FACTOR-MARKET RIVALRY AND COMPETITION FOR SUPPLY CHAIN RESOURCES

LISA M. ELLRAM
Miami University

WENDY L. TATE
University of Tennessee

EDWARD G. FEITZINGER
UTi Worldwide, Inc.

Organizations monitor factor-markets for strategic inputs that directly contribute to the firms' unique advantage. Thus, managers may be unaware of essential supporting inputs that bundle with strategic inputs to sustain the organization's success. Increasingly, supply chain resources are part of that strategic bundle of resources essential for achieving the firm's competitive advantage. This research employs a conceptual theory-building approach to examine competition among diverse industries in factor-markets using the example of supply chain services and the relatively new lens of factor-market rivalry theory. Data relative to air cargo capacity in China, port capacity in South Vietnam and the U.S. port and rail system provide the context for theoretical and practical insights into the implications of factor-market rivalry on firm performance.

Keywords: *factor-market rivalry; organization outsourcing; strategy development; organizational issues; strategic resource management; transportation, distribution and logistics; conceptual theory building*

INTRODUCTION

In recent years, the dynamic and volatile nature of global markets (Kracklauer, Janssen & Schneider, 2012) has created a surprising variety of resource shortages that have hindered effective support of offshore outsourcing and offshoring. This includes shortages of skilled labor in India (Khadria, 2002), sporadic shortages of factory workers in coastal China (Barboza, 2006) and shortages of various types of logistics capacity in India, China, Vietnam and the United States (Goldstein, Pinaud, Reisen & Chen, 2006; Kopczak, 1997; Krishnan, 2011; Lakshmi, 2011; Yusuf, Nabeshima & Perkins, 2009).

The shortages have been partially driven by unanticipated competition from adjacent and unrelated industries for the same factor inputs.[1] Firms tend to closely monitor activities and markets for "valuable, rare, inimitable and nonsubstitutable" (VRIN) inputs directly contributing to the firms' unique advantage (Barney, 1991; Porter, 1996), but they do not regularly track markets for non-VRIN inputs. These resources are essential for successful execution of the firm's strategy but they are considered "nonstrategic"

Acknowldgments: The researchers would like to thank those who attended and provided helpful feedback to the authors at the Academy of Management Conference in Montreal, at the ISM North American Research Symposium and the University of Tennessee Invited Scholar Research Symposium. The authors would also like to thank Michael A. Hitt, for his detailed comments and feedback on an earlier version of this manuscript. In addition, the authors thank the editor, anonymous associate editor and the reviewers for their many constructive comments. The authors accept full responsibility for any inaccuracies in this paper.

[1]The terms inputs, factors and resources interchangeably refer to items available in factor markets, as suggested in Markman, Gianiodis & Buchholtz, 2009, p. 423. Inputs is a term more common in the supply chain literature, whereas the strategy literature generally uses the terms resources and factors to discuss inputs to production of goods and services.

resources because they do not lead to sustainable advantage by themselves (Dyer, Chu & Cho, 1998).

Factor-market rivalry (FMR) theory focuses on those "nonstrategic" resources. FMR is defined "…as rivalry over resource positions…(that) can flare up at any level or link within a firm's value chain…" (Markman *et al.*, 2009, p. 423). The focus of FMR is versatile (multifunctional), mobile (transferable, tradable and maneuverable), and seemingly ubiquitous resources (Markman *et al.*, 2009). A recent example is the labor shortage in China's Guangdong province, China's main production and export center. The labor shortage is impacting labor and service intensive industries (UPI, 2012) predominantly because manufacturing bases are relocating to inland China (China Briefing, 2011).

This article uses FMR theory (Markman *et al.*, 2009) to explore how firms may overlook potential competitors for input resources and specifically logistics services. To this point, FMR theory has been applied primarily to understand FMR for technology among unanticipated competitors (Markman *et al.*, 2009). But FMR theory could fill an important void in supply chain management theory because supply chain management is responsible for all input resources, most of which are not the "critical few" VRIN resources. As these resources play a key role in the operation of an effective and efficient supply chain, FMR has the potential to provide an important foundation for greater theory building. FMR may provide insight into how firms view supply chain resources and then improve decision-making and outcomes related to these resources.

The primary objective of this research is to extend FMR theory to demonstrate fully the characteristics of input factors that are subject to FMR. *Does FMR theory provide insights into the potential consequences of unanticipated rivalry in supply chains, particularly in areas where there have been mass movements of production to low-cost labor regions?* If essential input resources are assumed to be competitively available, then the scarcity may thwart the firm's ability to achieve its strategic advantage.

Logistics and other supply chain factor inputs that support offshoring of manufacturing exist in dynamic markets and may be subject to limited supply with increasing costs. Thus, the secondary objective of this research is to expand upon earlier theoretical development of FMR and address the question: *What are the practical and theoretical implications of applying FMR theory to understand factor-market rivalry among firms considered noncompetitors in output markets that become competitors in supply chain services input markets?* This should provide insights into situations where unanticipated FMR for inputs may become a threat. An additional goal of this research is to introduce FMR theory to the supply chain management literature to shed new light on how researchers view and practitioners manage supply chain resources in a global economy.

The article is organized as follows. First, the article provides an explanation of the conceptual theory building approach used here. Then, the strategic management view of competition for inputs is explored. Next, conceptual development of FMR and the unanticipated type of rivalry identified in FMR is explored in more depth. To support this expanded view of FMR, additional literature from the strategic and supply chain management areas is called upon. They make sense out of the predicament that firms find themselves in when confronted by often heretofore unknown rivals in input factor-markets. This exploration is followed by examples of FMR in the supply chain. Testable propositions related to FMR in logistics areas of the supply chain are presented and supported by cases from the technology sector in China, the furniture sector in South Vietnam, and U.S. West Coast port and rail capacity. The concluding sections provide a summary of the theoretical and managerial implications as well as directions for further research, application and testing of FMR theory.

CONCEPTUAL THEORY BUILDING

The goal of conceptual theory building is to, "…generate and present theory, defined as a system of abstract concepts and the relationships between them" (Skilton, 2011, p. 23). According to Wacker (1998, p. 362), theory is important for researchers and practitioners because "…1. it provides a framework for analysis; 2. it provides an efficient method for field development; and 3. it provides clear explanations for the pragmatic world." Conceptual theory building uses existing theory, literature and other data sources to both inductively and deductively advance the understanding of a particular phenomenon (Carter & Rogers, 2008; Meredith, 1993).

