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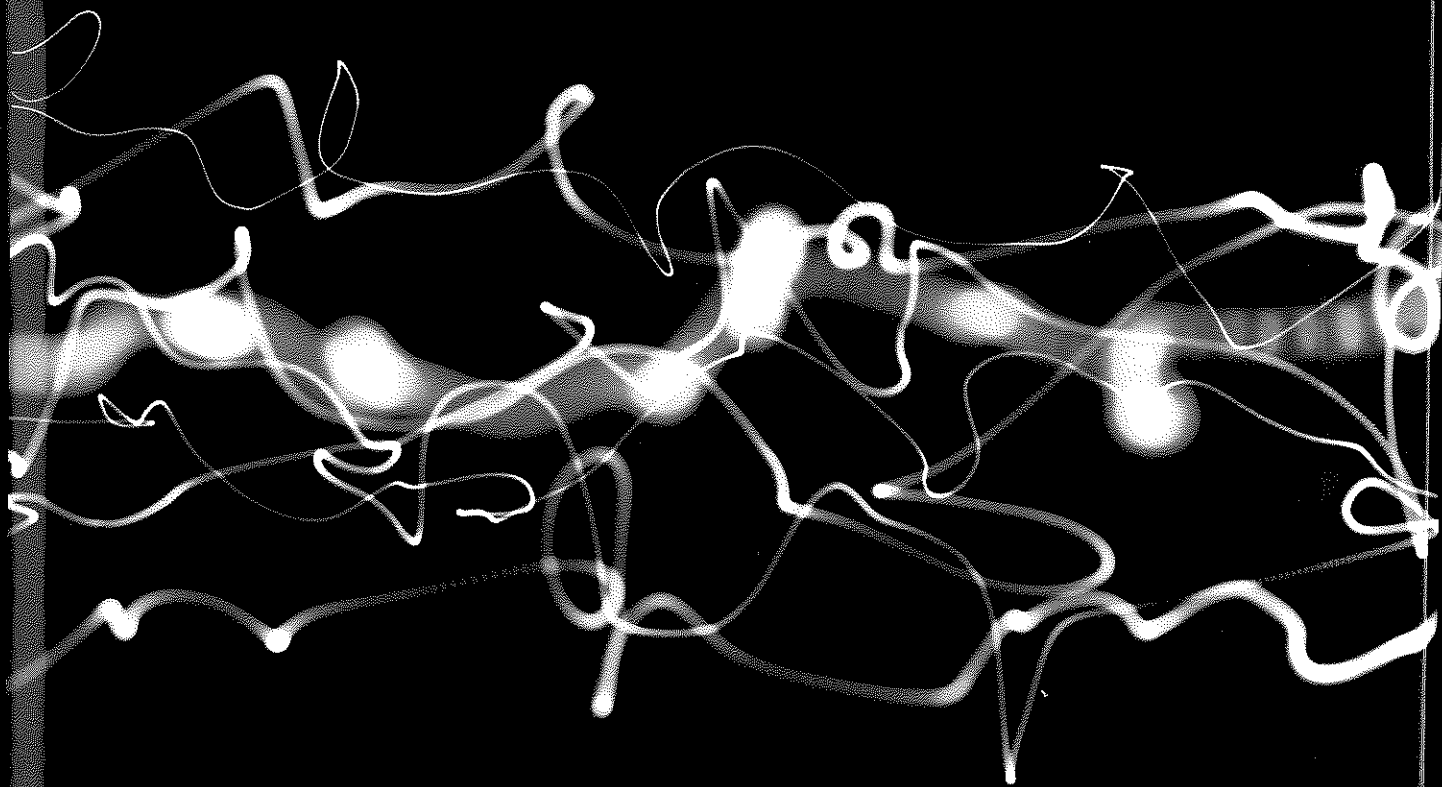
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Sources of Innovation

Jenny Darroch and Morgan P. Miles†*

*Claremont Graduate University and †Georgia Southern University

The need to reconfigure and innovate in the face of change is one of the dominant issues that underlies business strategy making today (Covin and Slevin, 2002). Firms are constantly attempting to leverage innovation in order to gain a competitive advantage or simply to survive. Hamel (2000, p. 11) suggests that:

"Somewhere out there is a bullet with your company's name on it. Somewhere out there is a competitor, unborn and unknown, that will render your strategy obsolete. You can't dodge the bullet—you're going to have to shoot first. You're going to have to out-innovate the innovators. Those who live by the sword will be shot by those who don't."

