Customer Co-Creation: A Typology and Research Agenda

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CHAPTER 4

CUSTOMER CO-CREATION

A Typology and Research Agenda

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Abstract

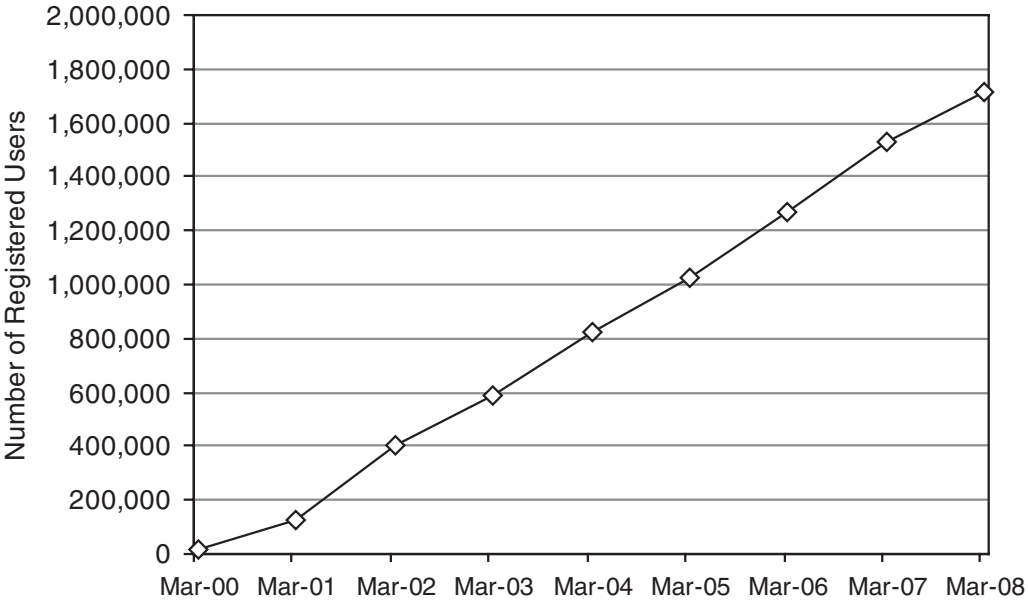
Traditional marketing thought and practice largely view new product development (NPD) as an internal, firm-based activity in which customers are relatively passive buyers and users. This traditional paradigm is currently being challenged by a new perspective in which customers are active co-creators of the products they buy and use. This chapter identifies the origins of this paradigm shift, presents a conceptual typology of four different types of co-creation activity, and offers an agenda for future research of this emerging paradigm.

New product development (NPD) is an important driver of corporate growth and profitability (Sorescu, Chandy, and Prabhu 2003; Wind and Mahajan 1997). Unfortunately, most new products fail to deliver on their objectives (Christensen 1997). Hence, marketing scholars and practitioners have duly devoted substantial attention toward improving NPD processes. This attention has led to several important advances, including the specification of the Stage-Gate model (Cooper 1990), the formulation of sophisticated NPD tools such as conjoint analysis and premarket launch forecasting (Rangaswamy and Lilien 1997), and advances in knowledge about how best to organize and manage NPD teams (Sethi, Smith, and Park 2001).

These core topics of NPD research and practice share an important but often unstated assumption that NPD is essentially an internal, firm-based activity. As recently observed by von Hippel (2005, p. 19), "The idea that novel products and services are developed by manufacturers is deeply ingrained in both traditional expectations and scholarship." Hence, NPD research and practice largely operate under a firm-centered paradigm in which customers are viewed as having little active influence upon NPD activity. While this paradigm may have served academics and practitioners well in the past, it is currently being challenged by the emergence of empowered customers seeking greater input and control over NPD activity (Seybold 2006). This challenge is ushering in a new paradigm in which firms can enhance corporate growth and profitability by allowing customers to take a more active role in NPD activity (Prahalad and Ramaswamy 2000; von Hippel 2005).

In this newly emerging co-creation paradigm, customers are central and vital participants in the NPD process and, in some cases, are capable of creating new products with little help from firms. For example, many of today's most successful computer applications, including Apache,

Figure 4.1 **Growth of the Open Source Software Movement**



Source: SourceForge.net.

Linux, and Firefox, are open source projects that are managed by self-organizing communities of volunteer programmers. As shown in Figure 4.1, the open source movement has experienced tremendous growth in recent years. Likewise, many computer game modifications are developed by players rather than manufacturers (Jeppesen and Molin 2003). Customers are also becoming actively involved in the creation of traditional manufactured products. For instance, over 120,000 individuals around the world served as voluntary members of Boeing's World Design Team and contributed ideas and input regarding the design of its new 787 Dreamliner airplane (www.newairplane.com). Likewise, Arduino, an Italian microcontroller manufacturer, provides open access to its software and schematics and actively encourages customers to tinker with its product design (www.arduino.cc). Although the literature on this topic is sparse, the evidence marshaled thus far suggests that customer co-creation is positively associated with several NPD metrics, including increased new product creativity, decreased time to market, and reduced development costs (Grewal, Lilien, and Mallapragada 2006; Shah 2006; von Hippel 2005).

This new paradigm has attracted the attention of the Marketing Science Institute, which has identified customer co-creation as a top research priority (Marketing Science Institute 2008). Likewise, Vargo and Lusch (2004) recognize customer co-creation as a foundational premise underlying marketing's new service-dominant logic. Moreover, the importance of encouraging and utilizing customer-generated solutions has been noted by several leading innovation researchers and practitioners, including Cook (2008), Evans and Wolf (2005), Prahalad and Ramaswamy (2004), Seybold (2006), and von Hippel (2005), among others. However, to date, marketing scholars have devoted scant attention to customer co-creation and, instead, continue to focus on NPD as largely a firm-based activity. Consequently, little is known about the nature of this phenomenon or its

implications for marketing thought and practice. To date, the limited body of marketing scholarship on customer co-creation has largely focused on specific exemplars of this phenomenon, such as assembling a store-bought bookshelf (Bendapudi and Leone 2003), modifying a computer game (Prügl and Schreier 2006), or developing open source software (Grewal, Lilien, and Mallapragada 2006; Rajagopalan and Bayus 2008). Although these studies provide an important contribution by examining the motives and mechanisms underlying customer co-creation, a focus on specific exemplars provides only a narrow look at a complex and multifaceted phenomenon (Cook 2008; Seybold 2006).

Our research seeks to address this gap by offering a broader examination of various forms of customer co-creation, which we define as *a collaborative NPD activity in which customers actively contribute and/or select the content of a new product offering.*[1] In accordance with this definition, customer co-creation involves two key processes: (1) contribution (that is, submitting content) and (2) selection (choosing which of these submissions will be retained). Using these two processes as our foundation, we offer a conceptual typology of four different forms of customer co-creation as well as an agenda for future research in this domain. We believe that this typology and agenda have the potential to enhance both marketing scholarship and practice. Specifically, we provide scholars with a nuanced understanding of the commonalities and distinctions among these various types of co-creation while offering practitioners an examination of their payoffs and challenges. In order to provide a contextual backdrop, our thesis begins with an examination of the trends fueling the rise of customer co-creation.

