

Designing E-Commerce Product Innovation Strategies to Disrupt Existing Industries

George M. Puia
College of Business and Management
Saginaw Valley State University
University Center, Michigan, USA
puia@svsu.edu

Xiaohua Yang
School of Business
Bond University
Gold Coast, Australia
xiaohua_yang@bond.edu.au

Abstract

This paper develops a taxonomy of product innovation methods for entering e-businesses. These product innovation strategies share two common features: 1) a goal of disrupting the competitive structure of an existing industry, and 2) the use of digital technology combined with e-commerce to enhance or transform products and services. By *disruption*, the authors denote the attempt to destabilize the profit structure of an industry such that the incumbent firms can no longer earn economic rents above the industry average. Under these conditions, incumbent firms make no more than new entrants, surrendering their economic advantages. Theoretical frameworks in strategic management and the management of innovation and technology suggest that radical innovations are more likely to lead to destabilized markets. While this paper suggests that the dominant incumbent's advantage can be toppled, the paper does not suggest that the firm destabilizing the market will become the eventual market leader. While one can readily conceptualize the potential of e-commerce to disrupt existing markets, in practice few e-businesses have replaced entrenched competitors. Some of the failures of e-businesses to disrupt markets can be laid at the feet of strategies that were inadequately radical.

1. Introduction

E-commerce product innovation strategies are often proposed as a means for new firms to unseat incumbent businesses in established markets. With e-commerce growing at more than twice the rate of the global economy-- more than \$2 trillion was spent worldwide on e-commerce in the year 2000 [21], we expect an increasing number of new entrants will flock into e-markets. These new entrants must more fully understand the e-commerce competitive environment and its corresponding innovation strategies.

This paper develops a taxonomy of product innovation methods for entering e-businesses. These product innovation strategies share two common features: 1) a goal of disrupting the competitive structure of an existing industry, and 2) the use of digital technology combined with e-commerce to enhance or transform products and services. By *disruption*, the authors denote the attempt to destabilize the profit structure of an industry such that the incumbent firms can no longer earn economic rents above the industry average. Under these conditions, incumbent firms make no more than new entrants, surrendering their economic advantages [18]. The paper does not suggest that the firm destabilizing the market will become the eventual market leader; it suggests only that the dominant incumbent's advantage can be toppled.

1.1 Advantages of incumbent firms

The strategic management literature provides a research basis for understanding the advantages and vulnerabilities of incumbent firms. These advantages can flow from a firm's unique resource position as described by the resource based view of the firm [2] [17] [23], or they can flow from the firm's market position as described the industrial/organizational model of firm and market behavior [6]. The advantages and weakness of incumbent firms are compared in the context of both the resource-based view of the firm and industrial organizational economics.

Under the resource based view of the firm, incumbents are posited to have resources superior to entrants, resources that are valuable, rare, and costly to imitate. Among those resources commonly cited are: reputation, preferred sources of supply, and exclusive distribution agreements [3] [12].

Incumbent reputation works against entering firms who possess what is referred to as the liability of newness. Particularly in technology markets, buyers need to have confidence that they will be able to receive spare parts, service, and technology upgrades over the life of the product. Established firms have reputations that act

as a proxy of experience and legitimacy. New entrants need to have technologies or other benefits that are sufficiently superior to offset the customer's perceived risk of the entrant failing and stranding the customer with unsupportable technology. Additional resources frequently possessed by incumbent firms are 1) strong relationships with key existing suppliers and 2) an established and often exclusive access to distribution channels. By controlling key suppliers, incumbents are often able to secure higher quality. By controlling distribution, incumbents preclude entrants from entering traditional marketing channels.

Industrial organizational economics also suggests incumbent firms will have significant advantages. First, incumbents will likely have established entry barriers making it more costly for new entrants. Commonly cited entry barriers included first mover advantages, market power, brand recognition, economies of scope, economies of scale, and economies independent of scope and scale. Market and technological leadership can also deter new entrants [11].

In an industrial organizational framework, incumbents can be overtaken if they are not sufficiently flexible. This is particularly true in e-commerce where speed and change are the norm. New entrants can capitalize on incumbents' inflexibility and inability to learn and innovate. They can also benchmark and sidestep the incumbents to identify niche markets.