The tremendous changes in technology, strategy, culture, and business models have greatly increased competitive pressures on firms. Accordingly, resources, routines, behaviors, and practices are frequently examined as firms strive to become more innovative. The first step in the innovation process is to determine where to begin; that is, to identify a source of innovation (see von Hippel's 1988 comprehensive work in this area). However, therein lies the problem as "spotting" or recognizing attractive economic opportunities is seldom an easy task. Hamel (1998a, p. 12) offers the following story to illustrate how pig on the hoof became roast pork:

"One day, a wild pig wandered into a hut; lightning struck the hut; the hut burned down; a human poked through the charred remains, touched the pig, sucked on a finger, and voila! Yummy . . ."

Hamel (1998b) notes that the real question for all firms attempting to be innovative is: "is there a pig spotting guide that can help firms find innovations?" This question lies at the core of work on innovation—where do ideas for

innovations come from? We focus on this question by proposing a dynamic innovation framework that integrates Drucker's (1985) seminal work on the seven sources of innovation. This chapter is divided into three sections: first, we outline the demand-side and supply-side sources of innovation. Here, we argue that innovations can originate from the supply side, where the focus is on the products or services firms are willing to offer (Saravathy and Dew, 2004), or from the demand side, where the focus is on revealed preferences for a certain combination of attributes (Lancaster, 1971) that appear either as existing or "yet-to-be-invented" products. Second, we introduce Drucker's (1985) seven sources of innovation and identify them as either demand-side or supply-side approaches to innovation. Finally, we provide a dynamic innovation framework that brings together demand-side and supply-side sources into an integrated system.

Demand-side sources of innovation

For demand-side sources of innovation, managers identify emerging tastes and preferences that typically arise due to social, technological, or regulatory environmental changes. These tastes and preferences manifest themselves as unmet needs and wants for which managers develop new products (see, e.g., Allen and Marquis' 1964 work on government requests for proposals). Consumers can state tastes and preferences but may not be able to articulate their needs and wants. In fact, it is quite likely that consumers harbor latent, but detectable, unmet needs and so can describe a problem they have with an existing product without offering a solution (e.g., the digital picture frame as a solution to displaying digital photographs). Importantly though, a sufficient number of consumers with a homogeneous set of tastes and preferences is assumed to exist, and this provides the incentive for managers to develop new products to satisfy

the needs of this new market. Thus, one task of marketing management is to detect consumer preferences in order to identify unmet latent needs (Kotler, 1973). Kotler (1973, p. 44) notes that:

"latent demand exists when a substantial number of people share a strong need for something which does not exist in the form of an actual product. The *latent demand* represents an opportunity for the marketing innovator to develop the product that people have been wanting."

The more latent the need, the more sophisticated managers' market-sensing and opportunity recognition capabilities must be, and the more entrepreneurial the manager must behave, in order to make the linkages between unmet market needs and innovative solutions.

Marketing, as a discipline, has provided managers with a plethora of tools and techniques aimed at keeping current customers at the center of the business, involving customers as part of the new-product development process, managing customer relationships and accessing customers in order to measure attitudes and opinions. Marketing managers generally have superior market-sensing capabilities (Day, 1994) and increasingly look to alternate, non survey-based methodologies such as demographic trend analysis (Drucker, 1985) or anthropological studies (see, e.g., Arnould and Wallendorf, 1994) in order to uncover latent needs. This demand-side approach to sources of innovation is embedded in the value creation approach to marketing, described in Kotler and Keller's *Marketing Management* textbook and offered as the most effective approach to marketing (Kotler and Keller, 2006, p. 36). By following the value creation approach, managers first do their homework by conducting marketing research in order to identify market segments that exist, thereby identifying consumers with homogeneous tastes and preferences. Next, managers choose a segment or segments upon which to focus and then set about creating a value proposition for each segment. Managers then develop a product that will provide value to consumers. Once launched, marketers embark upon a campaign to communicate the product's value to consumers. We contend that this demand-side approach to innovation is reflected in the past American Marketing Association (2004) definition of marketing, which emphasizes value creation:

"Marketing is an organizational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders."

