Technology Market Induction and Dairy Farmers

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High-processing programs which are not software based, but web-ware based. No more lag for graphic intense MMORPGs. High definition streaming video. Fun.

The definition of high speed in the U.S. currently is that 760Kbits per second is standard, and 1500K (1.5M) is the new U.S. “high” speed. The definition of high speed in Europe, Australia, and other parts of the world is 8.0M - almost six times as fast as the “high” speed in the U.S. I hereafter refer to this 8.0Mbits per second speed as *HSBroadband*; everything else (including, ironically, the U.S. “high” speed) is dubbed *low speed*. Despite the American market being considered a free market, a market where the available innovative technologies can adapt to integrate within the system, adoption of HSBroadband has failed and been rejected in the United States. Without the adoption of HSBroadband internet service in the United States, we have fallen behind in our technophiliac cravings, leading us to survive in a mediocre web existence. Without HSBroadband, we are not able to stream the information at necessary speeds to validate powerful web-based software applications or high definition video.

This failure is somewhat contrary to many other historical successes starting with the industrial revolution. For over a century, the U.S. has always had the freedom, drive, and ingenuity to lead the world in integration of new technology. It has been with this freedom in the market that innovations have been permitted and accepted by the market itself. But starting with steel mills in the late 1960’s, the U.S. has had several failures in adapting to new technology. Several reasons seem to exist for these failures; the free market presents a complicated picture. These failures have given engineers and market analysts a glimpse into the future of technology as it is adopted in the United States. As we are attempting to evaluate the failure of America’s adoption of HSBroadband technology, we can consider some lessons learned from agricultural technology as a parallel of broadband connectivity.

According to Raymond L. Nebel, from Virginia Tech, the dairy industry in the U.S. is “one of the most intensive technology intergraded farming systems in the world of production agriculture.”[1] He claims that “the market generally sorts out which technologies offer a competitive advantage.” Indeed, this is the founding principle of technological adaptation. If there is no monetary incentive, nothing will happen. In the case of HSBroadband, Europe, Australia, and some of Asia must be finding such an incentive, and the U.S. is not. There is money in America for broadband, so the failure to adapt to HSBroadband must lie elsewhere. Nebel cites five reasons to decide whether a dairy farmer should integrate a new technology; by applying these same principles to HSBroadband technology, we can clearly see the breakdown of the market absorption of HSBroadband in the United States. I then supplement another ten considerations from other research.

Nebel’s first founding principle of adaptive technology is efficacy: does the new technology really work under conditions similar to what is on the farm? Does HSBroadband work similarly with computers as low speed? It does work if the computer has a HSBroadband interface unit; and since any computer that will be connected to any broadband must have some interface unit, the HSBroadband interface unit could be purchased as easily as the low speed broadband interface unit. But the other end of the cable connection must have an HSBroadband server, which would need to be different than the low speed unit, and the cable wire would need to be different from the low speed wire. Herein lies the

biggest lack of monetary incentive. How many people in the U.S. would want to switch from low speed cable wires to high speed, and how long would it take to add new HSBroadband cable wires? At this point, the cable providers do not yet believe enough people will pay an added cost when low speed appears capable enough to appease the mass consumer.

Beyond the mass consumer, the management of an HSBroadband provider would require new training in marketing, installation, maintenance, and support, and until a complete switchover was made, both kinds of broadband support would be needed. Since Europe never set up a huge low speed broadband base, they had almost no switchover – just new sales opportunities. The European management system offered a clean base from which to build. When their broadband base becomes huge, they will have a conversion problem like the U.S. is experiencing. And at that time, the U.S. may have not converted to HSBroadband, so they could conceivably simply jump to VHSBroadband (Very High Speed, probably ten times more speed than High Speed) when it becomes marketable and beat the rest of the world in that conversion. Along the same vein as management training, Raymond Nebel discusses employee training – the cost of hiring new employees, and the cost of training them – as another principle of dairy farming technology adaptation.

Another principle, initial investment, considers what the downside risk is if the new technology does not work for you. This risk of initial investment is very real – especially in the Silicon Valley. Countless inventions have been financed into development but never gained popularity or some other need to take off well enough to repay investment costs. While the broadband providers are carefully watching the market for signs that the U.S. will be ready to dive into HSBroadband, they are carefully weighing the investment cost against the possible return on investment.

Nebel's final founding principle describes the adoption of technology as a give-and-take of the cultural psychology in relation to the technology. Can individual psychological and cultural feelings and beliefs be reconciled with the technology? This final condition must be satisfied, even after all the other conditions for change have been answered satisfactorily. Obviously, until there is at least one person willing to take the risk, the change will not occur.