The processes for conceptual theory building vary depending on whether the goal is extending an existing theory, developing a new framework or providing support for an existing framework. But the general approach, adapted from Meredith (1993), Wacker (1998), and Carter (2011) entails (1) identifying an important gap in current theory and knowledge, (2) gathering data and defining variables, (3) limiting and defining the domain and (4) building relationships among variables and developing predictions.

The introduction identifies the research gap. In the following sections, the extant literature is reviewed. This supports the significance of the research gap, the variable development and the research domain. The extant literature and secondary data are then used to build the relationships between the variables and create predictive propositions that extend the existing theory.

STRATEGIC MANAGEMENT VIEW ON COMPETITION FOR INPUTS

Although logistics is recognized as a key facilitator in the cross-functional efforts toward supply chain integration (Harrington, 1995), when manufacturing is moved offshore or outsourced, the literature's primary focus is on manufacturing capability, capacity and cost (Mayer & Salomon, 2006). As the continued growth in outsourcing, offshoring and global sourcing places increasing demands on the logistics function, economical and reliable supply chain and logistics capabilities emerge as an essential part of a VRIN bundle (Monczka, Handfield, Giunipero & Patterson, 2011). Whereas the application of the resource-based view (RBV) and resource dependency theory has been somewhat limited in the supply chain arena (Holcomb and Hitt 2007), these theories provide insights into how the strategic management literature views factor resources.

Jay Barney's seminal work grounds the RBV of the firm and introduces strategic factor-markets as "...a market where the resources necessary to implement a strategy are acquired" (Barney, 1986, p. 1231). Although the value of a resource is dynamic (Madhok, 2002), scarcity will drive up prices for any factor. Management time is considered a scarce resource (Scullion, Collings & Gunnigle, 2007). Indeed, the quality of managerial resources increasingly affects firm performance as the quality of input resources declines (Holcomb, Holmes & Connelly, 2009). This finding supports Barney's (1991) supposition that successful strategy implementation is not dependent only on VRIN resources, but also on complementary resources. These complementary, non-VRIN resources are part of a strategic bundle that allows the value of the VRIN resource(s) to be realized and take on a new importance when they are scarce. When properly combined, the otherwise non-VRIN resources and capabilities can be crucial to an organization's success (Barney, 1991, 2012; Madhok, 2002).

Resource dependency theory (Pfeffer & Salancik, 1978) warns that as a company becomes more dependent on a greater number of organizations that are not visible to them, the potential for problems increases. With increased offshoring and outsourcing, the breadth and depth of the organization's dependency grows, often with negative and unanticipated consequences. An example is the recurring heparin recall in 2007, 2008 and 2010 in the United States that poisoned hundreds of patients due to poorly executed process changes of a nonvisible sub-tier supplier (Mundy, 2010).

Domain of the Dominant Approach

Porter (1979, 2008) warns us to pay attention to the "Five forces that affect market competitiveness." These include: threat of entrants, buyer power, supplier power and availability of substitutes, which all affect the fifth factor, industry rivalry. This focuses on key industries where firms sell products but also purchased inputs. Bergen and Peteraf (2002) warn that firms should not focus only on rivals in product markets but also on rivals in supply markets. These authors suggest that indirect competitors who are participants in the same input markets could develop into direct competitors. Likewise, Zajac and Bazerman (1991) argue that when making competitive decisions, firms have common blind spots due to misperceptions about other competitive actors' decisions. If firms lack awareness of other competitive actors in different product markets, this potential threat will remain undetected until it materializes. Furthermore, as market conditions change, the competitive conditions may also fundamentally change. This influences the effectiveness of any strategy (Barney, 1986; Wiersema & Bowen, 2008).

The research cited in the previous section concurs that firms do a reasonably good job of monitoring FMR when there is also product-market rivalry. Firms also do a good job of dealing with rivalry for VRIN resources. However, many of the organization's resources do not fit directly into either of those categories. Markman *et al.* (2009, p. 424) note, "...indeed the most formidable threats are the least recognized." Yet firms cannot possibly monitor all the resources required to be successful. This relates to the second research question that concerns what insights FMR may provide, which may include identifying when firms need to monitor potential threats to the non-VRIN resources.

CONCEPTUAL DEVELOPMENT OF FACTOR-MARKET RIVALRY

This section provides a more in-depth explanation of FMR, its theoretical grounding and how it relates to SCM and logistics. FMR theory identifies three general rivalry scenarios and how they are related. The first case occurs where firms use the same types of resources to compete in the same product-markets. Ford and General Motors use many of the same suppliers in various competitive geographic markets to develop competing products. Most firms are aware of competitors who are rivals in product and input markets. These rivals' activities are monitored in strategic areas, and mutual forbearance often governs these rivals' behaviors, even across multiple geographies (Yu, Subramaniam & Cannella, 2009).

In the second situation, two firms may buy similar inputs and be in similar industries, but they are noncompetitive because product-markets do not

significantly overlap. Competition may arise as one firm expands and changes its offerings based on perceived opportunities. A potentially unrealized FMR may become a product-market rivalry (Markman *et al.*, 2009). An example of this would be a company that sells affordable mainstream bicycles such as Schwinn and a company such as Lamborghini that focuses on racing bicycles. Lamborghini never considered Schwinn a competitor until Schwinn introduced the over $1,000 LeTour GSX bicycles. The two prior scenarios have been the focus of most rivalry research in the strategic management literature. In both cases, the firms should be aware of each other as potential product-market rivals.

The final scenario evolves in situations where firms use similar resources but do not compete in similar markets nor create similar products. This factor-market only rivalry is very difficult to anticipate and can be very detrimental. An example is Wal-Mart hiring Amazon's key logistics personnel (Markman *et al.*, 2009). This type of rivalry is the focus of this research: firms that compete in input markets only. To provide further clarification, Table 1 summarizes the factors contributing to factor- and product-market rivalry with some examples. Although not well-developed in earlier research on FMR (Markman *et al.*, 2009), the factor-market only rivalry is of greatest interest herein, and is the variable of interest within this research.

In increasingly global factor-markets, such as those driven by the surge of offshore outsourcing, competition can come from numerous, unanticipated sources. Fifty years ago, Theodore Levitt warned companies that defining their business and their customers' needs too narrowly could render them obsolete (Levitt, 1960). This narrow focus places them at risk of losing to unexpected competitors with novel products, technologies or even supply chain designs, as evidenced by the 2008 bankruptcy filing of Tribune Companies (Associated Press, 2009) or the 2011 bankruptcy of Borders Books (Trachtenberg & Sonne, 2011).

