E X C H A N G E

Innovation and Growth: How Business Contributes to Society

by David Ahlstrom

Executive Overview

Milton Friedman once argued that profits are the chief purpose of business. Profits do matter, but today we know more about how business contributes to society. Good firms bring innovation to the marketplace, which facilitates their growth. Innovative, growing firms generate economic growth and employment, which, in turn, greatly improves people's lives. In this paper I argue that the main goal of business is to develop new and innovative goods and services that generate economic growth while delivering important benefits to society. Steady economic growth generated through innovation plays a major role in producing increases in per capita income. Small changes in economic growth can yield very large differences in income over time, making firm growth particularly salient to societies. In addition to providing growth, innovative firms can supply important goods and services to consumers, particularly those at the base of the pyramid. Through innovation and growth firms can do untold good for society.

It has often been argued that profits are the chief purpose of business. Famed economist Milton Friedman (1988) summarized this argument in a well-known and often reprinted 1970 *New York Times Magazine* article by contending that business's sole purpose is to generate profits for shareholders. Moreover, he maintained, companies that pursued other missions would be less competitive and thus would provide fewer benefits to their owners, employees, and society.

Lacking profit for extended periods, a firm's funds (and funding sources) can dry up very quickly, leaving the firm unable to conduct business. Profits do matter. But good firms supply far more than just profits for their owners: They bring innovations to the market, which in turn provide economic growth, employment, and significant improvements to people's lives (Baumol, 2004; Baumol & Strom, 2007; Christensen & Raynor, 2003). Indeed, many of the new products people use today did not displace existing products; rather, they created new markets by solving numerous problems of consumers that previously went unsolved (Christensen & Raynor, 2003; Nordhaus, 1997). In this paper I argue that the main goal of business is to develop new and innovative products that generate growth and deliver important benefits to an increasingly wide range of the world's population. The provision of these benefits to society is the major expectation we should have for business. And it follows that if a society significantly hinders firms from innovation and growth, the impact can be quite negative over the long term; even small reductions in growth over time can greatly diminish the potential benefits firms can bring to society (Barro & Sala-i-Martin, 2004; Baumol & Strom, 2007).[1]

[1] Sustainability of growth must not be overlooked. For example, currently it looks as if there will be little room for additional palm oil cultivation in Indonesia and Malaysia from cleared timberland, given theenvironmental degradation in those countries. Yet growth in this industry can still be sought through productivity improvements and the

David Ahlstrom *(ahlstrom@baf.msmail.cuhk.edu.hk) is a Professor in the Department of Management, The Chinese University of Hong Kong.*

A major route for firms to achieve growth and deliver products to a wider range of consumers is through disruptive innovation (Christensen, 1997). Effective disruptive innovation produces growth while providing innovative new products to the marketplace (Christensen & Raynor, 2003; Jensen, 1993; Tellis, Prabhu, & Chandy, 2009). Sustained economic growth generates significant long-term increases in per capita income and is especially important to those at the base of the economic pyramid (Barro & Sala-i-Martin, 2004; Dollar & Kraay, 2002; Prahalad, 2006). Innovation-driven growth, particularly through disruptive innovation, should be the main goal of business. If firms take this approach, profits and competitiveness are likely to come as a by-product of these activities (Christensen, Anthony, & Roth, 2004; Christensen & Raynor, 2003).

Technological innovation is particularly valuable in that it plays a central role in increased productivity and accompanying new business growth. For example, what required one hour to produce in 1890 now takes a worker in developed economies about seven minutes to produce (De Long, 2000). Innovation is a major reason for such increased productivity and economic growth as well as the enabling of a host of completely new industries (Helpman, 2010; Solow, 1956, 1957). As recently as a little more than a century ago, the purchasing power of an average American was one tenth of what it is today; the United States and several other countries have experienced sustained economic growth over the past two centuries, while others lagged considerably (though many are now rapidly catching up) (Maddison, 2006). The salience of growth is evident in that well-managed, growing firms can do much more for their employees and customers (Pfeffer, 1998). Wealthy societies can provide more for their populations; richer societies are safer and healthier (Viscusi, 1995). The world's problems can be better addressed by wealthier companies and countries and their citizens (Snowdon, 2006).

Economic growth does not happen automatically. A careful look at the remarkable economic growth since the early 1800s suggests that the market mechanism works through the innovations of individual entrepreneurs and companies (Baumol, Litan, & Schramm, 2009; Baumol & Strom, 2007; Helpman, 2010) in both de novo (new) and de alio (diversifying) firms (Carroll, Bigelow, Seidel, & Tsai, 1996). These firms bring to market cutting-edge and novel innovations, which in turn create new business growth while delivering novel goods and services to the marketplace (Baumol, 2004; Christensen & Raynor, 2003; Hamel & Getz, 2004). The social good is well served through new business innovation, which has created millions of jobs, generated hundreds of billions in revenue, and improved people's lives by creating numerous useful products and services and making them available to an increasingly large proportion of the world's population.

In the following pages I will further expand the argument that the central goal of business should be the development of new and innovative products that will generate growth and employment and be accessible to an increasingly wide range of the world's population. To do this, first, I investigate the significance of economic growth and how it matters to firms and society. Second, I examine disruptive innovation and offer examples of how it contributes to economic growth. Third, I consider how disruptive innovation can deliver new products to the lower tiers of the marketplace. I conclude with an important example of a new innovation that illustrates the above points in that it may create a significant new business for its innovator while at the same time delivering important benefits to society.

