

# A Resource-Process Framework of New Service Development

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Motivated by the increasing attention given to the operational importance of developing new services, this paper offers a theoretical framework that integrates both process- and resource-oriented perspectives of new service development (NSD) by defining and organizing 45 practice constructs for NSD-related practices and activities that occur in contemporary service firms. We employ a rigorous procedure whereby both quantitative and qualitative data were gathered through multiple rounds of interviews and card-sorting exercises with senior service managers. This iterative refinement process helps ensure that the construct domains and definitions are consistent and that they are applicable across multiple service sectors. A primary contribution of this research is to provide precise operational definitions of theoretically important NSD practice constructs. Importantly, this study expands on the NSD literature by including both resource- and process-centric perspectives within a single framework. A second contribution is to illustrate a general methodology for developing clear, concise, and consistent construct definitions that may be generally useful for production and operations management scholars interested in new construct development for emerging areas. Empirical results suggest that the resource-process framework can help guide and organize future research on, and provide insight into, a more comprehensive view of new service development.

*Key words:* service operations; new service development; theoretical framework; construct development  
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## 1. Introduction

New service development (NSD) is an emerging subject of scholarly inquiry in operations management (Johnson et al. 2000; Froehle et al. 2000; Menor, Tattikonda, and Sampson 2002; Fitzsimmons and Fitzsimmons 2003; Roth and Menor 2003; Roth, Schroeder, Huang & Kristal (forthcoming)). This paper proposes a framework that integrates both process- and resource-oriented literature with managerial perspectives of NSD by organizing various practice constructs for NSD-related activities that occur in contemporary service firms. Quantitative and qualitative data were gathered through multiple rounds of interviews and card-sorting exercises with senior managers involved in NSD from organizations spanning a wide range of

service industries. This paper presents preliminary empirical testing of an integrating framework and provides precise operational definitions of the NSD practice constructs embedded within it and thereby offers a foundation for measurement and future research.

Prior research suggests that competing in rapidly changing markets often requires the ability to quickly develop and deploy new offerings (de Brentani 1989; Voss et al. 1992; Gallouj and Weinstein 1997; Fine 2000; Carillo 2005). Services firms pursuing a strategy reliant upon innovation are under constant pressure to develop more effective NSD methods, make better use of their resources, and beat their competitors to market with the next great

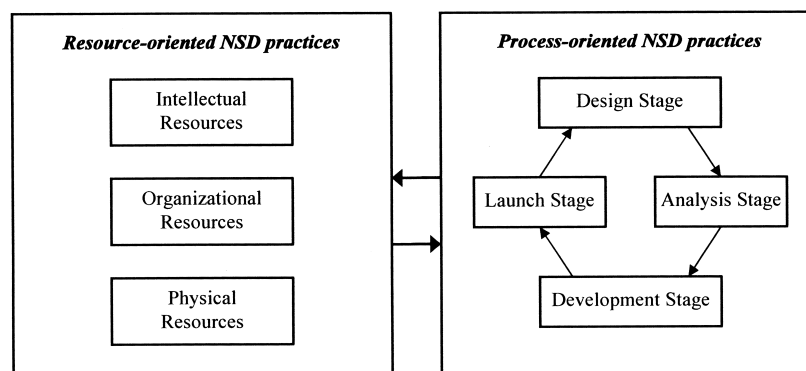
idea. Related research has previously demonstrated that certain organizational, technological, and process design choices have significant strategic influence on the firm's ability to rapidly and effectively develop new services (Froehle et al. 2000). But are these the only important elements? How do firms ensure they are in place? In other words, what are the key practices and activities that service firms undertake in order to enable their NSD efforts?

We are motivated both intellectually and practically to explore the practice-based “antecedents” of NSD (Menor, Tatikonda, and Sampson 2002). Cooper et al. (1994) define the new product process as it relates to NSD as the “set of activities, actions, tasks, and evaluations (e.g., project screening, market research, product development, test marketing) that move the project from the idea stage through to launch” (p. 283). Although there has been considerable research into the factors that connote effective NSD *processes* and on the arrangement of activities that best position the firm to succeed (Hill et al. 2002; de Jong and Vermuelen 2003; Krishnan and Loch 2005), there has been comparably little attention given to the *resources* necessary to support those NSD processes. By extension, the scope of *practices* associated with developing NSD-specific resources, as opposed to new product development, have been so far underexamined empirically. Despite the NSD process having been traditionally associated with project- or product-specific success (de Brentani 1995; Cooper et al. 1994; Edgett 1994), we believe a service firm should *also* examine how it manages its physical, organizational, and intellectual resources if it desires a more durable strategic positioning based on innovation. To this end, Figure 1 depicts the Resource-Process Framework (RPF) of new service development proposed here. The RPF is a conceptual representation of salient resource- and process-oriented practices that the literature and practitioners indicate are supportive to the development and execution of NSD efforts.

*Resource-oriented* NSD practices focus on cultivating, motivating, and developing the intellectual, organizational, and physical resources (e.g., employees, information, and facilities) that support and enhance the firm's NSD capability. Examples of resource-oriented practices include the development of an innovation-promoting culture, the cross-training of managers and employees involved in new service development, and the renewal of a supportive information technology (IT) infrastructure (van Reil, Lemmink, and Ouwersloot 2004). *Process-oriented* NSD practices focus on planning, defining, and executing the actual sequence of stages—design, analysis, development, and launch—the service firm follows when creating its new offerings. Examples of process-oriented practices include initial concept refinement, market testing, and formalized promotion of the new service.

Our guiding belief is that a firm that develops competencies in *both* process-oriented and resource-oriented practices is better positioned to create an NSD capability that differentiates it from its competitors and supports continued innovation and growth. However, the first steps in theory-building for NSD are to identify key constructs pertaining to this domain and subsequently provide precise operational definitions (Churchill 1995; Roth et al. (forthcoming)). So, the major contribution of this paper is to take some first steps in this direction. First, we put forth a theory-based conceptual framework and, through a rigorous procedure, operationally define key NSD practice constructs associated with both NSD process- and resource-oriented categories. This research expands on the NSD literature by including both views—resource- and process-oriented—within a single framework. The iterative approach used in this paper lends support for establishing that NSD constructs provide adequate coverage of the RPF domain and thereby ensure that the construct domains and definitions are consistent and appropriate in multiple service sectors.

Figure 1 The Resource-Process Framework (RPF) of New Service Development.



The importance of well-defined constructs is a critical first step in the measurement development process. The validity of what is ultimately being measured thus depends on construct definitions and the content domain (Churchill, 1995). Second, the paper illustrates a general approach useful for production and operations management (POM) scholars interested in construct development for emerging areas, where constructs have not yet been fully conceptualized and/or operationalized. It is useful to note that this effort contributes to the next step in the measurement development process (i.e., the confirmation and reliability/validity testing of new items and scales). Therefore, we leave to future research the development of multi-item measurement scales that tap into each construct (Clark and Watson 1995).

The rest of this paper is organized as follows. In the next section, we review the relevant literature on NSD and organizational resources. In Section 3, we describe the RPF (Figure 1) and the NSD practice constructs it considers more completely. Section 4 details our research approach in order to test the ability of the model to define and organize representative sets of NSD practice constructs shown in Figure 1. The results of that examination are provided in Section 5. The final section offers conclusions as well as limitations and opportunities for additional research motivated by this paper.

## 2. Background and Literature Review

### 2.1. New Service Development

Effective development of new services is vitally important primarily because it influences the success of the resulting service product (de Brentani 1995, 1989; Cooper et al. 1994; Edgett 1994; Voss et al. 1992; Storey and Easingwood 1993; Cooper and de Brentani 1991; Menor & Roth (forthcoming) a; Menor & Roth (forthcoming) b). This influence extends across industries and firm sizes (Reidenbach and Moak 1986) and has obvious and significant implications for organizational performance. Yet many, if not most, service organizations have not adopted formalized or well-structured NSD efforts (Cooper and de Brentani 1991; Cooper et al. 1994; Fitzsimmons and Fitzsimmons 2000). As noted by de Brentani (1989), “many service firms are still using a hit-and-miss approach when developing new services” (p. 239). These lapses and failures include haphazard concept generation and evaluation, insufficient testing prior to the final launch of the service, and inadequate knowledge of the market, among many others. To aggravate an already unfavorable situation, many service firms fail to measure what new service development processes they *do*

have (Voss et al. 1992). One executive, who had just joined his firm to lead its NSD efforts, stated in our interview, “I had to teach them the meaning of the word ‘test.’” In general, systematic attention to NSD practices has not been a priority for many U.S. service organizations (Roth, Chase, and Voss 1997).