The Rise of Customer Co-Creation

Successful NPD requires two essential types of information: (1) information about customer needs and (2) information about how best to solve these needs (Thomke and von Hippel 2002; von Hippel 2005). Typically, customers (or users) have the most accurate and detailed knowledge about the first type of information, while manufacturers (or providers) have the most accurate and detailed knowledge about the second type. This disparity creates a condition of information asymmetry (von Hippel 2005).

Traditionally, firms have attempted to manage this asymmetry by engaging in various forms of marketing research to obtain better information about their customers' needs. Under this approach, "Successful innovation rests on first understanding customer needs and then developing products to meet those needs" (Hauser, Tellis, and Griffin 2006, p. 3). Unfortunately, customer needs are often idiosyncratic and tacit in nature and, hence, hard to accurately measure and coherently implement (Franke and Piller 2004; Simonson 2005). As suggested by von Hippel (2005), consumers have deep and complex ("high fidelity") needs; however, traditional market research methods often provide managers with only a cursory ("low fidelity") signal of what customers want or need. As a result, most new product failures are attributed to a firm's inability to accurately assess and satisfy customer needs (Ogawa and Piller 2006).

As recently noted by von Hippel and colleagues (Thomke and von Hippel 2002; von Hippel 2005; von Hippel and Katz 2002), an alternative and emerging means of bridging this asymmetry is to provide customers with information and tools that enable them to take a more proactive role in the NPD process. As we detail subsequently, an increasing number of firms are employing this new approach in various manifestations. This movement toward providing consumers with greater autonomy over NPD activity has witnessed tremendous growth in recent years due to the rise of customer empowerment. In the remainder of this section, we briefly discuss these trends and their implications for co-creation.

As noted earlier, the traditional NPD paradigm largely views consumers as rather passive entities who are highly dependent upon firms to help satisfy their needs (Carpenter, Glazer, and Nakamoto 1994; Simonson 2005). Although many individuals still conform to this traditional role definition, recent cultural developments are empowering a growing number of end users to play a more active role in developing the products they buy and use. One important cultural development is consumers' growing suspicion and distrust of marketing communications. For example, a considerable body of research suggests that consumers are quite skeptical of marketing communication in general and claims about new product performance in particular (Darke and Ritchie 2007; Obermiller and Spangenberg 1998; Wright 2002).

In recent years, this inherent skepticism, fueled by increased news coverage of corporate scandals (such as Enron, ImClone), muckraking documentaries of big business (for example, *SuperSize Me, The Corporation*), and anticorporate websites (for example, adbusters.org, spacehijackers.org), has ignited more active forms of consumer resistance such as anticorporate blogging, brand avoidance, and culture jamming (Klein, Smith, and John 2004; Kozinets and Handelman 2004; Thompson, Rindfleisch, and Arsel 2006). Hence, an increasing number of consumers are engaging in direct action to alter corporate marketing activities that they find objectionable. This increased consumer agency represents a significant strategic challenge and has led several large firms, including Wal-Mart, Nike, and McDonalds, to be more cognizant of and open to customer input (Kalaignanam and Varadarajan 2006). For example, in order to appease consumer activists, Nike has taken steps to actively engage customers in many facets of its strategic planning and execution (Seybold 2006).

In addition to a growing suspicion and heightened activism, consumers also appear to be increasingly less fulfilled by the act of consumption itself (Firat, Dholakia, and Venkatesh 1995). The notion that material objects are unable to satisfy intrinsic psychological needs has been strongly established by consumer researchers (Belk 1985; Richins and Dawson 1992), and these findings have recently been disseminated to the broader public (Kasser 2003; Kohn 1999; Schor 1998). According to cognitive psychology, intrinsic needs are more likely to be met via creative pursuits (Csikszentmihalyi 1996; Deci and Ryan 1985). Thus, through their creative contributions, customers may reap psychological benefits they would normally be unable to achieve via consumption alone. Indeed, many of today's popular television programs glorify the creative process (for example, *American Chopper, Trading Spaces, This Old House*), and creative pursuits such as cooking, crafts, and home improvement are rapidly growing in popularity (Ebenkamp 2005; Pietrykowski 2003). Recent research on customer-led innovation reveals that users often find this activity highly enjoyable (Lakhani and Wolf 2005; Shah 2006).[2]

Spurred by these cultural influences, an increasing number of consumers are seeking a more active role in the creation of the products they consume (Handelman 2006; Roberts, Baker, and Walker 2005). For example, nearly one third of the members of extreme sports communities (such as sailplaning, canyoning, and snowboarding) engaged in some form of product innovation, and almost a quarter of these innovations were later incorporated into existing products by manufacturers (Franke and Shah 2003). Moreover, research on the creative potential of brand communities suggests that consumers are willing and able to introduce new offerings even after a product (for example, Apple Newton) is long abandoned by the firm that sold it (Muñiz and Schau 2005).

The ability of consumers to take a more active role in NPD has been significantly enhanced by recent technological advances, most notably the development and growth of the Internet. According to several researchers, consumers have traditionally lacked the technical skills and capabilities that NPD requires (Christensen 1997; Randall, Terweisch, and Ulrich 2005; Simonson 2005). However, the Internet has helped ameliorate this deficiency and empower customers in at least three ways.

First, the Internet increases *access* to knowledge that can enhance consumers' ability to engage in creative pursuits. For example, consumers interested in learning how to build an electric car can find several websites that contain detailed technical information and user-friendly tutorials on this topic (for example, www.evadc.org; www.makezine.com; www.evsupersite.net). Hence, through these electronic archived data sources, knowledge that was once tacit and remote has now become codified and proximate (Jeppesen and Molin 2003).

Second, the Internet also facilitates consumers' ability to *apply* their knowledge by providing access to a variety of online design tools (Prahalad and Ramaswamy 2004; Thomke and von Hippel 2002). For example, fans of popular computer games such as *Half-Life* and *The Sims* can access Internet-based programs that enable them to create their own modifications and extensions to these games. Similar types of online design tools can also be found for website development, podcasting, and digital audio/video production. According to von Hippel (2005, p. 123), these tools "are often as good as those available to professional designers," and research suggests that they are instrumental in encouraging end users to experiment with and improve their own products (Prügl and Schreier 2006). As a result, in many fields, an increasing number of consumers are acquiring skills and knowledge that nearly equal those of a firm's internal NPD team (Leadbeter and Miller 2004; Prahalad and Ramaswamy 2004).