How Growth Matters

Firm Growth

Generally speaking, long-term revenue growth for firms has been shown to lead to superior performance; on average, firm revenue growth explains about one third of the variation in long-term shareholder value creation, though this varies somewhat with industry (Pfeffer, 1998). Though sustained growth is difficult to achieve, capital markets insist that firms grow. They can

cultivation of areas other than cleared forests that would not hurt the environment (*The Economist*, 2010b).

reward firms handsomely for growing and can punish firms—with falling share prices and higher borrowing costs—for failing to grow or even having long pauses in growth (Rappaport & Mauboussin, 2001). One major study found that equity markets harshly punished companies that allowed their growth to flatten out: Almost a third of such companies lost more than three quarters of their market capitalization (Corporate Strategy Board, 1998). Growing firms can easily recruit the best people, but when growth slows, the employees can sense that their possibilities for advancement will be constrained—not by their personal talent and performance, but by the number of years that must pass before senior managers above them retire. When this happens, many of the most capable employees tend to leave the company, negatively affecting the company's abilities to regenerate growth (Hamel, 1999; Pfeffer, 1998).

Short-term thinking fixated on profitability is also believed to harm longer term firm prospects. To illustrate, senior management at U.S. Steel and other traditional integrated steel mills were not blind to the threat posed by the newer disruptive mini-mill technology, as they sometimes had been accused of (Tiffany, 2001). Recognizing the threat from mini-mill steel firms such as Nuccor and Chaparral, U.S. Steel started to build its own inexpensive mini-mill to compete against the disruptive upstarts. However, U.S. Steel was compelled to halt the project by firm accountants, who argued that it was cheaper just to produce more steel from the firm's existing fully depreciated blast furnaces, as they could produce steel at or near its marginal cost. The big mills also found that they could improve their profit margins by focusing almost exclusively on their upmarket positions for steel while avoiding the low-end markets around the world. Thus, the larger steel makers concentrated on rounding out strategies—the improvement and expansion of existing mills rather than investing in the new disruptive innovations of the mini-mills (Tiffany, 2001). The business press lavished praise on those companies, and the capital markets rewarded the large mills for their cost-cutting efforts with improvements in equity prices (Lubove & Norman, 1994; Miles, 1989).

That short-term thinking failed to consider the eventual improvement of the mini-mill technology and the further expansion of lower end markets that the mini-mills continued to develop through disruptive innovation (Christensen, 1997). U.S. Steel and a number of other large mills missed their chance to reinvent themselves by investing in the disruptive mini-mill technology (Christensen, 1997; Tiffany, 2001). U.S. Steel is still the largest domestically owned integrated steel producer in the United States, although it recently produced only slightly more steel than it did a century ago (Boselovic, 2001). The large integrated steel mills ceded most of the growth in the steel industry to the mini mills. Research on disruptive innovation has demonstrated that this pattern repeats itself in industry after industry. It shows that some firms—usually new entrants to the industry—are able to create innovation-driven new-business growth while other (often established) firms fail to pursue the same important innovations even though they have the necessary resources to do so (Christensen, 1997). Firm growth through disruptive innovation and the resulting new business creation is a major vehicle by which firms grow and upset established industrial orders (Christensen, Roth, & Anthony, 2004; Jensen, 1993; Lucier & Asin, 1996; Schumpeter, 1942).

Growth and Societies

The resulting growth that firms are able to achieve through disruptive innovation is also crucial to societies and their economies (Barro & Sala-i-Martin, 2004). Although much attention has been dedicated to foreign aid, welfare redistribution programs, and macroeconomic management for improving people's income (and well-being), research by growth economists (Lucas, 2002, 2003; Parente & Prescott, 2002; Romer, 1986) and economic historians (e.g., Maddison, 2006) shows that economic growth is a considerably more important mechanism than the former ones in improving people's well-being, particularly over the long run (Barro & Sala-i-Martin, 2004; Easterly, 2006).