Much research has been focused on providing a structure to the many activities and concepts associated with the NSD *process* (e.g., Scheuing and Johnson 1989). Most models have employed a temporal or predecessor-based structure that is essentially linear in nature, similar to many project management approaches (Johnson et al. 2000; Bitran and Pedrosa 1998). There are many examples of linear models of NSD. For example, Shostack (1984) developed one of the earliest notable linear models for NSD by deconstructing the process into 10 discrete stages. A more aggregated six-stage model is employed by Reidenbach and Moak (1986), which included the phases of idea generation/evaluation, concept development and testing, economic analysis, product testing, market testing, and commercialization. Voss et al. (1992) employ for their analysis a four-stage model consisting of concept development and analysis, prototype service development, prototype service test and debug, and full launch of new service. Bitran and Pedrosa (1998) attempt to bridge the NPD and NSD literature by developing a six-stage model of a generic development process. Their model, like many others, explicitly includes feedback loops that allow knowledge gained later in the process to be fed back into steps typically occurring earlier. Finally, Johnson et al. (2000) synthesized past service development research and created a general four-stage NSD process model involving the phases of design, analysis, development, and full launch.

Some researchers have drafted complementary nonlinear frameworks, hoping to attain different perspectives and insights into the development of new services. Edvardsson and Olsson (1996) abandoned the traditional linear/temporal structure in their quality-based model of NSD. By focusing on design quality, they posit that the goal of any new service development effort should be “to create the prerequisites for services which the customer perceives have an attractive added value” (p. 141). Johnson et al. (2000) add nonlinear elements to the new service development model, emphasizing the interdependence on design and development as well as the cyclical aspects of the new service creation process. Their work is among the first to critically examine the nonlinear nature of the new service *design* process. A nonlinear model has also been developed by considering the organizational learn-

ing that can occur during the development of new services (Stevens and Dimitriadis 2004).

All of these process-based models have their merits because they reflect practices dealing with the sequencing of NSD activities. With few exceptions, one important element that has not been thoroughly developed is the resource base necessary for, and involved in, new service development. Although many researchers have included various resource-oriented elements in their models, these are usually seen as ancillary or secondary to the sequences of steps and activities involved in the NSD *process* (Fitzsimmons and Fitzsimmons 2000). A growing emphasis on organizational resources in service operations strategy (Roth and Menor 2003) suggests some unique insights into this issue. The next section summarizes its relevance to the organizational and operations strategy literature.

## 2.2. Why NSD Resources?

Penrose (1959) is the first to be credited for viewing the firm as a “pool of resources, the utilization of which is organized in an administrative framework” (p. 149). Traditional strategy literature describes a resource as “anything which could be thought of as a strength or weakness of a given firm” (Wernerfelt 1984, p. 172). Within this broad definition, Barney (1991) specifies three distinct types of capital resources—physical, human, and organizational—that can provide these benefits. Physical capital resources include the physical technologies, facilities, equipment, location, and access to raw materials. Examples of human capital resources include the experience, training, education, judgment, intelligence, and insights of employees and managers within the firm. Finally, organizational capital resources involve the corporate reporting structure, formal/informal control mechanisms, and internal/external relationships.

The importance of resources has been studied in a variety of areas, including IT, operations strategy (Schroeder, Bates, and Junntila 2002), and the strategic role of acquisitions and diversification (Barney 1991; Mata, Fuerst, and Barney 1995; Markides and Williamson 1996; Prahalad and Hamel 1990; Roth and Jackson 1995). This approach has provided new insights into new product development (Henderson and Cockburn 1994) and it lies at the heart of the customer equity approach to services marketing (Hogan, Lemon, and Rust 2002). Service strategists have employed a resource-centric lens in analyzing deregulation’s effects on diversification in the financial services industry (Ingham and Thompson 1995), the effects of globalization on the general competitiveness of services (Fahy

1996), and interorganizational innovation in the health care industry (Goes and Park 1997).

Also examining the importance of resources (among other things) to service firms, Roth and Jackson (1995) hypothesized and demonstrated a link between organizational resources and service operations strategy and performance. Their findings place this element of the firm within a strategic framework of internal and external elements necessary to achieving a sustainable market position and long-term organizational success. A competitive advantage for service organizations has also been empirically linked to unique combinations of resource-building and process execution practices (Roth, Chase, and Voss 1997).

Gallouj and Weinstein (1997) indirectly touch on the notion of internal resources in new service development in their discussion of service provider competences. A “vector of competences” is employed in the development of a general service model, and innovation is defined as a “change” to one or more of the terms in the vectors included in the model. They posit that different modes of innovation are related to different types of changes in the various vector terms. While appealing in its parsimony and generalizability, the Gallouj and Weinstein (1997) model focuses on the *end* (i.e., the newly developed service offering), whereas the RPF focuses on the *means* (i.e., the process and resources employed). The behaviorist perspective takes a slightly different tack, seeing organizations not as “pools” or “bundles” of resources, but as *systems*, which utilize various types of resources through a variety of practices and routines (Bromily 2005). Focusing on this perspective in services reinforces the need for examining how organizational practices relate to the development and deployment of resources involved in the firm’s NSD endeavors.

Building upon this rich body of knowledge, we detail in the next section a new framework for organizing the various organizational practices and activities related to NSD. While this RPF for NSD helps establish a conceptual structure to this area of research, it does not, at this point, formally hypothesize or test any causal relationships between NSD practices and organizational performance. We do hope, however, that the RPF will motivate and facilitate research into these issues.

## 3. The Resource-Process Framework

### 3.1. Resource-Oriented Practice Constructs

The resource-oriented NSD practices adopted by the firm allow it to acquire, nurture, and organize the people, knowledge, infrastructure, and other elements

needed to develop new service products. In some firms, these practices are coordinated and consciously carried out in a planned manner. In other organizations, they may be allowed to “just occur” with little forethought, consistency, or guiding strategy (de Jong and Vermeulen 2003). Using Barney’s (1991) resource typology described earlier as a basis, three classes of resource-oriented NSD practice constructs are proposed as theoretically germane to the RPF. Some practice constructs are associated with developing intellectual resources, some with developing organizational resources, and others with developing physical resources. Each of the resource-oriented NSD practice subcategories—Intellectual, Organization, and Physical—is described below.

**3.1.1. Intellectual Resources.** The firm’s intellectual resources as considered here include those generally described by Barney’s (1991) “human capital” category. These resources include, but are not limited to, the educational, cultural, and experiential knowledge and skills contained within the firm’s employees. “The staff are usually seen as the service company’s key resource” (Edvardsson and Olsson 1996, p. 151). De Brentani (1989) empirically found that development projects involving the employees, and especially the front-line personnel, were generally more successful than those that did so to a lesser degree.

“Organizational knowledge. . . was the primary determinant of superior service quality influencing superior market performance” (Roth and Jackson 1995, p. 1,729). Just as it enables better quality and higher performance, knowledge, as held and used by employees and embedded in systems, also creates opportunities for improvement (Kogut and Zander 1992). Organizational and individual learning, and the associated transfer of production know-how, allow firms and employees to connect their daily work experiences with opportunities for improvement and innovation (Henderson and Lentz 1996; Ferdows 2006). Thus, we see broad support for the idea that innovation and improvement (a special form of innovation) are rooted in the firm’s intellectual resources (Grant 1996).

Also significantly contributing to these informational processes are intellectual resources outside the firm. Suppliers, business partners, and customers may be included in the new service development process in order to provide their particular insights (Ulrich and Ellison 2005). Goes and Park (1997) found that hospitals engaged in multi-institution collaborative relationships were able to take advantage of asymmetric competencies within the alliance, leading to more and better service innovations and enhanced business per-

formance. New service development practices that focus on developing and maintaining these resources, such as seeking regular employee input, active solicitation of feedback from customers, and constant attention to market trends, appear to be important, if not essential, to the firm’s ability to develop and execute an effective NSD process.