Third, in addition to enriching the creative capabilities of individual consumers, the Internet enhances *collective* co-creation by connecting individual consumers with others (both consumers and manufacturers) in a manner that allows them to participate effectively in a co-creation community (Moon and Sproull 2001; Prahalad and Ramaswamy 2000; Sawhney, Verona, and Prandelli 2005). These communities enable consumers to learn from (and teach) other consumer-creators (Prügl and Schreier 2006) and help form collective knowledge and memory systems that transcend the information and skills of any single individual (Jeppesen and Molin 2003; Leadbeter and Miller 2004). For example, open source computer software is typically developed via self-organized communities of thousands of contributors who work in a highly collaborative manner and play a variety of different roles. This collective information exchange enables these co-creation communities to create offerings that can equal or surpass traditional firm-based NPD activity in terms of development speed, creativity, and marketplace success (Shah 2006).

In sum, growing customer empowerment appears to be rapidly promoting customer co-creation by motivating consumers to play a more active role in the NPD process, enhancing their NPD knowledge and skills, and connecting them with proactive communities of like-minded individuals. This emerging trend presents an exciting opportunity for marketing researchers and practitioners to employ co-creation as a potential alternative to the traditional NPD paradigm.

A Typology of Customer Co-Creation

In recent years, the rise of co-creation has garnered considerable attention across a broad range of fields, including information systems, economics, management, and marketing (e.g., Sharma, Sugumaran, and Rajagopalan 2002; Etgar 2008; Evans and Wolf 2005; von Hippel and Katz 2002; Pitt et al. 2006; Prahalad and Ramaswamy 2004; Vargo and Lusch 2004). This research has uncovered a variety of different forms of co-creation, ranging from enhanced customer sensing techniques embedded within largely firm-driven NPD processes to open source innovation occurring beyond the boundaries of the firm. In this section, we conceptually synthesize this diverse array of co-creation initiatives into a coherent typology.

As previously noted, a growing number of consumers are seeking increased autonomy and displaying higher levels of empowerment over the NPD process. According to the organizational

creativity literature, a high degree of autonomy enhances creativity (Amabile et al. 1996; Velthouse 1990; Woodman, Sawyer, and Griffin 1993). For example, Amabile and her coauthors find that mid-level managers with substantial autonomy are considerably more likely to generate creative projects compared to mid-level managers with limited autonomy. The positive effect of autonomy is largely believed to be due to its ability to cultivate high levels of intrinsic motivation and psychological ownership, which in turn facilitates creativity by making the creative task more enjoyable and rewarding (Csikszentmihalyi 1996; Deci and Ryan 1985). A release of control should have a similar (and perhaps even greater) effect on customer co-creation, as customers (unlike employees) typically receive little or no direct financial compensation for their creative efforts and, thus, must possess high levels of intrinsic motivation in order to engage in and sustain such activity (Seybold 2006). Hence, releasing control of NPD activities should, theoretically, lead to more creative and successful offerings.

Although a few firms are beginning to recognize the potential benefits of releasing NPD control (Seybold 2006), many are reluctant to enhance customer autonomy due to concerns about leaking valuable proprietary information, ceding managerial power, and losing control over their brands (Pitt et al. 2006; von Hippel 2005). For example, Intuit's chairman, Scott Cook, recently revealed that upper-level managers at his firm resisted customer co-creation because of its "challenge to long unquestioned beliefs about the role of management, the value of experts, the need for control over customer experience, and the importance of quality assurance" (Cook 2008, p. 68). This type of reluctance may be well placed, as the marketing strategy literature suggests that tight and systematic managerial controls (such as the Stage-Gate model) enhance NPD success (Cooper 1990; Song and Parry 1997). Consequently, co-creation initiatives display considerable variance in the degree to which they empower customers by allowing them greater autonomy over the NPD process, especially at its early stages (that is, fuzzy front end).

The NPD literature suggests that the early stages of developing a new product entail two essential activities: (1) the *contribution* of novel concepts and ideas, and (2) the *selection* of which specific concepts and ideas should be pursued (Kahn 2005). In many firms, both of these activities are closely guarded and typically conducted by a small number of employees (that is, an NPD team) (Sethi, Smith, and Park 2001; Song and Parry 1997). In most cases, customers are not actively engaged in either activity. Thus, firms can engage in customer co-creation by releasing control of either the *contributions* made to the NPD process and/or the *selection* of these contributions. Consequently, the degree of customer autonomy across these two activities forms the conceptual basis for our typology.

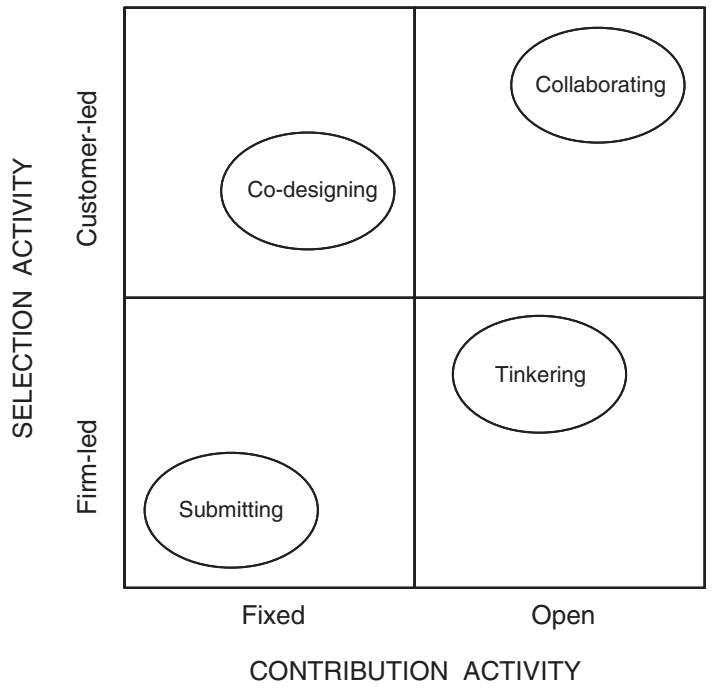
Our typology is depicted in Figure 4.2. As shown in this figure, we depict contribution and selection as two distinct NPD activities that vary in the degree to which a firm releases control and empowers its customers as active participants. Our depiction acknowledges that the balance between control and empowerment lies along a continuum from low to high. Specifically, we suggest that the type and format of NPD contributions can range from being essentially fixed by a firm to wholly open to customer input and that the selection of these contributions can be either directed by a firm or directed by customers. When arranged along two dimensions, these activities allow us to derive four distinct types of customer co-creation: (1) collaborating, (2) tinkering, (3) co-designing, and (4) submitting, with submitting at one extreme (fixed contribution and firm-led selection) and collaborating at the other (open contribution and customer-led selection). Although non-exhaustive, we believe that this typology classifies a considerable body of co-creation activity.[3] In the remainder of this section, we define each of these types of co-creation, identify their key features, provide relevant exemplars, and discuss their benefits and limitations (see Table 4.1 for a summary).

