

Human advances can prove strangely detrimental

SCIENCE

MARK BUCHANAN

Humanity is engaged in a high-stakes race with its own growth: lest our use of energy and materials get out of control, we must constantly innovate to become more efficient. Unfortunately, new research suggests we may be losing.

The rapid advancement of electronics technology illustrates how the race works. The number of transistors in the world's devices has gone from one in 1947 to a thousand billion billion today — more than there are letters in all the written text produced in human history. The proliferation hasn't inundated the planet because the amount of physical material and energy used in each transistor has shrunk spectacularly, reflecting a relentless advance — seen in almost all technologies — that

gets economists and tech enthusiasts excited about the possibilities for a cleaner and more environmentally friendly future.

The hope is that by doing more with less, we can keep growing without bumping up against physical limits — an optimistic vision sometimes called “decoupling”. But is there any evidence for it? That's less clear.

Long ago, the economist William Jevons noted that improved energy efficiency, by reducing prices, often induces people to use still more energy. For decoupling to work, efficiency gains in energy or materials must outpace this “rebound effect”, as well as other factors such as overall growth in production and population. Despite all the progress humanity has made, a new parsing of the empirical data suggests that's not happening.

Two engineers, Christopher Magee of the Massachusetts Institute of Technology, and Tesselano Devezas of the University of Beira Interior in Portugal, looked at two sets of data covering 116 different technologies existing between 1940 and

2010, ranging from the chemical industry and electronics to metals, wood and energy. Almost every technology over this period shows exponential improvement (though at different rates) in prices, performance and efficiency of energy and material use. Over 20 years up to 2009, for example, the price of photovoltaics consistently dropped about 10% per year.

The improvements weren't enough, though, to outpace the combination of population growth, economic expansion and the rebound effect. As a result, overall

material use tended to increase: those photovoltaics, for example, consumed about 13% more materials each year.

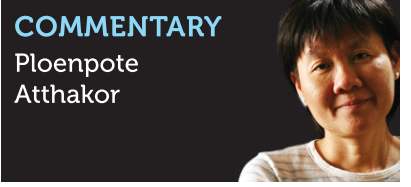
To be sure, the data are far from perfect. Information on many of the 116 technologies exists over intervals of only one or two decades. Still, the fact that none of the data fit the usual story of decoupling suggests that the concept is at the very least highly questionable. The only six exceptions were technologies for producing substances such as asbestos, mercury and thallium — all toxic materials that were ultimately controlled by policy intervention and legal restrictions.

The results don't imply that humans won't ever achieve decoupling. They simply suggest that the historical record so far isn't encouraging, and that there's no reason to expect it to happen on its own.

Mr Magee and Mr Devezas, for their part, remain optimistic. We might still find a solution, they told me, if we can manage to eschew politically motivated argument and predetermined conclusions in favour of more good science and especially empirical work. The more we recognise the burden that ever-increasing materials use puts on the planet, the more we might be able to encourage forces of many kinds — market, government or spontaneous social movements — to counter the trend. ©2016 BLOOMBERG VIEW

“Improved energy efficiency, by reducing prices, often induces people to use still more energy.”

Mark Buchanan, a physicist and science writer, is author of “Forecast: What Physics, Meteorology and the Natural Sciences Can Teach Us About Economics”.



Cyclists fall prey to the BTS crush

Should cyclists and their two-wheelers be allowed to use the BTS skytrain? The question has been raised time and again by BTS passengers.

Some believe bicycles should be banned from the system which now serves over 700,000 passengers a day. The reason is simple: bicycles, especially the non-folding type, take up too much space, and this is an inconvenience to other passengers. One passenger who encountered a group of cyclists on his journey called for a ban on their bicycles.

Others, however, think otherwise. In their opinion, the mass transit system is environmentally friendly and therefore should welcome cyclists, people with a green, zero-carbon lifestyle. They leave their cars at home and choose to pedal, thus helping to reduce city traffic.

If you ask me whether bicycles should be permitted on electric trains, my answer is yes and no.

