# A Conceptualisation of Process Mining Impacts

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**Abstract**

As the process mining domain continues to see growing interest among various industry sectors globally, it is expedient to study its impact in organisations. Currently, no models or frameworks exist specifically to assess the impact of process mining. Although generic IT/ IS impact models or frameworks could be adopted, they are unlikely to cater to the contextual nuances particular to the process mining environment. This study aims to provide a clear conceptualised understanding of process mining impact and its success factors and contextual elements. The extent to which these contextual factors contribute to Process Mining impact will also be ascertained. Applying a multi-phased qualitative analysis approach, secondary data from published case studies and empirical data from real-life case studies will be analysed to derive an empirically validated process mining impact model. Current research progress includes a structured literature review on Success literature and building an *a priori* model from the analysis of secondary case studies.

**Keywords**

Process mining success, process mining impact model, process mining impact, impact models

## 1. Background and Research Problem

Process mining is a field of techniques that extract insights from an organisation's information systems using readily available event logs [1, 2]. It draws from computational intelligence, data mining and process science to enhance business processes. The key capabilities of process mining techniques are their ability to automatically discover process models, monitor performance indicators, identify bottlenecks and resource constraints in a business process and assess regulatory performance [1, 3]. Several process mining tools and techniques have been developed and applied in a variety of contexts with promising results [4]. It continues to experience a growing interest in finance, software development, insurance, shared services, and many other sectors [5, 6, 3]

The process mining market is estimated to continue to grow. Results from the 2021 Global Process Mining Survey of 106 IT and business executives conducted by Deloitte[1] indicated that 67% of the respondents have started implementing process mining. 87% of non-adopters are planning to conduct pilot runs. 83% of organisations using process mining on a global scale intend to expand their initiatives. In all, 84% of respondents believe process mining delivers value. In 2019, Gartner[2] estimated that new product license and maintenance revenue for process mining was about $320 million. It was also estimated that by 2023, the global process

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[1] https://www2.deloitte.com/de/de/pages/finance/articles/global-process-mining-survey-2021.html

[2] https://www.gartner.com/doc/reprints?id=1-24ARMY34&ct=201002&st=sb

analytics market size will grow from $185 million in 2018 to $1.42 billion at a Compound Annual Growth Rate (CAGR) of 50% [3].

Considering current market trends and the attention of the BPM research community towards the applicability of process mining in organisations [7], a unique opportunity is presented to thoroughly investigate the nature of impact in the process mining domain. This forms the crust of my research.

Using qualitative analysis techniques, this research seeks to conceptualise the notion of impact in process mining through empirically-derived assessment models that elaborately capture its key dimensions and contextual elements.

This study proposes a definition for process mining impact as *a short- or long-term outcome or series of outcomes, perceived by relevant stakeholders which is directly or indirectly attributable to the implementation and use of a process mining tool in an organisation.*

## 1.1. Research problem and questions

As process mining continues to proliferate the business environment, the evidence to support its impact and contribution to organisations is mostly anecdotal. To the best of my knowledge, apart from reports and use cases from practitioners, tool vendors and consultants [8], no empirically designed models or frameworks exist for assessing the impact of process mining outcomes in organisations. It could be argued that existing generic impact models could be used to measure impact in process mining. However, such generic models or frameworks are less likely to properly capture the unique contextual nuances that pertain to the process mining environment. This could hinder a deep appreciation of the nature of impact that process mining provides and inhibit its potential to provide optimal value as a technology investment [9]. Based on this motivation, this research seeks to propose an extensive model that identifies and evaluates process mining impact and its influencing contextual factors.

To achieve this, the following research questions are posed:

1. How can the impact of process mining be conceptualised (constituents and key dimensions)?
2. What are the different contextual elements that can influence process mining impact?
3. How might the impact of process mining differ based on the contextual elements identified in RQ 2?

## 1.2. Research contribution

This study is expected to make the following theoretical contributions to research.

- Provide a clear conceptualised understanding of process mining impact.
- Provide a synthesis of existing literature on contextual elements of process mining impact to address RQ 3 (secondary contribution).
- Deliver a deep understanding of the changing nature of PM impact based on contextual elements.
- Propose a set of artefacts, actionable principles and procedural guidelines for measuring the interrelationships between process mining impact and contextual factors.

[3] https://research.aimultiple.com/process-mining-stats/

## 2. Related Work

Current success research in process mining mainly explores critical success factors for adopting process mining. A key literature on process mining success is [10]. They propose a model from theoretical and empirical foundations which identifies success factors and measures for process mining. Another relevant study focuses on the success factors for process mining adoption in organisations [3]. They explore the enabling factors and challenges for the early stages of adopting process mining tools by organisations. Elements such as speed, efficiency and compliance are identified as key success factors in [11] for achieving automation and digital transformation in process mining although their main study focus is not success factors.Two other studies by [12] and [13] touch on the impact and value realisation of process mining, but they provide no clear direction to achieving these objectives.

