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CONSTRUING CORPORATE DIVERSIFICATION AND THE ROLE OF INFORMATION TECHNOLOGY FOR DIVERSIFIED FIRMS IN THE KNOWLEDGE ECONOMY

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Abstract

Traditional approaches to corporate diversification are inadequate for understanding the role of corporation and strategy in the knowledge economy. This paper discusses (1) the need to construe corporate diversification in terms of knowledge-based relatedness and knowledge management capabilities of firms and (2) the role of IT for diversified firms. Knowledge-based relatedness captures relatedness of the most strategic knowledge resources—product, customer, managerial, and IT knowledge resources—residing across businesses of the firm whereas knowledge management capability captures the ability of the firm to create, transfer, integrate, and leverage knowledge across its businesses. While knowledge-based relatedness provides a potential for performance through knowledge-based synergies, knowledge-management capability converts this potential into actual performance. IT knowledge relatedness is key to both creation and realization of knowledge-based synergies across the diversified firm.

Keywords: Corporate strategy, knowledge management, strategic IS, corporate performance

1. INTRODUCTION

As we shift away from the traditional, relatively well-understood sphere of the industrial economy, we are required to rethink the underlying theories, concepts, and assumptions that form the basis of understanding firms (Bettis and Hitt 1995). In this paper, we focus on *diversification*, a concept that has served as the basis of understanding organizational scope.

A firm is considered to be diversified if it competes in multiple products (Pitts and Hopkins 1982), multiple markets (Gort 1962), or multiple industries (Berry 1975). The diversified firm should decide which businesses to include in its business portfolio and how to add value to them so that their overall value is greater under its governance than the sum of individual values of the businesses if they were organized as separate firms (Goold and Luchs 1993). Therefore, researchers and managers are concerned with understanding the basis, limits, patterns, and performance implications of diversification (Hoskisson and Hitt 1990; Ramanujam and Varadarajan 1989).

In this paper, we discuss whether traditional approaches to conceptualization and analysis of diversification, developed and refined at the height of the industrial economy, are still applicable in the knowledge economy. Although labeled in numerous ways, the knowledge economy is clearly focused on creation and management of knowledge resources as differential drivers of value (Drucker 1993). According to knowledge-based views of the firm, knowledge is the most strategic resource of the firm, and the firm adds value to its businesses by providing superior organizing principles for creation, transfer, integration, and leverage of knowledge resources (Conner and Prahalad 1996; Demsetz 1993; Grant 1996b; Kogut and Zander 1996; Nonaka 1994). We contend that traditional approaches to diversification are inadequate for conceptualizing and analyzing knowledge resources and knowledge management capabilities of diversified firms. We propose new constructs and a research framework that can explain the diversification-performance relationship in the knowledge economy.

The proposed framework recognizes the role of strategic IT resources in performance of diversified firms. Strategy and organizational researchers do not typically include IT constructs in diversification studies. However, evidence emerging from the IS literature indicates that IT investments and usage are significantly associated with diversification patterns and performance of diversified firms (Bharadwaj et al. 1999a; Dewan et al. 1998; Hitt 1999). Diversified firms may be using IT to reduce communication, coordination, and control costs associated with increasing firm scope (Bharadwaj et al. 1999a; Hitt 1999). In the knowledge economy, products and services are more knowledge-intensive and their features are fused with underlying information technology capabilities of firms. IT does not merely support coordination and control of business operations but it also enables business platforms that create and support new business models, processes, products and services (Henderson and Venkatraman 1999; Venkatraman and Henderson 1999). As IT moves center stage in the new competitive landscape, constructs capturing strategic importance of IT resources need to be incorporated into models of the diversification-performance relationship. In this paper, we develop one such construct, *IT knowledge relatedness*, and link it to performance of diversified firms.

The potential contribution of this paper is not just to the diversification strategy research but also to the IS research because *knowledge*, *management of knowledge*, and *the role of IT in managing knowledge* are key research topics in the IS field, and this paper studies these concepts in an important context, namely, in the context of diversified firms, which account for a significant portion of the overall economic activity.