The researchers have observed countless examples where companies face an additional risk by defining their factor-market competitors and the potential uses for their inputs too narrowly, several of which are presented in the following section. In doing so, a company may be surprised and thus unprepared for input factor price increases and scarcity caused by demand from unanticipated resource competition (Dyer *et al.*, 1998). This has been reflected in the significant price increases and shortages for basic commodities such as steel, cotton and wheat in the mid 2000s, and as economies emerged from the great recession in 2011 (Isidore, 2011). Supply issues and higher than planned prices have been at least partially absorbed by the producer in many industries, such as food, consumer products and durables, which has hurt company profit margins (Isidore, 2011; Sewell, 2011). As further noted by Michael Porter (1979, p. 93), "The essence of strategy formulation is coping with competition. Yet, it is easy to view competition too narrowly or pessimistically."

Theoretical Underpinnings of FMR

Most market rivalry research focuses on rivalry in product-markets. Inter-firm rivalry is viewed as a central research issue in strategic management theory (Baum & Korn, 1996, 1999) grounded in Barney's seminal work (Barney, 1986, 1991). Even the research that considers rivalry in factor-markets focuses on firms that compete in product-markets (Barney, 1986; Capron & Chatain, 2008; Chen, 1996) or firms that provide the same functionality (Peteraf & Bergen, 2003). Research suggests that the response of market rivals is influenced by resource or factor-markets (Yu & Cannella, 2007), with a focus on internal resources (Paulraj, 2011). Another key insight from the market rivalry research is that potential rivalry within an industry significantly reduces firms' profitability (Cool, Roller & Leleux, 1999). In addition, responses to competitive rivalry occur equally between and within strategic industry groups. The nature of the response to rivalry is affected by strategic group membership (Smith, Grimm, Young & Wally, 1997). Smith *et al.* (1997) supported Barney's (1991) work on rivalry by suggesting that when resources are not mobile and distributed among firms, some rivals may be unable to effectively react to the others.

Although this previous research is informative, it provides limited insight into anticipating rivalry that occurs when noncompetitive industries enter into common factor resource markets. These entries can be domestic, as in 1982 when Honda of America opened its automotive manufacturing facility in Marysville, OH, and competed with local businesses for hundreds of employees. In the factor-market for clay used to manufacture prototypes, Chrysler Corporation experienced an unexpected rival: a kitty litter company (Fine, 1998). The competition can be global as well, increasing the challenges of identifying it before it occurs. For example, American Express faced unexpected competition for call center and back-office operations labor from companies such as Hewlett-Packard (HP) that offshore outsourced its employee benefits desk. Rivalry occurs for both goods and services.

Most successful companies monitor their competitors in product-markets and are aware of these competitors' actions (Bergen & Peteraf, 2002; Liao, Hong & Rao, 2010). These organizations may also pay attention to these competitors' actions in input markets, as companies increasingly rely on their key

TABLE 1

Factors Contributing to Product and Factor-Market Rivalry[a]

Type of Rivalry Present	Product Market Example	Nature of Rivalry	Factor-Market Example
Compete in product markets	Ebay and Live auctions Ability to provide auction services for the same types of items May attract the same customers, but eBay has a wider geographical span	Very strong rivalry Factor-market rivalry Product-market rivalry	John Deere and Caterpillar Compete for capacity at Brazilian high-quality punch press metal shop Sell similar products in similar markets
Threat to compete in product markets	Scar fading cream and laser tattoo removal No competition for resources Scar fading cream provides a more affordable, less dangerous alternative for tattoo removal	Moderate rivalry No consistent factor-market rivalry Product-market rivalry potential	Auto parts companies Compete for steel in times of shortage One serves OEMs and the other serves the aftermarket, but either could easily expand into the other's market
No threat to compete in product markets	N/A	Unrecognized rivalry Factor-market rivalry No product-market rivalry	American Express and Honeywell Compete for information technology employees in India No competition for product markets

[a]Adapted from Markman *et al.* (2009).

suppliers to support their success (Petersen, Handfield, Lawson & Cousins, 2008). However, nonproduct market competitors' actions in factor-markets are often overlooked, particularly when members of the firm do not recognize that non-VRIN inputs can be part of the bundle of resources that provide essential support to the firm's competitive advantage (Hunt & Davis, 2008, 2012; Ramsay, 2001).

The Relevance of Supply Chain and Logistics

Supply chain management is responsible for all types of resources. It is often the resources classified among the "insignificant many" that can take firms by surprise when competing demand surges, and the item is no longer available, or available only at a very high price. These resources tend to be noticed only when they are missing or create some other type of problem.

There is a growing recognition of the critical contribution that SCM and purchasing can make to a firm's competitive advantage (Hunt & Davis, 2008, 2012) Priem and Swink (2012, p. 7) note, "We also recommend that the nascent demand-side perspective on strategic management can serve to provide new insights and a more complete understanding of SCM's role in competition." When a firm moves its production to, or sources inputs from, a low-cost labor region, it frequently trades lower prices for a longer, less visible and more transport-intensive supply chain to the end customer.

Within the area of supply chain management, logistics was chosen as the focus for this article because it is a resource that generally meets the criteria for a resource relevant to FMR. Although often thought of as a highly accessible resource with sufficient available capacity, transportation is a complex collection of infrastructure (Bowersox, Closs & Cooper, 2002). Asset-intensive resources are required to move a product from a factory to the customer and both skilled and unskilled labor are needed for logistics activities to be successful. Unless the company is a logistics service provider, transportation is an example of a non-VRIN resource that is often bundled with the more strategic VRIN resources.

The strategy literature notes the importance of bundling VRIN resources and properly managing the bundle to effectively realize competitive advantage (Adegbesan, 2009; Sirmon, Gove & Hitt, 2008). As noted earlier, without reliable, predictably priced transportation availability, a firm cannot make its products available to its end customers. Although this seems obvious, the potential impact of transportation is often overlooked because, "few shippers grasp the holistic approach to transportation management. They understand the components, but they don't know how transportation management fits into the performance of the entire organization" (Albright & Lo, 2009, p. 2), and how transportation and other supply chain factors are individually essential to supporting the organization's strategic resource bundle. The resources may not have all of the qualities of VRIN inputs, but are necessary for the organization to meet customer requirements, and therefore achieve its competitive advantage.

