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A value-based approach to the ex-ante evaluation of IT enabled business process improvement projects

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ABSTRACT

In this study, we propose a value-based management approach for assessing the potential for process improvements enabled by an information technology (IT) solution. Based on activity based management concepts, we perform a granular, process level analysis on workflow structure and associated resource consumption to provide *quantifiable* measures of potential improvement *prior* to system implementation. The proof of concept of this approach is illustrated in a southern United States county in need of integrating different government branches through an ERP implementation. Based on prior research, we first provide a catalog of non-value added (NVA) activities that can be used in management control and governance procedures for the systematic identification of process inefficiencies. Next, by breaking down processes to the level of atomic activities, we show that minimizing NVA activities provides a systematic means to mitigate process inefficiencies. A significant observation is that different NVA activities may impact process performance to varying degrees. Consequently, line items in the request for proposals (RFP) should be weighted accordingly during the vendor selection process, contrary to the common practice of treating all line items equally.

1. Introduction

Business process improvement (BPI) is gaining significant momentum as 21st century organizations continually seek to optimize their underlying processes to achieve higher quality at reduced cost and cycle time [82]. A recent survey reveals that 45% of organizations expect increased engagement in business process improvement projects. Indeed, BPI projects are one of the most important justifications for information technology spending [44].

The increasing number of BPI projects brings an imperative for managers. The *potential* performance improvement must be assessed *before* project initiation. While performance improvements from a BPI project may be observed along many dimensions such as reduced cost and/or time, better quality, increased productivity, etc., tracking performance along these metrics requires appropriate management control methods that enable *precise measurement* [56]. In other words, quantitative assessment of process performance is an integral component of BPI success.

While modern businesses increasingly focus on BPI, two of the top ten reasons for unsuccessful BPI initiatives concern the absence of proper measurements [27] – a lack of well-defined performance measures and a lack of monitoring. Clearly defined and measurable operational goals, such as percentage reductions in cost/time/defects, are cited as prerequisites for success. However, *precise* estimates of such improvements *prior* to implementation often prove difficult. This is further complicated by the fact that BPI is highly intertwined with information technology (IT). For most businesses, IT is essential for their core and support processes [21]. Consequently, any process improvement is almost inevitably led by IT. "*. . .it's that you just can't improve any process without IT being integrally involved. Most companies don't set out to do an IT project. They set out to fix distribution or hiring or pricing, and they can't move that needle without better IT*" [61]. It naturally follows that assessing BPI initiatives is therefore inseparable from evaluating the impact of the proposed IT solution.

In this paper, we address management's need for appropriate methodologies for *ex-ante* evaluations of IT-enabled business process improvement projects. Furthermore, we demonstrate how such pre-assessment methodologies can subsequently enhance the selection of the appropriate IT solution to achieve the desired process improvement. To this end, we adopt a "value based management" framework [35]. Our focus is on quantifying the precise *value contribution* of the different processes and sub-processes in an end-to-end process. To demonstrate the viability of our approach, we employ concepts from activity based management (ABM) – a practice within the umbrella of the value based

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management framework [35] – in the pre-evaluation phase of a BPI project for a case management process in a large country court system in the southern United States. To estimate the potential improvement, we first identify sub-processes and activities in the entire case management business process. Next, cost analysis is employed to apportion resource consumption to those specific sub-processes and activities. These activity costs are divided into two categories: value-added (VA) and non-value-added (NVA). Value-added activities are those that contribute directly to the desired process outcome, while non-value added activities are defined as those that contribute too little or no value to the desired outcome. The potential for process improvement is then evaluated based on how well the NVA activities can be mitigated through candidate IT solutions from different vendors. An important step in this vendor/solution selection process is the use of a non-traditional request for proposals (RFP) where functional line items are weighted according to their potential NVA reduction capabilities.