Strategy entails a set of commitments [8], often to specialized resources that cannot be utilized for other strategic purposes. Further, the network of a firm's business relationships forms a type of social exit barrier locking a firm into a set of supplier or distributor resources, thus, making it difficult to exit from unattractive arrangements. Also, managers often have difficulty abandoning strategies that have been successful for them in the past, even when the environmental context has changed [10]. Such complacency and inertia tend to create pockets of opportunities for new entrants. Not only can new entrants free ride the smoother path paved by incumbents, they can also capitalize on incumbents' mistakes and make the *right moves* in the new markets—moves that were difficult for the first-mover to envision.

Taken together, factors identified in the resource based view and the industrial/organizational model indicate that new entrants have the potential to overtake incumbent market leaders. Given existing resource endowments and market positions, however, the margin of error for product developers is small. To achieve industry leadership positions, entering firms must destabilize existing markets; they must take away their opponents basis of competitive advantage.

1.2 Product-design responses to incumbent power

Traditional product design frameworks often focus on one of two development strategies: incremental differentiation, or targeting a specific market niche. In incremental differentiation, the innovator attempts to develop a product or service whose benefits offset the

liabilities of newness in a sufficiently strong manner as to allow the innovator to charge a premium price, thereby offsetting some of the margin losses faced by entrants operating at a smaller than efficient scale.

An alternative approach is found in the hypercompetition literature [7]. Under hyper competition, firms choose strategies specifically designed to disrupt the normal functioning of markets. One such method is the introduction of a radical innovation. By definition, radical innovations obsolete knowledge [22]. If an innovation is sufficiently radical as to fundamentally change the way a customer does business, then traditional entry barriers fail to protect incumbents. Such disruption is likely in e-commerce for two main reasons. First, e-commerce is technology-driven and rapid technological change is the norm. For instance, when Iomega developed zip drives and high-capacity disks to replace the 3.5 inch floppy diskettes, computer hard drive manufacturers suddenly decided to build read/write hard drives with greater capacity, making zip drives and disks less marketable. Second, the product life cycle in e-commerce has become very short. The product developed of today may become irrelevant tomorrow in marketplace. Technological obsolescence is a common feature of e-commerce [1].

The high-velocity e-environment, with its inherent turbulence and uncertainty makes it easier to find windows of opportunity in which to launch new product designs. The rapidly emerging product launch windows in e-markets are a marked contrast to the pace of change in many traditional industries. In the auto industry for example, steam, diesel and internal combustion engines competed directly with each other for only about two decades; the next eighty years have belonged to the internal combustion engine and the now giant firms that mastered its technology. It is only in this decade that fuel cell technology has created a window of opportunity for smaller firms to compete with the giant automakers.

While one can readily conceptualize the potential of e-commerce to disrupt existing markets, in practice few e-businesses have replaced entrenched competitors. Some of the failures of e-businesses to disrupt markets can be laid at the feet of strategies that were inadequately radical. Early industry analysts expected electronic commerce to be sufficiently radical an innovation so as to obsolete traditional methods of conducting business. This proved to be far from the case. In the early stages of e-commerce, new entrants often employed off-the-shelf technologies, technologies that could be easily purchased by any competitor. As a result, incumbents were often able to adopt the same technology as entrants negating the newcomer's technical advantage.

2. Taxonomy of e-commerce product innovation strategies

This paper proposes a taxonomy of product/service innovation strategies specifically designed to disrupt markets, stripping incumbents of their resource based, and positionally based sources of competitive advantage.

The authors define product transformation as the creation of a product or service that generates a technological discontinuity [19]. For this paper, enhancement refers to strategies to incrementally improve core or ancillary goods or services in the new product bundle through e-business technology.

Taxonomies provide parsimonious descriptions of phenomenon that are useful in discussion, research and pedagogy [15]. The development of a taxonomy is beneficial because it reduces influences of confounding factors so that relationships and patterns can be detected [13] [14]. Identifying product/service innovation strategies with common features can help us understand how new entrants can destabilize markets and potentially unseat incumbent firms in established markets. Thus a taxonomy is useful both to researchers attempting to test relationships and patterns and practitioners who wish to exploit them.

2.1 Product service bundles

Central to the discussion of product innovation is the concept of product-service bundles. These bundles include the core product or service as well as ancillary services and expected future services [9]. A network administrator for example, purchasing computer system acquires the primary product of hardware and software; and ancillary services like training, documentation, and expected future services like the ability to purchase spare parts or additional training at some future date.