In situations where the supply chain capability is viewed as a source of competitive advantage, as in the case of Wal-Mart, United Parcel Service, or Amazon.com, it is bundled with the application of knowledge or even advanced information technology, not because of assets or capacity alone. This type of knowledge-based resource, often referred to as an organizational routine, or resource orchestration (Combs, Ketchen, Ireland & Webb, 2011; Sirmon, Hitt, Ireland & Gilbert, 2011) may create sustained performance differences and even competitive advantage among firms (Knott, 2003; Rothaermel, Hitt & Jobe, 2006). In addition, because of the dynamic nature of resource costs and availability, it is important to be aware of the developments that affect the importance of various capabilities (Schreyögg & Kliesch-Eberl, 2007), such as transportation.

Supply Chain Implications

Economic globalization is largely influenced by a desire to reduce production and material costs as well as compete with lower-cost foreign competitors (Fawcett, 1992; Kumar, Medina & Nelson, 2009; Wiersema & Bowen, 2008). An organization's ability to coordinate its worldwide supply chain determines its success in these globalized markets. Typically, firms that adopt a global strategy aim to improve their competitive position by using the best available resource portfolio to facilitate the value-adding process (Porter, 1985; Sirmon, Hitt & Ireland, 2007). The desire for low input prices, production capacity and labor efficiency are often the offshoring decision drivers. Many of these decisions are excellent, and serve the organization well for years. But conditions are constantly changing, and rivalry for resources perceived as non-VRIN can seem to come from nowhere.

In a global environment, multiple production and distribution tiers (Meixell & Gargeya, 2005) create increasingly higher levels of uncertainty. Effective supply chain and logistics coordination remains critical to manage and balance supply and demand (Christopher, 2005). In addition, logistics is a significant expense in many organizations. According to a 2011 Council of Supply Chain Management Professionals (CSCMP, 2011) report, business logistics costs averaged 10.4 percent of the United States' nominal gross domestic product (CSCMP, 2011); this is among the lowest in the world (Anonymous, 2009a). Because

logistics services may not be strategically emphasized in global supply chain planning, rivalry for these types of resources is rarely considered (Albright & Lo, 2009; Meixell & Norbis, 2008). If an initial investigation does not reveal a current problem, port, rail, air and trucking capacity are assumed to be adequate.

Low-price materials and production capacity continue to be higher, more visible, priorities than affordable quality transportation that is accessible and available (Hall, Hesse & Rodrigues, 2006; Hess & Yeung, 2006). However, competition for scarce logistics services can arise from many industries and induce FMR, increasing the value of these services.

FACTOR-MARKET RIVALRY IN THE SUPPLY CHAIN

A lack of understanding of the potential for and impact of FMR for logistics services is evidenced in each example presented below: air transport in China, ports in South Vietnam, and U.S. ports and rail. In each rivalry situation, on-time performance decreases and input costs increase. Prior research indicates that rivalry also hurts firm profitability (Cool *et al.*, 1999). Coupled with the theory presented in the previous section, each of the examples presented in the following section is provided as a description and an explanation of how real-world situations inductively support the relationships suggested here (Meredith, 1993).

Air Cargo Capacity in China

As one of the first wave of investors in Chinese manufacturing, by 1994, most of HP's Medical Products destined for North America were built in China. During the late 1990s, Shanghai and its export-friendly Free Trade Zones became extremely attractive for high-technology products manufacturing. These high-technology products have both high inventory carrying costs and rapid product devaluation, making scarce air transportation the preferred mode of transportation.

The Pudong airport opened with one runway in 1999 to meet increasing demand and support this rapidly developing area. FedEx seized the expansion opportunity available with the new airport, opening a new shipping center in October 2001 (Federal Express, 2001). The increasing demands for air capacity in the form of landing rights by both the high-technology companies and by Federal Express helped develop the Pudong airport into the 26th busiest airport in the world, with 634,000 metric tons of airfreight in 2002 (Airport Council International, 2009). Increasing airfreight capacity in an international market is often complex and politically challenging. In addition to limited physical capacity, each country leverages its landing rights in an effort to secure overseas rights for their own carriers.

The government of Shanghai was investing billions of U.S. dollars into export and business-related infrastructure. This included Pudong airport's second and third runway projects, the Yangsheng seaport complex and hundreds of miles of new controlled-access highway (China Internet Information Center, 2009; Kun, 2001; Yao & Heiberg, 2000). Highway miles rose from around 3,000 to over 10,000 between 1990 and 2006 (Shanghai Statistics, 2009). Shanghai's vibrant growth and infrastructure investments attracted many new export industries.

By 2003 most of the global laptop production for market share leaders HP and Dell was centered in Shanghai. Disk drive manufacturers, Maxtor and Seagate, had each moved production sites there. Computer exports to the U.S. rose from $4.1 billion U.S. in 1999 to $33.9 billion U.S. in 2006 (U.S. Trade Statistics, 2009). Each company had individually approached its logistics partners to understand better the market cost and availability of logistics services; neither the logistics partners nor high-technology companies anticipated that the organizations' combined actions would cause logistics to become a constraint. By 2004, both HP and Dell were shipping over 100 metric tons of freight per day out of Pudong.

During this same time period, the high technology companies also faced extreme variability in demand and skyrocketing prices for inputs as a result of rapid changes in technology and decreasing product lifecycles. Standard procedure for these companies was to use elaborate planning systems to optimize their parts availability and production capacity, but these systems largely ignored the constraints on logistics capacity. The scarcity of logistics capacity was exacerbated during peak times just prior to the November–December holiday season in the United States. For example, HP could have a demand for 200 metric tons in a single day and expect a 4-day transit time to Chicago, Frankfurt and Sydney. When air capacity was scarce, customers had to pay $1.50 U.S. or more per kilo surcharges to move their freight; this reduced profits because the environment did not allow companies to raise prices to customers. The total metric tons shipped out of Pudong increased more than four-fold from 2002 to 2007, going from the 26th to the 4th busiest airport hub in the world.

Many companies made supplier decisions because of the availability of a bundle of complementary resources: low cost of materials, availability of labor, attractive export rebate programs and a presumptive supply of logistics capacity. However, the scarcity of logistics capacity created a significant operating constraint. Ultimately, the problems with logistics

combined with increasing primary factor costs and decreasing export rebate programs, caused many companies to reconsider their location decisions. Although many companies have opted to remain in China, some of the companies that confronted rising costs chose to move to South Vietnam, another low-cost labor region. However, logistics capacity in this area suffered from similar issues.