Table 4.1

Characteristics of Co-Creation Types

Type of co-creation	Selection activity	Contribution activity	Key payoffs	Key challenges	Prototypical application	Key studies
Collaborating	Customer-led	Open	Reduced development costs Continuous product improvement	Protecting intellectual property Attracting a critical mass of collaborators	Open source software	Grewal et al. (2006) Lakhani and Wolf (2005) von Krogh et al. (2003)
Tinkering	Firm-led	Open	Enhanced differentiation Virtual test markets for new products	Policing the content of rogue co-creators Creating new competitors	Modified computer games	Jeppesen and Molin (2003) Nieborg (2005) Prügl and Schreier (2006)
Co-designing	Customer-led	Fixed	Reduced development costs Decreased risk of product failure	Attracting a critical mass of designers Defending against new entrants	Online voting on customer-generated content and designs	Ogawa and Piller (2006) Cook (2008)
Submitting	Firm-led	Fixed	Shortened product development cycles Increased access to novel customer ideas	Acquiring knowledgeable new co-creators Retaining and motivating existing co-creators	Company-sponsored design competitions	Füller et al. (2004) Sawhney et al. (2005)

Figure 4.2 **Four Types of Customer Co-Creation**



Collaborating

We define collaborating as a process in which customers have the power to collectively develop and improve a new product's core components and underlying structure. As shown in Figure 4.2, we conceptualize collaborating as the form of co-creation that offers customers the greatest power to contribute their own ideas and to select the components that should be incorporated into a new product offering.

At present, the best examples of collaborating can be seen in open source software initiatives such as Linux, Apache, and Firefox. In contrast to commercial software, which places considerable restrictions on consumer usage, open source software empowers users to make fundamental changes to a program's basic structure (that is, source code). This openness also influences the way intellectual property is managed, as many open source licenses dictate that program changes be made freely available to other users. In recent years, open source applications have gained widespread adoption and market success. For example, Apache, an open source application, dominates the worldwide market for web-server software with over a 70 percent market share (Grewal, Lilien, and Mallapragada 2006). In addition to software development, collaborators are making important and innovative contributions in several other areas, including agriculture (www.cambria.org), pharmaceutical products (www.tropicaldisease.org), medical devices (www.designthatmatters.org) and architecture (www.architectureforhumanity.org).

While many collaborator-based projects are managed by nonprofit organizations, the principles underlying this form of co-creation may be usefully employed by for-profit firms (Evans and Wolf 2005; Shah 2006). In fact, some software firms release the source code for selected commercial

products into the open source community in hopes of establishing a dominant technological platform. Sun Microsystems, for example, employed this strategy when it made the source code for its NetBeans development tool freely available. Today, NetBeans has been downloaded more than eight million times and enjoys contributions from over 300,000 collaborators around the world (www.netbeans.org). Similarly, IBM uses collaborating as a key part of its competitive strategy by employing hundreds of open source programmers dedicated to enhancing the Linux operating system (Harris 2004). IBM also actively encourages open source development outside the firm by serving as a founding member of the Open Invention Network, a company that supports open source innovation by purchasing software patents and making them available on a royalty-free basis.

We suggest that collaborating provides customers with a high degree of latitude to contribute their own new product improvements and gives them substantial freedom to select the new product improvements they find most valuable. In the case of open source software development, the underlying offering is based on open standards that grant all customers (who have the requisite skills) the ability to fully customize the product to better satisfy their own unique needs (Lakhani and Wolf 2005; Shah 2006). Hence, collaborating grants customers almost unlimited freedom to alter the underlying product, thereby transforming customers from passive users to active contributors (Pitt et al. 2006; Evans and Wolf 2005; von Krogh, Spaeth, and Lakhani 2003). Moreover, collaborators are often responsible for forming their own project teams. These teams exist outside the traditional boundaries of the firm, are organized in a non-hierarchical fashion, and rely on a community-based governance system to evaluate and select the inputs made by fellow collaborators (Grewal, Lilien, and Mallapragada 2006; Lakhani and Wolf 2005; von Krogh, Spaeth, and Lakhani 2003). Hence, this customer-led selection mechanism stands in stark contrast to traditional NPD teams in which the selection process is largely confined to a few select employees.

Although some individuals engage in collaborating for extrinsic rewards (such as enhancing their career opportunities or gaining status or recognition), most collaborators appear to be intrinsically motivated by a strong philosophical belief in the importance of their work as well as by a deep enjoyment of contributing their thoughts and ideas (Evans and Wolf 2005; Hertel, Niedner, and Herrmann 2003; Sharma, Sugumaran, and Rajagopalan 2002). Due to this high level of intrinsic motivation, collaborating has the potential to generate high levels of co-creator involvement (Lakhani and Wolf 2005; von Hippel 2005). Moreover, recent research suggests that collaborating can improve NPD performance by accessing novel sources of customer-held knowledge held across a diverse set of individual contributors (Grewal, Lilien, and Mallapragada 2006).

By generating a high degree of involvement and accessing diverse knowledge domains, collaborating appears to be a highly effective means of generating innovative and successful new products. For example, the open source–based Firefox web browser competes successfully against Microsoft's dominant Internet Explorer and is widely regarded as the most innovative browser currently available (Vogelstein 2008). In addition to spurring innovation, collaborating can dramatically lower the costs of NPD by using unpaid customers to replace salaried employees. Moreover, unlike traditional NPD projects, which have finite start and end dates, collaborating is an ongoing process. This quality should help firms stay on the leading edge by providing a mechanism for continuous product improvement and enhance customer welfare by accelerating the pace at which new innovations can be created and distributed to users (von Hippel 2005).

While collaborating may produce substantial benefits, this form of co-creation also faces a number of challenges. Most importantly, collaborating appears to best suited for information-rich applications (for example, software development, medical research, digital graphic design) and, thus, may be the most challenging form of co-creation for more traditional industries such as packaged goods or consumer durables. Moreover, in order to drive innovation, collaborating

requires that at least a small cadre of co-creators obtain a high level of skill and knowledge. This entry requirement may discourage lower-skilled and less knowledgeable customers (who may nevertheless have interesting ideas) from fully participating in the innovation process. Moreover, successful collaboration requires firms to cede managerial authority over NPD and loosen their control over their intellectual property (Cook 2008). Hence, collaborating may be especially difficult for firms with highly centralized organizational structures and large investments in proprietary assets. Thus, firms may be forced to strike a difficult balance between control and openness. For example, Shah (2006) finds that when firms engaged in collaboration initiatives restrict individuals' freedom to alter and share new product improvements, customers' willingness to contribute decreases and the risk of customer defections increases.

Tinkering

We define tinkering as a process in which customers make modifications to a commercially available product and some of these modifications are incorporated into subsequent product releases.[4] Tinkering is similar to collaborating in terms of allowing customers a relatively high (but somewhat lower) degree of autonomy over NPD contributions. However, firms that employ tinkering usually retain a considerable degree of control over the selection of these contributions.

At present, tinkering is most apparent in the computer game industry, where user-generated contributions (that is, modifications) are not only widely tolerated, but actively encouraged. For example, many game manufacturers invite users to make alterations ranging from incremental changes, such as edits to a character's physical appearance, to more radical innovations, such as the creation of a completely new computer game. In order to assist tinkerers in making these changes, several computer game manufacturers provide customers with free or low-cost design tools that are similar or even identical to those used by their in-house software developers (Moon and Sproull 2001; Nieborg 2005). This strategy often leads to unexpected and innovative creations, widespread adoption by other gamers, and marketplace success for the firm that produced the base game. For example, over 90 percent of the content of the widely successful computer game, *The Sims,* is derived from tinkerer-based modifications (called "mods" in the parlance of gamers) (Leadbeter and Miller 2004).