**3.1.2. Organizational Resources.** Organizational resources are necessary for effective NSD to occur. Organization capital resources “include a firm’s formal reporting structure, its formal and informal planning, controlling, and coordinating systems, as well as informal relations among groups within a firm and between a firm and those in its environment” (Barney 1991, p. 101). In summary, organizational resources are the management systems, attitudes, and personal relationships adopted and developed by the company. These resources are vital to the firm’s new service development process, manifesting in practices like development team structure, corporate culture, communication norms, and top management support. For example, policies and activities regarding how preliminary or uncertain design information is managed could be an important organizational resource (Loch and Terwiesch 2005; Anderson and Joglekar 2005).

Project teams are generally considered and have been empirically shown to be beneficial to NSD projects (Larson, Gobeli, and Gray 1991; Terrill 1992). Some evidence suggests that their benefit comes more from their diversity of ideas and contributed knowledge base than from greater efficiency or reduced development time (Froehle et al. 2000). Thus, managers must be careful regarding the degree and type of control they exert over their NSD efforts (Jewkes, Sawers, and Stillerman 1969).

In addition, top management support and involvement is vital to competing on an innovation-based strategy. Larson, Gobeli, and Gray (1991) found that the *direct* involvement of top management significantly contributes to the successful execution of development projects. As one of our executives stated quite clearly, “if you don’t have a champion, it doesn’t go.” NSD practices related to the development of organizational NSD resources also include establishing a supportive corporate culture and effective communication norms (Miller 1986). New services generally require more support from the firm’s organizational structure, such as human resource development, process definition, and management support (Edgett and Parkinson 1993; Menor & Roth (forthcoming) a,b). Thus, careful management of the company’s organizational resources for NSD is essential if the firm hopes to continually create successful new services.

**3.1.3. Physical Resources.** The concept of physical resources is defined to include such assets as the facilities, tangible technologies, capital equipment, geographic location, and raw materials employed by the firm (Barney 1991). Examples of “physical technologies” related to new service development include telecommunications and IT networks, prototyping setups, and computer simulation tools. The linkage between information technologies and business value is critical to many, if not most, service industries (Henderson and Lentz 1996). Service innovation is often triggered by the availability of new technologies (Quinn and Paquette 1990; Banaszak-Holl, Zinn, and Mor 1996). While the presence of widespread computer systems can hamper innovation efforts because of the complexities involved in changing them (Voss et al. 1992), the service sector’s rampant acquisition of IT indicates a willingness to take that risk.

There has been significant research offered to support the idea that resources, and their resulting competencies, are the result of, and contribute to, dynamic growth and decision making within the firm over time (Leonard-Barton 1992; Teece and Pisano 1991; Mata, Fuerst, and Barney 1995; Collis and Montgomery 1995). The ability to compete based on a firm’s new service development abilities is partly dependent upon a continually evolving and changing network of internal and external resources. Therefore, the importance of the firm’s NSD resources, and thus the consequences associated with its resource-oriented NSD practices, should not be ignored.

### 3.2. Process-Oriented Practices

The NSD process employed by the firm is a vital element in the development of new services (Reidenbach and Moak 1986; de Brentani 1995, 1989; Cooper et al. 1994; Edgett 1994; Voss et al. 1992; Storey and Easingwood 1993; Cooper and de Brentani 1991; Menor & Roth (forthcoming) a,b). Indeed, the better we understand the tasks involved in developing new services, the easier it is to replicate, convey, and improve them (Ferdows 2006). While there have been a number of proposed general models for the NSD process, as noted above, the one adopted here closely resembles the four-stage model proposed by Johnson et al. (2000). That model is a relatively recent attempt to synthesize and integrate previous models from the operations management, product development, and NSD literature, so it reflects a centrist perspective of the NSD process. Also, the four-stage model is intuitive and uncomplicated. And, because it is derived from models developed for a variety of industries and tested in diverse settings, it seems to be highly generalizable; industry- or firm-specific idiosyncrasies are

not embedded within its structure. With that in mind, the four generalized stages of the NSD process that correspond to our process-oriented NSD practice sub-categories are described in greater detail below.

**3.2.1. Design Stage.** The design stage is concerned primarily with the generation, evaluation, and screening of ideas for new services (i.e., creation of the new service *concept*). Since new concepts may come from sources other than the firm’s customers and employees, market acuity (or the constant assessment of relevant markets and competitors) has been shown to be an advantage in services (Roth 1993; Roth and Jackson 1995). This stage also involves the formal definition of objectives for the new service offering, such as target market and financial performance goals (i.e. the new service strategy). This stage might include practices aimed at extracting better concepts from information about complex or interrelated design components once customer requirements have been at least loosely identified (Mullins et al. 2005). Finally, the design stage also usually includes some sort of initial concept testing. This may involve obtaining informal (or formal) customer feedback or discussing the concept with employees.

**3.2.2. Analysis Stage.** The analysis stage provides an opportunity for the firm to critically evaluate the strategic, financial, and market-performance potential of the new service concept. Formal business analyses are performed, for example, in order to determine whether the concept is likely to fit well within the firm’s other existing service offerings, meets the firm’s minimum ROI or market share goals, and is aligned with the organizational strategy. As one manager put it, one of her company’s most valuable NSD-related skills was “identifying the marketability of additional services.” If the concept looks promising, a formal project may be authorized to carry the concept through the development stage to final commercialization and launch. Project authorization may also be accompanied by the assignment of a dedicated development champion, a project manager, and/or development team.

**3.2.3. Development Stage.** The development stage encompasses many important activities and practices that are necessary to convert the initial concept into a viable, marketable new service offering. During this stage, the service processes that will be used during the delivery of the service are worked out and refined. The systems and infrastructure that need to be in place to support the service

process are similarly outlined and refined. Prototyping and market testing are also important practices usually carried out during the development stage. Finally, the firm should begin to ready its people and administrative systems to deliver and support the new service, through proper training and hiring and the establishment of appropriate reward systems. This can be difficult to achieve, as one of our interviewed managers said when asked about training front-line staff: “We train them as best we can, but there’s never enough time. . . it’s a sore spot.”

**3.2.4. Launch Stage.** The launch stage completes the typical NSD process via practices that bring the new service offering to the market. Formalized promotions and advertising are usually considered appropriate practices during the launch stage. Customer training also usually occurs at this stage. Gathering of marketing data and customer feedback is vital to ensure that the new service is providing what customers anticipated and to uncover any unforeseen lapses in the service process or system. Once the launch stage is complete, comprehensive post-launch analysis may be desired in order to assess how well the NSD process and marketing efforts performed and to provide feedback for improving the firm’s NSD efforts.

These four stages neatly structure the many different broad-based practices that, taken together, create the top-level new service development process. While not explicitly discussed here for the sake of parsimony, NSD process models also usually involve feedback (and sometimes feed-forward) loops so that information obtained during the later stages may be used to modify the resulting service offering prior to final launch (Menor, Tatikonda, and Sampson 2002). Taking the entire process into consideration, it is not surprising that studies have found a relationship between the NSD process and the success of the resulting service offering. Reidenbach and Moak (1986) even found a significant relationship between new service development practices and the overall, long-term performance of certain banking institutions. More recently, Vermeulen, De Jong, and O’Shaughnessy (2005) empirically showed a relationship between NSD practices and performance. Thus, it seems reasonable to consider that the set of process-oriented practices that develop a formal process to convert ideas into viable new services may have a significant impact on the firm’s competitiveness.

While both theoretical and empirical evidence has been cited to support the RPF, its ability to represent and codify key constructs remains untested. The next section offers some empirical evidence supporting the definition and organization of NSD

practice categories and constructs as represented in the framework.

