New Insights Lecture on "Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns"

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29 May 2009

Professor Christensen's talk centred around the idea of disruptive innovation and its applicability to the education and health care sectors.

What job would you hire a milkshake to do?

Professor Christensen started his talk with a puzzle: why was success so difficult to sustain? That led to a related question: why was innovation so difficult to sustain?

One possible reason was the way new products were marketed. Professor Christensen used the example of McDonald's milkshakes to illustrate two approaches to marketing. The conventional approach was to segment the market by product and customer type, and conduct focus group discussions with people from the appropriate customer category. Professor Christensen proposed that companies consider instead the customer's point of view. What was the customer hoping to accomplish by buying that product? What job was the customer hiring that product to do?

One of Professor Christensen's associates looked at the sales of milkshakes from precisely that perspective: what job did customers hire milkshakes to do? The researcher found that milkshakes were bought primarily by two distinct groups of customers. The first group consisted of people bought milkshakes early in the morning, to occupy their minds and stomachs on their long drive to work. The second group consisted of fathers who bought milkshakes for their children in the afternoon, which children then threw away half-consumed. In other words, the same milkshakes had been hired to do two different jobs. Improving the first job might mean making the milkshake thicker, putting in place a separate milkshake-dispensing machine and a separate payment system for milkshakes — all steps to minimise the time customers took to buy the milkshake and increase the time taken to drink it. But improving the second job might mean diluting the milkshake or otherwise looking for ways to *decrease* the time taken to drink it.

Professor Christensen highlighted two points: first, that successful innovation had to be targeted *at the job that the customer wanted done*, not at any pre-existing product or customer category. Second, successful innovation meant looking not just at the design of the product but at *integrating different processes* to help the customer, such as the product, its delivery system and its payment system.

Turning to education, we could ask what jobs students were trying to do. It turned out what students wanted was not (just) to be educated, but to feel successful and have fun with their friends. Motivation was a problem in American schools, but the key to motivating students was not to improve the quality of their education — because the job was not to educate themselves — but to change the way they were learning in schools so that they could feel successful and have fun while being educated. One successful innovation in education, tries in a few schools in the US, was project-based learning. Its success lay integrating the

product (education) with the delivery system (project work) — project-based learning enabled students to feel successful on a day-to-day basis while learning new knowledge.

Disruptive innovation

Professor Christensen used the example of the steel industry to illustrate the idea of disruptive innovation. The steel industry used to be dominated by integrated mills, in which the different processes needed for primary steel production were vertically integrated in the same plant. However, beginning in the 1960s, integrated mills were disrupted by mini-mills. Mini-mills used scrap steel for iron rather than converting ore to liquid iron, and hence required smaller furnaces and were less costly — mini-mills could produce steel of any given quality for 20% less than integrated mills.

Mini-mills did not disrupt the entire steel market overnight. In the 1960s, mini-mills were confined to the lowest, least profitable end of the steel market, in rebar production. The integrated mills conceded this segment of the market to the mini-mills without too much concern, and moved up the value chain to focus on higher quality products like angle iron, which had higher profit margins than rebar. In 1979, the last integrated mill was driven out of rebar production, and the price of rebar steel, predictably, fell by 20%. Mini-mills were forced to seek profits further up the value chain, by producing angle iron as well as rebar. Integrated mills responded by retreating further up the value chain to structural steel, which had higher profit margins than angle iron. Mini-mills had at present disrupted the structural steel market and were competing with the integrated mills to produce sheet steel, at the highest end of the steel market.

Professor Christensen pointed out that the story of disruptive innovation in the steel industry was consistent with the pursuit of profit. Each time the integrated mills moved up the value chain, their profit margins improved, even if they had to sacrifice volume for profit margins. Each time the mini-mills moved up the value chain, they competed with integrated mills on cost, up to the point when the last integrated mill left that segment of the market and prices fell, driving the mini-mills further up the value chain. This pattern of disruptive innovation was not peculiar to the steel industry but had been repeated in many other industries, such as disk drive manufacture, aircraft manufacture, and the automobile industries. Disruptive innovation tended to succeed when an entering company came in at the bottom of the market, either to create a new market (more of that soon) or to compete in the lowest end of the market, because the incumbent leader's response was often to flee up the value chain. Conversely, disruptive innovation tended to fail when an entering company attempted to leapfrog the incumbent leader, because incumbents were generally motivated to defend their most profitable lines.