To begin with, I believe the mass transit system should provide space for all types of bicycles. Last year, due to overcrowding, the BTS wanted to follow the underground MRT in limiting access to folding bicycles, which use less space on the train, to minimise inconvenience to other passengers. Fortunately, the plan did not materialise. And I hope it never will.

But this does not mean cyclists should take advantage of the system without limitation. On the contrary, it's necessary to curb them to a certain extent.

It is understandable that a large number of passengers oppose bicycles on the trains, especially during rush hour. And they have every right to complain.

Most may argue that even a bike-friendly country like the Netherlands does not permit two-wheelers on city trams (which operate just like the Bangkok electric train), although it does permit bicycles on inter-city trains. But that argument has only a partial truth. There is no need for Dutch cyclists to use city trams because cycling lanes in the country are the most practical and as safe as you can imagine.

Cycling in Bangkok is different. It is still largely unsafe. Despite being a top priority of the Bangkok Metropolitan Administration under governor Sukhumbhand Paribatra (who introduced the Pun-Pun bike project and a few cycling lanes), cycling in Bangkok is a risk-taking experience because of the aggressive driving behaviour of most motorists. It is known cycling lanes — which are still limited — are impractical and violated by motorists.

Despite the risk, some people still opt for cycling as a mode of transport that, with the help of an efficient rail system, can save time on the road to get to their work.

That leads to a pressing need for a practical and sustainable solution to passengers and cyclists can co-exist. Such a solution should be reached through dialogue between the operator and cyclists.

I think it is acceptable for the BTS to limit space for bicycles during rush hour. But it should not be a blanket ban. Instead the curb should still make it possible for cyclists to ride to work. In the mornings, for example, the BTS could limit access during rush hour from 6.15am to 8am-8.15am.

The BTS can also limit carriages that cyclists can ride on. How about only the first and/or the last carriage? Passengers who don't want to share space with two-wheelers can opt for other carriages. A group of cycling advocates has suggested the operator provide standing-only carriages that can accommodate two-wheelers. The special trains can be open to other passengers as well.

No restrictions on the weekend would be highly appreciated. It's equally important the BTS makes it easier for cyclists to use facilities like lifts at the station. Security guards at some stations including Asok do not give cyclists access to those facilities. They insist that lifts are only for people in wheelchairs. They simply forget that people with large objects like bicycles and huge baggage should be categorised as people in need.

In fact, my call for the use of lifts is not just for the convenience of cyclists but also for public safety. Taking a bicycle (also heavy luggage for travellers) up the steep stairs or an escalator can be a risk for other passengers if there is an accident. The BTS may have started to notice this fact as I now see signs advising cyclists to handle their bikes with care.

The BTS deserves credit for cooperating with the state on certain cycling occasions — the car-free day, Bike for Mom and Bike for Dad events — by giving free rides to those turning up with bicycles. This shows the operator recognises their importance in Bangkok.

Such attitudes should not be forced to change.

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Pak Moon dam still a dilemma 25 years on

DEVELOPMENT

YUKA KIGUCHI

When dam proponents came to her house almost three decades ago and made promises that Pak Moon dam would bring prosperity and progress to surrounding villages, Lamphai Khamlap was immediately suspicious.

Today, her concerns are being realised. The dam which was completed in 1994 on the Moon River, a tributary of the Mekong River, has had a severe impact on the livelihood of the villagers in Ubon Ratchathani.

“Hell” was the terse response of Mrs Lamphai, now 59, when asked what the Pak Moon dam meant to her. Her harsh indictment was echoed by many others.

The mother of five, who now resides in Huaheew, a relocated village that is closest to the dam, recalled that in the past she and other villagers could live by fishing. But because of the dam, the fish have mostly disappeared.

“The fish are gone. Nothing good has come along,” she said.

“In the past, we were able to catch enough to feed my entire family using three gill nets and one cast net. Today, even if you invest 5,000 baht in fishing gear, you still cannot make a living by fishing,” Mrs Lamphai's five children now work in Bangkok and she makes brooms for a living.

