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Toward Cost-Effective Business Process Compliance: A Research Agenda

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Abstract: Checking and ensuring business process compliance (BPC) can be very costly, especially given redundant or conflicting compliance requirements or intensive regulation in general. Although managing BPC in a cost-effective way is critical for organisations, corresponding methods and procedures are lacking. This paper outlines a research agenda for developing a mathematical method and a procedural model for assessing the cost-effectiveness of BPC. The research agenda bases on design science research (DSR) paradigm and describes the implementation of corresponding DSR steps according to Peffers et al.

Keywords: business process compliance, cost-effectiveness, research agenda

1 Introduction

Compliance can be characterised as the act of ensuring that business practices and operations conform to a set of requirements arising from regulations such as laws, directives, internal guidelines, etc. [SG15]. Ensuring compliance within the conceptualisation and execution of business processes is known as business process compliance (BPC) [SG15, FZ14]. Checking and ensuring BPC can be exceptionally complex and expensive, even with the support of information technology (IT), especially given a variety of redundant or conflicting compliance requirements. Such redundancy and divergence in requirements can prompt high compliance-related costs (particularly for IT and human resources) as well as problems for companies, including the deterioration of profit or obstructions to the core business [KSS17].

Approaches to checking BPC seek to confirm business processes against formally expressed regulatory requirements or so-called compliance rules by using, for example, process verification tools [Sc10]. Such approaches address a variety of checking scopes, including time, information, resources, control flows, or location-based aspects [FZ14], and consider compliance from a rather technical view [Sc13]. However, if costs are taken into account, for instance to determine the cost-effectiveness of compliance measures, then the approaches reach their limits. Cost-effectiveness, also known as economic efficiency, refers to the economic principle of striking a balance between benefits and cost [KBS09]. Considering the cost-effectiveness of BPC is particularly important when economic deci-

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sions need to be made. Following the idea of reusability [Sc10, NS07], a plurality of compliance measures, including various compliance controls [NS07] and compliant process fragments [Sc10], can be used and even combined [KSS17] in order to ensure compliance in diverse business processes. For instance, the German Banking Act §18 KWG prescribes the requirement of confirming the creditworthiness of borrowers who take out large loans. Several compliance measures are available to fulfil that requirement, including software-based credit checks, manual credit checks performed by employees with different qualifications or roles, or combinations of both. Since those measures differ in terms of effectiveness and cost, they raise the dilemma of choosing an appropriate cost-effective alternative. Although [Sc13] and [SG15] have pointed out that managing BPC in a cost-effective way is critical for organisations, corresponding methods and procedures are lacking. The cost-effectiveness of a business process, which serves the core business and contributes directly to value, needs to be distinguished from the cost-effectiveness of compliance measures, particularly in terms of compliance activities. Since compliance activities and business processes are interwoven, developing a method of assessing the cost-effectiveness of BPC is challenging. In response, this research project seeks to develop both a mathematical method of assessing the cost-effectiveness of compliance measures in terms of compliance activities regardless of the business process and a corresponding procedural model. To those ends, the project poses two research questions (RQ):

- RQ 1: *How should a method for determining cost-effectiveness be designed in order to assess compliance measures of business processes?*
- RQ 2: *How can both economic benefits and associated costs be adequately determined for assessing compliance measures of business processes?*

The remainder of this paper is structured as follows. Section 2 describes the research method and agenda, both of which derive from the design science research (DSR) paradigm [Pe07]. Section 3 discusses both already achieved and future expected research results, after which Section 4 closes with a brief summary and an outlook for future work.

2 Research Method and Agenda

The DSR paradigm describes a systematic structure for artefact development in which artefacts are constructs, models, methods, or instantiations [GH13]. Since this research project aims at developing a mathematical method and a procedural model, which can both be classified as artefacts, it follows the DSR approach of Peffers et al. [Pe07]. The DSR approach involves six steps: problem identification, objectives definition, artefact design and development, artefact demonstration, artefact evaluation, and communication [Pe07]. Figure 1 presents an overview of how those six steps are implemented within the scope of the research project and contains references to previous publications.