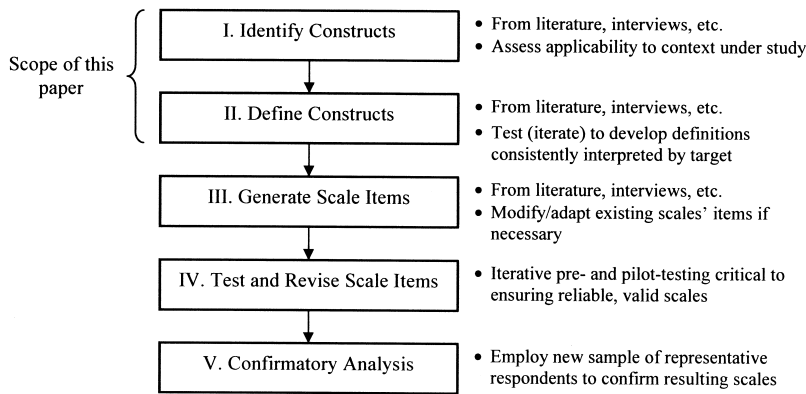
## 4. Research Approach

Empirical research in POM relies heavily on iteration between theory-building and theory-testing activities. Many important NSD papers in service operations management have offered a compelling new model or framework and left it up to subsequent research to develop the constructs and operational measures necessary to test the ideas. Here, in addition to presenting an integrative framework, we have attempted to take a first step toward providing empirical evidence in support of the model’s categories and subcategories and their associated construct definitions.

The rigorous definition of theoretically sound constructs and the specification of their content domain are necessary first steps for high-quality empirical research in general (Pedhazur and Schmelkin 1991; Churchill 1995). Because a key weakness of many studies has been the lack of attention to defining salient constructs (MacKenzie 2003) and because the RPF is intended to organize and define NSD practice constructs in a theoretically meaningful and pragmatic way, the second contribution of this research is preliminary external confirmation of the model by managers and executives who are actively involved in NSD across a variety of service industries. The third contribution is to highlight an approach that is especially useful for construct development in areas of emerging importance to POM, where the concepts are ill-defined and less structured. Figure 2 illustrates the steps common to empirical measurement development and highlights the subset of steps covered by this paper.

To populate our framework with relevant NSD practice constructs and assess the content domain, we reviewed the NSD literature, had conversations with practitioners, and gathered together a representative set of NSD-related practice construct descriptors associated with each of the seven subcategories in Figure 1. Thus, we had some assurance that our categories and subcategories adequately resemble the domain of NSD process- and resource-oriented practices (Nunnally 1978; Rungtusanatham 1998). As a result of our search, we identified more than 200 tasks, activities, and practices as contributing to effective new service development. These practices were then examined for significant connotative similarities. Some were nearly identical across multiple studies, which condensed the list to 44 unique NSD practice constructs. This first step is consistent with much of the content and construct

Figure 2 Generic Measurement Development Steps and Scope of This Paper.



development work in OM (e.g., Ahire, Golhar, and Waller 1996; Hensley 1999). While much of the extant OM empirical literature then proceeds directly to multi-item measurement scale development, few studies we have seen have attempted to iterate through multiple rounds of *construct* definition refinement and content categorization that are precursors to item writing. We detail our approach next.

4.1. Expert Judges

Our initial step toward empirical assessment of the framework involved using expert judges to categorize the NSD practices over four independent sorting rounds. In total, we involved 19 senior managers with diverse and extensive experience in new service development (see Table 1 for a description of the study participants). A different subset of these executives was employed for each sorting round of categoriza-

tion, with 10 managers in this first round, 2 managers in each of the second and third rounds (fewer judges were used in these rounds to accelerate the “assess-modify” iteration), and 4 managers in the final round (one judge did not complete the sorting exercise). Categorization was stopped after four rounds because acceptable levels of inter-judge agreement were achieved in categorizing the NSD practice constructs.

One key concern during the study was the employment of seasoned service professionals with experience in the development of new service products. Several studies have shown that the use of “expert” witnesses, or, at the least, judges who are highly representative of the population to which the study hopes to generalize, adds significant strength to the preliminary results of the study. For example, Anderson and Gerbing (1991) showed that a pretest assessment by even a very small sample of moderately experienced

Table 1 Summary Information for Respondents and Participating Organizations (N = 19)

Positions of respondents	Industry	No. of firms
Marketing Manager	Financial	5
Vice President, Energy Services	Healthcare	5
Director, Healthcare Coordination Services	Education	3
Vice President, Executive Staff	Media/communications	3
Manager of IT	Food services	1
President	Pharmaceuticals	1
Director, Administration and Academic Development Administrator	Utility	1
Executive Director	Employees	No. of firms
Product Planning Manager	<100	5
Medical Director	101–1000	7
Vice President, Product Development	>1000	7
Associate Dean, Curriculum Development	Annual revenue	No. of firms
CIS Manager	<\$100MM	4
Director of Planning	\$100MM–\$1B	5
Manager, Brand Marketing	>\$1B	2
Vice President/Director of Sales and Marketing	n/a	8
Director of Marketing		
Director of Product Development		

judges was very useful. Research by Maurer et al. (1991) demonstrated that studies using expert judges require fewer observations to achieve the same (or higher) levels of reliability as studies that employ nonexpert judges. Their findings recommend the use of between 5 and 18 expert judges to achieve traditionally acceptable levels of generalizability.

When seeking out these key informants and expert judges for participation, the study followed well-established guidelines (Mitchell 1994): participants were screened to ensure they were knowledgeable in the area of new service development; similarly ranked executives in all firms were sought, and their time and expertise were valued and respected. Thus, the quality and number of judges employed in this study follows precedence and generally recommended practices for this type of exploratory research.

#### 4.2. Sorting Method and Construct Refinement

Note that the structure of the RPF is hierarchical: two top-level NSD practice categories (resource-oriented and process-oriented) are further divided into a total of seven subcategories. Thus, due to the RPF's hierarchical presentation, a two-step sorting technique was employed to allocate the 44 representative NSD practice constructs that we found in the NSD domain. First, in the top-level categorization portion of the exercise, each expert judge was provided with operational descriptions of the two top-level NSD practice categories (i.e., resource-oriented and process-oriented) and the seven subcategories shown in Figure 1. The judge was then asked to allocate cards bearing the names and descriptions of the 44 NSD practice constructs into just the *two* top-level practice categories.

Once finished with the first step (i.e., the top-level sort), the judge was then asked to complete the second step. The judge allocated each of the practice constructs that s/he had indicated were *resource-oriented* to one of the three resource-oriented NSD practice subcategories (i.e., intellectual, organizational, and physical). The judge finished the exercise by allocating each of the practice constructs s/he had indicated were *process-oriented* to one of the four process-oriented subcategories (i.e., design stage, analysis stage, development stage, and launch stage). The sorting was without replacement and forced-choice (i.e., no practice may be reallocated or remain unallocated).

At the end of each sorting round, we interviewed the judges involved in that round and asked them to describe why they had allocated certain practice constructs to certain categories and subcategories in the RPF. We also inquired as to whether we were missing any important practices for each category. This provided additional qualitative insights into their choices

and aided in refining the wording of each construct definition. Then, those constructs exhibiting less-than-desired levels of inter-judge agreement (the estimation of which is detailed below) were examined by the researchers for semantic or content-related incongruities that may lead to disagreement by the judges in categorizing the practice constructs. While some level of disagreement is expected due to differences across industries, organizations, and professional experience, our goal was to make the category and practice construct descriptors as generic and hence generalizable as possible for service organizations.

This two-step approach, advocated by Anderson and Gerbing (1991), is more appropriate than a single one-stage sort (e.g., Moore and Benbasat 1991; Roth et al. (forthcoming)) because of two advantages. First, it better preserves the hierarchical structure of the organizing mental model (Figure 1). Second, because of the number of constructs involved, it provides a simpler task for the respondent by asking him or her to allocate the practice constructs to just one of two, three, or four categories instead of seven. Note that in our initial development of this research approach, we found that respondents had cognitive difficulty remembering the definitions for, and simultaneously considering, *seven* different categories (versus two, three, or four). Thus, for this research, a single-stage approach was much more difficult for judges to accommodate, and, as a result, would have been detrimental to the precision and consistency of their decisions.