South Vietnam Ports

Concerned by increased valuation of the Chinese currency, rising Chinese labor and benefits costs, and eastern China's less favorable tax treatment, companies began looking toward Vietnam for other global sourcing opportunities. With relatively plentiful young labor and plans to build new ports near Hanoi and Ho Chi Minh City, the Vietnamese government was working hard to attract new factories. However, the Vietnamese government was about 20 years behind its Chinese counterparts in export-related infrastructure investment.

By late 2006, production had migrated en masse to Vietnam and the production shift continues to this day. One furniture executive predicted that most of the furniture industry would soon be in Vietnam, but he also noted that Vietnam needed to upgrade its roads and its only deep-water port (Thomas, 2008). Furniture is one of the most space-consuming products and the United States' largest containerized imports by volume (U.S. Census Bureau, 2009). The value of furniture-classified exports from Vietnam to the United States increased 1,405 percent between 2002 and 2007 (U.S. Trade Statistics, 2009). Other industries such as toys and electronics moved into Vietnam between 2006 and 2008. For example, in 2006, Intel announced greater investment in Vietnam than in China over the previous decade (Folkmanis, 2006). The exports that moved via ocean put an enormous strain on the port infrastructure and the inadequate road infrastructure (Conti, 2009). Inflation spiked from an estimated 7.3 percent to over 25 percent by May 2008 (U.S. Department of State, 2008) as the country was impacted by rapid growth.

Cargo sat on the docks waiting for consolidation, and furniture containers congested roads to the various ports and the feeder vessels. To move from the outlying factories to the port, container trucks competed with motorbikes and cars on city streets. The new ports, scheduled for completion in 2009 at Huap Phoac and Vung Tau, offered little short-term relief. Trucks moving with the 40-foot "High Cube" containers popular for furniture and other light goods had to take circuitous routes or hire a person to push low-hanging telephone wires above the tall container during transport. Ocean freight companies began to levy new surcharges to consolidate freight and reduce the allowed dwell time for freight awaiting consolidation. Local landlords found that they could charge rates higher than Shanghai, Hong Kong and Los Angeles and receive a two and a half year payback on their warehouse investment (Anonymous, 2009b). Capacity issues caused delays in unloading ships that could cost $5,000–$6,000 U.S. per day. Prices to transport by air versus ship increased costs from around $1,100 U.S. per container to $32,000 U.S. per container (Tam, 2009). The performance impact of these unexpected changes was severe.

The theory of FMR provides a broad framework that suggests organizations be wary of FMR for inputs from adjacent and unrelated industries. However, it does not provide any specifics regarding when such risk may exist, only that it may. The above cases of Vietnam and China offshoring provide initial evidence for the following propositions:

Proposition 1: Moving a significant quantity of offshore production to a new geographic area will create FMR for capacity of supply chain services.[2]

Proposition 2: Firms that anticipate and plan for impending FMR for supply chain services from product and nonproduct-market rivals will experience better on time performance of goods produced in that region than those that only focus on the behavior of product-market competitors.

Proposition 3: Firms that anticipate and plan for impending FMR for supply chain services from product and nonproduct-market rivals will experience better cost performance on goods produced in that region than those that only focus on the behavior of product-market competitors.

Shifting market conditions create these situations, and impair the organization's ability to achieve its sustainable competitive advantage. Although the first proposition may seem obvious, rivalry and its negative impact are commonplace in global markets; the rivalry for supply chain services often seems to be unanticipated, creating disruptive effects. When rivals in the same or different industries are using similar resources, effectively managing those resources becomes even more critical to a firm's competitive advantage (Sirmon *et al.*, 2008). Perhaps more importantly, propositions 2 and 3 suggest that although such shortages may be inevitable, the ability to effectively cope with them by managing supply chain assets more effectively than others creates an opportunity to increase competitiveness.

[2]Significant is defined here as a major influx of volume to a particular geographic area.

The potential for logistics and other supply chain capacity problems should be obvious; however, the movement of manufacturing from China to Vietnam reveals that they are not. As Markman *et al.* (2009) point out, competitive blind spots evolve. Even when there is no product rivalry, mobile and versatile resources such as many types of unskilled and entry-level labor and transportation capacity, can cause new and unexpected firms to compete in factor-markets. Domestic examples presented in the following section further support that supply chain services are subject to FMR.

U.S. Port and Rail

Sudden events, such as the 2003 longshoremen's lock out at the major United States West Coast ports, can impact supply chain strategies. The sheer number of companies that were moving production destined for the North American market from Asia seriously strained the West Coast port infrastructure. Products flow into the interior United States through a deep-water port into the rail infrastructure. The major inland rail corridors include Vancouver, Canada on to Chicago; Portland through the Columbia River Valley; and Los Angeles through the Alameda Corridor toward Texas. All Asian imports that are destined for U.S. customers come through those corridors or through East Coast ports via the Panama or Suez canals.

The primary ports serving the western United States (Seattle/Tacoma, Los Angeles/Long Beach and Vancouver, WA) and the minor ports (Oakland and Portland) are near urban areas where building more terminal capacity is difficult. The ports' efficiencies are poor by international standards (Blonigen & Wilson, 2006) and are governed by complex agreements with the deeply entrenched unions. To add more capacity and serve increasing imports, new terminal construction or significant efficiency improvement is needed. Most recently, adding a single berth terminal at Prince Rupert in northern British Columbia took 4 years. As ports become more efficient or more terminals are built, the rail network taking containers from the port to inland destinations is the system's next constrained capacity network (Anonymous, 2004).

Railroad locomotive engines were backordered; and the more freight that moved into the rail system, the slower the freight moved. Bottlenecks emerged at key points between the port terminals and inland destinations beyond the West Coast. The "Sunset Corridor" between California and Texas has significant stretches of single-track, and the railroad companies like Union Pacific (UP) are only able to build 75 miles of double-track a year (Gallagher, 2007). In April 2004, the United States Postal Service pulled its freight from UP Railroad because UP's network speed had decreased 24 percent from 2003 to 2004, primarily as a result of increased congestion brought on by a surge in import containers and a growing economy (Page, 2004). A volume of 2.4 million containers moved in and out of the Port of Long Beach for the first 6 months of 2004, a 16 percent increase over 2003, with system-wide rail volume up 5 percent year over year (Gallagher, 2004). As a result of increased demands for rail capacity because of the growing shipments into west coast ports (Norek & Isbell, 2005), the transportation situation had become so dire that the Tennessee Valley Authority was concerned about keeping power plants at full operational capacity with so few engines to pull coal trains from the Powder River Basin to Tennessee Valley plants (Bleizeffer, 2006). Although logistics usage reached a record low in the 2008 recession (Wilson, 2009), the economy's initial recovery created shortages in various supply chain and logistics capacity (Dupin, 2010), with further shortages predicted (Schulz, 2011).