2. CONVENTIONAL WISDOM IN THE INDUSTRIAL ECONOMY: TANGIBLE RESOURCE-BASED RELATEDNESS

Since Rumelt's (1974) seminal work, diversification literature has hypothesized that firms build on their resources to diversify, and that *related diversifiers* outperform *unrelated diversifiers*. Traditionally, *relatedness* has been defined in three ways:

- **Product relatedness.** Product related diversifiers are those firms whose different product lines use similar raw materials, production equipment, and facilities (Davis and Duhaime 1992; John and Harrison 1999; Rumelt 1974).
- **Market relatedness.** Market related diversifiers are those firms that operate in similar geographic markets; serve similar types of customers (e.g., industrial versus consumer) and customer accounts (e.g., big versus small); and use similar distribution systems (Capron and Hulland 1999; Markides and Williamson 1994; Rumelt 1974; Stimpert and Duhaime 1997).
- **Human resource relatedness.** Human resource related diversifiers are those firms in which occupational profiles of human resources (percentage distributions of employees by occupational categories) are similar across business units (Farjoun 1994).

These relatedness constructs capture relatedness of tangible aspects of a firm's resources. Product relatedness captures similarities of raw materials, plants, and equipment rather than the similarity of intangible aspects of product portfolios such as underlying knowledge bases of product and process technologies. Likewise, market relatedness focuses on similarity of types of customers or sizes of customer accounts rather than the similarity of underlying intangibles such as customer needs, preferences, and behaviors across business units. Farjoun (1994) focuses on relatedness of an intangible resource by introducing the human resource relatedness construct. However, he measures human resource relatedness by the similarity of percentage distributions of occupations across business units, which is a tangible aspect of a firm's human resources, rather than the similarity of intangible aspects such as skills and expertise of human resources. In general, diversification studies that conceptually define relatedness in terms of intangibles but measure it using industry level SIC (standard industry classification) data, suffer from a lack of correspondence between conceptual definitions and operational measures (Nayyar 1992). Measures based on SIC data capture relatedness of tangible rather than intangible resources (Davis and Duhaime 1992). Therefore, traditional relatedness constructs capture *tangible resource-based relatedness*.

Empirical tests of the link between tangible resource-based relatedness and performance have produced equivocal results (Chatterjee and Wernerfelt 1991). While some studies found a significant link, others find no links at all (Hoskisson and Hitt 1990; Robins and Wiersema 1995). Researchers called for use of rigorous theoretical and methodological approaches to resolve the inconsistent findings (Hoskisson and Hitt 1990; Ramanujam and Varadarajan 1989). While theoretical and methodological rigor is important, the general concept of diversification, the underlying constructs, and operational measures also need to be rethought in the context of a shift away from the industrial economy.

In the industrial economy, products were mass-produced. Markets were assumed to be homogeneous groupings of customers with uniform demand characteristics (Brooks 1995). Business logic and competition were dominantly based on minimizing production

and transaction costs. Under these conditions, related diversifiers, which share raw materials, production equipment, and facilities across product lines and marketing-mix and distribution channels across markets, could outperform unrelated diversifiers that forgo these economies. However, some underlying assumptions of the industrial economy are no longer valid due to changes in the nature of products, markets, and value drivers of performance and competition.

In the knowledge economy, products are non-uniform outputs containing tangible manufactured goods fused with intangible embedded knowledge and a set of associated service activities (Pine and Gilmore 1998). Increasing numbers of products and services have built-in intelligence and include offerings that adapt or respond to changes in the environment as they interact with consumers (Glazer 1999). Each customer is a “market segment of one” who has distinct requirements to be fulfilled (Peppers et al. 1999). Flexible manufacturing and information technologies have reduced production and transaction costs. Value drivers of performance are less based on tangible factors but are more dependent on intangible factors (Stewart 1997). The basis of competition shifts from tangible resources to accumulation and deployment of intangible resources (Bettis and Hitt 1995). Consequently, the superior performance potential of tangible resource-based relatedness diminishes.

In the following sections, we propose two constructs and a research framework to understand the diversification-performance relationship in the knowledge economy. *Knowledge-based relatedness* captures synergies in underlying product, customer, managerial, and IT knowledge bases of a firm’s business units whereas *knowledge management capability* captures the firm’s ability to create, transfer, integrate, and leverage knowledge across the business units. These constructs reflect contemporary resource-based views of the firm, which make a distinction between “stock” and “flow” of resources (Dierickx and Cool 1989), or more generally, between resources and capabilities (Amit and Schoemaker 1993). While knowledge-based relatedness represents a *potential for superior performance* created by synergies among existing knowledge resources of the firm, knowledge management capability represents the capability of the firm in creating this potential and converting it into *actual performance*. Our main focus and contribution in this paper is the development of the knowledge-based relatedness construct. Although it is not our main focus, we also begin to define knowledge management capability and discuss its role in the relationship between knowledge-based relatedness and performance.