#### 4.3. Measures of Inter-Judge Agreement

Due to our two-stage, hierarchical sorting process and our use of more than two judges in some rounds, many agreement metrics (such as those proposed in Cohen (1960), Perreault and Leigh (1989), and Rust and Coil (1994)) were inappropriate for our application. These inter-judge agreement metrics are based on an assumption that there is an equal probability of an item being “wrongly” placed in any category. This assumption is violated in our application. The hierarchical structure of the RPF creates different probabilities of incorrect placement depending on whether the practice construct is first allocated to the Process side (which results in a 1-in-4 chance of assignment to any process subcategory) or to the Resource side (which creates a 1-in-3 chance of assignment to a resource subcategory). As a result, two inter-judge agreement metrics were available for our purposes: (1) *percent agreement* (PA) and (2) the *item placement ratio* (IPR) (Moore and Benbasat 1991). Neither of these two metrics assumes equal assignment chances (examples of PA and IPR calculations appear in Appendix A).

Percent agreement is the ratio of all pairwise agreements *achieved* among the judges across all practices and subcategories divided by all *possible* pairwise agreements. It therefore ranges from 0.0 to 1.0, with 1.0 indicating perfect agreement among the judges. PA is used here only as a baseline agreement measure because its weaknesses as a stand-alone metric are well known (Grayson and Rust 2001).

The second metric employed here, Moore and Benbasat's (1991) IPR, is subcategory-specific. It reflects the ratio of "correct" assignments to total assignments, summed over all practices belonging to a particular subcategory. While the IPR does not rely on the distribution assumptions that rule out the use of some other reliability metrics, an assessment of what may be considered an adequate IPR score has not yet been developed. The results of our preliminary empirical assessment are detailed next.

## 5. Results

### 5.1. Overall Results

The results appear to be a coherently organized set of practice constructs that are useful for thinking about how firms manage their NSD resources and execute their NSD processes. The assignment results are summarized in Table 2, which shows the percentage of judges assigning each practice construct to its expected category in that round.

Table 3 presents the results of each pretest round of categorization using the two measures of inter-judge agreement, PA and IPR, discussed earlier. The percentage agreement across all subcategories and practice constructs is provided for each round in the first row of Table 3. The subcategory-specific IPRs are then shown along with an average of the IPRs for each round. Again, while there are no strict guidelines or minima for these measures, higher scores are better. The complete IPR tables for each round are provided in Appendix B.

The results shown in Table 3 provide some assurance that agreement did improve, although not necessarily in a linear fashion, over the course of the four rounds. The results from round 2 for a few of the categories do not seem to fit with the general improvement trend observed over the entire sequence of all four rounds. This may be due to anomalous characteristics of one or both of the judges employed for that round; one judge, who came from an IT background, was relatively new to NSD in his firm, and the other manager oversaw NSD efforts at her firm (a healthcare provider) as part of a broader set of duties. A larger number of judges may have been useful in "averaging out" the possibly atypical perspectives of one or both

of these judges. In general, the results seem to indicate that the independent sets of judges agreed fairly consistently by the end of the fourth round, with IPR scores of 0.70 to 0.85 across all categories.

The resulting NSD practice constructs and their descriptors are listed in Table 4. The references cited for each NSD practice construct in Table 4 are not necessarily exhaustive, nor are the lists of practice constructs themselves—they are provided here as a potential starting point for future, and possibly more comprehensive, examinations of the topic.

### 5.2. Nonconverging Practice Construct Definitions

While the overall structure of the RPF is generally supported, some NSD practice constructs were still associated with more than a single practice subcategory, posing a threat to construct consistency. Even though most practice construct definitions achieved suitable levels of agreement by the judges, a minority of practice constructs did not. This outcome is indicative of the great difficulty associated with arriving at widely agreed upon definitions that can be consistently applied across a variety of service industries. Eleven of our NSD practice constructs were not consistently sorted by the end of the final categorization round. These are listed in Appendix C, and our treatment of the more interesting cases is described in the following paragraphs. By using insights gained from our conversations with the practitioners and the results of the sorting exercise, we generated revised descriptions for each of the nonconverging NSD practice constructs and included them in Table 4.

The *Employee Design Input* practice construct, believed to contribute primarily to the firm's intellectual NSD resources, was felt by one judge to be an important element of the *design* stage of the NSD process and by another judge to focus on developing *organizational* NSD resources. The literature suggests that this practice should be an ongoing activity with little or no direct relationship to a specific project (de Brentani 1989, 1995). As one manager put it, "why wouldn't you do this *all* the time?"

The *External Communication* practice construct was allocated once each to *Resources—Organizational* and *Process—Development Stage*. Due to fundamental differences between organizational and intellectual resources (Barney 1991), we pressed the experts in follow-up discussion and found that a modified practice construct description may reduce the disagreement. Because this practice is expected to belong in the *Resources—Intellectual* category (Voss et al. 1992; Edvardsson and Olsson 1996), it might be better described as, "Establish and maintain good communication with suppliers, partners, and customers outside the firm as

**Table 2** Summary Results from Categorization Exercises

Subcategory	Practice construct	Percentage of judges assigning construct to subcategory			
		Round 1, 10 judges	Round 2, 2 judges	Round 3, 2 judges	Round 4, 4 judges
Process—Design Stage	Customer design input	50	50	100	100
	Alliance design input	50	50	0	75
	Customer concept feedback	50	50	100	75
	Customer focus	40	0	100	75
	Strategic definition	80	50	100	75
	Development motivation <sup>1</sup>	40	0	100	50
Process—Analysis Stage	Financial analysis	90	50	50	100
	Project authorization	70	50	50	100
	Competitor analysis	30	50	100	75
	Market research	30	50	100	75
	Product line analysis	60	50	50	75
	Evaluation of alternatives <sup>1</sup>	30	2	2	2
Process—Development Stage	Pre-launch testing	100	100	50	100
	Prototyping tools	70	50	100	100
	Staff training	50	50	100	100
	Market confirmation	40	0	100	75
	Service fail-safing	90	100	100	75
	Staff recruiting	20	50	50	75
	Technology development	20	0	50	75
	Process flowcharting <sup>1</sup>	30	50	100	50
	Multilevel development <sup>1</sup>	50	0	0	2
	Customer interaction <sup>1</sup>	20	2	2	2
Process—Launch Stage	Formalized launch	100	50	100	100
	Formalized promotion	80	100	50	100
	Post-launch evaluation	90	100	100	100
	Expectation setting	20	100	100	75
	Customer training <sup>1</sup>	40	50	100	50
	Internal promotion <sup>1</sup>	20	50	50	50
Resources—Intellectual	Diverse creativity	80	100	100	100
	Idea generation	70	50	100	75
	Idea evaluation	60	0	100	75
	Employee design input <sup>1</sup>	60	50	100	50
	External communication <sup>1</sup>	70	50	50	50
Resources—Organizational	Development champion	70	50	50	100
	Employee motivation	50	50	50	75
	Internal communication	50	0	100	75
	Lines of responsibility	80	50	100	75
	Managerial support	90	50	100	75
	Reward structure	90	50	50	75
	Development team diversity <sup>1</sup>	70	50	50	25
Resources—Physical	External connectivity	2	100	50	100
	Physical facilities	80	100	100	100
	Communication enablement	80	100	100	75
	Systems compatibility	70	50	50	75
	Back-office development <sup>1</sup>	40	50	50	50

<sup>1</sup> Low convergence construct (see Section 5.2).

<sup>2</sup> Practice construct not included in categorization round.

potential sources of new ideas and enhanced market insight.” *Development Team Diversity* presents the most disappointing, and yet most interesting, categorization pattern of all the practice constructs. It was allocated to the *Process—Development Stage* scale by one judge who expressed the fact that, in his organization, it was at this point in the NSD process when team

assignments are made. It was also allocated by half of the judges into the *Resources—Intellectual* scale. This suggests a belief that having members from many areas within the organization involved in the NSD effort contributes more toward developing *intellectual* resources than toward developing organizational resources. While the ability to work and function effec-

**Table 3** Inter-Judge Agreements: Percent Agreement and Item Placement Ratio

Agreement metrics	Round 1 (10 judges)	Round 2 (2 judges)	Round 3 (2 judges)	Round 4 (4 judges)
Percent agreement (PA) over all practices	44%	23%	58%	60%
Item placement ratio (IPR) for each subcategory				
Process—Design Stage	0.52	0.33	0.83	0.75
Process—Analysis Stage	0.56	0.50	0.70	0.85
Process—Development Stage	0.53	0.50	0.81	0.81
Process—Launch Stage	0.58	0.75	0.83	0.79
Resources—Intellectual	0.68	0.50	0.90	0.70
Resources—Organizational	0.71	0.43	0.71	0.71
Resources—Physical	0.68	0.80	0.70	0.80

tively in teams has widely acclaimed virtues, the fact that the members represent various functional areas adds the notion of different knowledge contributions. To reflect this dichotomy, this practice might best be divided into two more appropriately specific practices. One practice, associated with the *Resource—Organizational* category, should be, “Develop your employees’ ability to work effectively in cross-functional NSD teams.” The other practice, indicative of the *Resources—Intellectual* category, should read, “Promote the sharing of ideas and knowledge related to NSD across functional boundaries within the organization.” The two new practice constructs are included in Table 4 and replace the original “development team diversity” practice construct.