Conclusions/Results of Ignoring Factor-Market Rivalry from Noncompetitors

Ignoring the impact of unanticipated competition on logistics or other flexible, non-VRIN inputs when shifting volume geographically, or during economic changes or other disruptions, can create serious consequences. Rivalry becomes most severe when there are issues such as physical infrastructure or major political disputes that prevent capacity from being restored or added quickly. In the short term, trucks and trailers can be diverted to different markets. However, building roads, ports or rail track takes much longer. Regardless, the competitive consequences of logistics and other supply chain disruptions can be very damaging. The strategic management literature warns that rivalry lowers profits (Cool *et al.*, 1999). There are grave potential implications for omitting supply chain and logistics issues from production expansion decisions and not explicitly considering logistics impact on the strategic resource portfolio of manufacturing firms. The bottom line is that when a firm does not adequately consider and plan for regional supply chain capabilities, such costs can surge. The company can struggle with higher prices, less than optimal alternatives, increased supply chain inventory, reduced supply chain speed, decreased responsiveness and service levels and generally declining market attractiveness.

IMPLICATIONS OF SUPPLY CHAIN FACTOR-MARKET RIVARLY

In its current nascent stage of development, FMR does not address the potential severity or longevity of FMR among firms that do not compete in product-markets. One important implication of FMR is that as

organizations become aware of growing competition and demand for resources in geographical operating regions, they should also assess the impact on supply chain resources and develop a plan for addressing potential resource constraints. With the increased severity of recent natural disasters, many firms are focusing on how to prevent disruptions associated with "acts of god" or "acts of war and terrorism" and are continuing to be blindsided by unexpected competition for resources. Supply chain issues should be specifically considered in the strategic outsourcing decision (Holcomb and Hitt 2007). For example, Wal-Mart has built its competitive advantage around supply chain factors and recently decided to bring more of its supply chain infrastructure, including tractors and warehouses, in-house (SCDigest Staff, 2010). This was in part as a result of the instability in the markets for logistics' services.

In most organizations, external environmental scanning of the competitive landscape focuses primarily on firms that compete within their industry (Porter, 1979), in customer markets (Barney, 1991) or for strategic resources (Kraljic, 1983). Yet, as firms continue to grow globally, they cannot afford to overlook factor rivals from different industries, and miss the potential for a factor shortage. Better scanning of market issues can allow firms to plan alternative logistical solutions or perhaps grow in different markets, where they are not experiencing constraints. Schreyögg and Kliesch-Eberl (2007) suggest market scanning for potential risks in dynamic environments for dealing with changes in the relative value of firms' organizational capabilities. Although there is much written about the critical contribution of supply chain management to a firm's success, it is imperative that supply chain concerns are incorporated in outsourcing capability and capacity issues. Thus:

> **Proposition 4**: Selective scanning of market conditions and capabilities for supply chain and logistical services in key areas where an organization manufactures, buys or sells its products can be a source of competitive advantage.

Such scanning can involve creation of an early-warning system for use both prior to entering a new factor-market, and for monitoring conditions in dynamic markets. Table 2 lists some of the leading indicators that organizations should attend to in markets in which they are competing. The effort could be a very high-level market scanning for overall trends in an area. A deeper review into specific situations could be performed if the early warning indicated a potential hazard. Furthermore, changes in any of the indicators in Porter's five forces (1979), applied at the market or regional level, could help the organization focus on the nature of the problem. Higher levels of industry rivalry may be seen directly, or by exploring the following questions. Is it more difficult for firms to enter the market? Is the power shifting between buyers and suppliers? Is there reduced availability of substitute items to fill our need?

The left column provides some general "warning signs" that indicate that commonly used resources may be subject to new competition and even scarcity in a given region. These include generic issues such as high growth in an area, increases in resources prices, and government incentives. For large countries such as China and India, many of these issues can be discovered simply by reading the *Economist*.

TABLE 2

Potential Indicators of Impending Factor-Market Rivalry

General Warning Signs	Warning Signs Related to Supply Chain and Logistics Capacity
Government statistics support double digit export growth in that region	Significant manufacturing capacity is being added in the area
Prices are increasing in the region	Roads are being built
Wages are increasing in the region	Logistics resources that your organization is using have no excess capacity
Business flights are being added in the region	Industries that are entering the area will likely use similar transportation modes
Your suppliers mention new customers in other industries	Capacity in the potential problem area is fixed over a certain time period
Excess capacity of productive resources is limited	
Government is offering tax benefits	
Inexpensive land is readily available	

If any of these indicators were present or increasing, the firm could look at issues in the right column. The right column lists warning signs more specifically related to logistics capacity. The indicators in the left column could also provide early warning for other types of resource shortages. Although logistics or other non-VRIN resource capacity may currently be sufficient, organizations should be aware of growing demand and competition in geographical operating regions. Any such system should be designed to detect crises early, while there is time to respond (Schreyögg & Kliesch-Eberl, 2007).

Organizations should also assess the impact on supply chain resources and develop a plan for addressing potential resource constraints to support the organization's ability to deliver goods to customers in a timely and cost effective manner. For example, incumbent firms in Shanghai were surprised by the effects of new entrants to their market. Monitoring market issues can help firms plan alternative logistical solutions or perhaps grow in different markets where they do not have constraints. Awareness and planning during the 2002 Long Beach dockworkers' strike allowed companies like HP and Toyota to secure alternate transportation capacity to move parts and avoid plant downtime and lost sales experienced by many competitors.

The relationship among the four propositions is illustrated in Figure 1. It suggests that whereas FMR among firms who do not compete in product-markets cannot be avoided, it can be effectively managed to contribute to the firm's competitive advantage during times of scarcity.