Although Nebel's five founding principles approach with a broad stroke the failure of innovative technological adoption, we need to consider more specific failures within the system of technology. We will now approach a number of additional points on possible factors influencing the failure of U.S. adoption of HSBroadband.

New technology must match the risk factors; this was one of Nebel's principles. But further than that – *upgraded* technology must answer the question of whether the upgrade will be beneficial enough not only to provide a monetary profit compared to investment costs, but also to be enticing enough for the established customer base to be willing to make the change. Until broadband providers can satisfactorily prove this condition satisfied, they will not make the investment. This is what the U.S. is fighting compared to the rest of the world. This was also the fight of cellular phones. The U.S. had the largest established landline telephone network in the world, and the cost of cellular was huge compared to maintaining existing land phone infrastructure. We saw a similar problem with foreign steel plants. Countries outside of the U.S. were building new, modern, efficient plants with the help of government grants, while the U.S. steel mills could not afford to build newer plants – instead, penny pinching and hanging on as long as possible using their old, established plants. Eventually, the efficiency differential between the new, foreign plants and the old, domestic plants meant U.S. plants could not compete with foreign steel plants.

A second possible factor is that some new technologies require approval from a governing agency. New drugs and medical procedures[2-4], for example, must be regulated. Regulatory agencies (such as the FCC) make the approval process such that the investment costs must be overcome by such a huge

profit margin as to make some technology unachievable in the U.S. Many drugs are only available by mail order outside the U.S., and may never become legal inside the U.S. Although this does not appear to be a concern currently for HSBroadband, the transmission noise phase does increase significantly, and could come under FCC regulation.

Special technologies requiring high investment in research and development is another issue for HSBroadband. For example, new semiconductor wafer fabrications cost so many billions of dollars it is literally impossible for any except the largest makers to advance to the next level of fabrication. As the knowledge and amount of research required to bring high tech ideas into reality escalates, the ability for small (traditionally more flexible) innovators to succeed rapidly diminishes. Fighting an established low speed broadband infrastructure for conversion to HSBroadband would likely need to use existing cable network and require special techniques to allow both low-speed and HSBroadband to run simultaneously on the network for some time. Some special technology solution would be required in the U.S.

Another possible factor in adopting new technology is the cost of buying permission (e.g. copyright or patent) to use the technology. For example, permission is required for the libraries[6] of the future as well as purveyors of music, video and many inventions; in some cases this limits advances in technology where the patent holder does not have the means to revolutionize, but his patent is worthy of it. However, this does not appear problematic for HSBroadband.

Discovering and providing incentives for the consumers is another requirement. This does not only include changing the methods of advertising, but the means of it as well.[13] Advertising is moving directly into program media instead of commercials as the ability to bypass commercials increases.[7] The web is also bringing forth new and innovative methods of advertising that are rapidly undergoing necessary changes as people adapt to web-based advertising and adopt filtering techniques. Enormous creativity will be required not only for the new technologies, but also for dispersing the information to the public. Providers seem to lack sufficient motivation to take efforts in discovering and communicating, in advertising to consumers the benefits of HSBroadband.

To adopt new technologies, R&D and the technologies have to be transported to fit custom markets. This is definitely why cures for tuberculosis, Malaria and Dengue fever are not being pursued by medical research in the U.S.[9] In order to adopt new technologies, the technologies have to be developed; someone with funds and knowledge has to step up to the plate. This is definitely not a factor for HSBroadband.

Another factor is choices. In many cases, so much new technology is being developed that manufacturers and buyers need to make choices about which to use. The Los Angeles police department is trying out huge amounts of innovative weapons (many non-lethal) and equipment, and must make choices about which to incorporate in their work. Choosing too many options make it hard to utilize the right equipment at the right time. LAPD is not the only instance of this phenomenon, and this may be a factor in HSBroadband.

[10-11] This could actually happen to HSBroadband; if it does, I believe it will mean the U.S. becomes the first to successfully implement VHSBroadband.

After careful consideration of the failure of the U.S. to implement HSBroadband, choosing the main cause of failure is difficult, but is in reality a combination of many of these 13 factors, most of which relate to money. Although the market is considered a free market – where the introduction of new technology could be considered available to all – the freedom is deceptive. My feeling that the largest reason the U.S. is failing in regards to HSBroadband is the fight with already existing infrastructure. Like the landline telephone versus cellular market, the U.S. was the first to implement such a large

infrastructure of broadband instead of dial-up or nothing at all that many people do not yet see a large enough advantage of further saved time. And, while the U.S. may consequently fail entirely at making the jump to HSBroadband, I believe it may then be the first to make the "jump to light speed" of VHSBroadband. Fun.

Notes and references (Accessed 27 January 2007):

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