One of the criticisms of the demand-side approach to innovation, however, is that managers may not be able to

"read" the market in order to accurately identify gaps or opportunities. In addition, and as Kaldor (1971) noted, consumers often do not really know or acknowledge their needs. Similarly, Houston (1986, p. 86) suggested that marketers use their capabilities to create future markets:

"(c)ustomers are not necessarily good sources of information about their needs a decade from now ... Anticipating future needs and wants are consistent with the marketing concept".

Once gaps are identified, however, it is assumed that managers can leverage or acquire those resources necessary to support the selected value-creating strategy (Barney, 1991; Penrose, 1959; Wernerfelt, 1984), question routines and long-held assumptions of the market in order to facilitate quick adaptation to changing conditions (Teece, Pisano, and Shuen, 1997), and leverage tacit knowledge and adjust routines in order to accommodate those changes (Nelson and Winter, 1982).

Supply-side sources of innovation

Alternately, an innovation can be created by first developing a new product and then leading consumers to that product; we call this a supply-side approach to innovation. Here the focus is on leveraging innovations around existing products, processes, strategies, domains, or business opportunities (see, e.g., Morris, Kuratko and Covin, 2008). For many managers, this internally driven option is often more certain, manageable, and economically attractive (see, e.g., Burgelman and Doz, 2001; Campbell and Park, 2004) because these entrepreneurial initiatives are operationally or strategically derived from core business capabilities. In some situations, however, new-product development may not be coupled with strong market-sensing capabilities and so the risk is that consumers may not adopt the product because managers have misread the market.

If the firm does succeed in creating primary demand for the new product, a market segment of consumers with homogeneous needs and wants emerges and a new market is created. An example of a supply-side approach to innovation is provided by Akio Morita, the founder of Sony, who pursued his idea for a portable cassette player (the Sony Walkman) on the basis that "Sony does not serve markets, it creates them" (Kotler and Keller, 2006, p. 353). With the Walkman, Sony gained an early position of market leadership in a newly created market and, in so doing, influenced emerging industry standards and enjoyed strategically significant cost advantages.

A slightly different take on supply-side sources of innovation comes from the theory of effectuation

(Sarasvathy, 2007). With effectuation, the starting point for an entrepreneurial new business is based on the answers to three questions: (1) who I am—my traits, tastes, and abilities; (2) what I know—my education, training, expertise, and knowledge; and (3) who I know—my work and social networks. An entrepreneur will start small, working with that which is close at hand, before growing the business through effective execution. Planning is not a precursor to execution; rather the entrepreneur simply makes a start and awaits the outcome of his or her actions.

Just as marketers use tools and techniques to identify sources of innovation from consumers, those working in technology-related roles have provided managers with a range of techniques to facilitate supply-side sources of innovation. For example, Ladewig (2007, p. 3) describes the TRIZ process, a Russian acronym for The Theory of Inventive Problem Solving, a technique developed to support engineering creativity. The TRIZ framework provides a stepwise process to stimulate innovative technology-based solutions by specifying: (1) the product's core function, (2) the constraints on product performance, (3) the "ideal product", and (4) potential solutions to overcome the constraints on the product and bridge the gap between the current product and an ideal one.

One of the early criticisms of supply-side sources of innovation is that inventions were often developed without taking into account the context of end-users. Much progress has been made, however, and supply-side techniques have been altered to better integrate the "voice of the customer" (Griffin and Hauser, 1993; Katz, 2004). For example, quality function deployment (Katz, 2007) breaks the new-product development process down into a number of steps, with each step focusing on transforming user demands into design quality (Akao, 1994); therefore, each step in a demand-side process includes the voice of the customer. Similarly, Orban and Miller (2007) introduce the notion of a "prosumer," an individual who plays a dual role as both a new-product development specialist and consumer of the product. The prosumer must represent the needs of the customer throughout the NPD process.

Drucker's sources of innovation

In Drucker's (1985, p. 95) paper titled "The discipline of innovation", he argued that innovation "can and should be managed like any other corporate function." Drucker notes that while some innovations "spring from a flash of genius," most are simply the result of a "conscious, purposeful search" for exploitable opportunities. He offers seven sources of innovation: (1) unexpected occurrences, (2) incongruities, (3) process needs, (4) industry and market changes, (5) demographic changes, (6) changes in perception, and (7) discovery of new knowl-

edge. The remainder of this section explains each of Drucker's sources of innovation.

