Eric (Er) Fang, Robert W. Palmatier, & Jan-Benedict E.M. Steenkamp

Effect of Service Transition Strategies on Firm Value

The authors investigate the effectiveness of service transition strategies for generating shareholder value by evaluating secondary data pertaining to 477 publicly traded manufacturing firms during 1990–2005. The impact of a firm's transition to services on firm value (as measured by Tobin's q) remains relatively flat or slightly negative until the firm reaches a critical mass of service sales (20%–30%), after which point they have an increasingly positive effect. Furthermore, the effect of service sales on firm value depends on both firm and industry factors. Service transition strategies are more effective at enhancing value when the service offerings are related more to the firm's core business and when firms have more available resources (i.e., resource slack). The impact of adding services to core products on firm value amplifies as industry turbulence increases but diminishes when the firm's core products are in high-growth industries.

Keywords: service ratio, solution selling, service transition strategies, Tobin's q, resource-based view, firm value

In the past few decades, many leading firms have added services to their existing product offerings in an attempt to provide total customer solutions and, thus, to improve their competitiveness and performance (Lusch, Vargo, and O'Brien 2007; Sawhney 2006; Wise and Baumgartner 1999). For example, the positive financial impact that the *Fortune* 20 giants IBM and General Electric gained from transitioning from product-centric manufacturers to primarily service providers highlights the attractiveness of this strategy among many managers (Sawhney, Balasubramanian, and Krishnan 2004). Academics add support to service transition strategies by arguing that to compete in the future, firms must shift from a "goods-centered paradigm" to a "service-centered view" (Vargo and Lusch 2004, p. 12). The resultant service-based initiatives have been successful in many cases, but there also are noticeable failures, including Intel's move to Web-based services and Boeing's offer of financial services (Sawhney, Balasubramanian, and Krishnan 2004). Building a critical mass of services may be necessary for such transition strategies to affect firm performance positively (Bharadwaj, Varadarajan, and Fahy 1993), but it seems surprising, given the attention devoted to "competing through services," that little empirical research identifies whether, the extent to which, and in what conditions this strategy will be effective (Bolton, Grewal, and Levy 2007). Sawhney (2006, p. 378) recently identified the need "to conduct an empirical investigation to see if the financial benefits of moving toward solutions [services] outweigh the risk and to define the contextual factors that separate winners from losers in migration to a solutions approach."

This article attempts to fill this gap in the literature by addressing three research questions: (1) Do service transition strategies increase firm value? (2) What level of service intensity is required for transition strategies to contribute to firm value? and (3) Which firm and industry factors increase or decrease the value of service transition strategies? We investigate these research questions by integrating multiple secondary sources of longitudinal data on 477 publicly traded U.S. manufacturing firms from 1990 to 2005. Specifically, we capture a firm's progress in implementing a service-based strategy by using the portion of a firm's total sales revenue that results from the sale of services; a firm initiating a service transition strategy typically begins with a low service ratio and, over time, attains progressively higher levels of service content.

Our focus on firm value to evaluate the effectiveness of service transition strategies is consistent with the position of the Marketing Science Institute (2006), which has identified the impact of marketing strategies on firm value as one of its top research priorities. Indeed, Lehmann (2004, pp. 73–74) argues that "if marketing wants 'a seat at the table' in important business decisions, it must link to financial performance," but he laments that the "link [of marketing actions] to financial outcomes and stock price surprisingly is rarely considered." Our measure of firm value is Tobin's q, which marketing academics increasingly recognize as an important metric for evaluating the effectiveness of marketing strategies (Lee and Grewal 2004; Rao, Agarwal, and Dahlhoff 2004; Srivastava, Shervani, and Fahey 1998). Because Tobin's q is based on stock prices, it is forward looking and risk adjusted, integrates multiple dimensions of performance (sales, profits, cash flow, earnings volatility), and is less easily manipulated by managers than other measures (Srivastava, Shervani, and Fahey 1998).

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Service Transition Strategies and Firm Value: A Resource-Based View

Studies in both marketing and strategy literature argue that manufacturing firms should shift to "solution" and/or "service" offerings to improve their competitive position in the era of intense global competition and increasing commoditization that characterizes many product markets (Sawhney, Balasubramanian, and Krishnan 2004; Vargo and Lusch 2004; Wise and Baumgartner 1999). We refer to these strategic redirections as "service transition strategies." The primary premise behind such arguments relies on the important benefits associated with offering services, including increased customer loyalty, enhanced pricing power, and improved resistance to outsourcing. These benefits derive from the innate characteristics of services; compared with products, services make a firm's offering more intangible, more likely to require coproduction, more difficult to standardize, more knowledge intensive, and more demanding of direct sales contact. In essence, service transition strategies reportedly can make the firm's total offering (tangible and intangible value proposition) more unique, difficult to duplicate or imitate, and valuable to customers, which should improve firm value through higher and more stable sales, cash flows, and profits (Vargo and Lusch 2004). We investigate this premise within the resource-based view (RBV) theoretical framework, which is well suited to evaluate how and when service transition strategies can affect the imitability and value of a firm's tangible and intangible resources and its ultimate market value (Barney 1991; Palmatier, Dant, and Grewal 2007).

The RBV perceives a firm as an idiosyncratic bundle of resources and capabilities that are available for deployment but difficult for rivals to imitate (Amit and Schoemaker 1993). Teece, Pisano, and Shuen (1997, p. 516) argue that these capabilities should be viewed from a dynamic perspective, based on the notion that dynamic capabilities—or the "ability to integrate, build, and reconfigure internal and external competencies"—are the most critical drivers of a firm's competitive advantage and value. Eisenhardt and Martin (2000) extend the dynamic perspective of the RBV with the premise that firm value is enhanced only if these dynamic capabilities coincide with environmental conditions. That is, any examination of the effect of a firm's strategic efforts (e.g., service transition strategies) on firm value must consider how those efforts facilitate the integration, combination, and utilization of firm resources and capabilities over time and within the firm's environmental context. Using this logic, we investigate the impact of a firm's service transition strategy on its value by evaluating how a shift from products to services might influence its ability to configure its tangible and intangible resources within changing market conditions.

We identify four major mechanisms through which service transition strategies affect firm value: leverage of knowledge and resources, increased customer loyalty, loss of strategic focus, and organizational conflict. Whereas the first two mechanisms work in a positive direction and strengthen the positive effect of service transition strategies on firm value, the latter two have a negative impact on this relationship.