After the first and third categorization rounds, respectively, the *Customer Interaction* and *Multilevel Development* practice constructs were no longer included. This was done because we found no strong association between these constructs and any *one* of the four process-oriented or three resource-oriented practice categories. Because it is possible that a clearer practice description may help align these constructs with their theory-based categories more consistently in the minds of managers, revised wording for each of these two practice constructs is included in Table 4.

After the first round, the *Evaluation of Alternatives* practice construct was dropped based on a lack of conceptual coherence, relatively low relationship with any specific category, and structured feedback from our managerial participants. While it conceivably belongs in the *Process—Analysis* category, the firm *should* be considering alternative means for providing the service continuously before, during, and after any NSD effort. Thus, this practice is *not* clearly and strongly related to any *one* stage of the development process, nor does it seem related to developing any NSD-related resources. While a potentially valuable organizational activity in general, it did not appear to be associated with any distinct NSD practice subcategory in our framework.

Obviously, there is great potential for researching

the reasons for, and implications of, these findings. While tentative, our rigorous approach to construct development suggests that going beyond conventional wisdom by coupling resource-oriented NSD practices with those that are process-based presents significant opportunities for further research. It also demonstrates the importance of using a systematic approach for construct definition and refinement prior to developing operational measures. Our general conclusions about this research, as well as its limitations and possible extensions, are discussed in the next section.

## 6. Discussion

Overall, the Resource-Process Framework of NSD proposed here appears to accomplish our objectives of defining and organizing NSD practice constructs in a meaningful way and of reinforcing the importance of resource-oriented activities. The RPF appears to offer a valuable, theory-based structure in which NSD practices can be organized and studied by researchers. It also provides a practical structure against which organizations can benchmark, evaluate, and manage their NSD-related activities. In addition, by providing tentative support for these NSD practice construct definitions, we contribute to theory-building in NSD. Frameworks, nomological networks, and construct definitions also serve as precursors to the development of multi-item measurement scales, which are necessary for subsequent theory building and empirical theory testing (Pedhazur and Schmelkin 1991; Churchill 1995). We have provided evidence supporting a rigorous, structured foundation for future research on NSD practices that expands current thinking on NSD in OM by considering both resources and processes.

### 6.1. Conclusions

The topic of NSD is quickly rising to the top of many organizations’ strategic and operational improvement agendas, and the traditional focus on the NSD *process* has provided some important insights. However, ad-

ditional capability and efficacy should be achievable by paying close attention to *resource-building* practices as well. NSD practices that focus on creating and maintaining the critical resources utilized during the firm's NSD initiatives are posited to help service firms compete based on their capability to innovate and develop new services.

The framework we have presented here, and for which we have offered a representative set of theoretically important NSD practice constructs, should prove useful to researchers in that it organizes NSD practices in a straightforward manner highly aligned with managerial thinking. This should facilitate future research on new service development. While we specifically developed our constructs for service industries, future research can determine their applicability for manufacturers that desire to introduce new services as part of their product portfolio. Thus, we have taken the initial step of construct definition and content domain with the hope of stimulating much-needed research on NSD.

Our conceptual framework should also be useful to practitioners because it highlights the importance of resource-building practices associated with NSD. In our discussions with managers directly involved in NSD, several were much more familiar with the more traditional process-oriented practices, while the resource-oriented practices discussed here had never been organized for them before in any coherent manner. Perhaps consequently, it was rare for their organizations to exhibit any concerted or organized effort at establishing and maintaining most of these resource-oriented practices. Often, these activities were relegated to other departments, such as in HR's role in hiring or in IT's role in making communication technologies available to the workforce. Yet, many managers in the study suggested that the impact of these resource-oriented practices on the firm's ability to develop new services, a strategically vital function for many organizations, should not be overlooked. They understood and appreciated the potential benefits of taking a broader perspective of NSD. We believe this framework will help service managers think differently, and perhaps more pointedly, about their NSD resources, and that can only improve their long-term capabilities.

## 6.2. Limitations of This Study

Although this paper provides some new insight into NSD practices, certain limitations should be noted and addressed through future research. First, the goal of this study was to develop an organizing framework of well-defined NSD practice constructs and to offer preliminary empirical evidence of its concurrence from

NSD practitioners. As a result, we arrived at 45 practice constructs related to NSD. Given the effort involved in determining precise and relevant NSD practice constructs, it was beyond the scope of this paper to also develop detailed sets of measurement items tapping into each construct. Consequently, we have not made an attempt here to explicitly develop the multi-item measurement scales that will be necessary for future modeling of relationships involving these NSD practice constructs and performance. We do hope, however, that the rigor of our framework and definitions will aid in this valuable research extension in the near future.

Second, our "sample" of expert judges was one of convenience and was relatively small. These issues restrict the study's generalizability somewhat. It is our hope that the use of senior managers with significant experience in service development covering multiple sectors would help mitigate this limitation to generalizability. Further development of NSD practice category membership should be performed in the future, preferably using a combination of large-sample and case/field-study methods covering the spectrum of services.

A third and less obvious limitation of the study deals with the nature of the category assignment tasks given to the participants. By restricting their assignment of each practice construct to a distinct category, the *degree* of membership in one category versus another was not considered. Thus, a manager's view that a given practice represents one category "slightly more" than it represents another is not distinguished from a different manager's view that the practice is *overwhelmingly* a member of a category. This lack of "degree" of category membership potentially reduces our ability to discriminate strong category membership from marginal category membership.

Finally, this paper does attempt to accommodate or consider industry-specific practices. Our goal was a generic, generalizable framework of NSD, and we hope that researchers interested in specific service industries will adapt and extend the RPF to their particular research frames by adding industry-specific NSD practices.

## 6.3. Opportunities for Further Research

The most obvious extension of this research is to move forward in the empirical research process toward the development of multi-item measurement scales that tap into each construct we have identified and defined. This operationalization of the RPF constructs could then be used to assess, on an organizational level, each of the NSD practices identified and defined here. While this work has taken only the very first step