Drucker's (1985) first source of innovation, that of "unexpected occurrences", mandates that firms seeking to innovate must reconsider social, political, cultural, economic, and macro-environmental problems as potentially attractive and exploitable entrepreneurial opportunities that might result in commercially successful innovations.

An example includes Pfizer's well-known drug Viagra, which was initially developed to provide relief from angina and found to be largely ineffective. However, as Langreth (1998, p. B1) reports:

"The program was about to be shelved permanently in 1993, when Pfizer's researchers noticed something quite unexpected: Several men who had received higher than usual doses in a small study told doctors they had achieved improved and more frequent erections than before. At that time, it seemed like a side effect rather than a remedy. But the Pfizer scientists, trying to salvage a drug they had worked on for years, believed the erection effect might represent a significant advance . . . Some patients were so enamored of Viagra that they refused to give the pills back when their tests had ended."

This example illustrates how Viagra went from being an ineffective cardiovascular drug to a blockbuster solution for a condition that was emerging as a social problem: male erectile dysfunction. In this case a new and highly profitable market was created by exploiting the completely unintentional outcomes of a new product.

Incongruities exist where there are opportunities to better integrate the actions of producers and consumers, something Drucker refers to as "expectations and results" (Drucker, 1985, p. 97). For example, the creation of Apple's iTunes came about because the MP3 player created incongruities by allowing music that had been "pirated" off the Internet to be stored, classified, and physically moved from a PC to a very small, inexpensive, and portable device. Apple recognized that many consumers wanted to legally purchase specific tracks without purchasing an entire CD. Thus, the iTunes/iPod business model was created (Kessler, 2003).

Innovations can sometimes arise due to "process needs"; that is, the inability of current market offerings to meet the functional needs of the market. An example is the e-book reader, which allows a consumer to download PDF files to a portable device that has a relatively large screen and high storage capability. As more and more information is marketed in PDF format, the e-book reader will, for example, allow students to download a textbook or article anywhere and at anytime. Since Amazon sells the Kindle reader and 90,000 e-book titles, which can be downloaded directly to

an e-reader (i.e., without a PC) at an average price of \$9.99/e-book (Mossberg, 2007), the e-reader will also alleviate the problem of high book costs that consumers, especially students, face. Another example of a process need comes from the recent energy shortage, which is driving innovation in new forms of energy such as ethanol, bio-fuels, and hydrogen and more efficient technologies for human transport (see PBS, 2004; Miles, Darroch, and Munilla, forthcoming).

Changes in the regulatory, industry, technology, political, economic, cultural, and/or market environments often stimulate innovation as well. For example, the recent green revolution is forcing innovation along the food supply chain (Mangu-Ward, 2006). Many food producers are offering organic alternatives, which in many cases offers the opportunity for product and process innovations (see Miles, Darroch, and Munilla, forthcoming). Consumer interest in organics and other types of healthier functional foods has dramatically increased and created many opportunities for innovation across products, strategies, processes, and business models.

Drucker (1985) also identifies demographic changes as a source of innovation. Changes in the age distribution, average income levels, and racial composition of a region are all demographic factors that can create opportunities for innovation. A noteworthy example is the recent emergence of high-performance, three-wheel, human-powered tri-cycles that offers innovative answers to the problems faced by an aging, but fitness-seeking, older generation. Likewise, with regard to income distribution, Hart and Christensen (2002) suggest that the rapidly growing population of less developed nations is providing many opportunities for socially useful innovations that meet basic human needs. The creation of the \$100 laptop to provide computer-assisted education in the less developed world by the NGO One Laptop Per Child is a result of innovation directed at meeting these very critical needs (Anon., 2008). Even the financial service industry has seen disruptive innovation with micro-lending being offered by institutions such as the Grameen Bank and the establishment of financial person-to-person small business loan organizations such as Kiva.org (Anon., 2008).