Positive Effects of Service Transition Strategies on Firm Value

Leverage of knowledge and resources. A firm can leverage its knowledge and resources, accumulated from manufacturing products for specific customer applications, to service extensions. Markides and Williamson (1996) argue that knowledge and resource spillovers help firms exploit synergies between their manufacturing and services, which results in cost savings and competitive differentiation advantages. For example, as a manufacturer transitions into service domains, such as integrated solutions, it can achieve cost advantages over its competitors by sharing both tangible resources (e.g., local offices, call centers) and intangible resources (e.g., customer relationships, brand image). Furthermore, this resource spillover between product and service offerings can facilitate the complexity and causal ambiguity of its resource endowments, protecting them from imitation by competitors (Reed and DeFillippi 1990). Thus, neither offshore product-only competitors nor local service-only suppliers will be able to replicate the reciprocal spillover benefits and synergies of an integrated product/service provider.

Increased customer loyalty. Service transition strategies often make the total offering more intangible and difficult to evaluate, which decreases market transparency and increases a customer's perceived purchase risk. Moreover, increased service content typically requires increased customer–seller interaction levels to deliver the offering. Because exchanges embedded in strong relationships are more adaptable and feature higher levels of trust and cooperation, differences in products versus services make strong seller relationships more important among customers who purchase services than among those who buy products (Bolton, Grewal, and Levy 2007). In their meta-analysis of the effectiveness of relationship marketing, Palmatier and colleagues (2006, p. 150) report that "strong relationships appear to be more effective for building customer loyalty and improve seller performance for service versus product offerings."

As a result of the changing characteristics of the total offering, intangible relationships and brand assets become more valuable to customers (e.g., by reducing perceived risk and increasing exchange flexibility), which in turn creates higher customer loyalty, more pricing power, greater opportunities to cross- or upsell, and more cooperative customers (e.g., who are willing to spend time with or disclose information to a seller). Loyalty-induced increases in customer cooperation and knowledge sharing also enhance a seller's ability to respond to changing environmental conditions through resource reconfigurations. In the aggregate, extending a manufacturer's businesses into the service domain can help build significant customer equity, as reflected by the total discounted lifetime value of a firm's customers, which increases its overall valuation (Rust, Lemon, and Zeithaml 2004).

Negative Effects of Service Transition Strategies on Firm Value

Loss of strategic focus. Service transition strategies also involve several important drawbacks. Firms often operate

under resource constraints, and adopting a service transition strategy may involve sacrificing the level of resource inputs to its core product and manufacturing competencies (Bourgeois 1981). In other words, the combined resource requirements of core product activities (e.g., research and development, manufacturing improvements) and service activities may dilute firm resources, such that neither business has sufficient resources to achieve the critical mass to succeed. Overall, spreading a firm's resources between an existing business and a new business that requires new skills, capabilities, and competencies should have a negative impact on a firm's financial performance and, ultimately, on its market valuation, at least in the short run. These negative effects likely remain until the firm develops the core capabilities and competencies needed for the new business to compete effectively and for managers to learn to allocate resources optimally across the different domains.

Organizational conflict. Service and product/manufacturing businesses require different organizational processes, cultures, leadership, and structures (Deshpandé, Farley, and Webster 1993; Vargo and Lusch 2004). Researchers have proposed that a culture focused on "people" is critical for service success (Bharadwaj, Varadarajan, and Fahy 1993), whereas performance in product markets depends relatively more on an organizational culture that stresses technology innovation and product value. Cost considerations in early stages of service transition strategies prevent most firms from structurally separating the businesses, which means that they integrate mixed organizational elements (e.g., process, culture) within the same entity. Thus, transitioning to services may create internal confusion, tension, and even outright conflict (Krishnamurthy, Johansson, and Schlissberg 2003). Such conflict within the organization can reduce employees' motivation and effort, undermine resource utilization and productivity rates, and cause suboptimal resource deployments and configuration decisions, which in turn undermine the firm's ability to create value.

We use these four mechanisms—leverage of knowledge and resources, increased customer loyalty, loss of strategic focus, and organizational conflict—as a framework for understanding why the effect of service transition strategies on firm value may vary systematically across firms, according to firm- and industry-level factors. Previous RBV researchers, such as Black and Boal (1994), have argued that the effect of a firm's strategic choice on its value depends on the fit of the strategic choice with the firm's underlying competencies, resource levels, and market position. Consistent with their argument, we investigate three firm-specific factors: service relatedness, resource slack, and market share. In addition to firm-specific factors, the RBV holds that the industry context must be considered to understand the effect of a firm's strategic initiative on performance (Amit and Schoemaker 1993) and distinguishes three industry-level context factors: (1) industry growth, (2) industry turbulence, and (3) industry competition (Jaworski and Kohli 1993). Although these factors can be examined for any industry, according to the RBV, the firm's core industry is especially pertinent (Srivastava, Fahey, and Christensen 2001). Therefore, we focus on the firm's core product industry.

Our goal is to develop hypotheses regarding the likely net moderating effect of a particular contextual factor on the impact of service transition strategies on firm value by considering the four mechanisms through which such effects may transpire. Note that the mechanisms may work in opposite directions. We summarize our expectations in Table 1, in which we use a "+" ("–") to indicate that a particular contextual factor strengthens (weakens) the mechanism and blank spaces to imply that we do not expect a strong impact in either direction. In the next section, we develop the rationale for our expectations.

Hypotheses

Effect of Service Ratio on Firm Value

We capture the notion of service transition with the concept of service ratio, which refers to a firm's progress in implementing a service transition strategy, according to the portion of the firm's total revenue that results from services. Thus, rather than capturing a firm's strategic thrust or

TABLE 1
Effect of Moderators on Mechanisms Influencing Service Transition Strategy Effectiveness

	Positive Mechanisms		Negative Mechanisms		
Moderators	**Leverage of Knowledge and Resources**	**Increased Customer Loyalty**	**Loss of Strategic Focus**	**Organizational Conflict**	**Hypothesized Net Effect**
Firm-Level Factors					
Service relatedness	+	+	–	–	+ H_2
Resource slack			–	–	+ H_3
Market share	+		+	+	Indeterminate H_4
Industry-Level Factors					
Growth			+	+	– H_5
Turbulence	+	+	–		+ H_6
Competition	+	+			+ H_7

Notes: Positive (negative) signs represent moderating conditions that strengthen (weaken) the effects of positive and negative mechanisms on firm value. For example, "+" indicates that the relatedness of a service offering increases the positive impact of knowledge and resource spillover on firm value, and "–" implies that the relatedness of a service offering decreases the negative impact of the loss of strategic focus on firm value.

"vision," the service ratio represents the firm's actual sales from services.

