

Developing Innovative Products

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There is one rule that is dominating private industry right now. It is the requirement for innovative product development. Companies who focus on innovation prosper. Microsoft started out with one innovative product, a new operating system for personal computers. This company's explosive growth has been fueled by other innovative products.

Developing innovative products is done through a process called Research and Development, or R&D for short. R&D is the development of new knowledge. To generate new knowledge it is essential to know what existing knowledge is available for a particular product or process. The generation of new knowledge in the R&D process typically requires intensive efforts by a network of people.

The cost of carrying out R&D is therefore substantial and the companies that invest heavily in R&D are counting on developing products that will be much better than existing products. I will give a few examples of such R&D costs. Fujitsu, when designing a new type of printer, spent \$5 billion. Chrysler, in redesigning a line of midsize 2001 car models, spent \$1.5 billion.

Computer companies and pharmaceutical companies in particular spend large sums of money to design new and innovative products. Sometimes this R&D does not lead to the desired solution. The inventor of the light bulb, record player and many other things, Thomas Alva Edison, when working on developing a battery made 8,000 tests without success. An assistant asked him if he wasn't discouraged. "Why should I feel downhearted?" replied Edison. "We've made a lot of progress. At least we know 8,000 things that won't work!" This is the foundation for research. Learn from experiments that did not produce the desired result so that new experiments can be designed. This is the scientific method.

Without innovative products, private companies are unlikely to grow or even survive. How does this apply to

agencies that don't need to gain competitive advantages to survive (including most government agencies)? It doesn't. Let's look at one government design that was, in 1930, an innovation: a rural prairie dugout. This product has received virtually no R&D; the only differences between a dugout in 1930 and today, are size and side-slope. Think about cars in the 1930s compared to the present and be grateful that government agencies are not designing cars.

During the nineties the agency that designed the prairie dugout, Prairie Farm Rehabilitation Administration (PFRA, Agriculture and Agri-Food Canada), has done some R&D, but for the most part stayed with demonstration of existing knowledge. Saskatchewan government agencies are even less inclined to invest in true R&D and applications to the development of solutions for rural water quality in Saskatchewan.

This has even led to a change in terminology by government agencies: they define straightforward application of existing knowledge as Research & Development. By redefining the meaning of R&D, government agencies are trying to justify public expenditures. While demonstrating existing knowledge is commendable, it will rarely lead to innovative products or sustainable solutions.

To find out if government agencies are putting any money into drinking water R&D (even accepting the broader definition) we asked three provincial government agencies how much money they spent on R&D for drinking water. Saskatchewan Health, Saskatchewan Environment, and Sask Water have the mandate to provide safe drinking water to people in Saskatchewan; it is squarely a provincial, not a federal, responsibility.

In 1998 for which we have data, Sask Water spent \$5,000 on water R&D, Saskatchewan Environment spent nothing, and Sask Health spent \$4 million on R&D, but as far as we can determine none of that R&D money went to drinking water research. This

brings us to a sum total of \$5,000. This sum is around 4,000 times smaller than Sask Water's investment into potatoes (most of which was lost). If this money had been invested in safe rural drinking water it would have been sufficient to provide major R&D breakthroughs. Somehow safe drinking water seems to be a better fit than potatoes for SaskWater.

Unfortunately, the provincial mandate in drinking water has been used by federal agencies as a good excuse to do very little. When the provinces get together with federal agencies to discuss the Canadian Drinking Water Quality Guidelines (about every six months), rural drinking water has never reached the table. These guidelines were designed to protect city dwellers from the ill-effects of unsafe drinking water. Maybe, then, the rural water situation has been addressed by agencies other than Health Canada and provincial environment and health departments?

That possibility was clearly dispelled by Agriculture and Agri-Food Canada in a letter to the Safe Drinking Water Foundation (Policy Branch, Ottawa, April, 2000, content abbreviated):

"The mandate of Agriculture and Agri-Food Canada is focused on the agriculture and agri-food sector and issues related to human health are not within Agriculture and Agri-Food Canada's scope including safe drinking water for rural citizens".

It is, however, clear that this same organization has helped construct 150,000 dugouts and more than 12,000 km of water pipelines to rural areas on the Canadian prairies in addition to dams, thousands of wells etc.

While hundreds of millions have been spent on these activities, it is not in the mandate of Agriculture and Agri-Food Canada to be concerned about the health of rural people that use the water from these dugouts, pipelines, wells and reservoirs. This is not dissimilar to a car manufacturer producing cars without brakes and then claiming that any problems associated

with the actual use of the car is somebody else's responsibility.

A car that is manufactured with a top speed of 25 km/h will be less dangerous to drive without brakes than a car that has been built to run at top speeds of 150 km/h. Equally, poor quality water in individual dugouts or wells will affect a limited number of people, but when 12,000 km of pipelines are laid, large numbers of people will be affected by the same water. Most of the pipelines are designated "raw water pipelines". If this water contains disease-causing microorganisms, this is the most efficient way of transporting them around. Despite the "raw water" designation, many of these piped water supplies have received some form of treatment and many people will drink this water. The "raw" designation is a convenient way to never have to do any testing on the water to ensure it is safe (as nobody is supposed to drink the water); it is also a convenient way to forget about regular maintenance.

Maybe most of those pipelines are safe, but the odds of having quality water in long distribution lines with little maintenance and no monitoring, are not good. The odds of having good quality water (without extensive treatment) from dugouts that have

drained manure piles, plowed, fertilized and crop-protected (application of pesticides) fields are not good either. Shallow wells that are in close contact with livestock will also need efficient treatment. Even livestock will have better weight gains and be healthier when consuming good quality drinking water.

Government agencies, through their lack of action on rural drinking water, seem to be content to join the fate of the 1930 automobile by becoming obsolete. Canada through its devolution of powers to the provinces followed by federal inaction has left rural people with the poorest water in Canada and with few options to deal with it.

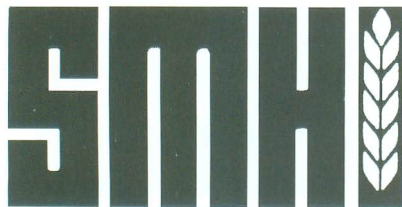
Product development (R&D) into safe drinking water has to compete with many other causes. To sort out what type of R&D government should fund it may be time to critically look at what is affecting the Canadian public, such as unnecessary poor health.

Health Canada estimates that the costs for waterborne illnesses are around \$200 million per year in Canada. If we then add to those numbers new microbes that are added just about every month to the list of known waterborne transmissions, (such as Hepatitis A virus, Coxsackie B virus, which can cause heart disease and

insulin dependent diabetes), the lack of government efforts are clearly generating business in the health sector. Surely prevention is better than treatment?

If we compare government and private industry R&D in Canada, a rather bleak picture emerges for products and solutions directly benefitting the public. Total federal investments on R&D (including the broadest definition) amounted to \$2.9 billion in 1999, which is among the lowest in the developed world (as a percentage of the economy). Compare that to one Canadian company involved in the computer industry, Nortel Networks. Its R&D spending was more than \$4 billion last year.

The message is clear. If innovative solutions are going to be developed that directly benefit the public, then provincial and federal government agencies need to learn from private industry how such products are developed. But, there again, it is likely simpler to just subsidize construction of dugouts, wells and pipelines, similar to what Agriculture and Agri-Food Canada has done for the past 65 years. At 65, wouldn't it be fitting to retire some ideas and bring in some new ones? ■



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