3. REDEFINING THE BASIS OF DIVERSIFICATION: A KNOWLEDGE-BASED APPROACH

According to the resource-based view, resources form the basis of related diversification (Wernerfelt 1984). Due to variance in strategic importance of the underlying resources, not all types of relatedness can provide superior performance. Whether related diversification leads to superior performance or not depends on the extent to which underlying resources are valuable, rare, imperfectly imitable, and unsubstitutable (Barney 1991). Tangible resource-based relatedness cannot lead to superior performance because tangible resources are available to all in competitive markets (Spender 1996). Knowledge-based intangibles, which are relatively more valuable and rare, but more difficult to imitate or substitute, are the most strategic resources of the firm (Grant 1996b), and they should form the foundation of new diversification theories and relatedness constructs (Sampson 1998).

We define knowledge-based relatedness as the *degree to which underlying knowledge resources of a particular business of the firm are applicable or have relevance across other businesses within the firm*. This definition recognizes that not all types of relatedness lead to superior performance. It focuses on synergies arising from relatedness of strategically important knowledge resources rather than synergies arising from tangible resources, which are still necessary for efficiency purposes, but no longer sufficient for superior performance.

4. CREATING THE PERFORMANCE POTENTIAL: KNOWLEDGE-BASED RELATEDNESS

Development of the knowledge-based relatedness construct requires identification of a firm’s strategic knowledge resources. We use the traditional building blocks of strategic thinking, i.e., products, markets, and managerial processes, as a starting point (Gilmore and Pine 1997a). However, we redefine them in order to account for the changes in the economy. Further, we identify IT knowledge as an additional strategic resource of the firm. We propose *product knowledge relatedness*, *customer knowledge relatedness*, *managerial knowledge relatedness*, and *IT knowledge relatedness* as key determinants of a diversified firm’s performance. Unlike many diversification studies, we focus on strategic rather than operational level relatedness (Grant 1988).

Product knowledge relatedness. We define product knowledge relatedness as the *degree to which product designs, process characteristics, and human expertise in a particular business of the firm are applicable or have relevance across other businesses within the firm*.

Product knowledge of the firm resides in its product and process platforms and human resources (Meyer and Lehnerd 1997; Robertson and Ulrich 1998; Sawhney 1998). Product platform is a set of subsystems and interfaces that allow development and production of a family of derivative products (Meyer 1997). It is a collection of common elements, especially the underlying core technology, implemented across a family of products (McGrath 1995). Process platform is composed of processes and technologies used in manufacturing a family of products (Meyer and Zack 1996). It allows reuse of related process components and architectures across products (Malone et al. 1999). For example, 3M leverages the same coating and bonding processes across 95% of its 40,000 product offerings (Galbraith 1983). Human resources carry especially tacit aspects of a firm's product knowledge such as the tradeoffs between distinctiveness and commonality of products, designs, production techniques, and technology applications (Robertson and Ulrich 1998). Knowledge carried by human resources is one of the most important and durable drivers of business success (Hall 1993).

Product knowledge relatedness can enable a diversified firm to share product designs, subsystems, components, manufacturing processes, and human skills and expertise across its business units. Reuse of existing product knowledge reduces development, tooling, and manufacturing costs, speeds up new product development, and allows the firm to rapidly address new market opportunities (Meyer 1997). Firms whose new offerings do not leverage existing product knowledge suffer from high costs and low margins (Meyer 1997) because new technologies and processes often require major investments in research, design, engineering, and manufacturing (Nobeoka and Cusumano 1997). Advantages arising from product knowledge relatedness may be sustainable because product knowledge is not easy to observe or replicate. The causal ambiguity associated with a firm's product knowledge provides a source of superior performance (John and Harrison 1999). Thus:

Proposition 1: *Product knowledge relatedness of a firm's business portfolio is positively associated with firm performance.*

Customer knowledge relatedness. Customer knowledge is the knowledge developed by the firm through a learning relationship with its customers and end consumers (Woodruff 1997). It includes knowledge of needs, preferences, buying behaviors of customers, why they purchase products and services, which attributes they value, what consequences they hope to get by using them, and knowledge of customers' businesses (Stewart 1997; Woodruff 1997).