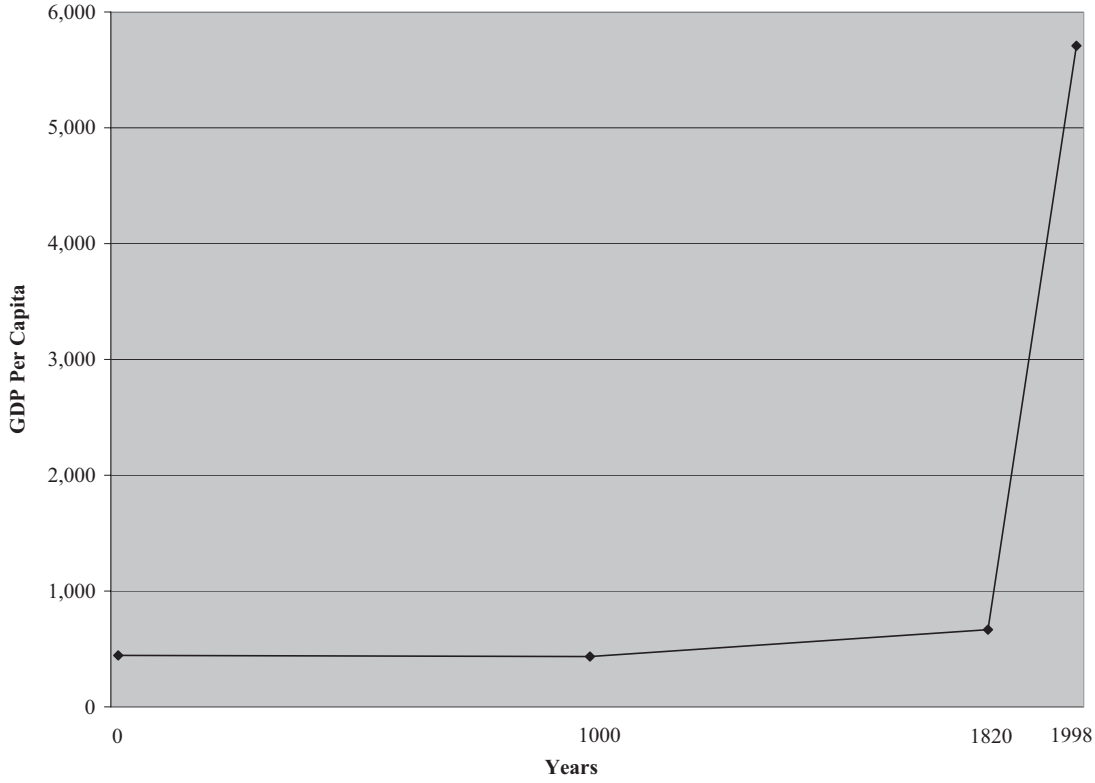
The takeoff in economic growth, which was first observed in Western countries, gave rise to

the firms that were early carriers of the industrial revolution and promoters of institutional change and property rights—changes that have spread to East Asia and more recently to other parts of the world (Baumol et al., 2009). Despite the wars, revolutions, and regular economic upheavals of the previous two centuries, the majority of the world's population is far better off than their parents and grandparents in terms of income per capita and living standards (Maddison, 2006). This improvement in living standards has been most pronounced in regions in which there has been strong economic growth, such as North America and Europe, and more recently in East Asia and India.

Economic growth is by no means inevitable or natural (Maddison, 2006). During the first millennium CE (1 through 1000), there was very little advance in people's income. The annual income of the average person remained at about $400 (in 1990 dollars) throughout that time (Maddison, 2006). From the year 1000 to 1820 average annual per capita income rose very slowly to $667 (Maddison, 2006, p. 30). Yet starting in 1820, income started to take off. Having risen just 50% in total over the previous 820 years, per capita income rose an unprecedented nine times between 1820 and the end of the 20th century, dwarfing all previous economic growth (Maddison, 2006). Figure 1 shows this growth in world gross domestic product (GDP) over the past two millennia.

Steady, long-term growth in per capita income is an indicator of the health of a society's industry (Baumol, 2004; Chandler, 1990; Maddison, 2007). Yet this economic growth conferred other significant benefits on society, such as a dramatic increase in life expectancy. In the year 1000, the average infant could expect to live about 24 years. A third of infants would die in the first year of life, and famine-related disease and water-borne illnesses would regularly ravage the population. Since 1820 vast improvements in life expectancy have occurred, tracking economic growth. Now a newborn on average can expect to live about 66 years (Maddison, 2006). Improvements in income and living standards have been

Figure 1
Growth of World GDP Per Capita (1990 dollars), 0–1998 C.E.



especially profound in East Asia. Brisk economic growth has brought the economies of Japan, China, and other East Asian countries up more than tenfold in per capita GDP in a few short decades, and with it significant improvements in the health of the population and industrial sector (Ahlstrom & Wang, 2010; Sala-i-Martin, 2006).

A Society's Economic Growth Need Not Be Large to Be Effective Over Time

Over short time horizons, the gains from moderate economic growth are largely imperceptible to the recipients of that growth, which sometimes makes them easy to downplay or overlook. But the gains in the long run are highly observable and impossible to ignore. Economic growth does not have to be explosive, Asian-style 10% growth to generate substantial improvements in industrial capacity and per capita GDP. Consider an example from the long-term performance of the U.S. economy. A steady economic growth rate of 1.8% increased the GDP per capita from $3,340 in 1870 to $33,330 in 2000, in 1996 dollars (Barro & Sala-i-Martin, 2004). That steady growth gave the U.S. one of the world's highest standards of living. Societies that are 10 times as rich can do quite a lot in terms of new technology development, and improvements to infrastructure, public health, and general living standards (Barro & Sala-i-Martin, 2004; Maddison, 2007; Viscusi, 1995).

