



The impact of service design and process management on clinical quality: An exploration of synergetic effects[☆]



Xin (David) Ding*

Information and Logistics Technology Department, University of Houston, Houston, TX 77004, United States

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ABSTRACT

While service design and process management have received research attention in the past, there is limited empirical work examining both factors in the hospital setting. Through operationalizing focus as a service design approach and quality improvement (QI) initiatives as process management efforts, we hypothesize that focus and QI initiatives affect clinical quality both individually and collectively. Utilizing heart attack procedures as the study context, we examine a set of hypotheses based on a panel dataset consisted of 201 hospitals from 2005 to 2011 in the state of Florida. After accounting for potential lag effects and endogeneity biases, we find empirical support to the proposed hypotheses.

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1. Introduction

The synergies between service design and process management have been repeatedly argued for in the literature. Service design includes the design of a mix of key physical and non-physical components in a service system (Goldstein et al., 2002). Effective service design adopts simplified and standardized components and processes, through which it reduces variations, improves quality and efficiency (Flynn et al., 1995). By designing *what* service offerings to *which* customers at *what* levels, a firm naturally chooses a combination of service offerings that not only aligns with its operations strategies but also maximizes its potential profit (Heskett, 1987). While such design approaches and results may vary significantly from industry to industry (e.g., the type of memorable experience staged by Disneyland Theme Park may not be transferrable to patient experience at Mayo Clinics), service systems and accompanying offerings are largely interlinked through various processes, which can be “engineered” for strategic service positioning purposes” (Shostack, 1987; p. 34).

Process management, on the other hand, “involves concerted efforts to map, improve, and adhere to organizational processes” (Benner and Tushman, 2003; p. 238). By orchestrating the interlinked processes within an organization, process management practices can reduce process variations and increase process control, resulting in reduced operating costs, improved service quality, and better financial outcomes (Ahire and Dreyfus, 2000). Through adopting simplified and standardized processes and components, service design helps reduce the variation in organizational processes and subsequently the complexity in process management (Flynn et al., 1995; Zu et al., 2008). The interaction between service design and process management further improves both internal and external quality (Shostack, 1987; Soteriou and Zenios, 1999; Ahire and Dreyfus, 2000).

Although the synergies between service design and process management have received research attention, they are rarely supported with empirical evidence. A few studies attempt to address the gap in the literature by utilizing cross-sectional data collected from bank branches (Soteriou and Zenios, 1999) and firms across different industries (Ahire and Dreyfus, 2000). As service design and process management involve standardizing and routing key components in a service system (e.g., technology, facilities, people, processes), their results may not be noticeable in short periods (Hyer et al., 2009). In addition, prior studies utilizing cross-sectional approaches cannot effectively address endogeneity issues (e.g., hospitals with larger sizes and longer history are more likely to involve in quality improvement initiatives) (Greene, 2008). Hence,

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* Tel.: +1 713 743 4095.

E-mail address: xding@uh.edu

panel models are called upon to unleash the synergistic effects by modeling potential lag effects and endogeneity biases (Ding, 2014).

Through operationalizing focus as a service design approach and quality improvements (QI) initiatives as process management efforts, we examine how both factors affect hospital clinical quality individually and collectively in this study. We choose heart attack procedures as the study context for the following reasons: (a) over one million Americans have heart attacks each year and the treatment of heart attacks and related cardiac diseases accounts for almost a third of Medicare spending (National Institute of Health, 2011; American Heart Attack Association, 2013); (b) the movement toward triple aims (i.e., better health, better care, lower cost) within the healthcare industry provides an ideal setting for us to observe how clinical focus on heart attack procedures and quality improvement (QI) initiatives improve clinical quality; (c) as part of the Affordable Care Act, national and state health agencies have collected and published hospital clinical quality data related to heart attack procedures since early 2000s, which make a longitudinal study possible.

After matching hospital data collected from multiple national and state health agencies, we were able to assemble a rich dataset that consists of 1223 observations of 210 hospitals in the state of Florida from 2005 to 2011. Specifically, the dataset includes detailed hospital demographic information, diagnosis related group (DRG) information including heart attack related procedures, and a full spectrum of clinical quality measures for heart attack procedures including outcome measures (i.e., mortality & readmission rates) and process measures (i.e., process of care). Through controlling potential endogeneity issues in treatment effect models, our analysis results show that focus and QI initiatives affect different aspects of clinical quality both individually and collectively.

In the following, we introduce a theoretical framework based on service design and process management and discuss how the framework applies to our study context. We next present our hypotheses and discuss our analysis methods and results. Finally, we summarize our contributions and future research directions.