Applicability of customer knowledge across product markets constitutes an important base of relatedness (Farjoun 1998). In serving customers, firms acquire knowledge about expressed and latent needs of customers, which they can subsequently use in cross-selling other offerings or developing new ones. However, opportunities for customer knowledge synergies exist only when customers have similar requirements and exhibit similar behaviors across different businesses (Gilmore and Pine 1997b). Therefore, we define customer knowledge relatedness as the *degree to which customer knowledge in a particular business of the firm is applicable or has relevance across other existing businesses within the firm or in the development of new businesses*.

Diversification based on customer knowledge relatedness may result in positive performance effects. For example, firms that discover multiple needs of customers to offer new services are valued higher by the stock market than firms which only share factors of production across their services (Nayyar 1993b). Markets with similar types of customers allow redeployment of intangibles such as general marketing expertise, brands, and sales forces among the markets, which in turn positively impacts revenues (Capron and Hulland 1999). Firms serving different types of customers have minimal opportunity to leverage customer knowledge across different products and services and suffer from high diversification costs. For example, in the banking industry, mixing institutional and individual customer segments, which have limited similarities, has a negative impact on performance (Ramaswamy 1997). Imitation of customer knowledge is difficult since it develops over time through causally ambiguous learning relationships with customers (Woodruff 1997). Creation of a portfolio of businesses, which build on related customer knowledge, is even more difficult to observe and imitate. Thus:

Proposition 2: *Customer knowledge relatedness of a firm's business portfolio is positively associated with firm performance.*

Managerial knowledge relatedness. Businesses that are seemingly unrelated in product or customer knowledge may be related in terms of managerial skills and knowledge by which they are governed (Prahalad and Bettis 1986). Managerial skills and knowledge of a diversified firm reside in corporate level processes that govern the business units (Grant 1988). The most strategic managerial processes include strategy formulation and coordination, resource allocation, performance setting and monitoring (Grant 1988), relationship management (Ring and Van de Ven 1994), human resource management (Saxton 1997), and risk, reward, innovation, and autonomy orientation (Chatterjee and Wernerfelt 1991).

Corporate level managerial skills and knowledge are key to creation and sustenance of a diversified firm's knowledge bases because individual business units tend to under-invest (Prahalad and Hamel 1990) or make sub-optimal choices in the absence

of a dominant managerial logic (Robertson and Ulrich 1998). Therefore, we define managerial knowledge relatedness as the *degree to which managerial skills and knowledge in a particular business are applicable or have relevance across other businesses within the firm*.

Firms can successfully diversify into new businesses if they can use their managerial knowledge, routines and repertoires in integrating and managing knowledge domains of the old and new businesses (Nayyar 1992, 1993b). For example, alliance partners who have similar organizational structures, human resource policies, decision-making patterns, organizational culture, and accounting and information systems achieve positive alliance outcomes (Saxton 1997). In merged businesses, similarity of managerial resource allocation decisions lead to positive performance outcomes (Ramaswamy 1997). Reverse engineering managerial knowledge (Zander and Kogut 1995), and copying it from another organization is not easy (Barney 1991) because it requires changes in existing organizational culture and power structures, and establishment of new management systems (Galbraith 1983). Hence, managerial knowledge relatedness provides a source of sustained superior performance.

Proposition 3: *Managerial knowledge relatedness of a firm's business portfolio is positively associated with firm performance.*

IT knowledge relatedness. IT constructs have rarely been included in models of the diversification-performance relationship. However, evidence emerging from the IS literature indicates that there is a significant relationship between levels of IT use and diversification (Hitt 1999). Firms diversifying into related lines of businesses tend to invest more in IT (Dewan et al. 1998), and performance of diversified firms is significantly associated with IT investments (Bharadwaj et al. 1999a). These findings support the assertion that IT moves center stage in the knowledge economy, and that researchers need to develop constructs capturing strategic importance of IT resources, and include them in models of diversification-performance relationship.