The contribution of our work is to analyze the potential application of a value-based technique using ABM as a standard methodology for process analysis to provide usable and useful information on resource consumption that can contribute to an *ex-ante quantitative* assessment of an IT-based process improvement. As we illustrate in this paper, decomposing business processes into sub-processes and activities followed by the subsequent minimization of NVA activities in every possible sub-process provides a systematic and rigorous methodology. The NVA detection process is guided by a catalog of performance inhibitors developed through an extensive literature review. The different NVA categories identified *ex-ante* are also helpful in pinpointing weaknesses in the current process. This information may be utilized *ex-post* for selecting appropriate key performance indicators (KPIs). For example, the presence of Technological Silos – an NVA category – in a business process may be indicative of the need to monitor a productivity KPI, as the lack of technological support hinders productivity. Furthermore, a significant observation from our work is that different NVA activities may impact process performance to varying degrees. Consequently, line items in the RFP should be weighted accordingly during the IT solution/vendor selection process, in contrast to the common practice of treating all line items equally.

The remainder of the paper is organized as follows. In the next section, we provide a brief overview of the methods used for evaluating process improvements and IT investments. In Section 3, we discuss the suitability of the value-based technique using activity-based methodology for assessing process improvements and technological and organizational inhibitors that contribute to NVA, followed by the development of an ABM based methodology for measuring process improvements in Section 4. Section 5 illustrates the implementation of our approach. In Section 6, we conclude with implications for research and practice.

2. Literature review: business process, performance, and the role of IT

To be able to measure business process improvements led by IT, an understanding of the term 'business process' is deemed necessary along with a review of the methodological approaches to measure both process improvements and IT effectiveness as it relates to organizational performance. Our criteria for selecting a specific methodology from a set of possible candidates is guided by the requirements elicited from the academic and practitioner literature on process management. First, the metrics used should be definable, measureable, and preferably not subjective in nature [27,66]. Second, the methodology should inform us *how* the process improvement will occur, not only *what* to measure [1]. Finally, as the process improvement is enabled by IT, the methodology should shed light on the causal linkage between IT, business processes, and firm performance [5,19,50].

2.1. Business processes

Both academics and practitioners have defined business process with slightly different emphasis and focus. For example, Davenport [15] defines business process as "*a structured, measured set of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how work is done within an organization, in contrast to a product focus's emphasis on what*" (pp. 5). According to Laguna and Marklund [43], a business process "describes how something is done in an organization" (pp. 3). The business process management common body of knowledge [2] of the association of business process management professionals (ABPMP) defines process as a "*set of activities or behaviors performed by humans or machine to achieve one or more goal. ... Processes are composed of a collection of interrelated tasks or activities which solve a particular issue. In the context of business process management, a business process is defined as end-to-end work which delivers value to customers*" (pp. 23). While the definition of what constitutes a business process varies slightly across academics and professional organizations, each variation of the definition emphasize that '*activities*' constitute an essential part of a business process. Inherently, a 'Business Process' can be conceptualized as a (set of) activities that firms engage in to accomplish some business purpose or objective [55,60].

2.2. Process performance/improvement

From the discussion of business processes in the preceding section, it is apparent that measuring process improvements essentially entails an analysis of how *activities* within an end-to-end business process will be *impacted* by the proposed enhancement project. Those impacts are reflected in and may be captured through two types of performance – *operational efficiency* and *operational effectiveness*. Operational efficiency relates to measures such as cost, time, product/service quality, and customer satisfaction [16] and should be measured both before and after system implementation [66]. Operational effectiveness, however, relates to the benefits such as increased revenue and market-share that arise from implementing systems to support various activities [22]. In summary, metrics for both operational efficiency and effectiveness – the gauges to measure process improvement – are essentially *quantitative* in nature.

Several methodologies and frameworks exist for evaluating process performance from the perspective of process maturity. The foundation of process maturity models lies in the view that organizational capabilities evolve in a stage-by-stage manner along a logically anticipated path and that each of these stages can be clearly defined, managed, measured, and controlled [65]. The underlying hypothesis is that maturity leads to the institutionalization of policies, standards, and organizational structures [31] that ultimately leads to better control, more visibility into the future, and the ability to continually set higher goals [49]. Numerous maturity models have been developed by academics, practitioners, and international consortia [13,25,31,45,57,68]. Many of these models trace their origins to the capability maturity model (CMM) and its subsequent capability maturity model integration (CMMI) developed by the Software Engineering Institute at Carnegie Mellon University [71]. The CMMI represents a five stage framework to assess an organization's process maturity level and provide roadmaps for improvement [42].

In addition to maturity models, statistical methods such as six-sigma and statistical process control (SPC) rely on rigorously