Step 1 involves deriving the problem statement, after which *Step 2* entails defining objectives intended to solve the problem. Both steps are theoretically grounded on literature

analyses of compliance measures (see [SKS17]), domain models for BPC (see [Kü17]), and calculation methods for cost-effectiveness (see [KSS17]). Based on a review of literature on the topic, the research project can be differentiated from related work. *Step 3*, which involves artefact design and development, includes several stages. First, a conceptual model is designed that encompasses domain-specific model elements, attributes, and methods for cost-effective BPC (see [Kü17]). The model is grounded in an analysis of previous literature and extends the conceptual structure of BPC checking to the aspect of cost-effectiveness. It also maps the operating principle of cost-effectiveness calculations in a BPC environment, serves as a conceptual foundation for deriving a procedural as well as corresponding mathematical approach and, thus addresses RQ1. Second, a procedural model is developed which serves the textual description of procedural steps for calculating the cost-effectiveness of BPC. Therefore, existing procedures for calculating the benefits and costs of other fields (for example, risk and investment theory) were investigated, verified, and adapted to BPC (see [KSS17]). Moreover, the procedural model clarifies how calculation results can be used for decision-making based on cost-effectiveness. Third, a new mathematical method for assessing the cost-effectiveness of compliance measures can be developed, which addresses RQ2. The method should be designed according to the methodological notes on mathematical modelling of [Me13] and in consideration of the conceptual structure of the previous domain model. Since the mathematical method has not yet been published, it is marked as [t.b.d.], meaning "to be done", in the column titled *Publication (Reference)* in Figure 1.

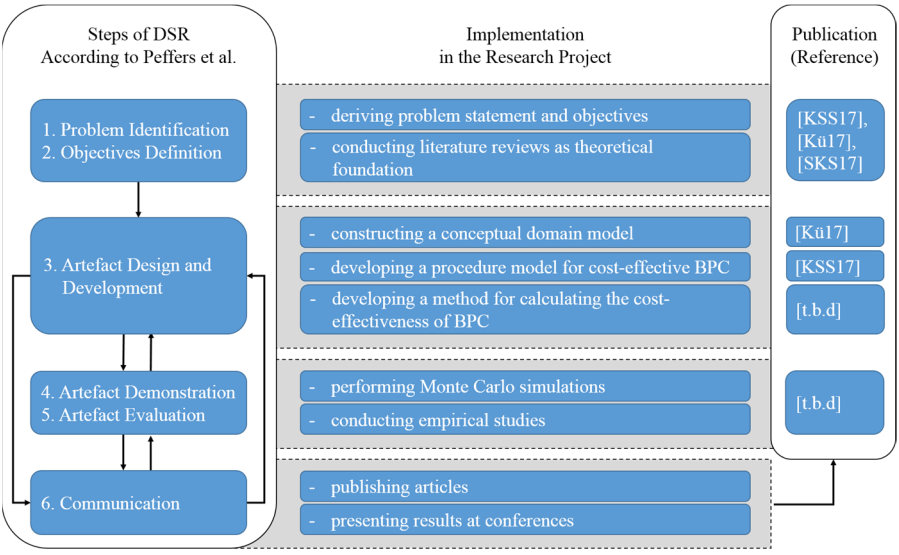

Fig. 1: Implementation of steps of the DSR paradigm in the research project

Steps 4 and *5* involve artefact demonstration and evaluation and should be addressed both by experimental and observational design evaluation methods. The experimental design evaluation should be executed through a Monte Carlo simulation of cost-effectiveness in

order to demonstrate the mathematical method with artificial data [GH13]. The observational design evaluation should be based on empirical studies, for example, on case studies. Such studies could be conducted, for example, considering the methodological notes on case study research by Eisenhardt [Ei89] and with companies operating in the financial services sector, since they are affected by numerous compliance requirements. The results of empirical studies should be used to improve the procedural model and the mathematical method in a new iteration and to investigate how well the artefact contributes to the problem solution. Since the results of Monte Carlo simulations and empirical studies have not yet been published, they are also marked as [t.b.d.] in the column titled *Publication (Reference)* in Figure 1. Lastly, *Step 6* involves communication with the research community. The research results should be communicated to researchers and relevant audiences [Pe07], ideally via publication in journals or proceedings and during presentations at conferences. The remarks of other researchers from peer reviews and discussions at conferences have already been used to further improve the research in several iterations, and future advice from the research community is expected to prompt additional iterations.

3 Knowledge Contributions

DSR allows the classification of research projects in terms of their contributions to current knowledge (Figure 2). The classification depends on the problem and solution maturity of the DSR project. Problem maturity is judged as low or high depending on whether it is a new or already known problem. Solution maturity is judged as low or high depending on whether new solutions need to be developed or known solutions are available [GH13].