We use Tobin's q as a proxy for our dependent variable—firm value. Tobin's q is the ratio of the market value of the firm to the replacement cost of its assets. The long-term equilibrium market value of a firm should equal the replacement costs of its assets. Tobin's q captures increases in a firm's market value due to unmeasured intangible assets (Bharadwaj, Bharadwaj, and Knosynski 1999), such as enhanced loyalty from service strategies. It is widely used as a measure of firm value in both the marketing and the finance literature. Table 2 provides selected references and research contexts.

As a performance metric, Tobin's q has several advantages for the purposes of our study (Anderson, Fornell, and Mazvancheryl 2004; Lee and Grewal 2004; Srinivasan 2006). Because it is based on stock prices, it is forward looking and risk adjusted, integrates multiple dimensions of performance (sales, profits, cash flow, earnings volatility), and is less easily manipulated by managers than other measures (Srivastava, Shervani, and Fahey 1998). Service transition strategies represent a fundamental shift in a firm's strategic direction. Therefore, they should affect the firm's financial performance in diverse ways for many years into the future, and a lag may exist between changes in service ratio and various single-year financial performance measures. Thus, when linking the service ratio to any single measure of a firm's annual performance (e.g., sales, profits, cash flow), many performance measures may not detect the actual impact of the service transition strategies. However, because Tobin's q reflects the market's expectation of the firm's future performance, it is immediately responsive to strategic changes and captures their impact over multiple years (Lee and Grewal 2004).

Our hypothesis development focuses on how service ratio affects firm value (as measured by Tobin's q) through the previously identified positive and negative mechanisms that can affect multiple aspects of firms' intangible assets (e.g., loyalty, brand, relationships). We submit that for low service ratios, the impact on firm value is minimal because the negative effects of a loss of strategic focus and internal conflict outweigh the positive effects of resource spillover and increased customer loyalty. However, when a manufacturer's service intensity increases beyond a certain level, the synergies between its products and services—developed through greater knowledge and resource spillover, increases in customer loyalty and cooperation, and the leverage gained from intangible assets (e.g., brand)—likely outweigh the negative effects. This positive effect also becomes reinforced by the weakening of the negative effects of service transition strategies due to learning effects. Therefore, as the firm attains higher levels of service content, it should gain the required competencies and skills, implement the necessary organizational changes, and build the experience needed to manage a service-based business, all of which undermine the negative mechanisms. Thus:

H_1: At low levels of the service ratio, the effect of service transition strategies on firm value (Tobin's q) is minimal; as the service ratio increases beyond a critical level, the effect of service transition strategies on firm value (Tobin's q) becomes increasingly positive.

TABLE 2
Selected Marketing and Finance Literature Using Tobin's q as a Measure of Firm Value

Reference	Context	Use of Tobin's q
Marketing Literature		
Bharadwaj, Bharadwaj, and Knosynski (1999, p. 1011)	Investigates the impact of information technology (IT) investments on firm value, or as the authors state, "q ratio provides a better measure of the value created by IT investment."	Uses Tobin's q as an indication of "true contribution to firm value."
Simon and Sullivan (1993, p. 28)	Investigates the impact of brand equity "on the financial market value of the firm."	Uses Tobin's q as a measure of financial market value of firm.
Rao, Agarwal, and Dahlhoff (2004, p. 132)	Investigates the impact of brand strategy on "firm value (as measured by Tobin's q)."	Uses Tobin's q as a measure of firm value.
Finance Literature		
Allayannis and Weston (2001, p. 244)	Investigates the impact of foreign currency derivatives on "firm market value, as captured by Tobin's q."	Uses Tobin's q as a measure of firm value.
Bebchuk and Cohen (2005, p. 409)	Investigates the impact of board membership on "firm value (as measured by Tobin's q)."	Uses Tobin's q as a measure of firm value.
Cronqvist and Nilsson (2003)	Investigates the impact of controlling minority shareholders on firm value using Tobin's q as a proxy for firm value.	Uses Tobin's q as a measure of firm value.
Mackay and Moeller (2007, p. 1381)	Investigates the impact of corporate risk management on "firm market value (using Tobin's q as a proxy)."	Uses Tobin's q as a measure of firm value.

Firm-Level Moderating Factors

Service relatedness. Service relatedness indicates the extent to which a manufacturer's service business links to its core product business. In certain service extensions, such as integrated solutions that bundle services around a product (e.g., maintenance of aircraft engines), product and service offerings are related operationally to each other, and the knowledge requirements overlap. In contrast, other service extensions have little overlap or commonality between the product and service offering, such as manufacturing high-tech electronic components and offering financial services. The degree of service relatedness should affect both the positive and the negative pathways that link service ratios to firm value.

When the service offering is more closely related to a firm's core manufacturing business, the knowledge developed and resources used in manufacturing can be more easily leveraged to the service area, which results in greater knowledge and resource spillover (Varadarajan 1986). For example, an engine manufacturer can leverage its knowledge in engineering and manufacturing when its service extension is engine maintenance rather than financial services.

The customers' perceptions of "product fit," or the extent to which customers perceive the product and service offerings as compatible or complementary, can also play a significant role in how they respond to the product and service bundle, their attitude toward the supplier, and eventually their level of firm loyalty (Simonin and Ruth 1998). Therefore, when customers perceive a higher level of relatedness between a firm's product and service offerings, they sense lower evaluation and performance risks and display higher loyalty toward the seller. Overall, the two positive mechanisms linking service ratios to firm value should be enhanced by service relatedness as a result of the more efficient resource and knowledge spillover effects and by strengthening the risk reduction effect of intangible relationships and brand assets.

Finally, when services are related to the firm's core product business, there is less danger of a loss of strategic focus. Because service-focused tasks relate better to ongoing product-focused tasks, fewer incremental or dedicated resources are required. Service relatedness also should reduce problems stemming from tension or conflict among divergent organizational foci because the similarity among the operational and knowledge requirements should promote more convergence among perspectives and processes (Homburg and Bucerius 2005). Thus:

H_2: Service relatedness positively moderates the effect of service ratio on firm value (Tobin's q).

Resource slack. Resource slack refers to the cushion of excess resources that the firm can use in a discretionary manner (Bourgeois 1981). It enables managers to allocate resources to opportunities or needs dynamically, without "stealing" funds from another use (Sharfman et al. 1988). Because resource slack supports new investment without constraining existing projects, the proposed negative mechanism for the effect of service ratios on firm value due to shifting resources is attenuated as resource slack increases.

Resource slack also plays a crucial role in resolving conflict among different organizational entities that must compete for limited resources and thus mitigates another potential short-term, negative effect of service transition strategies. It acts as an "organizational shock absorber" that provides managers with the dynamic flexibility to respond to market conditions and exploit unforeseen high-return opportunities, without the organizational conflict inherent in competition for scarce resources (Bourgeois 1981; Eisenhardt and Martin 2000). Thus:

H_3: Resource slack positively moderates the effect of service ratio on firm value (Tobin's q).