Firms do not compete on just products or services but on *bundles* of products and services. Product development teams clearly include enhancements to ancillary elements of the product in their research agendas.

2.2 Creating disruptive strategies

New product development teams can develop disruptive strategies for either the core product/service or the ancillary products/services. The core product is the primary instrument of customer value-creation; it is the customer's principal reason for doing business with the company. When products within an industry are similar, firms attempt to differentiate based on ancillary services, e.g., training, warranty, documentation, diagnostics, compatibility with other products, upward compatibility, etc. Given limited development resources, firms typically choose whether they will enhance or transform a core product or ancillary service. These choices lead to the matrix described in figure 1: The product innovation/market disruption matrix.

The product innovation/market disruption matrix identifies four unique product bundle strategies. They are: core and ancillary enhancement; core enhancement with ancillary transformation; core transformation with ancillary enhancement; and core and ancillary transformation. The paper describes the four strategies in detail and provides concrete examples for current e-commerce practice. The empirical literature and preliminary practitioner evidence suggest that firms wishing to disrupt incumbent market positions will be

most successful if they pursue a product transformation strategy. By definition, transformations require a radical innovation, thereby obsolescing knowledge. This obsolescence and weakens resource-based barriers like reputation and can even offset large positional barriers like economies of scale.

	Core Products		
	Enhance	Transform	
Ancillary services	Enhance	1 Enhance core and ancillary products	3 Transform core products/ enhance ancillary service
	Transform	2 Enhance core product/ transform ancillary services	4 Transform core and ancillary products

Figure 1: Disruptive product innovation strategies

2.3 Product digitization

In his influential research on technological innovation, Sahal [20] posited that as devices are made larger or smaller (scaled) the relationship between their structure and function changes. To Sahal, technological progress can be characterized as "learning by scaling." Product or service digitization represents the ultimate "scaling" of technology, taking physical goods and scaling them for instantaneous virtual delivery.

Choi et al [5] conceptualized e-commerce along three dimensions: products, processes, and agents. Firms considering e-business opportunities could chose a physical or virtual product; a physical or virtual process; or a physical or virtual agent/intermediary. Traditional firms had all three dimensions in the physical world; pure e-businesses had all dimensions in the virtual world. Implicit in Choi's model is the emerging capability of firms to digitize traditional products.

Product digitization is a radical innovation in that it obsolesces the economics of distance. To the extent a product is physical, it incurs logistics costs: inventory, warehouse, shipping, and warranty returns. Firms that can digitize products can compete globally at a cost advantage over traditional businesses. Similarly, physical agents typically accompany physical distribution. In addition to the direct costs of this model, there is the cost of recruiting, training, and retaining culturally sensitive agents who can represent products and services across cultures.

Service and agent digitization converts variable costs into fixed ones. Given fixed costs, firms with high volumes will achieve economies of scale and above normal returns when competing directly against firms with high variable costs. The cost advantages of digital intermediaries is ravaging traditional distribution

philosophy, rendering many distribution channels obsolete [16].

2.4 Enhancement strategies

Firms may choose to enhance either their core product or ancillary services in order to gain competitive advantage. Enhancements, being less radical innovations than transformations, are easier for competitors to imitate and therefore tend not to form the basis for sustainable advantage.

National and international newspapers used to deliver single edition products worldwide; through product digitization and delivery they evolved to create regional editions that were delivered electronically to distributed-production facilities. These publishers integrated local materials like advertising into the regional edition for physical distribution. The result was an enhanced product. These same publishers have added enhanced services in the form of on-line tools for subscribers to accompany the printed page. These tools may allow subscribers to search full text of back issues or view the full set of regional editions.

Software firms have long known that they can reduce the cost of product distribution by digitizing product documentation. For large firms like IBM and Hewlett Packard, the savings over printing and distribution costs is substantial. Further, customers can have the enhanced features of search engines and advanced indexing. Like most incremental innovations however, once it has been introduced into the market, it is easily imitated.

Credit card issuers have added a number of enhancements to their services to merchants including instantaneous credit screening and card issuance, electronic accumulation and transfer for frequent flyer miles and internet security provisions. None of these features transform the industry, but they tend to make the innovator more competitive for the short-run.

2.5 Transformation strategies

Transformation strategies are so radical that they render obsolete the existing basis of competition within an industry. Consider the case of the global recording industry. Questions of copyright aside, point-to-point file transfers combined with disk copying technology has ravaged the industry's existing product development and distribution framework.

