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Operations Management and Reengineering

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Business Process Reengineering has been the most influential management movement of the 1990s, and like the quality movement of the 1980s, it has put management attention squarely on processes and operations. At first glance, however, it is hard to see any relationship between the precepts of Business Process Reengineering and traditional Operations Management teaching. The purpose of this article is two-fold. First, it offers some opinion as to what that relationship is by conceptualizing process design in terms of a design evaluated iteration: reengineering as represented by the most influential book on the topic, *Reengineering the Corporation* by Hammer and Champy (1993), concentrates almost exclusively on the design step, whereas traditional Operations Management teaching is heavily oriented toward evaluation, taking a design as given. Second, this article identifies and discusses the process design principle of integrated work enunciated by Hammer and Champy. It is demonstrated how the quantitative benefit of integrated work can be estimated using Operations Management tools, and that the benefit depends on flow control, an important additional process design lever that Hammer and Champy do not address. The article concludes with the observation that as corporations turn away from cost cutting to growth generation, Business Process Reengineering is disappearing from the headlines, but process redesign and improvements can be turned toward performance improvement and revenue generation just as effectively as they have been used for efficiency gains in the past. © 1998 Elsevier Science Ltd. All rights reserved

Introduction

Business Process Reengineering (BPR), although disappearing from the headlines of the business press, is undoubtedly the most influential development in management thinking in the 1990s. Although BPR seems to have run its course as companies turn from an efficiency focus to a search for new growth, reengineering concepts have been driving organizational change in many leading North American and European companies.

The popular conception of BPR was crystallized by Michael Hammer and James Champy in their 1993 best-seller *Reengineering the Corporation*, the most influential reengineering book, on which this article focuses, and hereafter referred to as H&C.[1] Two distinct and separable elements can be identified in H&C. On the one hand, they enunciate principles of business process design. In particular, they advocate a reintegration of industrial work, reversing the trend toward specialization and division of labor that has been with us since the early Industrial Revolution. On the other hand, Hammer and Champy advocate dramatic change, as opposed to an incremental or evolutionary approach, in implementing new process designs and associated organizational structures. Indeed, many managers' primary association with the term 'reengineering' is the bold approach to change management advocated by Hammer and Champy.[2]

Leaving aside the important subject of change management, this article focuses attention on principles of business process design, a central topic in the discipline of Operations Management (OM). A large body of knowledge associated with process design has been developed by practitioners and scholars over the last century. At this time when BPR is subsiding, it is natural to ask which of its precepts are likely to endure, and how they relate to the pre-existing body of knowledge that dominates OM teaching. This is the purpose of the present paper.

From the perspective of an OM professional, the reengineering movement has made an important contribution simply by putting in the foreground of top management concern the operations side of business through which work is routinely accomplished, without the wasted effort and firefighting that characterize inefficient operations. By focusing attention on processes as the means of achieving effective operations, reengineering leaders have reinforced a central theme of the 1980s quality movement.[3] To be effective, organizations must put creative energy into the design, documentation and maintenance of processes that satisfy customer needs on a routine basis. Workers must understand the overall function of core business processes, and performance must be measured in terms of value delivered to customers.

It seems, however, that BPR has illuminated some parts of the OM landscape while leaving other parts in shadow. In their treatment of process design, all of the influential books and articles cited earlier use vague language and lack cause-and-effect reasoning. In addition, their recommendations implicitly depend on a critical element of process design, namely intelligent flow control, but they never acknowledge it as a separate category of design levers.

The next section summarizes what Harrison (1997) calls the 'processing network paradigm,' a general process model that underlies much of OM teaching and from which one obtains precise language, causal reasoning, and analytical procedures to support process design. Section 3 summarizes the main precepts of BPR and explains, using the language of the processing network paradigm, how BPR and OM complement each other, while differing in both emphasis and texture. The last section of the paper demonstrates, in the example of integrated work, the benefit of flow management protocols and the usefulness of OM tools to estimate their value.

A Conceptual Framework of Business Process Design

To evaluate principles of process design, one needs to understand the causal relationship between design choice and bottom-line performance. For this kind of cause-and-effect reasoning, one first needs a vocabulary to describe business processes, including generic names for the elements that make up a process. Furthermore, any design problem worthy of discussion involves tradeoffs, whether it is a mouse trap or a business process that is being designed. Designers, therefore, invariably need to balance factors or objectives which cannot be achieved simultaneously.

To address these needs, operations management practitioners and scholars have developed over many decades a collection of generic process models and associated analytical techniques.[4] In this paper they will be referred to collectively as 'processing network models,' and their common structure will be called 'the processing network paradigm,' following Harrison (1997).

A process design in this paradigm consists of five basic elements – jobs, tasks, precedence constraints, resources, and flow management protocols. A sixth element will be proposed below. First, in this terminology the units to be processed are called *jobs.* Jobs are the entities that 'flow' through a process, and a single process may need to handle a variety of job types. As a second basic concept in the processing network paradigm, jobs are made up of *tasks.* In particular contexts, jobs might be called, for example, *transactions*, *manufacturing orders*, *projects*, or *customers*, and tasks are frequently referred to as *activities* or *operations.* Tasks are connected by *precedence relations*, that is to say, some tasks must be completed before others can be started.

Jobs, tasks and their precedence relationships can be represented in a conventional flow chart. Figure 1 shows the example of a flow chart of the product development process at ConnectCo, a manufacturer of electrical connectors. This example is described in detail in Adler *et al*. (1995, 1996). Jobs are development projects, tasks are depicted by boxes and precedence relationships by arrows in Figure 1. Precedences may be uncertain due to unforeseeable events: in the example, prototyping must be repeated in 75 per cent, and scale-up plus prototyping in 60 per cent of all cases because the design poses manufacturing problems which can be planned statistically, but not for an individual job.

The third basic element of a processing network model is a set of system performance criteria, which describe what the desired output of the process is (in Figure 1, it is new connector products), and how one can tell whether the process does well or not. Typical performance measures comprise a combination of: volume or frequency (e.g. 12 new products per year), throughput time (e.g. time-to-market of under 12 months on average), service level (with 90 per cent evidence, one can promise a new product in under 18 months), or costs (the whole process costs less than $10 M per year).

Together, the first three elements describe *what* the process should accomplish, namely its output as well as the work that needs to be performed in order to produce the output. In order to specify a complete process design, one must also determine *how* the work is to be performed. This is specified by resources, a flow management protocol and system status information.

Processing *resources* are the units that execute the tasks, which make up the jobs. At ConnectCo the key resources are groups of development engineers and technicians. Resources are characterized by capabilities, such as the breadth of job types they can process, or whether they need to be supervised by other resources. For example, engineers have a wider range of capabilities and can work more independently than technicians, but they are also more expensive.

The fifth element of a process specification is a *flow management protocol*, the simplest example of which is a *route,* corresponding to a fixed order in which