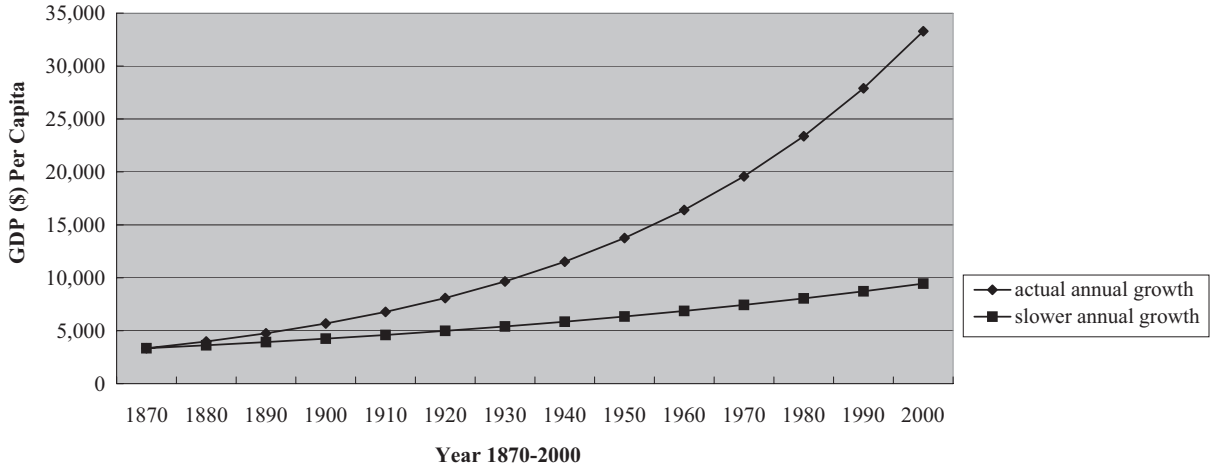
Small differences in economic growth can matter a great deal when compounded over long periods of time. Consider where the United States would have stood in economic terms as of the year 2000 if it had instead grown at 0.8% from 1870 to 2000 annually. That growth rate of 0.8% per year is just one percentage point lower than the actual U.S. rate over that time and is similar to the rate attained by the Philippines, Pakistan, and Mexico over comparable time periods (Maddison, 2006). If the U.S., beginning in 1870 with a real per capita GDP of $3,340, had grown at that lower 0.8% per year over the next 130 years, its per capita GDP in 2000 would have been $9,450 (compared to the actual $33,330)—only 2.8 times the value in 1870 (compared to an actual figure of 10 times). Instead of ranking near the top in the world in per capita GDP, the United States would have instead ranked 45th out of 150 countries in 2000. That is to say, if the growth rate had been reduced over an extended period of time by only one percentage point per year—a "modest reduction" that some say is a worthwhile price to pay for implementing aggressive environmental proposals (*The Economist*, 2009b)—the U.S. per capita GDP in 2000 would have been less than one-third of its actual level and close to that of Mexico. A modest 1% reduction in annual GDP growth over just one century produces decidedly immodest reductions—both in terms of per capita income and in industrial capacity (Barro & Sala-i-Martin, 2004; Maddison, 2007). Societies need to take care that they are not loading too many expectations on firms such that they are not able to focus on the key goal of generating new business growth and employment—growth that fuels crucial long-term societal economic growth and industrial capability. See Figure 2 for the comparison of the U.S. current per capita income and the lower growth rate.

Similarly, small positive differentials can also produce some surprisingly impressive economic outcomes. If starting in 1870, the United States had instead grown at 2.8% per year—one percentage point greater than the actual value, but a rate achieved on average by Western countries from 1950 through 2001, and similar to that of Japan (2.95% per year from 1890 to 1990) and Taiwan (2.75% per year from 1900 to 1987)—the result would have been quite impressive (*The Economist*, 2003; Maddison, 2006, 2007). The U.S. per capita GDP in 2000 would have risen to $127,000—about four times its actual value in 2000 of $33,330 (see Figure 3). That is heady territory that no country has yet experienced. It is reasonable to assume that a country with such a high per capita income would be able to accomplish quite a lot for its populace in terms of health and well-being compared to one that is only one quarter as wealthy.

What Else Economic Growth Does

Growth does not only make middle- and upper-income countries wealthier. In 1990, there were roughly 472 million people in the East Asia and Pacific region living on less than $1 a day. By

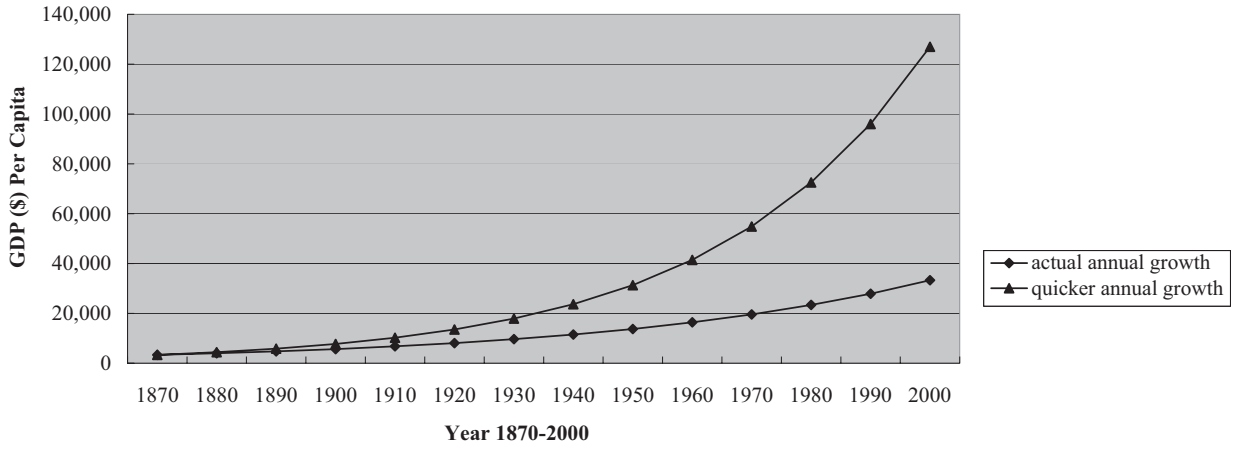
Figure 2
Growth in Per Capita GDP in the United States in the Case of Actual (1.8%) and Slower Growth (0.8%)



2001, there were 271 million living in that extreme poverty, and by 2015, at current projections, there will be only 19 million people living under those conditions (Brooks, 2004). Especially in the briskly growing countries of China and India, growth has led to rapid declines in poverty and related problems. The upshot is that, where poverty was mostly an Asian phenomenon 30 years ago (87% of the world's poor lived in East and South Asia), today it is more of a problem in Africa, where about two thirds of the world's poor live, compared with 18% in Asia (Collier, 2008).