The contributions of tinkerers are not, however, limited to computer gaming. Tinkering is also quite common in other information-based products, such as customized digital music and individually tailored web-based applications. For example, leading Internet firms such as Google.com and Amazon.com offer open access to their application program interfaces (APIs). Consumers can combine these open APIs with data from third parties or self-created content to generate innovative hybrid creations known as "mashups." One impressive user-generated mashup is the website Chicagocrime.org, which melds information from the Google Maps API with a database from the Chicago Police Department (CPD). This co-created website allows users to create their own customized visual display of reported crimes for any street, neighborhood, travel route, or time period they wish to select. This mashup is considerably more visually appealing and interactive than CPD's traditional database and provides customers with enhanced product functionality and a more enjoyable online experience. At present, Chicagocrime.org receives over 500,000 hits per month. Google also directly benefits from the efforts of tinkerers like the creators of Chicagocrime .org, as the changes they make provide a nearly continuous stream of new content that enhances product functionality and helps differentiate Google Maps from its competitors.

Like collaborating, tinkering begins with the release of a basic building block (such as base commercial product and development tools). However, in contrast to collaborators, tinkerers do not

have unfettered access to a product's source code. This is an important point, because firm-based control over the underlying product and its source code limits the scope of the product improvements that tinkerers can develop. In addition, tinkerers must typically sign end-user licensing agreements. This means that firms have the power to revoke tinkerers' rights to use development tools and can limit tinkerers' ability to share their creations with other users. Thus, customer-created content that was once freely available may be restricted after the firm launches a new product release that includes these customer-led improvements. As a result, tinkering allows a firm to exert substantial control in determining which new customer-generated product improvements are selected to appear in its official new product releases. These characteristics are depicted in Figure 4.2, which positions tinkering as exhibiting less openness (compared to collaborating) in terms of customer contribution and a heavily firm-led selection approach.

Although knowledge regarding the outcomes of tinkering is at a formative stage, it appears that this type of co-creation may deliver several benefits to firms. In crowded markets with similar offerings, tinkering may provide a basis for product differentiation. For example, the powerful development tools included in the *Unreal Tournament 2004* (*UT 2004*) Special Edition DVD distinguished this product from similar offerings and helped *UT 2004* become a highly successful computer game (Nieborg 2005). Firms may also benefit from the activities of tinkerers in terms of enhancing customer satisfaction and extending their market reach. By supporting and leveraging the contributions of tinkerers, firms can assist customers in satisfying their own needs and sharing their solutions with other customers who may have similar needs.

Firms can also benefit from the actions of tinkerers in terms of enhancing market acceptance of their *in-house* NPD efforts. For example, LucasArts allowed images and music from its *Star Wars* films to be incorporated into the customer-led mod *Galactic Conquest,* even though it was simultaneously developing its own proprietary *Star Wars*–themed computer game (Nieborg 2005). By visiting websites where *Galactic Conquest* devotees congregated, LucasArts was able to identify and contact users who downloaded this popular mod and determine which customer-generated content they found most appealing. This approach provided LucasArts with both direct access to customer-created innovations as well as a virtual test market for its fledgling commercial product, which ultimately incorporated many of the mod's most popular features.

Although tinkering may provide a number of benefits, it also poses several challenges. First, in most (but certainly not all) cases, the act of tinkering requires a considerable degree of user knowledge and expertise about the product to be modified as well as its underlying technology. However, with the increasing availability of user-friendly development tools, consumers who are not expert users can readily acquire basic tinkering capabilities with moderate learning costs.[5] Tinkering also presents the risk that high-quality (and freely available) mods may dissuade customers from purchasing a firm's future new releases. Thus, firms that actively encourage tinkering may find that their customers have become a formidable source of competition (Cook 2008). In this sense, tinkering can raise the NPD bar, as a firm must ensure that new releases surpass both the functionality of its existing products while also demonstrating superiority over versions that have been created and made freely available by tinkerers.

It is also possible that the actions of tinkerers can have a negative impact on a firm's brand equity. For example, some tinkerers may modify computer games in ways that are especially violent and/or sexually explicit. Imagine, for instance, the case of a customer transforming a World War II combat game into a mod set in an American high school, in which players amass points by gunning down their fellow students and teachers. Most consumers would be appalled by such a game, and the surrounding media attention would undoubtedly reflect very negatively on the firm that created the base product. Thus, the level of contribution autonomy provided by tinkering may

be a double-edged sword, as firms that rely heavily on tinkering may be particularly vulnerable to the negative actions of rogue co-creators.

Co-designing

We define co-designing as a process in which a relatively small group of customers provides a firm with most of its new product content or designs, while a larger group of customers helps select which content or designs should be adopted by the firm. As shown in Figure 4.2, co-designing is characterized by a relatively fixed contribution approach but a high degree of customer autonomy over the selection of these contributions.

One of the best examples of co-designing is the online clothing manufacturer Threadless.com. This firm actively solicits original T-shirt designs from current and potential customers and then invites its extensive network of online customers to evaluate and select a short list of prospective new products (Chafkin 2008). Similarly, both the online news service Digg.com (www.digg.com) and the cable television channel Current TV (www.current.tv) acquire much of their content directly from their users. In contrast to the standard approach used by commercial news organizations, Digg.com eschews hierarchical editorial control and instead allows its community of over 300,000 registered reviewers to vote on the stories they deem worthy for display. Likewise, Current TV provides amateur film makers with the opportunity to upload their homemade documentaries and gives viewers the chance to select the clips that air on the network.[6] This co-creation approach has been utilized across a wide variety of product categories, including sporting goods, household products, home appliances, and consumer packaged goods (Ogawa and Piller 2006). For example, Jones Soda (www.jonessoda.com) uses co-designing to differentiate its products by displaying customer-submitted photographs (which are rated online by its users) on its product labels.

The co-designing process begins when customers create new designs and submit their original content to a central hub (such as a company website). Next, a network of interested customers evaluates these submissions and selects (typically via online voting) those they find most appealing. Based on these evaluations, the firm then decides which products it will produce and market.

In contrast to tinkering, where co-creators have considerable latitude in terms of altering the base product, firms engaged in co-designing usually dictate the precise format that co-created contributions must follow. For example, contributions to Threadless must be submitted using a company-issued template, can contain only limited text, and are constrained to eight sanctioned colors. Due to these mandates, co-designing contributions are considerably more fixed and constrained compared to either collaborating or tinkering. In contrast, co-designing provides customers considerable autonomy in terms of the selection process. For example, the contributions that Threadless selects to print as new T-shirt designs are almost exclusively determined by ratings provided by its customers. However, at times, Threadless invites particular designers to submit designs, and thus bypasses its typical selection process. Consequently, it appears that co-designing entails a level of customer autonomy over content selection that falls somewhere between collaborating and tinkering.