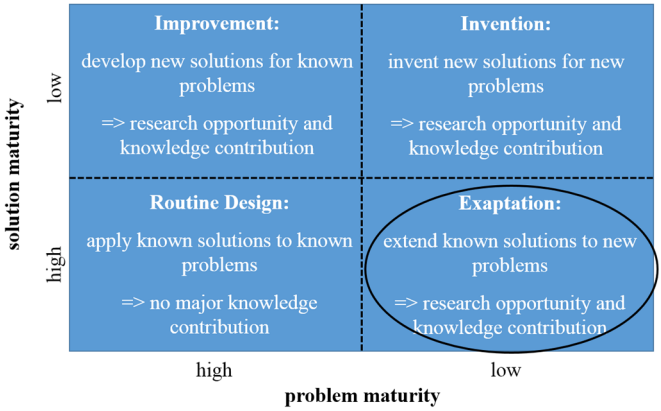

Fig. 2: Classification into the DSR knowledge contribution framework [GH13]

The research project can be classified as an *Exaptation*, since it builds upon current BPC checking approaches that provide a technical foundation for cost-effective BPC. The project also considers existing procedures for calculating benefits and costs of other domains,

including profitability and cost analyses of investment and risk theory [KSS17]. Therefore, the project demonstrates high solution maturity. However, existing approaches either originate from other domains and cannot be transferred directly to BPC or do not explicitly address the research gap. In contrast, the project poses low problem maturity. BPC is a relatively young area of research that scholars have seriously investigated only in the past decade [FZ14]. Because companies initially faced problems related to avoiding compliance violations, the chief focus of previous approaches was supporting the detection of such violations, as well as ensuring and validating compliance [FZ14]. The ever-increasing number of regulatory requirements [SG15] has precipitated a new problem, as avoiding compliance violations has become a cost-intensive task that can cause further deterioration of profit or pose obstructions to the core business [KSS17]. In response, the described exaptation of BPC approaches to include cost-effectiveness establishes a research opportunity and the potential to contribute knowledge. The anticipated and partly already realised contributions to knowledge are discussed below.

First, the literature analyses serve to classify related work, contribute to the descriptive knowledgebase [GH13], and have already been published in [SKS17], [Kü17], and [KSS17]. These analyses avoid the risk that the research gap is already addressed in previous approaches. Second, the conceptual model for cost-effective BPC contributes to the prescriptive knowledge base (artefact type: model) [GH13] and has already been published in [Kü17]. It includes domain-specific model elements, attributes, and methods of cost-effective BPC, maps the operating principle of cost-effectiveness calculations in a BPC environment, and serves as a conceptual foundation for deriving a procedural model and corresponding mathematical method. Third, the procedural model for cost-effective BPC contributes to the prescriptive knowledge base (artefact type: model) [GH13]. It describes prerequisites and work steps necessary to implement cost-effectiveness calculations in BPC and shows how calculation results can be used for decision-making. Moreover, it allows the derivation of strategies and recommended actions. Practitioners can use the procedural model to efficiently manage BPC in companies, while researchers can use it to extend BPC approaches to a procedural concept for cost-effectiveness. Initial ideas and results regarding the construction of the procedural model have been published in [KSS17]. Fourth, the mathematical method for calculating the cost-effectiveness of BPC contributes to the prescriptive knowledge base (artefact type: method) [GH13]. It is suitable for assessing the cost-effectiveness of, for example, compliance fragments [Sc10] or compliance controls [NS07]. Researchers can use the method to extend existing BPC checking approaches with corresponding calculations. The mathematical method also provides opportunities for practical application, for instance by identifying cost-effective compliance measures or inefficient compliance activities. An initial approach to assessing compliance controls was presented in [KS14]. A more complex mathematical method for BPC has already been developed but has yet to be published. Fifth, the results of Monte Carlo simulations and empirical studies contribute to the descriptive knowledge base [GH13] and are the subject of future research. Those evaluation methods will be used to investigate the applicability of the mathematical method and procedural model. Ultimately, benefits and limitations in application will be identified.

4 Conclusion

Although managing BPC in a cost-effective way is critical for organisations, corresponding methods and procedures are lacking. In response, this paper introduced a research agenda for developing a mathematical method and a procedural model to assess the cost-effectiveness of BPC. The necessary steps of the research project have been introduced, ways to implement those steps described, and both realised and expected findings discussed. The goal of future efforts is to implement the research agenda in full.

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