The brooms — once a supplementary revenue source to fishing — are now the only source of income for villagers in Huaheew. Visitors can see stacks of brooms in front of the villagers' houses.

“The profit from one broom is three baht. I can make 30 in a day,” Mrs Lamphai said, not pausing as she completes yet another broom. Her daily income is 90 baht, just a third of the minimum wage.

“I still fish but the catch is usually minimal — sometimes I'm able to catch fish for our meal, sometimes not.”

The controversial dam has been largely opposed by local communities and international NGOs since 1990.

In December 1991, the World Bank approved the financing of Thailand's Third Power System Development Project, which included the construction cost for the Pak Moon dam.

As suspected by the communities and NGOs, the dam has damaged the natural and social environments, destroying fisheries and leaving villagers impoverished. After 20 years, local communities continue to demand the dam be decommissioned.



Residents affected by the Pak Moon dam in Ubon Ratchathani are barred by guards at Government House during one of their protests to call for the decommissioning of the dam. CHANAT KATANYU

Huaheew village where Mrs Lamphai was relocated as the dam was being built. The project's original plan indicated 262 households would be displaced in the project area. However, a study by the World Commission on Dams in 2000 revealed that 912 households were actually displaced and 780 households have lost all or part of their land as a result of the dam.

Inadequate surveying during the project planning stage underestimated the compensation cost and therefore embellished the economic appeal of the dam project.

“We had to negotiate for three years to receive 70,000 baht for relocating my house and my children's houses, but it was not enough,” Mrs Lamphai said. She has rebuilt her family's houses at the relocation village, but all her children who were involved in fishing have left to find work as unskilled labourers in Bangkok. They are able to return to their houses for only a few days a year.

In 1991, due to the strong opposition, the

World Bank's decision to fund the dam project could not pass the standard approval process, and the final approval was carried over to a board of governors meeting.

Despite opposition by the US and others, Japan and many developing countries supported the project, leading to the bank's approval.

According to news reports, the decision to finance the controversial project was influenced by the Japanese government; if the project were rejected, future dam development in the Mekong River watershed would be difficult.

Today, the perception of the dam's development has changed. In the United States, where large-scale dam development originated, dams that have a large environmental impact are being decommissioned.

But Mekong country governments still claim the dams are the foundation of their economic development, and construction in the region is progressing.

The private and public sectors in the

region continue to financially support dam development while concern over the adverse impact on natural and social environments is increasingly neglected.

China not only continues to develop dams on the Mekong, but also treats the river as a domestic resource. In the Lower Mekong Basin shared by Laos, Thailand, Cambodia and Vietnam, dam development accelerated after the World Bank's decision to finance the Laos' Nam Theun 2 dam in 2004.

Despite the decline of fish in Laos' Xe Banfai River, once known for its rich resources, the country is continuing with its Xayaburi and Don Sahong dams on the Mekong.

Vietnam implements dam development in the Mekong's major tributaries, namely the Sekong, Se San and Srepok rivers.

The Pak Moon dam is the only case in the whole of the Mekong Basin where people affected by a dam's construction are demanding decommissioning. As fish

are not able to spawn in the Moon River, the dam continues to adversely affect the Mekong ecosystem.

The world must see the gravity of the threats the dam continues to pose on the Mekong's biodiversity. Solutions proposed by the local communities are simple and the effect is guaranteed: all eight gates of the dam must be opened.

The local communities have the right to compensation for the losses that they have suffered. It's not only the government but the World Bank which needs to take responsibility for the compensation.

If the World Bank is sincere about its mission to reduce poverty, it should not be allowed to remain silent about the poverty that it has created.

Yuka Kiguchi is director of Mekong Watch. She has been conducting field research on natural resources management and negative impacts of hydropower dams in the Mekong River Basin for many years.

Apple must continue to resist FBI's 'cracking' demands

TECHNOLOGY

WANDA SLOAN

It has been 25 years since encryption hit the computer-internet mainstream, and it is disheartening to see just how little the issue is understood.