From the perspective of a firm, co-designing appears to offer several advantages. Most importantly, this approach should dramatically reduce a firm's cost of developing its own original designs or creative content, as this function is largely outsourced to customers. In addition, because customers actively assist a firm by both contributing new content and selecting the content that should appear in future product releases, firms should reduce their cycle times and launch new products more quickly compared to traditional NPD processes. For example, Threadless typically introduces several new T-shirts each week. Moreover, in contrast to collaborating and tinkering,

co-designing is an approach in which both highly skilled (design contributors) and lower-skilled (design selectors) customers can freely participate. Thus, by providing its broader customer base with a strong voice in NPD selection and a sense of collective identity, co-designing should allow a firm to attain higher levels of customer satisfaction and commitment (Hertel, Niedner, and Herrmann 2003). In addition, by subjecting designs to prelaunch evaluation by a large network of customers, co-designing should reduce the risk of product failure, avoid drastic price markdowns, and minimize inventory holding costs (Ogawa and Piller 2006).

Although the benefits of co-designing are intriguing, there are also substantial challenges in implementing this approach. First, firms may encounter difficulty in terms of attracting a critical mass of designers large enough to ensure that they obtain a sufficient amount of high-quality content (Cook 2008). This challenge may be especially acute for firms whose competitors have already established co-designing initiatives. In addition, although customers may be initially intrigued with this approach, the novelty of being able to submit and vote on designs may quickly wear off. Hence, a firm may find its pool of evaluators shrinking over time. Moreover, because this approach is relatively easy to imitate, firms that base their value proposition primarily on co-designing may end up lacking a distinctive core competence as competitors copy their approaches. To combat these challenges, firms that employ co-designing should establish strong lines of mutual communication with their co-designers and devote substantial effort toward fostering a collective sense of community (Cook 2008).

Submitting

We define submitting as a process in which customers directly communicate ideas for new product offerings to a firm. Submitting is differentiated from traditional forms of customer inquiry (for example, focus groups, satisfaction surveys, tracking studies, and so forth) by both the degree of customer effort required and by the nature of the input that customers provide to the firm. In contrast to most traditional forms of customer inquiry, which simply ask customers to provide responses to a set of prearranged queries, submitting requires customers to expend considerable energy developing (either in isolation or as part of a team) tangible ideas for new product offerings. In addition, while traditional inquiry approaches typically involve customers solely in concept ideation and evaluation, submitting often requires customers to translate general ideas into well-defined processes, detailed graphic depictions, or working new product prototypes. As shown in Figure 4.2, we conceptualize submitting as the form of co-creation that is characterized by the least amount of customer autonomy in terms of both NPD contribution and selection. Although submitting resembles co-designing (that is, both types of co-creation allow customers to directly contribute their own novel ideas and solutions), it differs from co-designing because in submitting, the firm retains full control over the NPD selection process.

Firms that employ submitting-based co-creation actively solicit input from either current or potential customers. This solicitation often (but not always) occurs in the form of online invitations for customer-generated content. For example, the Swedish appliance manufacturer Electrolux sponsors an annual submitting competition called "Designlab" in which participants are asked to submit technical designs and product prototypes for cutting-edge household appliances. This initiative attracts thousands of entries across dozens of countries. From these, Electrolux selects a small set of finalists and invites them to a six-day, company-sponsored retreat, where they participate in workshops, present their inventions, and compete for cash prizes (www.electrolux.com/designlab). The Italian motorcycle manufacturer Ducati Motors employed a similar approach via its recent "Design Your Dream Ducati" contest that encouraged Ducati enthusiasts to submit

innovative artistic and technical ideas to an executive team, which then selected the winning contributions (Sawhney, Verona, and Prandelli 2005).

In addition to these firm-sponsored initiatives, submitting can also be brokered by third parties. For example, InnoCentive (a spinoff of Eli Lilly) is a brokering agent that links firms seeking solutions to complex scientific problems to a network of thousands of individual scientists. Firms anonymously post their NPD problems on the InnoCentive website, and highly trained specialists from around the world can submit solutions. Successful InnoCentive submitters receive financial compensation that can total tens or even hundreds of thousands of dollars, and their contributions have led to innovative breakthroughs for a variety of major corporations, including Procter and Gamble, Boeing, and DuPont.

As described in the above examples, submitting begins when customers contribute detailed new product ideas, solutions, or prototypes. Based on these inputs, a firm then decides which concepts to further develop, test, and eventually launch. Compared to the three prior types of co-creation, submitting represents the lowest level of customer empowerment (as the firm dictates the format that contributions must follow and also has full power to select which customer contributions to adopt). In addition, many firms seek to retain control by insisting that submitters release their legal rights to the product improvements they help develop (Wells 2005). Compared to more traditional forms of customer input, however, submitting provides consumers with a much stronger voice in the NPD process and allows them to share their knowledge and creative skills directly with firm-based NPD teams.

Firms may derive several benefits from submitting. First, case study evidence from large firms such as Intuit and Procter and Gamble suggests that this approach can result in a significant reduction in the time required to develop a new product and an increase in its degree of innovativeness (Cook 2008; Huston and Sakkab 2006). Also, because submitting offers customer benefits (for example, enhanced self-image and increased social status) largely absent from more traditional customer input methods, this form of co-creation should allow firms to engage in richer dialogues with customers who would normally be unresponsive to more traditional research inquiries. Thus, this engagement should result in improved market-sensing capabilities and enhanced customer relationships.

Like other co-creation approaches, submitting also entails a number of challenges. Compared to the three other forms of co-creation in our framework, submitting may be least likely to result in truly innovative products because of its minimal level of customer empowerment. Due to these conditions, submitters may feel less connected with both the firm and other customers compared to collaborators, tinkerers, or co-designers, and may lack sufficient intrinsic motivation to actively cooperate with the firm on an ongoing basis. Consequently, firms interested in using this approach may experience difficulty in retaining active customer participation. Hence, it is important that firms duly recognize the contributions of submitters (with, for example, financial rewards, words of praise, explicit recognition). Without this type of reciprocity, it is possible that submitters may feel exploited and come to view submitting as a one-sided exchange (Fournier, Dobscha, and Mick 1998) rather than as a mutually satisfying bidirectional relationship (Oliver 2006).

Perhaps more importantly, firms seeking to adopt this approach may find it quite difficult to continuously attract new contributors to their submitting initiatives. Because each customer may have only a limited number of new product solutions to offer, attracting new submitters may be even more important than retaining established contributors. Moreover, the successful retention of existing contributors should also enhance a firm's ability to identify and recruit new submitters via positive word of mouth (Mathwick, Wiertz, and De Ruyter 2007).