Resource-based analyses of IT resources indicate that the most strategic IT resource of the firm is *IT knowledge* carried by IT managers (Mata et al. 1995), and IT infrastructure of the firm (Broadbent and Weill 1997). IT managers carry firm-specific skills and knowledge including abilities to recognize, understand, and appreciate business needs; work with business managers, customers, suppliers, and partners; develop appropriate IT applications; coordinate existing IT activities; and identify future IT needs of businesses (Mata et al. 1995). IT infrastructure is a set of information and technology designs, subsystems, interfaces and components that form a common structure, which supports existing business processes, products and services, and enables development of new ones (Venkatraman and Henderson 1999). Clearly, managerial IT skills and knowledge are key to creating integrated and compatible IT infrastructures across the firm.

IT knowledge carried by IT managers and IT infrastructures of the diversified firm develops over long periods of time through socially complex and causally ambiguous working relationships among IT managers, business managers, customers, suppliers, and partners during conceptualization, development, and use of the firm's IT systems (Broadbent and Weill 1997). While competitors may observe hardware and software commodities used in creation of a firm's IT infrastructure, they cannot easily identify and imitate skills, expertise, strategic deliberations, and social processes that shape the IT infrastructure. Therefore, the IT knowledge carried by IT managers and IT infrastructure of the firm is imperfectly imitable, and hence, it may serve as a source of sustained superior performance (Mata et al. 1995).

In the context of diversified firms, IT knowledge residing in individual business units can enable those business units to achieve superior performance. However, islands of IT knowledge at the business unit level do not suffice to achieve superior performance at the corporate level. Synergy realization at the corporate level requires transfer and leverage of related product, customer, and managerial knowledge across business units. Transferability of these intangibles depends on the integration and compatibility of IT systems across business units, which in turn depend on the extent to which IT knowledge within business units are inter-related.

We define IT knowledge relatedness as the *degree to which information and technology designs, subsystems, interfaces and components are compatible across business units; and the degree to which managerial IT skills and expertise used within a particular business unit are also relevant and applicable across other business units*. Compatibility of IT infrastructures and relevance and applicability of managerial IT skills and expertise enable the firm to exchange and leverage related product, customer, and managerial knowledge across business units (Powell and Dent-Micallef 1997). Firms with unrelated managerial IT skills and expertise, and fragmented and incompatible information and technology structures, may forgo such synergies. Thus:

Proposition 4: *IT knowledge relatedness of a firm's business portfolio is positively associated with firm performance.*

5. REALIZING THE PERFORMANCE POTENTIAL: KNOWLEDGE MANAGEMENT CAPABILITY

We identified product, customer, managerial, and IT knowledge as the most strategic resources of the diversified firm, and argued that relatedness of these resources across business units might provide a potential for superior performance. In order to create this potential and convert it into actual performance, the diversified firm also needs a capability to manage its knowledge resources. Since firms cannot usually buy knowledge stocks in imperfect factor markets, they need to accumulate them over time (Dierickx and Cool 1989). The rent generating potential of accumulated knowledge stocks may disappear over time as they depreciate, become obsolescent, or are replicated by other firms (Grant 1991). Hence, sustaining knowledge-based competitive advantage is difficult (Glazer 1991). Firms need a capability to continuously accumulate knowledge stocks and to realize their rent generating potential. Both existing stocks and new flows of knowledge are important for achieving superior performance (DeCarolis and Deeds 1999).

We define knowledge management capability of a diversified firm as *the ability of the firm to create, transfer, integrate, and leverage knowledge resources across its business units for achieving knowledge-based synergies*. These four knowledge processes are consistent with current thinking in the knowledge management literature: (1) knowledge creation (Nonaka 1994); (2) knowledge transfer (Huber 1991; Zander and Kogut 1995); (3) knowledge integration (Grant 1996a, 1996b); and (4) knowledge leverage (Spender 1996). While it is conventional to focus on one or more of these knowledge processes in different settings, in the context of diversified firms, a systematic consideration of knowledge management capability requires the simultaneous consideration of the four processes.

Knowledge creation capability refers to the ability of the diversified firm to generate new stocks of knowledge or transform its existing stocks of knowledge for superior performance. Creation of new knowledge stocks does not occur in abstraction from current knowledge stocks and capabilities of the firm (Kogut and Zander 1992) since knowledge is path dependent (Cohen and Levinthal 1990). New knowledge creation requires a capability to generate new applications from existing knowledge stocks as well as a capability to exploit unexplored potential of new technologies (Kogut and Zander 1992). Hence, when a diversified firm expands its scope by diversifying into a new business, its performance depends not only on relatedness of knowledge resources in its existing and new businesses, but also on its ability to create knowledge required for competing effectively in the new business.