Success research in Business Process Management (BPM), the mother-domain of process mining has been substantial, both theoretically and empirically. For instance, some BPM success models, such as by [14], extend the DeLone and McLean IS success model to test *systems quality* and *use* of BPMS applications in operational activities. Other models [15] are unique to certain industry contexts such as banking. The works by [16] and [17] propose a holistic BPM framework with detailed sub-constructs for achieving BPM success. Other such as [18] consider the contribution of organisational roles and responsibilities to BPM success initiatives while [19] empirically test how organisational characteristics such as culture can influence success factors in BPM adoption. [20] investigate success factors for the individual stages of BPM adoption. Finally, BPM critical success factors have been systematically assessed for the Public Sector [21].

In the broader area of IS, success has been an active research area for many decades [22, 23, 24, 25]. However, it is understood differently among various organisational stakeholders [24, 25]. Different scopes and measures have been used in evaluating IS success which has further complicated the understanding of the concept [22, 23].

The initial effort to unify diverse views of success in IS research was conducted by DeLone and McLean in 1992. Currently the most cited and recognised success model in IS literature, the DeLone and McLean model of IS success is a taxonomy of six dimensions which presents a unified and integrated conceptualisation of the *dependant variable* [26, 27]. It identifies six dimensions of IS success [22]. The DeLone and McLean IS success model has been examined by other researchers such as [28], [29] and [30] who have either re-specified, extended or studied the inter-relatedness of its dimensions with other independent variables.

Gable et al. [23] re-conceptualise IS success in a formative and multi-dimensional model that provides a benchmark for monitoring IS performance based on current and anticipated net benefits from an information system as perceived by relevant stakeholders. Their 2-part four-dimensional model measures *individual* and *organisational impact* to date on one half, and uses *system quality* and *information quality* to assess probable future impacts on the other half.

## 3. Relation of Work to BPM State of the Art in Research

From a research perspective, the strides made in process mining (a sub-domain of Business Process Management), have naturally skewed towards the *technical* aspects such as the developing and designing of algorithms [6, 7]. The more *managerial* aspects that study process mining

in practice still has significant research gaps. For instance, over the years, most case studies about the application of process mining have touched on some issues relating to process mining in the organisational context, process mining methodologies, process mining success factors and process mining adoption [5, 7]. Other pertinent *managerial* topics relating to governance, organisational culture and enterprise integration of process mining have received little to no attention hence a call for research contributions [7] to fill some of these existing gaps.

# 4. Research Methodology

The study will employ a multi-phased qualitative study using secondary data from published case studies and empirical data from selected multiple real life case studies. Qualitative techniques will be used to inductively derive an *a priori* model which will be validated using primary data from three to five case studies. Table 1 below captures a detailed representation of the research design based on the respective research questions.

| SN | Research questions | Nature of enquiry | Research input | Research methods | Research output |
|---|---|---|---|---|---|
| RQ1 | How can the impact of process mining be conceptualised (constituents and key dimensions)? | Detailed investigation | - Secondary case evidence;<br>- In-depth case studies (empirical) | - Structured Literature Review;<br>- Qualitative analysis of case study data | A clear conceptualised understanding of process mining impact |
| RQ 2 | What are the different contextual elements that can influence process mining impact? | High level investigation | Literature on success factors and process mining adoption | Structured Literature Review | A synthesis of existing literature on contextual elements of process mining impact to address RQ 3. |
| RQ 3 | How might the impact of process mining differ based on the contextual elements identified in RQ2? | Detailed investigation | Process mining impact model with extended contextual elements (moderating and mediating factors) | - Qualitative analysis of case study data;<br>- Expert interviews | - A deep understanding of the changing nature of PM impact based on contextual elements.<br>- Ascertain the extent to which contextual factors contribute to Process Mining impact.<br>- Provide a rich understanding of outputs from RQ 1 and 2. |

**Table 1**
Research Design

## 4.1. Research progress

The research is still in its early stages. A thorough literature search has been conducted using specific success and impact related keywords to collate success and impact literature from the process mining domain. Due to limited published literature, the search was expanded to BPM and IS domains. The literature analysis outcomes were used to draft a structured literature review. Exploratory studies have been conducted by qualitatively analysing secondary data from 12 real-life best practice process mining use cases by [8]. An initial version of a conceptual model for process mining impact has been derived. The next stage involves a confirmatory analysis of the model using empirical data from in-depth case studies.

## 4.2. Open points and issues

- Feedback on the proposed research design and associated risks pertaining to the study area.

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