Market share. For a given level of the service ratio, a firm with a larger market share in its primary business markets should be better positioned to leverage its knowledge (e.g., wide, diverse product offerings) or resources (e.g., large, diverse customer base) than its lower-share competitors (Boulding and Staelin 1990). Similarly, firms with high market share should be able to leverage existing relationship and brand resources better than competitors with lower market share, which results in higher returns from their service transition efforts (Szymanski, Bharadwaj, and Varadarajan 1993).

Counteracting these beneficial effects, high market share may enhance both negative pathways between service ratios and firm value. The opportunity cost of shifting resources away from product initiatives to service initiatives should be more detrimental for entrenched leaders than for firms with smaller market share in their core business, as should the negative effect on firm value due to productivity losses, slower decisions, and general discord as a result of implementing service-focused organizational changes. Thus, on the basis of these conflicting effects, we offer a nondirectional, moderating hypothesis:

H_4: The firm's market share moderates the effect of service ratio on firm value (Tobin's q).

Industry-Level Moderating Factors

Industry growth. The opportunity cost associated with shifts in resources from products to untested new service initiatives is greater in fast-growing product industries (Green, Barclay, and Ryans 1995) because the effect of stealing resources and lowering productivity, motivation, or decision speed due to organizational realignments to support service initiatives is more detrimental on firm performance in such markets. From an RBV perspective, product-based assets are more valuable in fast-growing industries, and any action that negatively affects the full deployment of these valuable assets undermines the firm's financial performance and overall market value (Mehra 1996). Thus:

H_5: The growth rate in the firm's core product industry negatively moderates the effect of service ratio on firm value (Tobin's q).

Industry turbulence. Knowledge gained from close interfaces with customers is a more valuable resource for firms in industries with rapidly changing customer demands and preferences (Jaworski and Kohli 1993), but because competitors without product-based linkages are less likely to have access to accurate and timely knowledge about customers' needs, knowledge spillovers from product- to service-based offerings should be a more valuable asset with a greater impact on firm value in more turbulent industries (Kumar, Subramanian, and Yauger 1998). Alternatively, in stable industries with little change, even outsiders can determine customers' needs and preferences (e.g., from industry reports or consultants), so firms with existing product sales gain little opportunity to arbitrage their position.

Industry turbulence should also enhance the other positive pathway for the effect of service ratio on firm value, in that customers in volatile industries perceive a higher degree of risk (evaluation and performance) when purchasing the often-changing products and services (especially if they are interrelated), so their decision making likely relies more on the confidence generated from supplier brands and ongoing relationships. Therefore, firms' existing intangible resources (e.g., brands, relationships) are more fully leveraged through service offerings in volatile industries than in stable industries. Furthermore, the loss of strategic focus associated with service transition strategies may be less problematic in turbulent industries because diversification into other activities, especially less volatile services, may provide a more diversified portfolio that helps stabilize firm earnings and cash flows and increase the chances of survival (Zahra, Ireland, and Hitt 2000). Thus:

H_6: Turbulence in the firm's core product industry positively moderates the effect of service ratio on firm value (Tobin's q).

Industry competition. Finally, as competition increases, firms without valuable, difficult-to-imitate resources perform poorly and are driven out of business. Researchers argue that as industries mature and competition increases, the differential competitive advantage generated by unique, difficult-to-duplicate tangible and intangible resources becomes even more important (Hunt and Morgan 1995). Thus, the cost savings and synergistic benefits from resource and knowledge spillovers, as well as the enhanced customer loyalty generated from service offerings, likely become more critical to firm value as industry competition increases (Kumar, Subramanian, and Yauger 1998). In industries with little competition, all firms—even those without rare or valuable resources—may generate acceptable profits, but as competition increases, differential resource advantages become more important drivers of firm value. Overall, resource enhancements (i.e., spillover and leverage of intangible assets) from service transition strategies that provide sources of differentiation should have a greater impact on firm value as competitive rivalry increases. Thus:

H_7: Competitiveness in the firm's core product industry positively moderates the effect of service ratio on firm value (Tobin's q).

Methodology

Data

We focus our investigation of service transition strategies on U.S.-based, publicly traded manufacturing firms with primary Standard Industrial Classification (SIC) codes of 28–39 over a 16-year period, from 1990 to 2005. These SIC codes cover a wide range of manufacturing industries, including chemical products, industrial machinery, electronic equipment, and transportation equipment. We obtain the data from multiple sources, including the COMPUSTAT Industrial Annual and COMPUSTAT Business Segments databases, as well as the U.S. Department of Commerce.

Measures

Firm value. As we mentioned previously, we use Tobin's q as a measure of firm value, relying on data obtained from the COMPUSTAT Industrial Annual database. We use Chung and Pruitt's (1994) method to calculate Tobin's q:

$$q = \frac{MVE + PS + DEBT}{TA}, \quad (1)$$

where MVE is the closing prices of shares at the end of the financial year × number of common shares outstanding, PS is the liquidation value of outstanding preferred stock, DEBT = (current liabilities – current assets) + (book value of inventories) + (long-term debt), and TA is the book value of total assets.

Service ratio. The data for the service ratio come from the COMPUSTAT Business Segment database, which provides firm sales revenue for different business operating segments, as defined by the firm's management. From the description of these business segments and their respective SIC codes, we divide them into service and nonservice. For example, a business segment consists of a service when the description of the segment is "global service" with an SIC code of 7379 or "financial service" with an SIC of 6153. Because in some cases the description of the business segments does not exactly match the SIC code, we used two independent judges to evaluate both the SIC code and the description and categorize each business operating segment. Differences (<5%) were resolved through discussion. To maintain a conservative measure, business segments that could not be definitively categorized appear in the nonservice category. Using these data, we calculate the service ratio as the percentage of sales revenues in all service business segments compared with the total sales revenue of each firm in a given year.

Note that many firms do not report sales in separate business segments, which represents a voluntary managerial disclosure. Therefore, we include only firms that report at least one year of sales in a segment categorized as a service.[1] After identifying these firms, we calculate their service ratios from 1990 to 2005.

[1]In practice, after firms in our study reported sales revenue from services, they continued to report service sales in 87% of the subsequent years.

Service relatedness. The data pertaining to service relatedness also come from the COMPUSTAT Business Segment database. For all sales in service categories identified in the service ratio calculation, we categorize the service sales as related or unrelated to the core product business, such that service relatedness documents the extent to which the manufacturer's service business links to its core product business. Two expert judges evaluated each business segment categorized as a service business and independently determined whether the service was related or unrelated to the core product business. Any differences (<5%) were resolved through discussion. For example, all business segments described as "integrated solutions," "solutions and software," and "product service" are categorized as related services, whereas those described as "distribution," "retail," "financial service," and "credit" are categorized as unrelated services. More specifically, firms with only one service business segment are assigned either a 1.0 (100% related) or .0 (0% related) with regard to their core product business.

