automation and its consequences, some of which were not at all discussed in the context of case studies, as evidenced by our investigation of discussions of automation risks. Consequently, we have also contributed by broadening the discourse on the rationalities of automation in BPM. As our work has shown, researchers and practitioners may profit from critically considering exactly what automation is applied to identify and address unintended consequences. In future automation case studies, it could be beneficial to reflect implications based on the rationality framework, similarly to how it was used in this work.

Future work for a full-fledged theoretical contribution based on this initial investigation might include quantitative studies on BPM-motivated automation initiatives and the underlying rationalities to investigate them directly instead of based on reports. As discussed above, a longitudinal study of long-term social consequences of process automation by observing process automation initiatives in organizations also appears promising for future work. As another valuable extension, we plan to enrich our findings with qualitative interviews of relevant experts from industry and academia. Further, we plan to expand upon this work by analysing reports of applied automation approaches that do not explicitly refer to BPM and stem from other disciplines. Comparing their rationalities with our findings on the BPM discipline as reported herein can provide an even broader picture of how automation is applied and justified.

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