Knowledge transfer capability refers to the ability of the diversified firm to transfer knowledge among its businesses for performance improvements. To the extent that they can exchange and utilize each other's knowledge, diverse business units can do things better together over time (Prokesch 1997). The ability to transfer and replicate knowledge (e.g., best practices) across business units enables the firm to appropriate rents from its knowledge stocks, and hence, to build competitive advantage (Szulanski 1996; Zander and Kogut 1995). For example, to respond to the needs of customers, the firm must have capabilities in place for effective sharing of customer knowledge among marketing, sales, engineering, and research and development units (Kohli and Jaworski 1990). However, knowledge is sticky and difficult to transfer across business units (Szulanski 1996), organizational levels (Inkpen and Dinur 1998), and time within the same business units (Garud and Nayyar 1994). Knowledge-based relatedness across business units cannot lead to superior performance unless the firm has the capability to transfer related knowledge among its businesses.

Knowledge integration capability is the ability of the diversified firm to synergistically combine heterogeneous knowledge stocks of its business units into new knowledge stocks that have higher value potential than the value of previously separated knowledge stocks. This capability is a key justification for the existence of the firm (Grant 1996a). The firm exists because it provides superior organizing principles than the market for integration of knowledge (Conner and Prahalad 1996; Kogut and Zander 1996). For example, the firm provides conducive social settings where individuals, teams, and business units share and internalize each other's knowledge resources, and consequently transform them into products and services (Brown and Duguid 1991; Grant 1996b; Nonaka 1994). Businesses of the diversified firm may have related knowledge resources, but unless the firm has the capability to integrate them around core product and process platforms, and firm level organizing principles, synergy effects cannot be realized.

Knowledge leverage capability is the ability of the diversified firm to realize the value potential of its existing knowledge stocks. It allows the firm to reap returns on its knowledge stocks. A diversified firm may have capabilities in creating, transferring, and integrating knowledge resources, but these capabilities are irrelevant if the firm cannot ultimately utilize the knowledge resources efficiently (Majumdar 1998). The capability to leverage a related knowledge base in introducing new products and services allows the firm to respond more effectively to changes in technologies and customers needs, which, in turn, has positive performance effects such as sales growth (Nobeoka and Cusumano 1997). In the absence of firm capabilities to use and act on knowledge, relatedness of knowledge resources cannot have a positive effect on performance (Hurley and Hult 1998).

These four knowledge processes collectively enable the diversified firm to create new knowledge stocks in its individual businesses, to transfer the created knowledge to its other businesses, to integrate the incoming knowledge with existing knowledge stocks at the destination, and to leverage the integrated knowledge for superior performance. The four knowledge processes are interrelated and interdependent. They co-exist, co-vary, and overlap with each other; together they define the firm's knowledge management capability. This capability enables the diversified firm to realize potential knowledge-based synergies across its businesses so that the individual businesses are worth more under its governance than they would be under the governance of separate firms (Goold and Luchs 1993). In the absence or weakness of one or more of the four knowledge processes, the diversified firm runs the risk of failing to realize the potential synergies arising from knowledge-based relatedness of its businesses.

Although there is no prior theory informing whether knowledge management capability is a moderator or mediator of the relationship between knowledge-based relatedness and performance, we specify it as a moderator since we conceptualize it as a construct determining the existence of a relationship between our independent and dependent constructs.

Proposition 5: *The relationship between knowledge-based relatedness and firm performance is moderated by the organizational knowledge management capability.*

Figure 1 depicts the interplay among knowledge-based relatedness, performance, and knowledge management capability.