Next, for any firm with multiple business segments categorized as services, we use a sales revenue weighted average to determine the measure of firm service relatedness. For example, if a firm has two service segments, one that is unrelated to the firm's core business and represents one-third of the total sales in services and one that is related to the firm's core business and represents two-thirds of the total sales in service, that firm receives a service relatedness score of .67.

Resource slack and firm market share. Consistent with Lee and Grewal (2004), we use factor scores, calculated through principal components analysis from two financial ratios—(1) retained earnings to total assets and (2) working capital to total assets—to assess resource slack. Retained earnings capture the resources that a firm decides to maintain for unforeseen eventualities and implementation strategies (Bourgeois 1981), and working capital indicates the firm's current assets less its current liabilities, which typically include inventory, account receivables, and cash. Firm market share reflects a ratio of a firm's overall sales revenues to the sales revenues of all firms in the same four-digit SIC code industry. Thus, a firm's market share represents the firm's share in its primary business market. We obtain data from the COMPUSTAT Industry Annual database for these measures.

Industry growth, turbulence, and competition. Our measures of industry growth and turbulence are consistent with previous research (e.g., Finkelstein and Boyd 1998). For industry growth, we first regress sales revenues in the firm's core product industry (four-digit SIC) across the prior four years (i.e., time is the independent variable). Next, we divide the slope coefficient obtained from this regression by the mean value of the industry sales for those years (to adjust for absolute industry size) to arrive at the growth score for each industry.

For industry turbulence, we first calculate the standard deviation of sales in the firm's core product industry across the prior four years and then divide it by the mean value of industry sales for those years. Industry competition reflects a Herfindahl index. In the firm's core product industry, we square each firm's market share and take the sum over all firms. Because we are interested in industry competition, not its concentration, we subtract this sum from 1. We obtain the data for these measures from the COMPUSTAT Industry Annual database.

Control variables. We also include several time-varying control variables in our model. We control for firm size, measured as the log-transformation of the number of full-time employees in the company. We control for firm profitability using return on assets (ROA), measured as the firm's operating income divided by its total assets. At the industry level, we control for advertising intensity because heavy industry advertising creates differentiation, barriers to entry, and quasi-monopolistic profits. We calculate industry advertising intensity as mean advertising expenditures divided by mean sales in the firm's core product industry. We obtain the data for both these measures from the COMPUSTAT Industry Annual database.

We also control for the rate of growth in services, weighted by sales, across the applicable service industries for each firm, thus recognizing that the impact of the service ratio on firm value may not be solely due to the effect of transitioning from product to service, as proposed herein, but also due to improved firm performance as a result of inherently higher growth rates in the service segments targeted by the firm. Similar to industry growth, we first regress the annual average sales of the service industry (four-digit SIC) into which the firm has expanded across the preceding four years and then divide the slope coefficient obtained from this regression by the mean value of the industry sales for those years, which represents the growth score for that industry. For firms entering into more than one four-digit SIC service category, we first calculate the service growth in each of the service categories and then calculate a service revenue weight average based on the sales in each service category. Finally, to control for changes in economic growth over the period evaluated, we include gross domestic product (GDP) growth, according to data from the Bureau of Economic Analysis of the U.S. Department of Commerce.

A total of 2748 observations across 477 manufacturing firms from 1990 to 2005 appear in our model. The average service ratio in our sample increases steadily from 8.9% in 1990 to 42.2% in 2005, which demonstrates the strong prevalence of service transition strategies for the firms in this sample during this period. Table 3 summarizes the descriptive statistics and correlations for all measures, pooled across firms and time.

Estimation

Our data have a panel structure, in that we have time series of observations for multiple firms. This requires special attention to several estimation issues. First, Tobin's q may be nonstationary, which could cause biased estimates (Cuthbertson and Gasparro 1995). However, in our sample, a significant panel unit root test ($\chi^2 = -24.35$, $p < .01$) indi-

TABLE 3
Descriptive Statistics and Correlations

Variables	M	SD	Minimum	Maximum	Correlation Matrix 1	2	3	4	5	6	7	8	9	10	11	12
1. Firm value (Tobin's q)	1.34	2.69	−.85	1.62	1.00											
2. Service ratio	.31	.32	.00	1.00	.13	1.00										
3. Service relatedness	.49	.48	.00	1.00	.04	.05	1.00									
4. Firm resource slack	.34	.28	−.98	1.21	−.35	−.08	.02	1.00								
5. Firm market share	.12	.20	.01	.67	−.06	−.25	−.01	.03	1.00							
6. Industry growth	.06	.11	−.34	.79	.02	.11	.04	−.01	−.12	1.00						
7. Industry turbulence	.03	.04	.00	.60	−.01	−.01	.07	.01	.01	−.03	1.00					
8. Industry competition	.64	.19	.04	1.00	−.04	−.02	−.02	.02	.42	−.06	.12	1.00				
9. Industry advertising intensity	.02	.11	.00	1.32	.00	−.01	.02	.00	−.01	.00	−.01	.01	1.00			
10. Firm size	2.56	.35	.44	6.63	−.17	−.55	−.03	.11	.51	−.09	−.08	−.01	−.02	1.00		
11. Firm ROA	.04	.08	−2.45	1.29	.12	.07	.02	.21	.10	.03	−.06	−.11	.01	−.14	1.00	
12. Growth in services	.08	.06	−.14	.46	.02	.05	−.06	−.03	.05	.15	.11	−.03	.02	.04	.12	1.00
13. GDP growth	.05	.01	.03	.07	.03	−.00	−.01	−.02	.01	.12	−.05	−.01	.03	.03	.03	.11

Notes: $p < .05$ if $r > .04$.

cates that Tobin's q is stationary (Cameron and Trivedi 2005; Levin, Lin, and Chu 2002).