China is a case in point. China's economic reforms, initiated in 1978 by Deng Xiaoping, unleashed a torrent of entrepreneurship and inbound investment. Since that time, China's economy has grown at approximately 8% annually, sometimes faster (Huang, 2010). This has led to a growth in GDP of more than eight times and about a six-fold increase in real per capita income (Barro & Sala-i-Martin, 2004; Maddison, 2006); China is approaching the income levels of many middle-income countries such as Thailand and Ukraine (World Bank, 2010). In China, the middle class has grown from 174 million in the mid-1990s to a remarkable 806 million just 15 years later (*The Economist*, 2009a). Millions of new businesses have been created, and approximately 300 million people have been lifted out of poverty. Despite some recent setbacks with respect to private enterprise (Huang, 2010), China has continued its growth. In a mere 30 years China went

Figure 3
Growth in Per Capita GDP in the United States in the Case of Actual (1.8%) and Quicker Growth (2.8%)



from having a low GDP and a faint industrial footprint to having the second-largest economy in the world, with the ability to produce sophisticated exports across a wide range of industries (Hoffman & Enright, 2008).

As other research confirms, these rapid improvements at the bottom of the income ladder have also led to declines in illiteracy, child labor rates, and fertility rates (Barro & Sala-i-Martin, 2004; Maddison, 2006). The growth in the world's poorer regions also supports the argument that we are starting to see a drop in global inequality (Brooks, 2004; Snowdon, 2006). Other dramatic declines in extreme poverty have been noted around the developing world, with the exception of most sub-Saharan African countries. It now seems possible that the United Nations' Millennium Development Goal of halving, between 1990 and 2015, the proportion of the world's population whose income is less than $1 per day is well on its way to being achieved (Brooks, 2004; Sala-i-Martin, 2006). As economist Martin Wolf (2004, p. 141) wrote in *Why Globalization Works*: "Never before have so many people—or so large a proportion of the world's population—enjoyed such large rises in their standards of living."

Where Does Growth Come From?

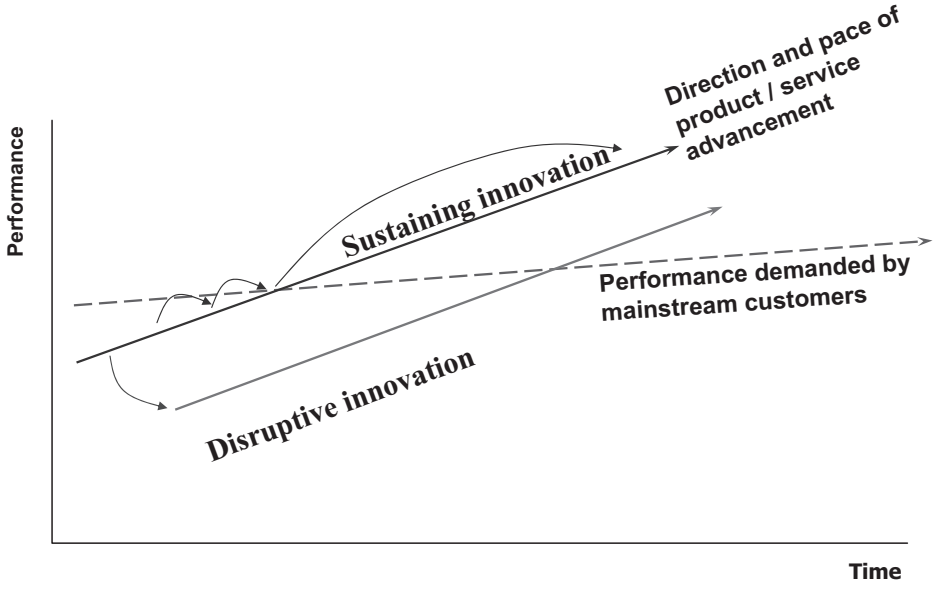
Growth is very important to firms and to societies, as small differences over a long period of time can yield enormous differences in industrial capacity and people's standard of living. In examining the salience of economic growth, Schumpeter (1934, 1942) posed an early challenge to the traditional view that growth came strictly from the accumulation of capital, labor productivity, or the more effective macroeconomic management of business cycles. Rather, he maintained, the work in firms' labs and by entrepreneurs led to creative destruction and renewal. Schumpeter argued that the development of new "combinations" by entrepreneurs, rather than the steady accumulation of capital, was the major factor behind long-term economic growth. Subsequent research (Helpman, 2010; Romer, 1990; Solow, 1956, 1957) further validated Schumpeter's work on the importance of technological progress. Technological innovation requires entrepreneurial initiative: The exceptional economic growth of the past two hundred years shows that the market mechanism requires the input of entrepreneurs and firms creating innovative new growth businesses (Baumol, 2004; Landes, Mokyr, & Baumol, 2010). Technological progress that fosters the creation of new growth businesses is central to economic growth (Helpman, 2010).