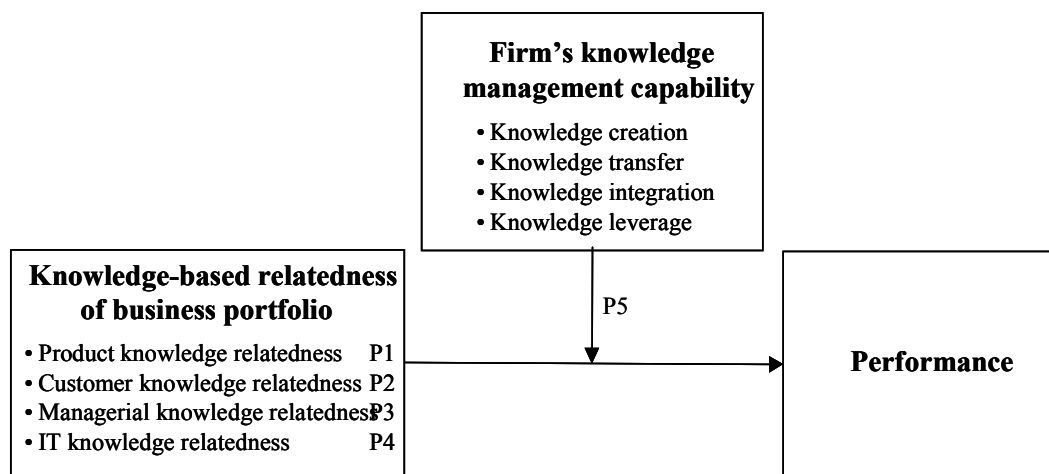


Figure 1. Diversification-Performance Relationship in the Knowledge Economy

6. OPERATIONALIZATION APPROACH

A critical next step in refining the proposed framework is to test its veracity through empirical assessments. In this section, we offer some preliminary ideas for operationalizing the knowledge-based relatedness construct, which is the major focus of this paper.

Our definition of knowledge-based relatedness emphasizes two points that also guide its operationalization. First, it specifies the most strategic resource of the firm, namely knowledge, as the basis of business portfolio relatedness. Second, it recognizes that underlying knowledge resources of a business unit should be applicable or relevant across other businesses within the firm. The first point requires knowledge-based relatedness measures to have strategic rather than operational focus (Grant 1988) whereas the second point calls for direct measures using data at the firm level rather than indirect measures using industry level SIC data. Table 1 briefly summarizes our operationalization approach.

Traditional relatedness measures infer relatedness of a firm's business portfolio from industry level SIC data. Our approach allows measurement of a firm's actual relatedness since it requires firm level data. Actual relatedness allows more accurate tests of diversification-performance relationship and direct firm-to-firm comparisons, which were not possible with traditional relatedness measures.

Table 1. Approach to Operationalization of Knowledge-Based Relatedness

Construct	Definition	Operationalization Approach	Theoretical Underpinnings
Product Knowledge Relatedness	The degree to which product knowledge in a particular business of the firm is applicable or has relevance across other businesses within the firm	Measure the extent to which (1) product or service designs, modules, interfaces, and component parts; (2) process modules, interfaces, and component parts; (3) skills, experiences, and know-how gained by employees in developing and producing products of a business unit are applicable or have relevance across other business units	Baldwin and Clark 1997; Farjoun 1994; Fisher et al. 1999; Malone et al. 1999; McGrath 1995; Meyer and Lehnerd 1997; Meyer and Zack 1996; Nobeoka 1995; Nobeoka and Cusumano 1997; Robertson and Ulrich 1998; Sawhney 1998
Customer Knowledge Relatedness	The degree to which customer knowledge in a particular business of the firm is applicable or has relevance across other existing businesses within the firm or in the development of new businesses	Measure the extent to which (1) customer needs, preferences, buying behaviors, factors that influence what customers value, business and industry conditions; (2) skills, experiences, and know-how gained by employees in working with customers of a business unit are applicable or have relevance across other business units	Gilmore and Pine 1997b; Jaworski and Kohli 1993; Kohli and Jaworski 1990; Nayyar 1993a, 1993b; Peppers et al. 1999; Ramaswamy 1997; Slater 1997; Slater and Narver 1995; Woodruff 1997
Managerial Knowledge Relatedness	The degree to which managerial knowledge in a particular business of the firm is applicable or has relevance across other businesses within the firm	Measure the extent to which (1) strategy formulation and coordination; (2) performance setting and monitoring; (3) resource allocation; (4) relationship management; (5) human resource management; (6) risk management and innovation orientation of a business unit are applicable or have relevance across other business units	Bergh 1997; Chatterjee and Wernerfelt 1991; Galbraith 1983; Grant 1988; Kazanjian and Drazin 1987; Prahalad and Bettis 1986; Prahalad and Hamel 1990; Ring and Van de Ven 1994; Saxton 1997
IT Knowledge Relatedness	The degree to which IT knowledge in a particular business of the firm is applicable or has relevance across other businesses within the firm	Measure the extent to which (1) information and technology designs, subsystems, interfaces and components; (2) managerial IT skills and know-how in understanding business needs, working with business managers, customers, suppliers, and partners, developing IT applications, coordinating existing IT activities, and identifying future IT needs in a business unit are applicable or have relevance across other business units	Bharadwaj et al. 1999b; Broadbent and Weill 1997; Mata et al. 1995; Rockart et al. 1996; Ross et al. 1996