Second, serial correlation of Tobin's q can be problematic because it may bias parameter estimates. For our sample, the panel Durbin–Watson statistic (1.46, $p < .05$) indicates that autocorrelation is not a major issue (Baltagi 1995; Bhargava, Franzini, and Narendranathan 1982). However, to control for any unobserved firm heterogeneity, we include firm-specific effects in the model (Jacobson 1990). This has the added advantage of also reducing any serial correlation in the errors (Cameron and Trivedi 2005). Moreover, for data with many cross-sectional observations and limited periods, Cameron and Trivedi (2005, p. 725) recommend basing the statistical "inference on panel-robust standard errors that do not require specifying a model for the error correlation." We employ the White period robust coefficient variance estimator for statistical inferences (Arellano 1987), which is designed to accommodate arbitrary serial correlation in the disturbances. We calculate it as follows:

$$(2)\quad \left(\frac{N^*}{N^* - K^*}\right)\left(\sum_t X_t' X_t\right)^{-1}\left(\sum_t X_t' \hat{e}_t \hat{e}_t' X_t\right)\left(\sum_t X_t' X_t\right)^{-1},$$

where N* is the number of observations and K* is the number of parameters estimated.

Third, the Hausman (1978) specification test is significant ($p < .05$), which indicates that the random-effects treatment of unobserved heterogeneity is not tenable. Therefore, we adopt the following two-way, fixed-effects panel model:

$$(3)\quad y_{it} = \upsilon + \alpha_i + \gamma_t + X_{it}'\beta + \varepsilon_{it},$$

where

y_{it} = tobin's q for firm i in period t,
υ = the overall constant,
α_i = the firm-specific constant,
γ_t = the year-specific constant,
β = a vector of the influence of the independent variables,
X_{it}' = the independent variables, and
ε_{it} = the error term, such that $E(\varepsilon_{it}) = 0$ and $E(\varepsilon_{it}^2) = \sigma_e$.

Consistent with H_1, we specify a nonlinear effect for the service ratio in our model. We expect that service transition strategies begin to contribute to firm value only after a critical mass of service activity, and thus we anticipate that the linear effect will be significantly negative and that the quadratic effect will be significantly positive. (If both effects are positive, service transition strategies contribute to firm value at all levels of service ratios.)

In H_2–H_7, we address the moderating effects of firm and industry factors on the performance implications of service transition strategies; we obtain support for these hypotheses if the coefficient for the linear and/or quadratic term of the service ratio with the moderator is significant and has the anticipated sign. Specifically, a positive (negative) moderator coefficient indicates a more positive (negative) effect on firm value as the service ratio increases. The moderator effect is especially strong if the moderator × (service ratio)^2 is significant.

As we mentioned previously, we include five control variables: firm size, firm ROA, industry advertising intensity, growth in services, and GDP growth. We also include the main effects of the moderators. For the proper interpretation of our focal moderator effects, we must include the simple main effect of the moderators as control variables. We first estimate a main-effects-only model (Model 1) and then add the 12 interaction terms and conduct our hypothesis testing on Model 2 (Table 4).

Results

In Table 4 (Model 2), we present the results for the full model. The significant, positive effect of the quadratic term of service ratio (b = 1.15, $p < .05$) indicates that the effects of service transition strategies on firm value are not constant but rather increase at a progressive rate at higher levels of service transition. The negative linear effect (b = –.68, $p < .05$) further reveals that at low levels of a service transition strategy, the effect on firm value is minimal or even slightly negative. We depict this relationship graphically in Figure 1 and show that a service transition strategy has no appreciable impact on firm value in the 0%–20% range. A slight curvature reaches a minimum at approximately 15%, but the decline in firm value is not significant. Only when service intensity moves into the 20%–30% range do service transition strategies begin to influence firm value positively and at a rapidly increasing rate. Thus, we find support for H_1.

H_2–H_7 pertain to the moderating effects of firm- and industry-level factors on the relationship between service ratios and firm value. Specifically, H_2 predicts that service relatedness positively moderates the relationship between the service ratio and firm value; we find support for this claim because the interaction term between (service ratio)^2 and service relatedness is positive and significant (b = 1.67, $p < .05$). In addition, H_3 is supported because a firm's resource slack positively moderates the relationship between (service ratio)^2 and firm value (b = .27, $p < .05$). However, we do not find support for H_4; the interaction terms between firm market share and service ratio are not significant.

Regarding the moderating effects of industry-level factors on the relationship between service ratio and firm value, we find that industry growth negatively moderates the relationship between service ratio and firm value; the interaction term between industry growth and (service ratio)^2 is negative and significant (b = –7.89, $p < .05$), in support of H_5. Industry turbulence positively moderates the impact of service ratio on firm value (b = 19.34, $p < .05$). Finally, because industry competition does not significantly moderate the relationship between service ratio and firm value, we reject H_7.

To clarify these results, we plot the relationship between service ratio and firm value for the high and low conditions of each significant moderating factor (i.e., two standard deviations above and below each moderator's mean). Figure 2 reveals the relationships between service ratios and firm

TABLE 4
Results: Effect of Service Transition Strategies on Firm Value

Variables	Hypotheses	Firm Value (Tobin's q) Model 1		Model 2	
Intercept		1.08	(.26)**	1.13	(.23)**
Main Effects of Service Ratio					
Service ratio	H_1	–.42	(.24)*	–.68	(.37)*
Service ratio^2	H_1	1.22	(.56)*	1.15	(.65)*
Moderating Effects					
Service ratio × service relatedness				–1.01	(.92)
Service ratio^2 × service relatedness	H_2			1.67	(.92)*
Service ratio × firm resource slack				–.10	(.11)
Service ratio^2 × firm resource slack	H_3			.27	(.14)*
Service ratio × firm market share				2.03	(1.76)
Service ratio^2 × firm market share	H_4			–5.78	(4.00)
Service ratio × industry growth				–1.76	(2.05)
Service ratio^2 × industry growth	H_5			–7.89	(4.06)*
Service ratio × industry turbulence				3.57	(4.46)
Service ratio^2 × industry turbulence	H_6			19.34	(10.23)*
Service ratio × industry competition				–2.78	(2.66)
Service ratio^2 × industry competition	H_7			8.02	(6.33)
Control Variables					
Service relatedness		.07	(.22)	–.22	(.25)
Firm resource slack		–.03	(.01)**	–.12	(.03)**
Firm market share		.97	(.56)*	1.83	(1.14)
Industry growth		.34	(.66)	.64	(.54)
Industry turbulence		–.37	(.97)	–.51	(.91)
Industry competition		–.29	(.63)	–.41	(.68)
Industry advertising intensity		.18	(.19)	.06	(.22)
Firm size		–.21	(.06)**	–.43	(.22)*
Firm ROA		1.32	(.26)**	1.15	(.24)**
Growth in services		.23	(.35)	.56	(.40)
GDP growth		5.34	(3.03)*	6.17	(3.24)*
R^2		.57		.69	
Adjusted R^2		.54		.61	
F-statistics		8.32**		8.84**	

*$p < .05$.
**$p < .01$.
Notes: We report unstandardized coefficients with White period standard errors in parentheses (Arellano 1987).

value for the two significant firm-level moderators, and Figure 3 duplicates this portrait for the industry-level moderators.