The concept of disruptive innovation could also be applied to economies. Japanese companies, for example, had started by competing against American companies at the bottom of the markets they entered — Honda, for example, had started in motorcycles, Sony in electronics, Canon in photocopying — and by the 1990s had moved up the value chain to the high end of these markets, making the best products in their categories in the world. Japan had disrupted the West, and had been disrupted in turn by newly industrialised economies like Singapore, Taiwan, Hong Kong and South Korea, which were now being disrupted by fast-growing developing countries like China and India. The Japanese economy was a cause for concern because it had not shown a capacity to renew itself, unlike the US economy; Japan did not, for example, have the same level of venture capital, or degree of labour market mobility, or culture of entrepreneurialism that the US had. Professor Christensen felt that

Singapore's challenge was to avoid the Japan route by building up our entrepreneurial sector and encouraging new businesses to start in new industries. Instead of just moving up the value chain, Singapore should look for new growth opportunities, especially in areas that could not be (easily) outsourced, such as in the education and health care sectors.

Centralisation and Decentralisation

Disruptive innovation tended to first follow a process of centralisation, driven by the advent of sophisticated technology, and then a competing process of decentralisation, driven by the costs and inconvenience of centralisation and standardisation. In computing, for example, centralisation had been driven by the development of mainframe computers. The cost and inconvenience of the large mainframe computers then drove the decentralisation of computers from mini-computers to personal computers to laptops and now to handheld and pocket computers. Each new product brought the ability to compute to a larger population, creating a new market from those people who had not been able to afford the previous product — that is, creating a new market out of non-consumption.

The same model could be applied to health care. Health care was originally decentralised, with doctors making house calls. Improvements in medical technology such as new imaging technologies, surgical suites and high-speed multi-channel testers drove the centralisation of health care services in the form of large hospitals. The time was ripe for the decentralisation of the industry, to spread technology and services away from hospitals to outpatient clinics, doctor's offices, and even the home, and to spread expertise away from specialist physicians to general practitioners, nurse practitioners, physicians' assistants and even patients. Professor Christensen argued that the decentralisation of the health care industry would bring down health care costs in the US, without compromising health outcomes.

The dynamic between centralisation and decentralisation paralleled the tension between standardisation and customisation in education. The education system in the US was an example of interdependent system architecture, and could not be easily customised for different kinds of students. The sheer diversity of learning and teaching styles, on the other hand, could not but create a demand for customisation in education. Professor Christensen made the case for computer-based learning as the disruptive innovation needed in the education market. Computer-based learning had so far been successful in competing against "non-consumption" in areas like remedial lessons, advanced placement courses and home schooling, where the computer was literally better than nothing. Professor Christensen suggested expanding the use of computers to the low end of the education market, such as expensive, unpopular or extra-credit classes that schools could only afford to run online, and to eventually further up the value chain as a way of customising content to the learning style and ability of individual students. Computers could be used not as a substitute for teachers but a way to introduce customisation into the education system, while preserving the overall architecture of the system.

The solution for hospitals was not just the decentralisation of technology and expertise, but the reorganisation of the hospital as a business model. Professor Christensen used a comparison of two factories from the Michigan Manufacturing Corporation to illustrate the problems with the hospital's value proposition, which was in essence "do anything for anybody". Factory A was organised for maximum flexibility, with a wide range of processes and machines and operators that could be deployed in any number of pathways to make any number of products. The price for flexibility, however, was the high cost of

managing the different pathways that different products took through the factory floor. Factory B, on the other hand, instead of promising all products to all men, had selected the two pathways with the highest volume of products and set them out in a straight line — sacrificing flexibility for efficiency. Of the two, Factory A had gone bankrupt.

The typical hospital in the US could be compared to Factory A — it had a department for just about every disease, and the price of that flexibility was high overhead costs. Large general hospitals conflated at least two different business models: the solution shop, which diagnosed problems and recommended solutions, and was paid a fee for service; and the value-adding process business, which took stuff that was not complete and added to it, and was paid a fee for outcomes. Professor Christensen's proposal was to break up the hospital into two separate businesses, conforming to the separate business models: a coherent solution shop, which brought physicians together and was responsible for producing an accurate diagnosis of the patient's problems, and a coherent value-adding process business, within which patients were run through a tightly linked process. Professor Christensen argued that clearly distinguishing the business models and functions currently merged within the same hospital would lower costs and improve outcomes for patients.

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