Future Research Agenda

As seen in the preceding typology, customer co-creation represents a dramatic departure from traditional NPD practice both in terms of how customers are viewed as well as the roles they play. In brief, firms that abide by the traditional paradigm seek to solve NPD's information asymmetry problem by first researching consumer preferences and then using this information to develop new products in-house. In contrast, firms following the emerging co-creation paradigm seek to solve this problem by actively soliciting consumer contributions and incorporating selected contributions into their new product offerings. As evidenced by our many examples, a paradigm shift is currently under way. While the full ramifications of this transition for marketing thought and practice are not yet clear, they are likely to be quite substantial. In the words of Wind and Rangaswamy (2001, p. 20), the emergence of customer co-creation has the potential to alter "everything we take for granted in marketing." In this final section, we outline an agenda for future research in this domain. This agenda focuses on the impact of customer co-creation on six distinct domains of inquiry: (1) organizational culture, (2) organizational learning, (3) organizational dynamics, (4) resources and capabilities, (5) customer valuation, and (6) brand communities.

Organizational Culture

Because co-creation is fundamentally different from traditional NPD practice, successful implementation of this new paradigm will likely require significant changes in organizational culture (Sawhney, Verona, and Prandelli 2005; Vargo and Lusch 2004; von Hippel 2005). According to Thomke and von Hippel (2002, p. 78), "Turning customers into innovators requires no less than a radical change in management mind-set." Specifically, co-creation's highly interactive nature may require firms to adopt an open culture in which their goals, activities, and processes are highly transparent and collaborative (Ogawa and Piller 2006; Prahalad and Ramaswamy 2004). In particular, firms seeking to harness the benefits of co-creation may find it necessary to relax control over their intellectual property. For example, in 2005, IBM took the radical step of declaring that it would not enforce hundreds of its software patents in an effort to stimulate open source innovation and increase the market size for its Linux-based servers (Lohr 2005). This type of openness should encourage co-creation activity and enable customers to contribute innovative solutions to help a firm meet its goals and objectives. However, many firms with traditional organizational cultures are quite reluctant to relax control over their intellectual property (Cook 2008; von Hippel 2005). These firms may be willing to entreat customer contribution but will likely seek to retain control over the selection of these contributions. Thus, the degree to which the benefits (such as increased new product creativity, decreased time to market, and reduced development costs) of customer co-creation depend upon releasing organizational control over each of these two key processes (contribution and selection) is an important issue for future research.

Along with increased openness, firms seeking to reap the benefits of customer co-creation will also likely need to adopt a more emergent strategic perspective (Mintzberg 1994). According to Jeppesen and Molin (2003, p. 377), under co-creation, "The management issue is not to enforce ideas, but to make room for them to emerge and channel them into an innovation." This diminished focus on planning, forecasting, and control runs directly counter to the well-planned logic of the traditional NPD paradigm and, thus, is likely to meet with considerable resistance from managers who strongly believe in a more traditional approach. Indeed, their resistance may be well founded, as the substitution of improvisation for planning can be potentially harmful to NPD success (Moorman and Miner 1998). Of the four types of co-creation identified in our

typology, co-designing appears to strike the best balance between improvisation and planning, as it encourages active customer participation within defined constraints. Future research is needed to determine the effectiveness of planned forms of co-creation such as co-designing and submitting versus more emergent forms of co-creation such as collaborating and tinkering.

Organizational Learning

Research on the drivers of innovation success has a long tradition in marketing scholarship (see Henard and Szymanski 2001, and Hauser, Tellis, and Griffin 2006 for reviews). Historically, the bulk of this research has focused on internal (that is, firm-based) drivers of NPD success, such as a firm's degree of marketing and technological skills, level of market orientation, and amount of cross-functional integration. In recent years, this research has been supplemented by a growing number of studies that examine drivers of successful innovation beyond the immediate firm, such as the influence of acquired entities or alliance partners (see, for example, Chandy, Prabhu, and Ellis 2005; Rindfleisch and Moorman 2001; Sividas and Dwyer 2000). This research broadly suggests that the success of these collaborative NPD efforts strongly depends upon the degree to which a firm is able to acquire, assimilate, and apply information and know-how from its partners. In sum, collaborative NPD has been largely viewed from the perspective of a firm's ability to learn.

Customer co-creation adds a new dimension to this emerging literature by suggesting that NPD success strongly depends not only on a firm's ability to learn but also on its ability to teach. Specifically, successful co-creation rests heavily upon the degree to which a firm is able to enhance its customers' NPD-related knowledge and skills via such actions as allowing access to its source code, providing toolkits that allow customers to directly alter their products in creative ways, and engaging in direct, two-way communication with co-creators. This education imperative should be most important for collaborating and tinkering, as these co-creation approaches typically require a high level of technical skill. However, co-creation education may also be valuable in enhancing the quality of the contributions of customers engaged in co-designing and submitting. The importance of customer education has received some attention within the emerging literature on customer toolkits (such as Franke and Piller 2004; Prügl and Schreier 2006; Thomke and von Hippel 2002). However, several intriguing questions remain unanswered. For example, what is the relative value of educating existing customers versus recruiting new customers who already possess co-creating skills? Likewise, what types of customer education efforts are most valuable for each of the four types of customer co-creation identified in our typology?

Organizational Dynamics

The sense of empowerment that co-creators enjoy, combined with the increased knowledge and skills they are likely to acquire, may give customers a strong sense of psychological ownership over their contributions (Pitt et al. 2006; Prahalad and Ramaswamy 2000). In turn, this sense of ownership may complicate a firm's internal NPD plans and activities. Because co-creation shifts tasks that were formerly conducted by managers down to customers, it may blur the boundary between these two groups (Evans and Wolf 2005; Prahalad and Ramaswamy 2000). Thus, customers may begin to see themselves not only as consumers but also as producers. Research on organizational dynamics (that is, stakeholder theory) suggests that firms that are heavily engaged in customer co-creation could find it more difficult to quickly alter their product lines or radically change their NPD processes in order to respond to competitive pressures (Donaldson and Preston

1995). In essence, co-creation initiatives could create a new class of organizational stakeholders, many of whom may vigorously oppose NPD-related changes with which they disagree.

These challenges are likely to be especially pronounced for those forms of co-creation that involve a high degree of customer-led contribution activity (tinkering and collaborating). However, anecdotal evidence suggests they can also occur in co-designing settings. For example, Threadless is currently facing a sense of ownership struggle, as several members of its online community are upset about its selection procedures and the recent opening of a brick-and-mortar store in Chicago (Chafkin 2008). Future research is needed to shed light on both the positive and negative impact that empowered co-creator stakeholders have upon NPD performance. In particular, the ability of these stakeholders to effectively respond to market challenges such as the entry of a new competitor or the emergence of a discontinuous technological is a topic ripe for empirical investigation.

Resources and Capabilities

The ability of a firm to achieve and sustain a competitive advantage is widely believed to rest upon its resources and capabilities such as sensing market trends, developing strong customer relationships, and creating innovative new products (Day 1994; Hunt and Morgan 1995; Moorman and Slotegraaf 1999). These resources and capabilities have been broadly viewed as assets that are internal to a firm and reside in its organizational culture, operating procedures, and human resources. For example, Day (1994, p. 38) suggests that "Capabilities are deeply embodied within the fabric of the organization."