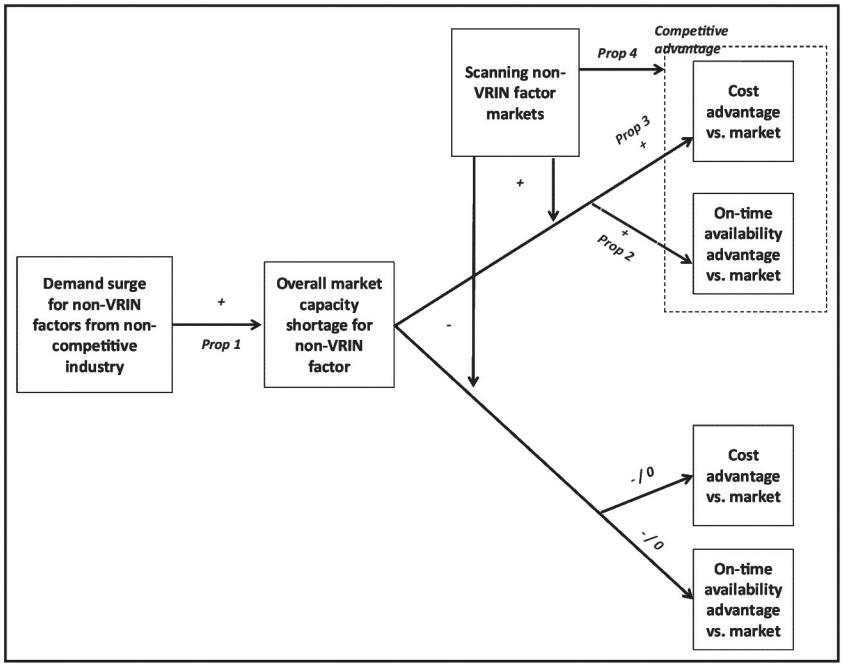
Managerial Implications

From a managerial standpoint, this article contributes to practice in a number of ways. First, it raises the awareness of market issues affecting supplier choices, outsourced services and logistics. There has been a pattern of disappointing results associated with industry offshoring and outsourcing. In examining these situations more closely, a subset of the failures is related to logistics failures.

The findings suggest that supply chain, and in particular logistical services, should be given consideration as part of a strategic bundle of resources that support the firm's competitive advantage. When organizations make decisions that will affect their logistics activities, the logistics and supply chain functions should have an important role.

The results presented herein also serve as a reminder to practicing managers not to overlook essential, seemingly non-VRIN resources they need in their operations. This warning applies as they enter new market areas and as changes occur in their existing markets. Although conventional wisdom and theory (Barney, 1986; Kraljic, 1983) greatly downplay the role of routine inputs, the criticality to supporting the firm's competitive advantage should be assessed and potential risks considered. Today, companies pursuing

FIGURE 1
Proposed Model of Factor-Market Rivalry in Non-Competitive Industries



efficiency tend to shift geographic locations to avail themselves of low-cost labor relative to the quality of labor available. However, as this research points out, focusing primarily on the labor costs or material costs may result in reduced overall performance if logistics or other essential supply chain capacity is constrained. The message is not a new one: both strategic and operational issues must be integrated and considered in outsourcing decisions. Despite this, logistics and other non-VRIN resources that are essential to the firms' strategic resource bundle continue to be overlooked in research and practice. When moving or reconfiguring a supply chain, all essential pieces of the chain should be considered, even if they have not been constraints in the past. The leading indicators provided in Table 2 provide some general guidelines of potential warning signs that FMR for inputs from unrelated industries may be emerging.

Theoretical Implications

As noted by Priem and Swink (2012, p. 11), "... SCM research based on resource arguments can be enhanced by a more rigorous definition of resources and by more systemic views of competition. We also recommend that a demand-side perspective can serve to provide new insights and a more complete understanding of SCM's role in competition." This research addresses both of these issues.

Initially, this research proposed to answer two fundamental questions associated with FMR. This first question explored whether FMR theory provides insight into the potential consequences of unanticipated rivalry for supply chain services, particularly when there are mass movements of production to low-cost regions. The second tried to shed light on the theoretical and practical implications of applying FMR theory to understand FMR among firms considered noncompetitors in output markets that become competitors in input markets.

This article contributes to theory by providing more depth to FMR theory's explanation of input FMR and more specifically to FMR between firms that do not compete in product markets. To date, supply chain research has focused primarily on a resource-based perspective to view supply issues, giving more attention to VRIN inputs. Management researchers primarily focus on VRIN inputs and product market competition (industry) rather than unrelated or adjacent firms competing for input factors. Yet the rivalry that occurs between firms in unrelated or adjacent industries for non-VRIN factors is growing in both practical and theoretical importance (Markman *et al.*, 2009) with increased outsourcing and global sourcing. This research provides new insight into the importance of supply chain inputs, such as logistics, in global competition, supporting Barney's (2012) notion that an SCM capability can be a source of competitive advantage. As pointed out in Proposition 1, mass geographical moves to different regions can trigger FMR for supply chain services, as the items manufactured or purchased need to be transported to where they will be used. Without the ability to get the items purchased to the ultimate customer on a timely and cost effective basis, the competitive advantage is at best reduced, and in the worst case eliminated.

In addressing the first research question, the examples here support that examining the actions of other organizations related to input factor-market resources may provide new insights into the sources of value and scarcity of a firm's resources. Such work can also complement the work of supply chain management, strategy, the RBV, and resource dependence theory scholars (Capron & Chatain, 2008; Casciaro & Piskorski, 2005). Failure to recognize the potential for FMR can negatively affect both the on-time and cost performance associated with sourcing in a particular region, as indicated in Propositions 2 and 3, respectively.

Propositions 2 and 3 build on the work focused on understanding the importance of resource management from a competitive advantage perspective, supporting the notion that the value of resources depends of context, and how the resources can be adapted when the context changes. It extends Sirmon *et al.*'s (2008) research on resource bundling by highlighting the potential inflexibility of outsourced resources. When there is a shortage of outsourced inputs, the entire resource bundle can devalue, leading to increased costs and reduced services that can significantly diminish the firms' competitive advantage.

This research also extends the research on the dynamic nature of resource deployment (Kor & Mahoney, 2005) beyond the firm, to consider the resources that the firm deploys within its supply chain. The examples and discussion surrounding propositions one, two and three support the research by Schreyögg and Kliesch-Eberl (2007) that suggest that as a result of the dynamic nature of capabilities, they must be monitored and adapted to respond to discontinuities in the environment. Without such monitoring, factor-market conditions could lead to an inability to meet customer demand or rising prices could lead to a loss of competitive advantage. The potential competitive value from scanning key indicators in markets is the crux of Proposition 4.

In most industries, supply chain and logistics resources are not viewed as a source of competitive advantage at the top levels of the firm. Thus, not only may logistics be overlooked when developing strategy, but those managing logistics may manage it from primarily a tactical standpoint, focusing on short-term cost and performance issues (Albright & Lo, 2009; Meixell & Norbis, 2008). Proposition 4 proposes that

firms expend at least a minimal level of efforts on high-level scanning of key markets. The managerial guidelines shown in Table 2 provide some specific practical suggestions for items to scan. These indicators can be generalized in varying degrees to all factor-markets.