In addition, changes in perceptions and social cognitive structures can provide sources of innovation. By this, Drucker means changes in social attitudes that may impact the desirability of a product. For example, prior to the 1960s, a deep dark suntan was socially desirable. Then research suggested that there may be health concerns associated with excessive sun tanning and so the sun block industry was born. Likewise, an alliance between Ericsson, Skandia, and the Huddinge University Hospital in Sweden formed to develop an innovative health care product that leveraged telecom technology and remote sensing to create a medical monitoring system that allows older people to remain at home rather than move to hospital

(Covin and Miles, 2007). However, for this innovation to work, caregivers, patients, and the medical service industry in Sweden had to change their perceptions and agree that home health care was in fact as good as, if not superior to, institutional health care.

The discovery of new knowledge can also provide a source of innovation. Examples include the creation of food products from genetically modified organisms (GMOs) and the cloning of livestock due to the dramatic advances in biotechnology. Monsanto has completely reconfigured its industry by the effective application of GMO technology to agricultural seeds and other production inputs (see Magretta, 1997). This newest green revolution has allowed more efficient and profitable farming practices to be developed enabling food production to increase while providing farmers with alternate ways to manage rising costs.

Five of Drucker's sources of innovations are largely driven by consumer demand and include exploiting (1) market incongruities, (2) process needs, (3) industry and market changes, (4) demographic changes, and (5) changes in perception. The remaining two sources of innovation, exploiting unexpected occurrences and discovering and leveraging new knowledge, are predominately driven by the producers' ability to supply the market with innovations. Table 14.1 classifies Drucker's sources of innovation into demand-side and supply-side approaches to innovation.

An integrated dynamic model of innovation

Since managers should not emphasize one source of innovation over another, the many sources of innovation become an integrated whole. Drucker's framework suggests that innovation is more of a business process and less of a chance occurrence. In the spirit of Drucker's systems approach to innovation, we contend that managers need to develop a comprehensive process that allows the firm to cycle between the demand and supply side so that once an opportunity is discovered or created, supporting processes assess the innovation for strategic and operational fit and enable the firm to assess and then exploit the entrepreneurial opportunity (see Burgelman, 1984; Shane and Venkataraman, 2000).

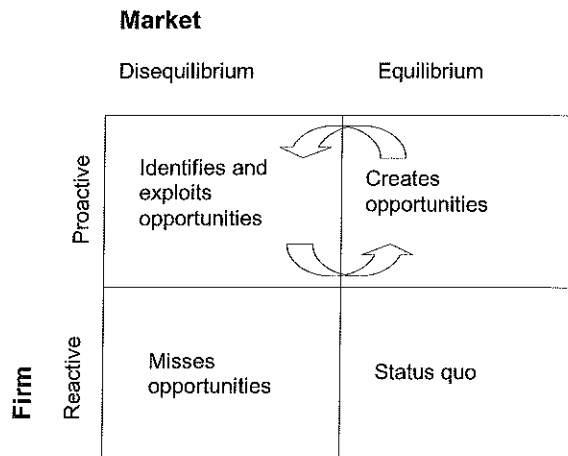
In this section, we bring the demand-side and supply side perspectives together into one framework and allow for dynamic interactions between the two (Robertson and Yu, 2001). Our approach is outlined in Figure 14.1.

Identifies and exploits opportunities

Initially, the market is in disequilibrium, and demand exceeds supply because consumers have needs that are

Table 14.1. The interrelationship between Drucker's sources of innovation and supply-side and demand-side sources innovation.

<i>Drucker's (1985) sources of innovation</i>	<i>Selected example</i>	<i>Demand-side and supply- side sources of innovation</i>
Unexpected occurrences	Viagra	Supply side
Incongruities	i-Tunes	Demand side
Process needs	e-book readers	Demand side
Industry and market changes	Organic foods	Demand side
Demographic changes	\$100 laptops and Kiva.org	Demand side
Changes in perceptions	Tele-home-health-care	Demand side
Creation/Discovery of new knowledge	Cloned livestock	Supply side

**Figure 14.1.** A dynamic model of market creation.

not currently being met by existing products (Kotler, 1973, p. 44). Consumers might be able to articulate their unmet needs or they might be able to articulate problems they have with current product offerings. However, because existing products do not satisfy those unmet needs, consumers are unlikely to offer a solution. Therefore, managers must possess superior market-sensing and opportunity recognition capabilities (Day, 1994; Hayek, 1948; Kirzner, 1997) because traditional marketing research methods might not successfully uncover latent demand. However, those within the firm are likely to be immersed in the market and be very connected to the players in it. Thus, the task of marketing management is to actively identify and then exploit new opportunities by developing new products. Once a product is developed, firms need to adopt innovative marketing practices to persuade and educate consumers about new-product/market opportunities and develop additional demand for that product (Houston, 1986). Thus, the firm generates supply to satisfy latent demand, builds more demand, and in so doing moves the market back to equilibrium.