Disruptive Innovation

Research from Penrose (1959) to Peng (Peng, 2003, 2006; Peng & Heath, 1996) has suggested a number of ways that firms can grow. Broadly speaking, firms are thought to be able to grow if they make the right strategic choices about revenue growth, diversification, and alliances. Some recent research adds the importance of firms staying close to their core skills and utilizing scope economies when possible (e.g., Slywotzky & Wise, 2004; Zook, 2004). Yet other work suggests that more radical change with respect to innovation is needed for firms seeking to create significant and lasting growth (Christensen, 1997; Christensen & Raynor, 2003; Foster & Kaplan, 2001; Jensen, 1993; Lucier & Asin, 1996).

Building on the work of economist Joseph Schumpeter (1934, 1942), Christensen (1997) argued that virtually every commercial market (and some noncommercial ones) features three types of product-performance trajectories—ongoing economic and innovative forces that encourage creative destruction, renewal, and growth (Christensen, 1997). These trajectories are illustrated in Figure 4. The first trajectory measures the typical pace of innovation and product advancement undertaken by the established firms in a product market. This performance trajectory is called the sustaining innovation trajectory because it describes how these product improvements sustain the ability of the firm to meet customer needs along an established performance trajectory and technological standard (Christensen, 1997). The improvements are usually incremental in nature, much like the steady advance of Intel's microprocessors, but they occasionally also make revolutionary jumps in performance, as Figure 4 shows. Sustaining innovations generally give the existing customers more of what they were using yesterday,

Figure 4
Sustaining and Disruptive Innovations



and generally maintain the same technological standard, facilitating those improvements (Christensen, 1997).

This pace of product advancement almost always outstrips the mainstream customers' abilities to utilize the improvements. This leads to the other two performance trajectories shown in Figure 4. The second trajectory illustrates the more slowly growing performance demands of mainstream customers and their abilities to utilize the new product improvements. A good illustration of this is Microsoft Word. Microsoft can innovate at a much faster pace than customers require, such that most users are not even aware of most of Word's features and functions. This means that Microsoft, through its ongoing sustaining innovations, is "overshooting" the needs of a large number of customers—an overshoot that tends to become more pronounced over time, as Microsoft continues to make sustaining innovations to Word.

The third trajectory illustrates a disruptive innovation. A disruptive innovation enters a given product market at a lower performance point than the already established sustaining innovation. It is usually introduced by a firm outside of the mainstream of that product market, and sometimes by a start-up firm. That disruptive innovation is usually much worse than the established product on a key performance dimension and essentially functions at best as a weak substitute for the sustaining product. But it usually brings new performance criteria to the market, such as convenience and portability, lower price, or ease of use. This interests the overserved mainstream customers of the second trajectory and also enables completely new users to enter the market—those who were unable to use the established sustaining innovation because it was too big, complex, or expensive (Christensen, Johnson, & Rigby, 2002).

The creation of new businesses through disruptive innovation has occurred regularly over the past two centuries and has led to the establishment of a range of new industries, from plastics to personal computers to discount retailing (Christensen, 1997). For example, major new markets created in recent decades by disruptive microcomputers and other portable information technology devices have grown to more than ten times that of the previously dominant mainframe computer market, with much more growth expected (Anthony, Johnson, Sinfield, & Altman, 2008). The disruptive innovation of the microcomputer opened up major new markets for computing by bringing inexpensive and uncomplicated computing products to increasing numbers of new users—many of whom today are base-of-the-pyramid customers in developing economies (Prahalad, 2006;

Zeng & Williamson, 2007). Thus, companies are able to generate growth, both in developed and developing economies, by bringing out innovative new products that create new businesses and open up new markets, often at the low end (Dodgson, 2009).

Disruptive Innovation and the Base of the Pyramid

Disruptive innovation helps firms and economies grow through the creation of new businesses and the development of new product markets. But disruptive innovation also provides users with important products that were previously out of their reach. It does this by bringing technology to lower cost providers and users so they can have access to products that improve their living standards and productivity (Hart, 2010; Prahalad, 2006). Inexpensive computer and communications applications, for example, have been particularly beneficial to farmers in rural South Asia, where access to outside information such as current crop prices was limited. With the new, inexpensive devices farmers can access the Internet and get better prices for their crops (Prahalad, 2006).

Many such possibilities for firms exist at the lower end of world markets, where several billion people earn less than $1,500 annually but are starting to demand some of the goods and services previously available only to wealthier people or organizations (Friedman, 2000). Consider the circumstances that lead to the success of a disruptive innovation. The product or service must be a weak substitute for an existing product, one that initially is not as good but is more accessible in terms of price, convenience, or simplicity (Anthony et al., 2008). Thus, it follows that the disruptive innovation can develop well in new or less demanding applications, often among customers and applications outside of the mainstream. If the product can be made cheaply or simply enough, or be designed to be shared, it can be sold to customers at the base of the pyramid (Prahalad, 2006). Companies may also be able to work with entrepreneurs in developing economies to co-develop disruptive products that can serve lower income communities (Hart, 2010).