To summarize, whereas supply chain services are seen as essential, they are not often seen as strategic. Yet, in virtually all industries that have a physical product, the ability to deliver a product to the customer in a timely and cost-effective manner is crucial to the firm's competitive advantage, and plays a critical role as part of a firm's strategic resource bundle. For some firms, it plays a primary strategic role.

This research provides an initial glimpse of supply chain services' importance for products/services where FMR may occur. This helps to raise awareness of supply chain as a factor that may have an important impact on strategy, and thus an issue that should be considered when conducting management, outsourcing, and offshoring research, and also should be considered in light of their importance in supporting the organization's competitive advantage. This research also contributes to the supply chain management and logistics literature by introducing a new theoretical lens with which to view supply chain services.

LIMITATIONS AND FUTURE RESEARCH

One limitation of this research is that it looks specifically at logistics services. With similar FMR issues related to logistics in the United States and a variety of Asian countries, it is likely that the results can be generalized across logistics functions and regions. Uniquely, logistics is a service requiring both physical and human assets, either of which can be in short supply. Findings surrounding logistics services can be generalized to other services in noncompeting industries. Consider for example customer contact center services. Many companies from various industries discovered the high quality contact center services available in India. This discovery created a bandwagon effect in which companies raced to take advantage of low-cost, well-educated, English-speaking employees. Eventually, a shortage of qualified employees developed. The companies that were already in the region had to spend significant amounts of money to retain the supplier's employees through differentiation and increasing wages (Tate, Ellram & Brown, 2009). The employee turnover ratio increased and the average qualifications of the employees decreased. For many companies, reduced customer satisfaction was an outcome of the input-factor rivalry; it created a movement out of India into other locations with similar labor pools, such as the Philippines (Minter, 2009).

Research applying FMR is in its nascent stages. Yet there is a tremendous opportunity to apply FMR to many areas in supply chain as well as purchased or outsourced goods and services. The opportunity to apply FMR theory to the trucking sector, port development and rail could provide important insights into theory and practice regarding regional and global growth. Many of the services offshored, and offshore outsourced today, such as accounts payable reconciliation and claims processing, are viewed as nonstrategic. Yet, the flexible nature of the labor assets utilized allows them to be moved to support other sectors and other activities, if the new activities are more attractive. It appears that FMR would apply to these services. These offshore outsourced services have a more "pure" service nature than logistics. This type of research could be beneficial in developing a general model for segmenting and assessing FMR risks, based on the information provided in Table 2. In addition, applied research that focuses on developing environmental scanning systems that effectively balance risks and costs would be very beneficial to practice.

An area with significant practical implications that the researchers observed is that when infrastructure problems are coupled with political issues, the uncertainty associated with capacity resolution appears to be exacerbated; this adds to the severity of the FMR for logistics capacity and the ambiguity of the resolution time. There may be additional factors worthy of research that affect the resolution time in cases of severe FMR.

Related to this, in the area of strategic management, there is an emerging literature on the importance of resource orchestration (Combs *et al.*, 2011; Sirmon *et al.*, 2011). It appears that resources viewed as non-VRIN could play an important role in successful resource orchestration that is worthy of additional research. This is especially true if those resources help support the growing demand-side perspective of SCM (Priem & Swink, 2012). This article also provides some support for the growing notion that excellent supply chain capability can be a source of competitive advantage, perhaps even sustainable competitive advantage (Barney, 2012). More research is needed to advance this idea.

CONCLUSIONS

As companies pursue global competitive advantage, the theory of FMR becomes more relevant and critical to general management, and supply chain management in particular. Increasingly, secondary factors provide support to essential VRIN factors as part of a resource bundle. These factors have been the purview of a firm's operating levels. Although that approach works well when resources are plentiful, it can create

significant problems when there is extensive and often inter-industry competition for factors.

In addition, this application of FMR should raise the level of awareness of competitive threats in factor-markets. Organizations are increasingly concerned with designing and implementing systems to identify and manage important uncertainties that affect business continuity. Factor-market rivalry indicates that unrelated industries compete for the same versatile, mobile nonstrategic resources. This competition affects the firm's ability to provide products and services to its customers. This is an important strategic issue that firms should address before they invest significant resources and enter markets that may no longer be attractive as a result of unanticipated FMR from other industries.

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Lisa M. Ellram (Ph.D., The Ohio State University) is the Rees Distinguished Professor of Supply Chain Management in the Farmer School of Business at Miami University in Oxford, Ohio. Her primary areas of research interest include sustainable supply chain management, services supply management and supply chain cost management. Dr. Ellram has published more than 90 articles in peer-reviewed outlets, including the *California Management Review*, the *Journal of Business Logistics*, the *International Journal of Production and Operations Management*, the *Decision Sciences Journal*, the *Journal of Operations Management* and the *Journal of Cost Management*. She is a Co-Editor-in-Chief for the *Journal of Supply Chain Management* and a Visiting Professor at the Cranfield Graduate School of Management at Cranfield University, United Kingdom.

Wendy L. Tate (Ph.D., Arizona State University) is an assistant professor in the Department of Marketing and Logistics at the College of Business Administration, University of Tennessee in Knoxville, Tennessee. Her research interests include both services purchasing and environmental supply chain issues. One of her current projects investigates why suppliers might adopt environmental projects or initiatives. Dr. Tate has experience as a practitioner as well as an academic, having spent 17 years in corporate planning, supply chain management and operations management within the furniture manufacturing industry before earning her doctorate. She has published widely, with articles appearing in the *Journal of Business and Industrial Marketing*, the *Journal of Operations Management*, the *California Management Review*, the

Journal of Business Logistics and the *International Journal of Production, Distribution and Logistics Management*, among others. Dr. Tate is a member of the *Journal of Supply Chain Management* Review Board.

Edward G. Feitzinger (M.S., Industrial Engineering, Stanford University) is the Executive Vice President for Global Contract Logistics and Distribution at UTi Worldwide, Inc. He has also held leadership roles as both a customer and provider of global supply chain solutions. Prior to joining UTi Worldwide, Mr. Feitzinger served as Vice President of Worldwide Logistics for Hewlett-Packard, where he managed more than $1 billion in transportation and logistics spend. Before working for Hewlett-Packard, he was Senior Vice President of Sales and Marketing at Menlo Worldwide, where he also led the technology and engineering division. Mr. Feitzinger began his career in operations engineering with AT&T Network Systems and the Intel products group.