Table 2. Comparison of Tangible Resource-Based and Knowledge-Based Models of Diversification-Performance Relationship

Characteristics	Tangible Resource-Based	Knowledge-Based
Logic underlying the concept of diversification	Scale economies arising from sharing of tangible resources across business units within a corporation	Scale and scope economies arising from accumulation and deployment of knowledge resources across business units within a corporation
Assumptions underlying the role of diversification	All types of relatedness are synergistic and lead to superior performance	Traditional types of relatedness may not be differential and unique as other firms may be able to imitate; only relatedness of strategic knowledge resources leads to superior performance
Assumptions about products and markets	Products are uniform, manufactured, tangible outputs	Products are non-uniform outputs containing tangible manufactured goods, intangible embedded knowledge, and a set of associated service activities
	Markets are homogeneous groupings of customers who have uniform demand characteristics	Each customer is a market segment of one who has distinct requirements to be fulfilled
Assumptions underlying the role of Information Technology	IT reduces communication and coordination costs across business units of a corporation	IT enables value creation by facilitating creation, transfer, integration and leverage of related knowledge resources across business units of a corporation
Key constructs	Product relatedness; Market relatedness; Human resource relatedness	Product knowledge relatedness; Customer knowledge relatedness; Managerial knowledge relatedness; Information technology knowledge relatedness
Key moderators	Mostly “structural” factors reflecting agency and market conditions	A predominantly “process” view whereby the focus is on how the firm creates and deploys the knowledge resources within the corporation that is referred to here as the “knowledge management capability”
Concept and measurement of performance	Financial performance reflected in profitability and growth	Financial market performance reflected in value creation and market capitalization
Dominant research setting in diversification research	Manufacturing industry	Manufacturing and service industries—especially those that are becoming knowledge-intensive
Data source	Industry level secondary data (SIC data) can be used to test many of the propositions	Firm level primary data required for testing many of the propositions

7. SUMMARY AND CONCLUSIONS

We discussed two approaches available to a diversified firm in formulating its corporate strategy. The first approach, which reflects the conventional wisdom on diversification in the industrial economy, emphasizes cost minimization through scale economies arising from tangible resource-based relatedness across the corporation. It suggests that the corporation should form its business portfolio from businesses that are related in tangible aspects of products, markets, or human resources. The second approach, which we propose as a more appropriate approach in the knowledge economy, emphasizes value creation through knowledge-based synergies across the corporation. It suggests that the corporation can create a potential for superior performance by forming its business portfolio from businesses that are related to some degree in one or more of the product, customer, and managerial knowledge domains. It also suggests that the corporation can create this potential and convert it into actual

performance by enabling creation, transfer, integration, and leverage of related knowledge across its businesses. Unlike the first approach, which does not recognize the role of IT in the diversification-performance relationship, our approach identifies *IT knowledge relatedness* as critical to both creation and realization of knowledge-based synergies across the corporation. Table 2 summarizes the key distinctions between the two approaches.

This paper contributes to the diversification strategy research, and to the knowledge management stream of the IS research, by defining *knowledge-based relatedness* and *knowledge management capability* constructs and by developing a research framework that articulates the interplay among knowledge-based relatedness, performance, and knowledge management capability. This research framework can be used to study how diversified firms organize their knowledge resources across multiple products and markets and what capabilities they use for managing these knowledge resources for superior performance. By identifying *IT knowledge* as a strategic resource of the firm and by defining *IT knowledge relatedness* as a key determinant of the diversified firm's performance, this study introduces an IT construct into models of the diversification-performance relationship. This construct may enable researchers to study how diversified firms organize and manage IS resources to create and realize knowledge-based synergies. This study constitutes one of the initial steps toward understanding corporate diversification, its link to performance, and the role of IT for diversified firms in the knowledge economy. Further work is required for operationalizing the constructs and validating the propositions of the study.

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