**Table 4** Final Suggested NSD Practice Construct Descriptors

Subcategory	Practice construct	Construct description/definition	Sample references
Process—Design Stage	Customer design input	Gather input from customers during initial conceptualization of the new service	Edvardsson and Olsson (1996); Cooper et al. (1994); Bitran and Pedrosa (1998); Goldstein et al. (2002)
	Alliance design input	Present the initial new service concept to suppliers and partners for early feedback and input prior to beginning formal design	Edvardsson and Olsson (1996); Loch, Stein, and Terwiesch (1996)
	Customer concept feedback	Obtain customer feedback on the initial new service concept prior to beginning formal design	Cooper and de Brentani (1991); de Brentani (1995); Goldstein et al. (2002)
	Customer focus	Focus on meeting the needs of a specific customer or market segment during initial conceptualization of the new service	Hedvall and Paltshchik (1991); Cooper et al. (1994)
	Strategic definition	Define and communicate strategic goals for the new service concept	Meyers (1984); Bitran and Pedrosa (1998)
	Development motivation	Ensure that the new service concept meets real customer or business need (versus just using the latest technology)	Edvardsson and Olsson (1996)
Process—Analysis Stage	Financial analysis	Analyze the financial/economic viability of the new service concept prior to beginning formal development	Cooper and de Brentani (1991); de Brentani (1995, 1989); Edvardsson and Olsson (1996); Reidenbach and Moak (1986)
	Project authorization	Formally approve and authorize the new service development project	Meyers (1984)
	Competitor analysis	Analyze and consider competitors' strategies and services when evaluating the viability of the new service concept	Meyers (1984); Roth and Jackson (1995); Cooper et al. (1994); Roth (1993); Thwaites (1992); de Brentani (1989); Edvardsson and Olsson (1996)
	Market research	Perform an in-depth market analysis to help define the initial new service concept prior to beginning formal design	Edvardsson and Olsson (1996); de Brentani (1989, 1995); Cooper et al. (1994); Cooper and de Brentani (1991)
	Product line analysis	Analyze existing product line to identify synergies and conflicts with the new service concept	Bitran and Pedrosa (1998); Evangelist et al. (2002)
Process—Development Stage	Pre-launch testing	Fully test and “debug” new service prior to launch	Cooper and de Brentani (1991); de Brentani (1989, 1995); Voss et al. (1992)
	Prototyping tools	Use prototyping tools to test new service process/system	Bitran and Pedrosa (1998); Cooper et al. (1994); Edvardsson and Olsson (1996); Loch, Stein, and Terwiesch (1996); Reidenbach and Moak (1986)
	Staff training	Extensively train front-line staff on how to support the new service being developed	Loch, Stein, and Terwiesch (1996); Cooper et al. (1994); de Brentani (1989, 1995); Edvardsson and Olsson (1996); Cooper and de Brentani (1991)
	Market confirmation	Conduct market tests in order to confirm the new service product is marketable, appropriately developed, and ready for launch	Cooper et al. (1994); Bitran and Pedrosa (1998); Reidenbach and Moak (1986)
	Service fail-safing	Reduce potential sources of error/variance in new service	Stewart and Chase (1999); Stewart and Grout (2001); de Brentani (1989)
	Staff recruiting	Recruit and hire new front-line staff that will be needed to offer the new service offering	Bitran and Pedrosa (1998); Edvardsson and Olsson (1996)
	Technology development	Identify and analyze conflicts between the new service concept and currently existing IT systems	Identified by practitioners
	Process flowcharting	Create a service “blueprint” in order to solidify the processes, people, and information flows involved in providing the new service	de Brentani (1989, 1995); Shostack (1984); Cooper and de Brentani (1991)
	Multilevel development	Ensure that both core and supporting services are co-developed prior to launch of the new offering	Bitran and Pedrosa (1998); Edvardsson and Olsson (1996)
	Customer interaction	Development the new service so that the customer will have positive interactions with other elements of the service environment	Edvardsson and Olsson (1996); Bitran and Pedrosa (1998); Cook et al. (2002); Hill et al. (2002)
Process—Launch Stage	Formalized launch	Develop and implement a detailed program to launch new service	de Brentani (1989, 1995); Cooper and de Brentani (1991); Bitran and Pedrosa (1998)
	Formalized promotion	Implement a detailed promotional program for the newly introduced service	de Brentani (1989, 1995); Cooper and de Brentani (1991); Reidenbach and Moak (1986)
	Post-launch evaluation	Formally evaluate the development and introduction of new service after launch	Voss et al. (1992); de Brentani (1989, 1995)
	Expectation setting	Establish realistic expectations in your customers for the newly introduced service through appropriate marketing	Edvardsson and Olsson (1996)
	Customer training	Train new customers how to use newly introduced service	Edvardsson and Olsson (1996); Bitran and Pedrosa (1998)
Process—Launch Stage (cont'd)	Internal promotion	Market and promote the new service to front-line employees and others involved in supporting it	Cooper and de Brentani (1991); Voss et al. (1992); Edvardsson and Olsson (1996); Cooper et al. (1994); de Brentani (1989, 1995)

Table 4 (cont'd)

Subcategory	Practice construct	Construct description/definition	Sample references
Resources— Intellectual	Diverse creativity	Cultivate and utilize a variety of sources for new ideas	Loch et al. (1996); de Brentani (1989)
	Idea generation	Develop both formal and informal methods of generating new service ideas	Reidenbach and Moak (1986); de Brentani (1989); Thwaites (1992)
	Idea evaluation	Develop both formal and informal methods of evaluating new service ideas	de Brentani (1995); Cooper and de Brentani (1991)
	Employee design input	Actively consider ideas and suggestions from employees for new service ideas and improvements	de Brentani (1989, 1995)
	External communication	Establish and maintain good communication with suppliers, partners, and customers outside the firm as potential sources of new ideas and enhanced market insight	Voss et al. (1992); Edvardsson and Olsson (1996)
	Diversity appreciation <sup>1</sup>	Promote the sharing of ideas and knowledge related to NSD across functional boundaries within the organization	Froehle et al. (2000); Edvardsson and Olsson (1996); Terrill (1992); de Brentani (1989); Loch et al. (1996)
Resources— Organizational	Development champion	Establish and empower a new service development “champion” to oversee and manage the firm’s new service initiatives	Voss et al. (1992); de Brentani (1989)
	Employee motivation	Motivate staff to help support the firm’s new service development efforts	
	Internal communication	Ensure that functional areas or departments involved in developing new services communicate effectively with each other	Meyers (1984); de Brentani (1989); Voss et al. (1992); de Brentani (1995); Lievens and Moenaert (2000)
	Lines of responsibility	Make sure the firm’s organizational structure defines lines of responsibility and authority for developing new services	Edvardsson and Olsson (1996)
	Managerial support	Require support from and involvement of senior management	de Brentani (1989); Chiesa, Coughlan, and Voss (1996)
	Reward structure	Base rewards on performance of NSD team (versus individual reward)	
	Team development <sup>1</sup>	Develop your employees’ ability to work effectively in cross-functional NSD teams	Froehle et al. (2000); Edvardsson and Olsson (1996); Terrill (1992); de Brentani (1989); Loch et al. (1996)
Resources— Physical	External connectivity	Create information/telecom systems capable of enhancing communication with suppliers, partners, and customers	Froehle et al. (2000)
	Physical facilities	Provide appropriate physical facilities for new service development efforts	Bitran and Pedrosa (1998)
	Communication enablement	Create information/telecom systems capable of enhancing communication among staff	Froehle et al. (2000); Ray et al. (2004)
	Systems compatibility	Ensure that the IT systems used by those developing new services are compatible	Van Reil, Lemmink, and Ouwensloot (2004)
	Back-office development	Maintain back-office and administrative IT systems that can support the firm’s new service development efforts	Edvardsson and Olsson (1996)

<sup>1</sup> These resulted from splitting the original “Development Team Diversity” practice construct into two separate practice constructs.

in this process—identification and rigorous definition of key constructs—the next valuable step would be to operationalize these constructs and develop reliable and valid multi-item measurement scales. The work performed in this paper facilitates this follow-up effort by helping ensure that the constructs are appropriately defined and that the construct “space” is theoretically mapped prior to initiating the development of actual scale items.

Second, there is certainly some interesting potential to examining the NSD practices *within* each of the subcategories included in the RPF. We have not attempted to order the practice constructs within each subcategory in terms of temporality or importance, yet

there may be instances where precedence or priority may be evident in practice. For example, within the Development process stage, some have suggested that “blueprinting” should precede the training of new staff, since the blueprint itself can be a valuable training tool (de Brentani 1989). But, are there instances where the new staff themselves could, or should, help blueprint the service process, thereby necessitating that those practices be reversed or concurrent? Similar questions can be raised about NSD practices in each RPF subcategory, possibly resulting in a series of testable propositions of the form “practice X occurring before/after/concurrent with practice Y results in better performance for the service/business unit/firm.”

A third, and perhaps the most daunting, extension would be to perform an empirical test of the impact of these resource-oriented practices on performance. While some research has already shown that NSD process activities can influence organizational performance, to our knowledge there has been no explicit empirical test of the resource-building practices we have identified in this paper. Process performance can be a valuable outcome variable to understand the impact of resources (Ray, Barney, and Muhanna 2004) and, by extension, resource-oriented practices. One possible proposition resulting from this observation could be that firms that actively and effectively manage *both* types of NSD practices—resource-oriented and process-oriented (per the RPF)—exhibit better performance for the firm or resulting service offerings than firms that focus exclusively on the process (or the resources). The causal direction of the effect should be both carefully constructed theoretically and rigorously tested through empirical study. Although it may be difficult to show that any one of these NSD practices contributes significantly to firm performance, we do expect them to have an effect within the larger organizational NSD effort. As Bromily (2005) points out, “many things a firm does lack intrinsic value, but rather interact with other organizational activities to contribute to the value the firm creates” (p. 95). Thus, the most viable approach to studying this issue may perhaps be to examine the *systems* (combinations of practices, processes, and resources) that firms use to carry out their NSD initiatives, which is inherently more inclusive, and, therefore, more challenging, than studying the firm’s NSD process alone.