The current brouhaha between Apple and the US Federal Bureau of Investigation (FBI) has again raised the interest level on encryption, but it has increased the steady flow of misinformation about it.

Article after story after blog entry after broadcast in the past week has misstated facts, misled readers and shown how little the public knows about a topic that can start uniformed debates at a hat-drop.

One might say, in fact, that “if everyone's an expert, then no one is”. So it seemed last week, anyway, as the Apple-FBI standoff of the past year got downright testy and moved into the US federal courts.

It is disappointing.

Encryption, how it works and what the public could do about it was an issue often raised in the pages of the late *Post Database* weekly, carried in this newspaper. Today's columnists could quickly learn about the subject, but seem more interested in getting

their political views across than in informing readers.

Thus we learned last week in these very printed and web pages that the FBI had asked Apple to “extract unencrypted user data from” an iPhone found on the cold, dead bodies of the husband-wife terrorist team who killed 14 people and wounded 22 in California.

But the FBI has done no such thing.

It has demanded (not asked) Apple to invent and then to insert on that phone a bit of software that does not yet exist. It wants to be able to try to crack the phone's security password by feeding it millions of possibilities with a high-speed password cracker. It cannot do that now, because Apple's iOS 8 shuts down and bricks the encryption after 10 wrong password guesses.

In addition to not even understanding the basic government demands, opinion writers have come up with such silly statements as “any encryption can be broken”.

As we explained to readers of this newspaper 25 years ago, it is both impossible and uninformed to make absolute statements about computer-generated security. Who knew that plain text could be dangerous and virus-causing? Those in the field know enough never to say “never”.

In any case, then and now, there is unbreakable encryption today — both in the real and theoretical world. Virtual and real warehouses in many countries

hold millions of messages the government owners would love to read, but so far cannot.

(In theory, even one-time codes, the toughest of all, can be broken. But in the real world, up to today, they will yield multiple message possibilities. An unencrypted message might say either “Begin attack at 8am” or “Cease attack at 8am”. For a vastly over-simplified example.)

It seems for now that those writing about the current encryption controversies, and especially the Apple-FBI uproar, want to get across their political view about it. In essence, it will help you as a reader to know which side the writer or broadcaster falls:

One. Encryption is okay for people who want to hide stuff for some reason, but the government has the right and duty to read people's mail when it's absolutely necessary, to make us safe. If people have nothing

to hide, what are they worried about?

Or, two. Privacy is the basic right of every citizen, and tops any and every government claim of “the right to know”. Without doubt, crooks and bad people of every stripe use encryption, but every bit of technology since the invention of the wheel is used for both good and bad purposes, by good and bad people.

I am a Type-Two encryption person. That is at least partly informed by my knowledge that government doesn't only want data off bad guys' computers, phones, email and data in the cloud. Quite a few governments want it from me, too.

I know the FBI might get useful information off the terrorist's iPhone it seized after the FBI failed completely to detect or stop the attacks in San Bernardino, California. At the same time, I know that if Apple invents and installs one software fix, one time, on

one iPhone, it is handing the FBI and other US, Chinese, Russian and other spy agencies the key to every iPhone made before 2015. And to crooks and terrorists, too.

It must be clear that even if the FBI gets the key it demands from Apple, it is only one step closer to learning what is on that terrorist's iPhone. If Syed Rizwan Farook and/or his wife Tashfeen Malik thought to put data behind an encrypted wall on the iPhone, they may well have also encrypted the data, with very strong methods that will make it effectively uncrackable anyhow.

Or maybe they didn't. Maybe they took CEO Tim Cook at his word that Apple never would give up or cooperate to break the encryption keys. Maybe there's a treasure trove of useful anti-terrorist information; maybe there's absolutely nothing useful.

That's why governments don't want the ability to break into one terrorist's phone. They want to be able to tap, crack and view everything on every phone and computer, just in case there's something interesting there.

Reporters and commenters on this story will naturally have different, probably opposing views on the issue. If they are honest, however, they will learn the basics of the subject and not leave readers misinformed of facts.

“Governments want the ability to tap, crack and view everything on every phone and computer.”