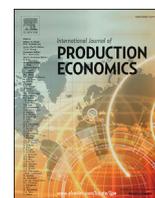


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# The relationships between information management, process management and operational performance: Internal and external contexts



Daniel Prajogo<sup>a,\*</sup>, Jordan Toy<sup>a</sup>, Ananya Bhattacharya<sup>a</sup>, Adegoke Oke<sup>b</sup>, T.C.E. Cheng<sup>c</sup>

<sup>a</sup> Department of Management, Monash Business School, Monash University, Australia

<sup>b</sup> Department of Supply Chain Management, W.P. Carey School of Business, Arizona State University, USA

<sup>c</sup> Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University, PR China

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## ABSTRACT

The role of information in supporting processes in firms' operations has become increasingly important. In today's competitive market, information management has become a "prerequisite" for process management. This study examines the role of information management as the driver of process management and its impact on operational performance. Specifically, we distinguish the contextual factors of the variables used in this study in terms of internal and external aspects that reflect intra-firm and inter-firm boundaries. Using a data set drawn from 202 manufacturing firms in Australia, we find that both internal information management and external information management have positive relationships with both internal process management and external process management. Internal process management has positive effects on both internal and external operational performance, but external process management only has a positive effect on external operational performance. Finally, both internal and external operational performance have positive effects on business performance. We conclude by discussing the implications and contributions of the findings.

## 1. Introduction

Creating long-term competitive advantage has long been held as one of the most important objectives of management. The importance of process management in improving the efficiency, effectiveness, and flexibility of production, as well as the quality of the final product, has been well recognized in the literature (Chiarini and Vagnoni, 2015; Ebrahimi and Sadeghi, 2013). However, the potential of such improvement is often limited without the coordination and support of external parties along the supply chain, including suppliers, transporters, distributors, and warehouses. Firms that do coordinate with external organizations are able to improve their operational performance (Goffin et al., 1997). Effective supply chain management requires the integration of the inter-firm processes of supply chain firms (Chen and Paulraj, 2004b). In this study we characterize the management of inter-firm processes as external process management (EPM). Combining effective EPM with effective internal process management (IPM) could result in a supply chain that is characterized by timely deliveries and increased flexibility in responding to changes in market demands, thus enhancing operational performance (Jayaram and Xu, 2013).

Achieving effective process management requires information management, which can be defined as the availability and management of timely and relevant information (Devaraj et al., 2007). Modern information technology (IT) allows firms to capture a large amount of internal and external information, which was previously not available, making internal information management (IIM) and external information management (EIM) more important than ever before. In addition, the use of business intelligence systems is increasingly important for firms to analyze internal and external processes. IIM, comprising the provision of real-time, accurate information within a firm, can aid the management of a firm's internal processes, including coordination among a firm's functional departments (Marchand et al., 2000). For example, the use of digital technologies such as computer-aided design, computer-aided manufacturing, 3D printing, and enterprise resource planning (ERP) can make the data flow from one department to another seamless to the extent that information can be quickly used within organizations to reduce production lead time and improve process efficiency. The inter-connection of firms through their supply chains suggests that focusing on internal processes alone might not be sufficient to achieve overall process efficiency, especially because competition is no longer among firms but

\* Corresponding author.

E-mail addresses: [Daniel.Prajogo@monash.edu](mailto:Daniel.Prajogo@monash.edu) (D. Prajogo), [ananya.bhattacharya@monash.edu](mailto:ananya.bhattacharya@monash.edu) (A. Bhattacharya), [Adegoke.Oke@thunderbird.asu.edu](mailto:Adegoke.Oke@thunderbird.asu.edu) (A. Oke), [Edwin.Cheng@inet.polyu.edu.hk](mailto:Edwin.Cheng@inet.polyu.edu.hk) (T.C.E. Cheng).

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among firms' supply chains (Christopher, 1992). As firms continue to look beyond their own internal processes to improve performance, they need to establish strong communication channels with key supply chain partners through appropriate information technologies (Jitpaiboon et al., 2013; Kembro and Selviaridis, 2015). Managing external information has, therefore, become arguably as crucial to operational performance as IIM.

Despite the important performance implications of information and process management, the interplay between the internal and external aspects of process and information management, and performance has not been explored in the extant literature. In general, previous studies have explored the link between process management and firms' operational performance, as well as the link between information management and process management, while ignoring the different intra-firm and inter-firm contexts of the constructs and the related links. So far, only a few studies have specifically considered the contextual characteristics of information and process management (Barratt and Barratt, 2011; Jayaram and Xu, 2013; Maiga et al., 2015; Savitskie, 2007), none of which specifically or comprehensively covers and distinguishes the internal and external aspects of information and process management of firms' operations and supply chain activities. As such, our overall objective in this research is to investigate how a firm's IIM and EIM relate to its IPM and EPM, and internal operational performance (IOP) and external operational performance (EOP). We argue that how a firm shares information internally and how it manages information with external parties can affect the firm's internal and external processes and performance.