A number of disruptive medical innovations have created major new businesses for their developers while making important treatments more widely available (Christensen, Grossman, & Hwang, 2008). These innovations range from field test kits for various illnesses to "assembly line" cataract surgery at Aravind Eye Care System in India to simple water filters. These are products that were previously out of reach for healthcare providers and patients at the base of the pyramid. Abbott Labs is one company that experienced rapid growth largely through its ability to open up several new product markets through disruptive innovation. A number of years ago, Abbott chose to reorient its strategy toward something it called cost-effective medicine. That is, Abbott studied a number of expensive medical procedures and medicines and tried to develop lower end alternatives, particularly in diagnostics and nutritional products (Collins, 2001). Abbott and others enabled a new group of providers and patients to enter the market for such products and procedures. Many of those new customers are in remote clinics or villages and are thus able to enjoy access to an increasing variety of health services that were formerly out of reach (Christensen et al., 2008; Prahalad, 2006).

The story of disruptive innovation has been repeated many times over. Innovators create new disruptive goods and services that are weak substitutes for the established, sustaining innovations and usually have to sell them into new, often lower end markets. The mainstream customers cannot use the new products and the established firms in the industry often choose not to invest in the new innovation. The disruptive innovation initially brings new customers into the market who could not use or afford the established product, as happened when personal computers disrupted minicomputers and mainframes and initially brought large numbers of new customers into the market for computing (Christensen & Raynor, 2003). The story is repeating itself again as $100 laptops and cheap smartphones are opening up computing to large groups of customers in developing countries. In addition to facilitating new markets and economic growth, these disruptive innovations allow businesses and consumers

to do things that previously could be done only with the help of skilled professionals or by wealthier organizations (or people). Societal good is well served by disruptive innovation, which has, over the past two centuries, created millions of jobs, generated hundreds of billions of dollars in revenues and market capitalization, and raised standards of living by making useful products available to increasingly large numbers of customers and organizations. This has contributed significantly to the considerable economic growth over the past two centuries in the developed world and is contributing mightily now to growth in the developing world (Baumol et al., 2009; Hart, 2010; Helpman, 2010; Zeng & Williamson, 2007).

A Case Illustration: Water Purification Technology

One example of a disruptive innovation that has the potential to both create a new growth business and have a positive impact on people's well-being is the new water filter technology coming from Hindustan Unilever and Tata. Many people in developing countries still struggle to get access to clean water (Collier, 2008). Patients with water-related diseases fill about half the hospital beds in the poorest countries, while dirty water and related sanitation problems kill some 5,000 children a day (*The Economist*, 2010a, p. 4). Studies from Ghana and Pakistan suggest that diarrhea-related infections cost those countries about 4.5% of GDP. This does not include additional burdens of malaria and poor access to clean water and sanitation facilities—all water-related problems. One estimate is that these problems cost as much as 9% of GDP for Ghana and Pakistan, and their experience is quite typical of other developing countries (*The Economist*, 2010a, p. 4).

Billions are spent fighting water-borne diseases worldwide when providing safe drinking water to the poor can prevent much disease in the first place, while minimizing GDP spent on preventable illnesses. India, for example, does not have the capacity to treat a lot of the waste generated in urban households, leading to the pollution of surface and ground water. Bad water leads to large numbers of water-borne illnesses there (Babu, 2008; *The Economist*, 2010a).

A recent study by the consultancy firm Frost and Sullivan notes that in spite of this problem, only one in every 40 Indian households uses water purifiers (Babu, 2008). Needless to say, this is a massive potential market and one that has the potential to do much good. The problem is that the established water purifiers usually cost around $100 and require electricity or water pressure and are thus not feasible for the average consumer in India, particularly those in the countryside. The well-known Pureit water filter made by Hindustan Unilever is cheaper than the more established, higher end filters, but at $40 is still too expensive for most of the base-of-the-pyramid consumers, and cannot be assembled locally.

But another filter that is even cheaper and simpler than Pureit is Tata's Swach. Swach, derived from the Hindi word for clean, is a disruptive, very low-cost water purifier that can be manufactured using locally available resources. Costing around $7, it is affordable for people living at or near subsistence levels. Swach uses commonly available rice husk ash, pebbles, and crushed cement to get a filter bed that can trap almost all of the common harmful coliform bacteria. Early Tata studies have suggested a large reduction in water-borne diseases from the use of this filter (Rodrigues, 2010).

As with many new and disruptive innovations, the Swach filter does not work as well as other similar products, nor does it satisfy the requirements of the professional bodies—in this case the World Health Organization (WHO). Early studies report bacterial trapping efficiency for a batch of 10 filters to be around 200 CFU/100 ml, significantly below the current WHO standards of 5 CFU/100 ml[2]. But like so many disruptive innovations targeted at new low-end growth markets, the product is better than what the potential customers have now, which for most of them is nothing.

In tests conducted by Tata, normal drinking

[2] CFU or colony-forming unit is a measure of viable bacterial or fungal numbers. For liquids, CFUs are usually measured per milliliter or 100 milliliters of liquid.

water used in one typical village had 2,000 CFU/100 ml without any filtering. By lowering it to 200 CFU/100 ml, the Swach purifier helps eliminate 90% of the contaminants and almost all of the most serious pathogens that cause most of the major diseases. As with many disruptive innovations, the Swach is good enough because it is otherwise competing against nonconsumption. Most people in the village do not have any filter and cannot afford the more expensive ones, so this filter has proven very popular in its early tests. In addition, consumers can use some local materials to construct the filter, which is consistent with another helpful characteristic of disruptive innovation, in that such innovations enable less wealthy or sophisticated users to do things for themselves.