From the perspective of the resource-based view of the firm perspective, incumbents should have had such enormous advantages as to blunt the threat of any entrant, especially small ones like Napster or Kazaa. Independent producers were unable to imitate the industry's large distribution networks. As a result, many talented artists choose to work with large record labels, even when they had artistic disagreements with the company, for fear of losing access to captive markets.

Electronic commerce has created a significant disruption in the recording industry. Independent producers can now distribute product over the Internet in small volumes and still be economically viable. With electronic distribution, small labels argue that artists can

be more profitable selling 15,000 items with them than through signing with giant labels selling millions of copies. The supergroup *Backstreet Boys* recently bolstered this argument in a lawsuit against their record label; after their sale of multiple million CDs, their label argued that the company has not made sufficient profit to justify extra payments to the band. Even for a small artist, industry analysts suggest a major label needs to sell 500,000 units to reach the break-even point.

Further, the very source of success in the record industry has created a high level of strategic inflexibility; record companies seem unwilling or unable to abandon their traditional strategies in light of new technology. Industry analysts note they have relied instead on copyright infringement suits to protect rents. However, sales revenues indicate this strategy has been particularly ineffective.

Similar radical e-commerce technologies are emerging in health care finance. U.S. hospitals and physicians have struggled for decades with case flow problems. Patients are required to pay the balance of their accounts after insurance companies have paid their share. The insurance payment is very unpredictable. The patient's co-pay amount is determined by a complex set of rules governing covered procedures, reasonable and customary charges, and accumulated health costs. The patient waits for the insurance industry to pay their share in order to establish their true out of pocket expense. In practice, the medical community has expected payment from individuals three to four months after the service has been provided. An entire billing and claims processing industry has developed in the US to help the medical community managing the patient billing and financing process.

An emerging radical e-business technology in healthcare has the potential to destabilize the patient financing industry. New services are being developed that would allow the instantaneous calculation of the outstanding account balance of an individual after insurance payments. The patient would be required to settle on the spot using cash or credit cards. The first card company to perfect the system will likely destabilize the billing, claims processing and patient financing industry.

Radical innovations are not without major shortcomings. First, radical innovations have a more complicated development process. Identifying breakthrough technologies is speculative work at best. Second, firms may create a radical technology that is disruptive to the industry but does not become the industry's dominant design. Third, radical designs need to be sufficiently beneficial to consumers for them to overcome exit barriers and other forms of inertia. Just having a radical design is not then a guarantee of market success.

3. Implications for research and practice

If radical innovations obsolete knowledge, and product digitization is a radical innovation, then e-businesses have the potential to destabilize markets. In a destabilized market, incumbent firms possess no better advantage than

entrants. Through radical innovation, entering firms can level the strategic playing field. For practitioners, this raises several important implications. New entrants may wish to focus greater resources on both search and development [22] and research and development.

Incumbent firms need to identify areas where product digitization would fundamentally change the industry and develop an a-priori strategy for responding to this challenge. It may be particularly valuable for firms to identify intelligent second-mover or late mover strategies that would allow them to benefit from resources like reputation while still competing on the new playing field.

Market entrants need to consider the value in disrupting the existing market. Without a discontinuous change, incumbent advantages in mature industries may be too powerful to overcome. Entrants need to consider methods of altering the fundamental customer value proposition through radical innovations like core product/service digitization.

Researchers face several key questions. While for purposes of simplicity the paper proposes an *enhanced* versus *transformed* innovation dichotomy, in practice innovations form a continuum from incremental through radical. An important question for researchers to determine is the extent to which an e-commerce innovation must be radical in order to disrupt an existing industry. Similarly, while a single enhancement will unlikely lead to competitive advantage, it is conceivable that a set of enhancements may combine to form an industry-destabilizing package. Researchers may wish to examine the effect of multiple product/service enhancements.

Due to the business risks associated with radical innovations, it is important for researchers to understand the role of intelligent late mover strategies. Intelligent late mover strategies have played an important role in the emergence of several Asian high-tech firms. It is unknown whether late-mover strategies can lead to competitive advantage in e-markets.

Theoretical frameworks in the management of innovation and technology and strategic management suggest that innovations like product/service digitization have the potential to obsolete incumbent advantages, thereby destabilizing existing markets. Given the potential rewards from overcoming incumbent positions, we anticipate more radically innovate e-business concepts in the future.

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