2. Research framework

2.1. Service design

Although service has been defined and measured in different ways, researchers in both operations and marketing largely agree that it is a combination of tangible and intangible offerings providing certain value propositions to customers (Heskett, 1987; Fitzsimmons and Fitzsimmons, 1999; Roth and Menor, 2003). Accordingly, service design encompasses the design of key service components including vendors, facilities, equipment, technology, and specific processes for service creation and delivery (Goldstein et al., 2002). Schmenner (1986) and Kellogg and Nie (1995) propose that service companies can achieve competitive advantages through strategically designing the labor intensity, range and customizability of their service offerings. Drawing upon manufacturing strategy logic, Roth and Menor (2003) further suggest three sets of service design choices including structural choices on service encounters, infrastructural choices on programs and policies, and integration choices of internal/external systems. The three sets of service design choices collectively build distinctive competitive capabilities that reflect a company's competitive strengths relative to its peers and help realize requisite service concepts (Hill and Jones, 1989). From a consumer's standpoint, competitive capabilities as indicated by factors including the physical appearance of the facility, the level of courtesy shown by service personnel and the range of service offerings greatly assist her to make choices among

competitors and to evaluate the overall service experience (Roth and Menor, 2003).

2.2. Focus as a service design approach

One example of service design in the hospital setting is the use of "cellular" and "de-coupling" concepts to leverage resources including beds and employees to highlight and emphasize certain clinical procedures and patients to improve patient care (Skinner 1974; Greene and Sadowski, 1984; Metters and Vargas, 2000; Huckman and Pisano, 2006). As evidenced by hospital rankings released by USNEWS, in which leading hospitals across the nation were ranked in 16 individual specialties, general acute-care hospitals such as Cleveland Clinic, Mayo Clinic, and Massachusetts General Hospitals have been continuously developing their facilities around multiple highly specialized areas such as cardiology & heart surgery and orthopedics, etc.

Focus emphasizes a specific service line above others through either "narrowing" or "emphasis" (McDermott and Stock, 2011). From a resource-based view perspective, creating operational focus through emphasizing a specific service line results in a distribution of resources (i.e., facilities, equipment, technology, service personnel, and processes) leaning toward the service line and thus represents a service design approach. By shifting internal resources to address a limit set of clinical areas, focus helps reduce variations introduced by patient heterogeneity and associated clinical procedures (Huckman and Pisano, 2006; McDermott and Stock, 2011). It also enables a hospital to foster a focused market (e.g., cardiology patients) and focused operations (e.g., treatment of heart attacks), both of which allow the hospital to "exploit economies of scale by consolidating volumes that would have otherwise been allocated across multiple diversified facilities" (Barro et al., 2006; p. 704). Focused operations also result in simplified routines for acquiring and utilizing knowledge to treat patients and thus improve learning capacities (Skinner, 1974; McDermott and Stock, 2011). In addition, clinicians' extended experience with surgical procedures (e.g., coronary artery bypass graft procedures) should also lead to improved clinical quality and fewer "defective units" in the focused areas (Schonberger, 1986; Ahire and Dreyfus, 2000).

Recent studies in healthcare operations examine focus at different levels of granularity. Kc and Terwiesch (2011) examine the effect of focus on operational performance by modeling focus at three levels: hospital level measured by the percentage of patients treated in cardiology department, department level measured by the percentage of cardiac patients received coronary revascularization procedures, and procedure level measured by the percentage of CABG procedures among all revascularization procedures. Viewing focus as emphasis, McDermott and Stock (2011) capture cardiology focus with a different set of measures including proportion of cardiology cases among total cases, proportion of cardiology patient days among total patient days, and proportion of coronary care beds among total beds. In order to differentiate potential spillover and complementarity effects of clinical focus, Clark and Huckman (2012) measure focus with the percentage of patients treated with cardiovascular disease and define complementary service areas as those admit at least one fifth of cardiovascular patients. Overall, focus reflects the concentration of certain procedures or clinical areas and is calculated as a percentage value.

Prior focus studies have largely used cross-sectional datasets (Kc and Terwiesch, 2011; McDermott and Stock, 2011) or operations related performance metrics (Huckman and Pisano, 2006). Although Hyer et al. (2009) attempt to evaluate the longitudinal impact of a focused trauma unit on a range of performance metrics at the University Medical Center (UMC), their findings based on the single hospital may not be generalizable to other hospitals. Clark and Huckman (2012) utilize patient level data to assess the

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