Figure 2, Panel A, documents the importance of service relatedness. If the firm moves into services unrelated to its core product business, the positive effect of services mostly disappears over a broad range of service ratios. However, if the firm's service transition strategy fits with its product strategy, the effect is strong and increasingly positive, especially when service intensity surpasses a critical level of approximately 20%. Comparing the high- and low-resource-slack conditions reveals similar shapes in both conditions; at a given service ratio, higher resource slack generates slightly higher levels of firm value (Figure 2, Panel B).

In addition, in high-growth industries, service transition strategies decrease firm value across the full range of service ratios, as we show in Figure 3, Panel A. In low-growth industries, the service ratio has a positive impact on firm value at an increasing rate. The impact of industry turbulence on the relationship between service ratios and firm value also varies dramatically from high to low conditions (Figure 3, Panel B). With high industry turbulence, service sales positively influence firm value at an increasing rate, such that the effect becomes noticeable after service intensity surpasses a critical level of approximately 15%–20%. In contrast, service transition strategies have a negative impact on firm value in low-industry-turbulence conditions.

Discussion

Academics and practitioners alike promote the benefits of shifting from a product- to a service-centric business as a way to improve firm performance in an era of increased product commoditization and global competition. Yet little empirical research tests whether and in what conditions service transition strategies actually contribute to firm value. This research extends the literature by providing insights

FIGURE 1
Firm Value Across Different Service Ratios: 1990 to 2005

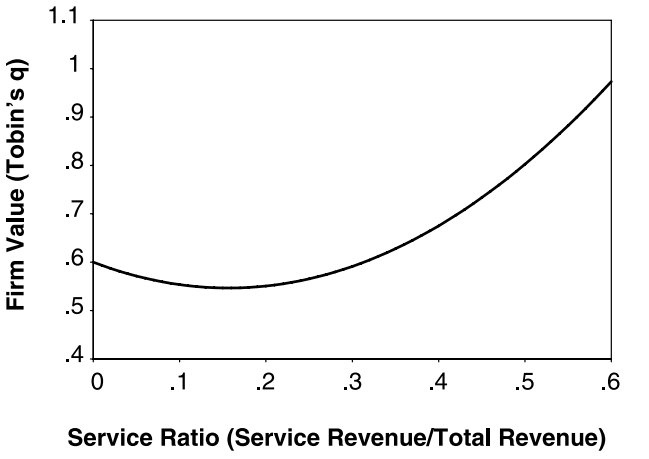
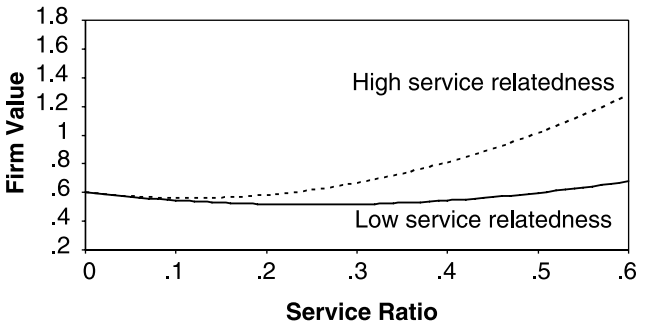
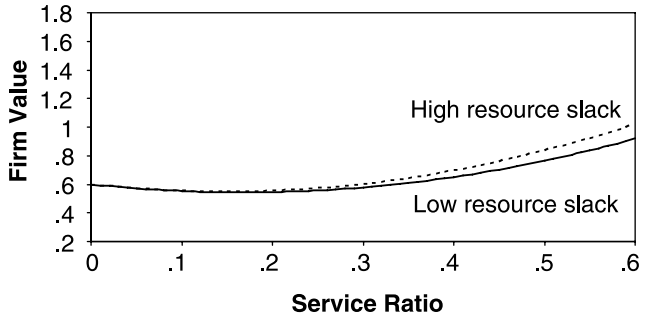


FIGURE 2
Firm-Level Moderators of the Effect of Service Ratio on Firm Value

A: Moderating Effect of Service Relatedness



B: Moderating Effect of Resources Slack



into the following three questions: (1) Do service transition strategies pay off? (2) What level of service intensity is required for transition strategies to be effective? and (3) Which factors leverage the effectiveness of service transition strategies?

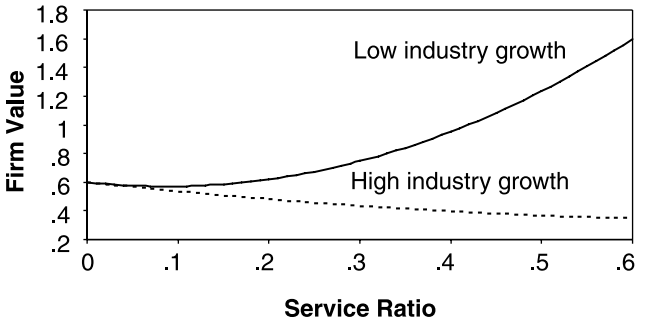
The results from the overall sample support the notion that transitioning to services positively affects firm value, but there are two important caveats. First, the effects on firm value become pronounced only after the level of service sales reaches a critical mass, which averages approximately 20%–30% of total firm sales. These results are consistent with our premise that shifting to services involves both positive and negative mechanisms and that the overall effect depends on their combined effect (see Table 1). Although the benefits of service transition strategies appear often in the literature, the negative mechanisms are often ignored or minimized (Sawhney 2006). In many cases, negative results are attributed to "implementation issues," and consultants offer guidance to prevent these problems (Krishnamurthy, Johansson, and Schlissberg 2003). For example, shifting to services typically requires managers to allocate their limited resources from existing product opportunities to new service initiatives, even though they have little prior experience evaluating or managing service-based projects. These new service initiatives also demand different and possibly conflicting organizational elements, which can undermine motivation and productivity. These negative mechanisms become less salient as managers and employees gain more experience or more service-minded replacements join the organization. In addition, as service sales increase to a meaningful level, organizational elements can be optimized for service offerings (e.g., separate business units), which reduces product–service conflicts. These results are consistent with the argument that the negative effects of service transition strategies are strongest at low levels of service sales and diminish as the service ratio increases. Thus, until the service ratio reaches a critical mass, its effects on firm value remain minimal or negative, but after that point, the synergistic benefits of offering products and services and the inherent benefits of services become more dominant, such that the service ratio provides an accelerating positive effect on firm value.