We contribute to the current knowledge base surrounding information management and process management in the field of supply chains in several ways. First, we integrate the intra-firm and inter-firm aspects of information and process management and performance into a single model, and test the relationships simultaneously. We extend the body of work focused on the relationship between information and process management (Kesner and Russell, 2009; Lutters et al., 2000; Seltsikas, 1999; Subramani, 2004; Yu et al., 2006), and the relationship between process management and operational performance (Kannan and Tan, 2005; Prajogo and Olhager, 2012) separately. Second, we examine the cross-effects of information and process management and performance at the intra-firm and inter-firm levels, further building on previous studies in this area. Finally, we identify the mechanisms through which information management relates to performance, thus building on previous studies that focus on the direct effect of information management on firm performance (Devaraj and Kohli, 2000; Honggeng et al., 2008; Maiga et al., 2015; Ravichandran and Lertwongsatien, 2005).

## 2. Key variables of interest

Process management is a strategic management approach that deals with the policies, methods, and management practices used to coordinate and govern firms' processes (Bruch and Bellgran, 2013). Because processes exist both within organizations and across organizational boundaries, management of such processes exists at the internal intra-firm level, i.e., IPM, and the external inter-firm level, i.e., EPM. In this study, we define IPM as the extent to which a firm possesses the following: standardized and clear process instructions for internal processes, processes under statistical quality control, low set-up times for equipment, and a shop floor layout that facilitates low inventories and fast throughput. IPM relates to a firm's ability to coordinate, streamline, and control its processes required for the delivery of products and services to improve its operational performance of flexibility, speed, and cost economy through the creation of efficient and effective organizational procedures (Miyake et al., 1995).

EPM, on the other hand, deals with the coordination and management of the processes that connect organizations or span inter-organizational boundaries to achieve flexibility, speed, and cost

economy (Qi et al., 2017). External processes include the logistics activities involved in the sourcing, production, distribution, transportation, warehousing, and delivery of products. Specifically, we define EPM as the extent to which inter-organizational logistics activities, and inbound and outbound operations are seamless, integrated, and coordinated to ensure effective distribution and delivery of goods.

Information management largely comprises the management of IT and information systems. As such, information management is the prime factor that dictates decisions relating to IT and information systems. Similar to process management, information management has been viewed and studied in internal and external contexts. Several studies, particularly in the management of information systems literature, have focused on the management of IT systems within the context of firms (Hammer, 2001), which we refer to in this study as internal information management (IIM). IIM comprises the integration, distribution, and co-ordination of data and information within an organization through the use of appropriate IT (Wong et al., 2011). Central to IIM effectiveness is the integration of information infrastructure to facilitate the sharing of accurate and timely information in support of cross-functional processes within a firm (Hammer, 2001). As such, in this study, we define IIM as the extent to which relevant databases and IT systems are integrated and accessible across various operational activities and departments within a firm to provide real-time access to information, including inventory status and vendor information.

Though IIM is important, it is not sufficient for firms to ensure the flow and integration of information across functions within the confines of an organization. Due to the interconnected nature of firms in supply chains, ensuring that relevant information is shared and made available across supply chain partners is key to business success (Chengalur-Smith et al., 2012; Huo et al., 2014). As such, firms use EIM to facilitate logistics-related communication and information exchange between supply chain partners and customers through the use of appropriate IT, such as e-mail, electronic feedback forms, electronic data interchange (EDI), and enterprise resource planning (ERP) systems (Savitskie, 2007). In this study we define EIM as the extent to which relevant, timely, and sensitive information is shared and exchanged with supply chain partners through appropriate channels, including face-to-face communication.

We also consider the internal and external aspects of operational performance. The external aspects of operational performance, such as quality, delivery, flexibility, and price, have been well recognized in the literature as sources of competitive advantage in terms of sales, profit, and market share (Hayes and Wheelwright, 1984; Li et al., 2006). The internal aspects of operational performance also offer competitive value (Adisak and John, 2008). Maintaining operating efficiency and high productivity (asset utilization) is also important in producing healthy profit margins through competitive prices and low operating costs (Brigham and Gapenski, 1997).

## 3. Research model and hypothesis development

Based on the literature review, the importance of information management and process management to operational performance can be established, and previous studies have examined how these important firm practices are related to performance. However, we argue that both IIM and EIM, and IPM and EPM are interconnected practices in firms that can influence firms' operational performance within supply chains. In this regard, previous studies have not examined the interconnected nature of these practices, particularly in terms of how they relate to one another and firm performance. In the sections that follow, we establish the relationships between IIM and EIM, IPM and EPM, and firms' IOP and EOP, as depicted in the research model in Fig. 1.

As mentioned earlier, our model integrates different streams of studies that capture certain parts of the model separately. For example, several studies (Baihaqi and Sohal, 2013; Huo et al., 2016; Liu et al.,

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