The emergence of customer co-creation suggests that this strict focus on internal-based resources and capabilities ignores an important source of potential competitive advantage: the knowledge and skills embodied in a firm's customer base (Jeppesen and Molin 2003; Prahalad and Ramaswamy 2000; von Hippel 2005). As suggested by Prahalad and Ramaswamy (2000, p. 80), when firms adopt co-creation, "consumers become a new source of competence for the corporation." In essence, firms that succeed in establishing co-creation can gain access to a rich external source of NPD-related resources and capabilities that can supplement their internal value creation ability. Thus, the emergence of customer co-creation suggests that marketing scholars should view a firm's resources and capabilities from a broader network-based (embodied) perspective rather than focusing narrowly on its internal (embedded) assets. As with their internal counterparts, the value of co-creation–based capabilities is likely to depend upon the degree to which they are distinctive and non-imitable. These qualities may be especially difficult to attain via a sharing approach because this form of co-creation appears to have few barriers to entry. Future research could make an important contribution by identifying the degree to which our four types of co-creation possess these desired qualities.

Customer Valuation

Understanding and assessing customer value is currently an extremely important topic of marketing scholarship (Marketing Science Institute 2008). To date, research on this topic has primarily focused on identifying the characteristics of profitable customers based largely upon their purchase behavior over time (for example, Gupta, Lehmann, and Stuart 2004; Reinartz and Kumar 2003; Rust, Zeithaml, and Lemon 2001). This focus reflects marketing's traditional belief that the transaction itself is the primary mechanism of value exchange (Vargo and Lusch 2004). According to this belief, firms are responsible for creating value, and customers reward this value by purchasing their products (Srivastava, Shervani, and Fahey 1998). However, this perspective

seems inconsistent with the logic of co-creation, which suggests that customers are not only targets of a firm's value proposition, but also active value creators in their own right (Prahalad and Ramaswamy 2004; Vargo and Lusch 2004). In sum, it seems as if the boundary between producers and consumers is clearly shifting.

The emergence of customer co-creation is a prime example of these shifting boundaries, as consumers provide firms with value in the form of their purchase activity as well as their production activity. Thus, it is possible that a customer who is an infrequent and low-volume purchaser, but a highly active contributor or selector of new product ideas, may be one of the firm's most valuable assets. Unfortunately, the worth of this customer would go unrecognized by existing customer valuation perspectives, which do not account for the productive aspects of customer behavior. Hence, the emergence of customer co-creation calls for updated and enhanced customer value metrics that adopt a broader view of consumers and the spectrum of value they bring to the firm. For example, new metrics that focus on assessing the value of a collaborator's contributions using market-based criteria such as the number of times their contributions have been downloaded, viewed, or further modified by fellow collaborators would be an important refinement of the existing customer valuation frameworks.

Brand Communities

Historically, marketing scholars have focused on consumer behavior from the perspective of the individual. In recent years, however, researchers have highlighted the growing phenomenon of collective consumer behavior in the form of brand communities (McAlexander et al. 2001; Muñiz and O'Guinn 2001; Muñiz and Schau 2005). These communities bring together (either physically or virtually) individuals who share a common affinity for a particular brand such as Apple computers, Saab automobiles, or Harley Davidson motorcycles. Thus far, this literature has emphasized the potential of these communities as vehicles for forging deep and enduring customer-brand relationships. However, they may also serve as especially fertile ground for co-creation activity. Recent research by Muñiz and Schau touches on this potential by observing that members of the abandoned Apple Newton community develop applications for this product and actively share their creations with fellow members. Indeed, the basic features of brand communities (for example, a collection of dedicated and knowledgeable individuals who exchange information about their beliefs, interests, and insights) should provide a means of incubating customer co-creation. Moreover, because customers may engage in co-creation as contributors as well as selectors, community-based appeals may resonate with one kind of co-creator but not the other. In the case of Threadless, for example, customers who regularly engage in selecting T-shirt designs are perhaps more likely to feel a greater sense of community than those who contribute these designs, because this latter group may be more self-directed and extrinsically motivated by Threadless's $2,000 cash reward and the chance to garner greater professional exposure. Thus, the role of brand communities as a catalyst for co-creation (and vice-versa) is an intriguing topic for future research.

Conclusion

In today's highly competitive marketplace, a growing number of firms are placing increased reliance upon innovation as a means of achieving growth and profitability. Unfortunately, most new products fail because they do not adequately satisfy customer wants or needs. Thus, as a means of minimizing market failure and enhancing financial performance, an increasing number of firms are empowering customers and allowing them to actively participate in the NPD process. As we have

shown, this customer empowerment can take a number of distinct forms. Our typology classifies four emerging forms of co-creation delineated by the degree to which customers are empowered to contribute and select new product ideas. Although each of these co-creation types has its own potential benefits and challenges, they all lie outside the boundary of NPD's traditional worldview and, hence, are contributing to the emergence of an exciting new paradigm. Millions of empowered customers around the world have embraced the co-creation ethos. Thus, firms should look beyond the confines of their traditional NPD approaches and develop effective strategies for identifying and harnessing the ideas, skills, and talents of their customers. We hope this typology and research agenda fosters greater appreciation for and investigation into this important phenomenon.

Notes

1. For ease of exposition, we employ the term "product." However, we acknowledge that customer co-creation is highly congruent with marketing's service-dominant logic, which posits that collaborating with customers creates value by harnessing the power of customer learning and leveraging the service-based benefits embedded in products (Vargo and Lusch 2004).

2. Although we make no claim that these creativity-based benefits supersede consumption-based benefits, the extant literature on customer co-creation nevertheless suggests that benefits that are based on the creative work of customers can play an important role in enhancing customer satisfaction (Lakhani and Wolf 2005; Shah 2006).

3. Some scholars also identify lead users as a form of co-creation (for example, Urban and von Hippel 1988). Our typology does not explicitly consider lead users as a specific form of co-creation unto itself. Instead, we highlight the role that lead users play in some of the types of co-creation identified in our typology. In addition, while a few scholars view mass customization as a form of co-creation (Wind and Rangaswamy 2001), a large number of scholars disagree and feel that mass customization does not sufficiently incorporate customer input into the actual creative process (for example, Jeppesen and Molin 2003; von Hippel 2005). Thus, our framework does not explicitly consider mass customization as a form of co-creation.

4. Many examples of lead-user alterations (such as the first homemade windsurfers developed by surfing enthusiasts) bear a resemblance to tinkering. Although these modifications may result in creative outcomes, firms rarely if ever assist end users in making these alterations (Franke and Shah 2003; Luethje, Herstatt, and von Hippel 2002). In contrast, firms engaged in tinkering actively encourage customers to alter their products, establish forums for tinkerers to share their creations, and specifically design their products to allow for easy customer modification.

5. It is estimated that approximately one-third of all computer games offer these types of toolkits to their users (Jepperson and Molin 2003).

6. Current TV was founded in 2005 by former vice president Al Gore. Its tagline ("The TV network created by the people who watch it") nicely reflects its co-creation ethos.

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