The second important caveat to the received wisdom regarding the value-enhancing qualities of service transition strategies is that the effects of service sales on firm value are highly contingent on the firm and industry. Transitioning to services is substantially more effective for firms that offer services related to their core product business. Sales of unrelated services have little impact on firm value over the full range of meaningful service ratios, which suggests that without some spillover from existing products, any benefits of the inherent characteristics of services cannot overcome the costs of launching and maintaining a new service business. Without these spillover or synergistic benefits, product-centric firms likely find themselves hard-pressed to compete against more focused, service-only firms. It is noteworthy that service relatedness has a much greater impact on the performance of transition strategies than resource slack. Thus, choosing a transition strategy wisely contributes much more to firm value than having abundant financial resources, which offers hope for smaller companies as well.

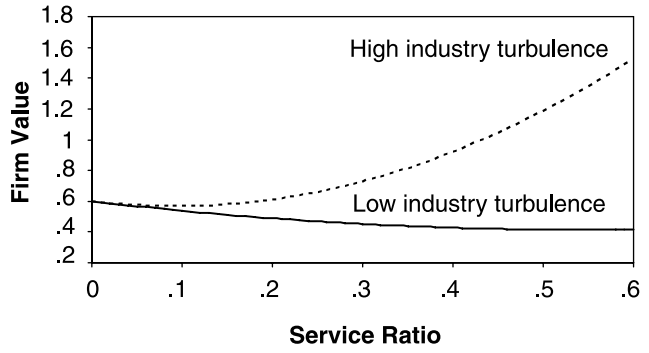
Generating firm value from service transition strategies also depends heavily on the characteristics of the firm's

FIGURE 3
Industry-Level Moderators of the Effect of Service Ratio on Firm Value

A: Moderating Effect of Industry Growth



B: Moderating Effect of Industry Turbulence



core product industry. Adding services to a core product offering is most effective for firms in slow-growth and turbulent industries, but in other conditions, service transition strategies may decrease firm value. The effects are similar for both industry factors. Firms in high-growth industries can destroy firm value by shifting their focus and the resources needed to cater to the persistent growth in the core product markets to services initiatives. In stable (low-turbulence) industries, adding services also has a negative effect on firm value, because product suppliers have minimal insider knowledge that they can arbitrage into spillover benefits, cannot offer substantial advantages by bundling products and services, and achieve little advantage from the reduced volatility of service compared with product sales.

Managerial Implications

Business analysts note that for many firms, service transition strategies fail to generate shareholder value. As Krishnamurthy, Johannsson, and Schlissberg (2003, p. 1) conclude in their assessment of 60 firms transitioning into services, "Simply, for most companies, the pain has not been worth the gain." Why might this be the case? What can managers do differently?

First, companies should recognize that service transition strategies typically require building a critical mass in sales, estimated to be 20%–30%, before they can expect positive effects on firm value. If anything, depending on contextual factors, a limited push into services may detract from firm value. It takes time to attain this critical mass, but time may be in short supply given the short-term focus of many managers (Steenkamp et al. 2005). So what can managers do? One solution is to accelerate the growth trajectory of services by acquiring existing service businesses or pricing services aggressively. Another solution might be to minimize the negative mechanisms that restrain the value contributions of service transition strategies. For example, by hiring experienced outsiders, managers could limit the negative impact of poorly informed decisions. Organizational conflict also could be reduced by separating product and service groups or instituting incentives to increase cooperative efforts.

Second, an analysis of the firm-specific moderators suggests that managers should focus their service initiatives on closely related businesses as much as possible so that they can enhance synergistic spillover benefits. A prime example of such service relatedness appears in the popular tactic of "solution selling," which involves combining products and service offerings. In addition, the strong interaction between the service ratio and service relatedness on firm value suggests that managers should avoid unrelated service initiatives.

Third, managers should recognize the strong effect of industry factors on the effectiveness of adding services to product offerings and avoid service initiatives if their core product markets grow quickly or are in stable industries. This significant role of industry factors in the ultimate success of service transition strategies also calls into question some multidivision corporate strategies, which direct all business units to implement service initiatives. For example, Emerson's "Service Initiative," which attempts to duplicate the success of a few business units by tasking all product divisions to offer service solutions, regardless of the potential differences in their industry dynamics, likely fails to account for the importance of industry differences across each business unit's market.

John Deere and Texas Instruments (TI), two firms in our sample, provide two cases in which service transition strategies generated versus did not generate firm value, depending on contextual factors. From 1995 to 2005, John Deere's value increased 76% (Tobin's q) as the company transitioned from 17% to 36% service-based sales. During the same period, TI's value decreased by 3% as it increased services from 14% to 33% of sales. Although both firms launched services related to their core business, TI's core industry was growing rapidly (>20%), whereas John Deere's was shrinking in the face of high levels of industry competition and turbulence. Although both firms made similar progress in shifting to services, the strategy was much more effective for John Deere, which leveraged its trusted brand and loyal but slowly growing customer base; in contrast, the benefits of shifting to services for TI could not overcome the loss of its strategic focus on its valuable and fast-growing core business.

In summary, managers should recognize that service transition strategies enhance firm value only (1) with a

meaningful minimum of services, in the ballpark of 20%–30%, whereas below this critical minimum, service transition strategies may have a negative effect; (2) if the service is strongly related to the firm's core manufacturing business; (3) when industry growth is sluggish; and (4) when the industry is volatile.

Limitations and Future Research Directions

Using longitudinal data from U.S. firms in a wide range of industries gathered from secondary sources has some important advantages (e.g., supports firm and industry analysis, uses objective measures rather than subjective or retrospective reports, provides insight into causality), but secondary data also have their weaknesses. We lack the necessary data to investigate the mechanisms (Table 1) through which moderators affect the value of service transition strategies directly. The consistency of our results with the theoretical underpinnings of our model supports our proposed positive and negative mechanisms, but additional research should explore this point using other methodologies (e.g., survey-based research). Further research also could expand the set of moderators, for example, by collecting additional data through surveys or expert interviews.

We link the impact of the service ratio to firm value, but we do not isolate the performance variables (e.g., sales, costs, cash flow, profits) through which this effect occurs. Thus, additional research should attempt to identify and isolate the relative importance of different mediating performance variables. Moreover, we use Tobin's q as a proxy for firm value; further research should replicate our results using other valuation measures to provide a more comprehensive view of the overall impact of service transition strategies on firm value.

Although the United States is leading the transition to a service-based economy, our results also should be replicated in other economies at different development stages. Moreover, the RBV, which we use to support our hypotheses, could be extended to a multicountry setting (based on the availability of secondary data) to explore both country- and culture-level moderating variables.

Our results suggest the potential for a negative impact of service transition strategies on firm value in certain firm and industry conditions, as well as the need for additional research to understand how to mitigate these effects. Thus, further research should investigate the interaction between implementation and context on service transition effectiveness.

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