Finally, we could consider extending the RPF’s scope of application. There has been some evidence that the manufacturing and service industries lie along a continuum and that some differences between them are slowly disappearing (Wyckoff 1996; Anderson, Fornell, and Rust 1997; Edvardsson and Gustavsson 2003; Roth and Menor 2003; Hull 2004; Sampson and Froehle 2006). If this is indeed a more accurate representation, then we should ultimately pursue an integrated development framework that is equally applicable to both services and goods. There has already been some effort to derive models generalizable to either sector, such as those of Bitran and Pedrosa (1998) and Gallouj and Weinstein (1997), but thus far the resource perspective advocated here has not been addressed by such an integrative approach. At the least, research should establish whether this RPF can be extended to new

*product* development. Measurement frameworks for new product development processes have been proposed (e.g., Mallick and Schroeder 2005), and extending these to incorporate resource-based metrics as well appears to be a potentially valuable contribution. A related aspect that should be pursued involves the interorganizational NSD resource implications. There has been some discussion regarding the effects that changes in interdependent relationships have on resource allocation and how this may affect the ability or motivation of firms to develop new services (Banaszak-Holl et al. 1996; Goes and Park 1997). Using the resource-process framework developed above as a starting point, further investigation into these interdependencies seems relevant and warranted.

## Appendix A

### Sample Calculations for Percent Agreement and Item Placement Ratio

**Percent Agreement.** PA is defined as the ratio of all pairwise agreements achieved among the judges across all practices and subcategories divided by all possible pairwise agreements.

**EXAMPLE.** We have the following assignment data for two categories (X or O), three judges (A, B, and C), and three items (1–3):

Judge	Item		
	1	2	3
A	X	O	X
B	X	X	O
C	X	X	O

A scenario with these dimensions contains nine potential pairwise agreements (three for each of the three items). We observe a total of five actual pairwise agreements in the data (three for item 1 and one each for items 2 and 3). Therefore, our PA for these assignment data can be calculated as  $5/9 = 55\%$ .

**Item Placement Ratio.** The IPR is the ratio of “correct” assignments to total assignments, summed over all practices belonging to a particular subcategory.

**EXAMPLE.** Using the same example assignment data as above and hypothesizing that items 1 and 2 actually do belong in category X and item 3 belongs in category O, we can calculate the IPR for each category. Items in category X were placed in category X five times of the six possible, yielding an IPR of  $5/6$  or 0.83. The item in category O was assigned to category O twice of three possible times, yielding an IPR of  $2/3$  or 0.67.

**Appendix B**  
**Item Placement Ratio Results from Categorization Rounds**

Round 1		Category actually assigned						10 Judges		
Target category	Proc—Des	Proc—Ana	Proc—Dev	Proc—Lau	Res—Int	Res—Org	Res—Phy	TOT	TGT %	
Process—Design Stage	<b>31</b>	5	6	0	11	7	0	60	52	
Process—Analysis Stage	14	<b>31</b>	2	0	8	5	0	60	52	
Process—Development Stage	12	12	<b>49</b>	3	12	4	8	100	49	
Process—Launch Stage	1	1	10	<b>35</b>	8	5	0	60	58	
Resources—Intellectual	6	3	2	1	<b>34</b>	3	1	50	68	
Resources—Organizational	3	2	5	2	8	<b>50</b>	0	70	71	
Resources—Physical	0	4	8	0	0	1	<b>27</b>	40	68	
Total item placements: 440	Hits: 257				Overall hit ratio: 58%					
Round 2		Category actually assigned						2 Judges		
Target category	Proc—Des	Proc—Ana	Proc—Dev	Proc—Lau	Res—Int	Res—Org	Res—Phy	TOT	TGT %	
Process—Design Stage	<b>4</b>	3	1	0	3	1	0	12	33	
Process—Analysis Stage	0	<b>5</b>	0	0	3	2	0	10	50	
Process—Development Stage	0	3	<b>8</b>	0	3	2	2	18	44	
Process—Launch Stage	0	0	2	<b>9</b>	1	0	0	12	75	
Resources—Intellectual	3	2	0	0	<b>5</b>	0	0	10	50	
Resources—Organizational	5	1	1	0	1	<b>6</b>	0	14	43	
Resources—Physical	0	1	1	0	0	0	<b>8</b>	10	80	
Total item placements: 86	Hits: 45				Overall hit ratio: 52%					
Round 3		Category actually assigned						2 Judges		
Target category	Proc—Des	Proc—Ana	Proc—Dev	Proc—Lau	Res—Int	Res—Org	Res—Phy	TOT	TGT %	
Process—Design Stage	<b>10</b>	1	0	0	1	0	0	12	83	
Process—Analysis Stage	1	<b>7</b>	1	0	1	0	0	10	70	
Process—Development Stage	1	1	<b>13</b>	0	2	1	0	18	72	
Process—Launch Stage	0	0	2	<b>10</b>	0	0	0	12	83	
Resources—Intellectual	0	0	0	0	<b>9</b>	0	1	10	90	
Resources—Organizational	0	0	0	1	3	<b>10</b>	0	14	71	
Resources—Physical	1	0	1	0	0	1	<b>7</b>	10	70	
Total item placements: 86	Hits: 66				Overall hit ratio: 77%					
Round 4		Category actually assigned						4 Judges		
Target category	Proc—Des	Proc—Ana	Proc—Dev	Proc—Lau	Res—Int	Res—Org	Res—Phy	TOT	TGT %	
Process—Design Stage	<b>18</b>	4	1	0	1	0	0	24	75	
Process—Analysis Stage	2	<b>17</b>	0	0	1	0	0	20	85	
Process—Development Stage	1	2	<b>26</b>	0	3	0	0	32	81	
Process—Launch Stage	0	0	4	<b>19</b>	1	0	0	24	79	
Resources—Intellectual	2	0	1	0	<b>14</b>	3	0	20	70	
Resources—Organizational	0	0	4	1	3	<b>20</b>	0	28	71	
Resources—Physical	0	0	3	0	1	0	<b>16</b>	20	80	
Total item placements: 168	Hits: 130				Overall hit ratio: 77%					

Note. TGT % is the “target %,” or the percentage of actual assignments in the target category.

## Appendix C

### NSD Practice Constructs Exhibiting Low Convergence during Categorization

Practice construct	Expected subcategory	4th Round assignments <sup>1</sup>						
		Process subcategories				Resource subcategories		
		Des	Ana	Dev	Lau	Int	Org	Phy
Development motivation	Process—Design Stage	<b>2</b>	1	—	—	1	—	—
Evaluation of alternatives	Process—Analysis Stage	—	—	Not included in 4 <sup>th</sup> round			—	—
Process flowcharting	Process—Development Stage	1	—	<b>2</b>	—	1	—	—
Customer interaction	Process—Development Stage	—	—	Not included in 4 <sup>th</sup> round			—	—
Multilevel development	Process—Development Stage	—	—	Not included in 4 <sup>th</sup> round			—	—
Customer training	Process—Launch Stage	—	—	2	<b>2</b>	—	—	—
Internal promotion	Process—Launch Stage	—	—	1	<b>2</b>	1	—	—
Employee design input	Resources—Intellectual	1	—	—	—	<b>2</b>	1	—
External communication	Resources—Intellectual	—	—	—1	—	<b>2</b>	1	—
Development team diversity	Resources—Organizational	—	—	1	—	2	<b>1</b>	—
Back-office development	Resources—Physical	—	—	2	—	—	—	<b>2</b>

<sup>1</sup> Number of judges assigning the practice construct to the subcategory.  
Bold indicates “correct” assignments.

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