The WHO is reportedly not happy with the aggressive promotion of Swach, as they would like to see a superior product going into South Asian homes, but consumers seem content to use Swach until a WHO standard-compliant filter that is low priced and similarly convenient can be developed. Other alternatives are either too expensive or require sophisticated disinfection technologies that use electricity or water pressure, which is not yet practical for many villages. The Swach can benefit hundreds of millions today in South Asia, and hundreds of millions more in Africa and elsewhere.

By developing disruptive innovations such as a low-cost cataract surgery or a simple water filter firms can do an immense amount of good. In India, water-borne diseases cause more than one and a half times the number of deaths caused by AIDS. Given that nearly one billion people are without access to clean water, the potential new business for Tata is sizable (*The Economist*, 2010a; Kinetz, 2009). But the good that can be done with an inexpensive and simple water purifier by reducing the terrible problem of water-borne illness around the world is greater still. By concentrating on bringing lower end disruptive innovation to the market, firms can do untold good for consumers, particularly those in developing economies, while creating sizable new businesses that facilitate economic growth.

Discussion

Milton Friedman (1988) once argued that profits were the main goal of business, because if they were not, firms would get side-tracked and lose their competitive edge. Today we know more about the value that well-performing firms can provide to society. Firms provide far more than just profits to their owners; they supply innovative products and, with them, economic growth and employment. Profits are important, but the main goal of a business should be to develop innovative new products—products that will generate growth and employment while also being economical and increasingly accessible to a wider range of the world's population.

Economic growth is very important to societies. Although much attention is given to redistribution schemes and macroeconomic management to improve people's well-being, steady economic growth is the most important mechanism for raising the world's living standards (Barro & Sala-i-Martin, 2004; Helpman, 2010). In spite of the upheavals of the past two centuries, the majority of the world's population is far better off than their parents and grandparents were. This is particularly true in developing countries such as China and India where, in recent years, hundreds of millions of people have left poverty and entered the middle class (*The Economist*, 2009a). No previous era of development—not that of Egypt or Imperial China in their heyday, not during the grandeur of the Greco-Roman world, not even throughout the period following the Industrial Revolution—approaches the modern era of economic growth.

Many studies have shown that a large and rising share of economic growth in recent decades—and with it living standards—is derived from innovation. Innovation leads to increased productivity and the launch of new industries (Baumol, 2004; Helpman, 2010; Solow, 1956, 1957). Firms create growth in economies largely via disruptive innovation and subsequent new business growth (Baumol, 2004; Christensen & Raynor, 2003; Jensen, 1993). Disruptive innovations create significant new growth in industries as they enable the less skilled and less affluent to use products previously used only by wealthier people and organizations.

Disruptive innovation also brings products and services that are cheaper, better, and more convenient to consumers who had little or no access to them before.

Economic growth has provided the world with remarkable improvements in per capita income and standards of living over the past two centuries. Even more rapid growth is occurring today in China, India, Brazil, and a number of other economies, lifting an unprecedented number out of poverty and into the middle class (*The Economist*, 2009a). But can the environment absorb so much growth? There are serious questions as to where the world's energy will come from and how to manage all the carbon emissions from a population that is still growing and consuming more than in the past. The ever-present specter of global warming also dogs efforts to promote economic growth and development without a plan to avoid or simply mitigate the potential strain on the environment. All the unknowns raise questions about growth (Nordhaus, 2007).

Given these problems, should firms focus on growth at all? Some would argue that growth is hurting the environment and countries need to act to restrict growth considerably. In their view, sustainability is the new imperative for firms, which means that growth has to be tempered in favor of sustainable strategies and innovations. Others do not talk about directly restricting economic growth but would apply severe regulations and costs to firms and consumers that would effectively do just that. One such plan is a tax to reduce carbon emissions and global warming. This tax would mean society would sacrifice wealth today, and based on the most popular proposals, probably every year for at least the next 100 years (*The Economist*, 2009b).

How can growth be the main agenda of a firm if it is seen as being unsustainable? It is a difficult and complex question for which there is no clear answer as yet (Nordhaus, 2007). But considering that question in the context of economic growth and development, it is helpful to understand what the costs are of aggressive measures to slow global warming versus the costs of less aggressive mitigation strategies. For example, one major study from the United Nations Intergovernmental Panel on Climate Change (IPCC) suggests that we can expect about a 3-degree Celsius increase in temperature over the next 100 years, with more severe climate problems following in the decades after that. Avoiding that increase through taxation and strict regulations will likely reduce overall economic growth by roughly 1 percentage point on an annual basis over that 100 years. In practice, that means growing the world economy at about 1.8% annually, or about six times over the next 100 years, as opposed to growing the world economy under a less aggressive strategy of mitigating the effects of warming at about 2.8% annually, or about 16 times over the next 100 years. Under the latter "mitigation" strategy, the world would end up much wealthier in 100 years' time compared with the stricter "avoidance" strategy. Future societies will have to decide for themselves if slowing down growth for the next 100 years or more (and thus forgoing significant future income) is a worthwhile trade-off to make (*The Economist*, 2009b). If the world can live with a slowly warming climate (at least temporarily), then in 100 years' time, society will be 16 times as wealthy as it is today and much better equipped to devise solutions to the problems of sustainable energy and global warming. Each generation will have to confront this question and carefully consider the growth and wealth trade-offs in its answer. But whatever the answer, the development of disruptive innovations that will generate economic growth and bring important new products and their solutions to bear on an increasingly wide range of the world's problems should be the number-one goal of business.

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