Creates opportunities

Here, the market starts out in equilibrium and managers actively seek to create new opportunities through innovation (Schumpeter, 1934), the result of which is that firms generate supply that pushes the market out of equilibrium. In order to develop an innovation, managers make use of existing resources by, for example, leveraging R&D to produce technology-driven innovations. Kotler's (1973) demand framework suggests that there are eight states of demand possible for any product including (1) negative, (2) nonexistent, (3) latent, (4) declining, (5) irregular, (6) full, (7) overfull, and (8) unwholesome demand. In this situation we suggest there is nonexistent demand for the innovation: consumers are either disinterested or indifferent to the innovation. Once the product is developed, the task of marketing management is to create or stimulate demand by making consumers aware of the innovation and demonstrating the value the innovation has over current offerings. When full demand has been created the market moves back to equilibrium.

Missing opportunities

Under this scenario, the market is in disequilibrium because, as before, there are unmet consumer needs (i.e., demand exceeds supply). However, those within the firm sometimes fail to identify market opportunities. Firms operating in this quadrant are in danger of losing ground to competitors because they are neither satisfying existing consumers (who have unmet needs) nor creating new consumer groups. In addition, the firm does not possess the market-sensing capabilities that will allow it to discover, assess, and exploit these opportunities. Such a firm is very tied to the security offered by maintaining the *status quo*. The firm does not want to cause conflict in the market by confusing or alienating its consumers and so those within the firm tend to listen to only a small group of customers. For example, firms in the computer industry, such as the Digital Equipment Company (DEC), were developing mini-computers with the attributes most desired by their best customers. However, DEC and

many other firms in the mini-computer industry simply did not understand the competitive threats that emerged out of the development of the micro personal computer such as the Apple II or Commodore (Christensen, 2000).

Serves customers

The market is in equilibrium and supply equals demand. Because the firm is not proactive, however, it will not endeavor to alter the supply curve. The firm will stick to its knitting, preferring to serve current customers well. The task of marketing management, in this context, is to maintain full demand or revitalize declining demand (Kotler, 1973). Such a stance might result in making incremental adjustments to existing products or revitalizing current offerings in response to feedback from customers to avoid a situation of faltering demand (Kotler, 1973). This strategy is highly effective in a market for which preferences are relatively stable but have been disrupted by an environmental shock. For example, the beer-brewing industry was negatively impacted by the success of the Atkin's diet and its low-carbohydrate mantra. However, brewers quickly responded by either reformulating beers as low-carbohydrate (such as the development of Michelob Ultra) or better communicating that some existing beers, such as Miller Light, were already low in carbohydrates. The danger, however, is that a competitor might engage in Schumpeterian-type innovation (Schumpeter, 1934) and upset the *status quo* by altering consumer preferences and creating demand; once again the firm runs the risk of losing ground and becoming uncompetitive.

Conclusions

The central thesis of this chapter is that innovation is a systematic process requiring managers to cycle between demand-side and supply-side sources of innovation—sometimes beginning with the product/technology and sometimes beginning with the consumer. Ultimately, however, and in order for the innovation to succeed, both the demand and supply side need to be brought back into equilibrium. We argue that adopting a blended approach to innovation, and moving comfortably between demand-side and supply-side sources, is important to the eventual success of innovation in the market place.

Implicit in the integrated framework shown in Figure 14.1 is a recommendation that successful new-product development requires cross-functional integration as the firm cycles between the talents of those in marketing (demand-side innovation), who are likely to excel in sourcing ideas from the market, and the talents of those in technology, R&D, and operations, who are skilled at leveraging internal core competencies (supply-side innovations).

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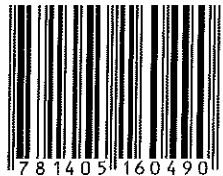
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