

Disruption and System Change^{1, 2}

Veikko Väilä

Helsinki, Finland

Theory

First, a few words about the theory of disruption. Let's start with a definition: 'A disruption happens when new products and services create a new market and, in the process, significantly weaken, transform or destroy existing product categories, markets or industries.' The key words are 'create' and 'destroy'.

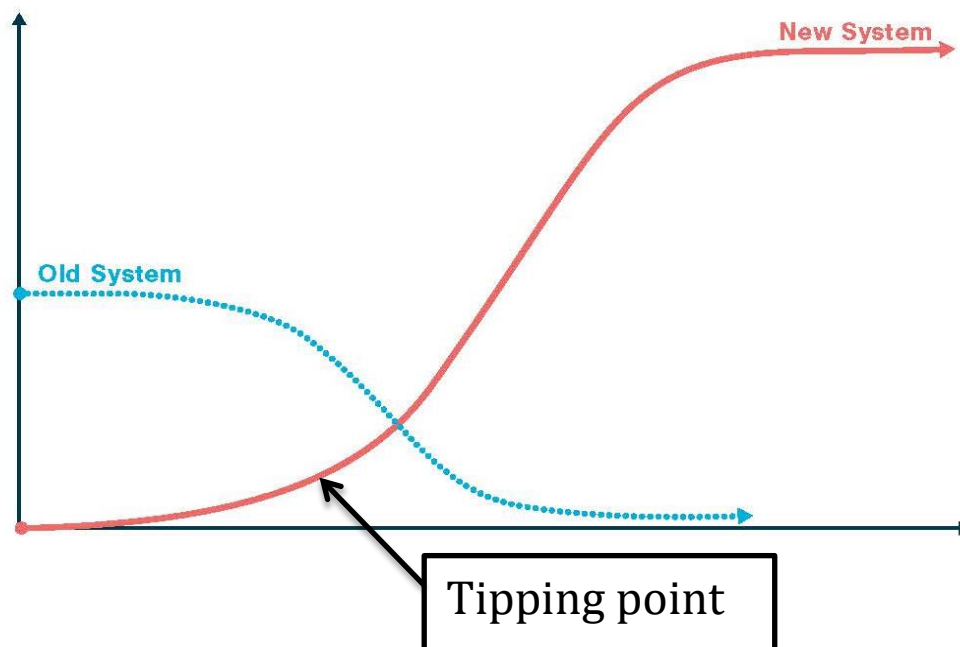


Fig. 1: Source RethinkX.com

This is the so-called X-Curve of Disruption. We can see that typically the old system starts to decline slowly and then with an accelerating speed as it reaches the tipping point. The new system grows following an S-curve and the old system collapses at the same time. Typically, the technology adoption lifecycle is exponential, and not linear. Whole business sectors may be disrupted as a result.

¹ This article represents the contents of a keynote speech by the author at the 2nd World Project Management Forum (WPMF) 2020, 14 - 16 December 2020, New Delhi, India

² How to cite this article: Väilä, V. (2021). Disruption and System Change, Keynote Speech at 2nd World Project Management Forum, New Delhi, India, December 2020; published as Commentary, *PM World Journal*, Vol. X, Issue I, January.

World Energy Supply

If we look at the world total energy supply by source, still more than 80% of all energy comes from different fossil fuels. But the share of solar and wind power is growing very rapidly. Why is that?

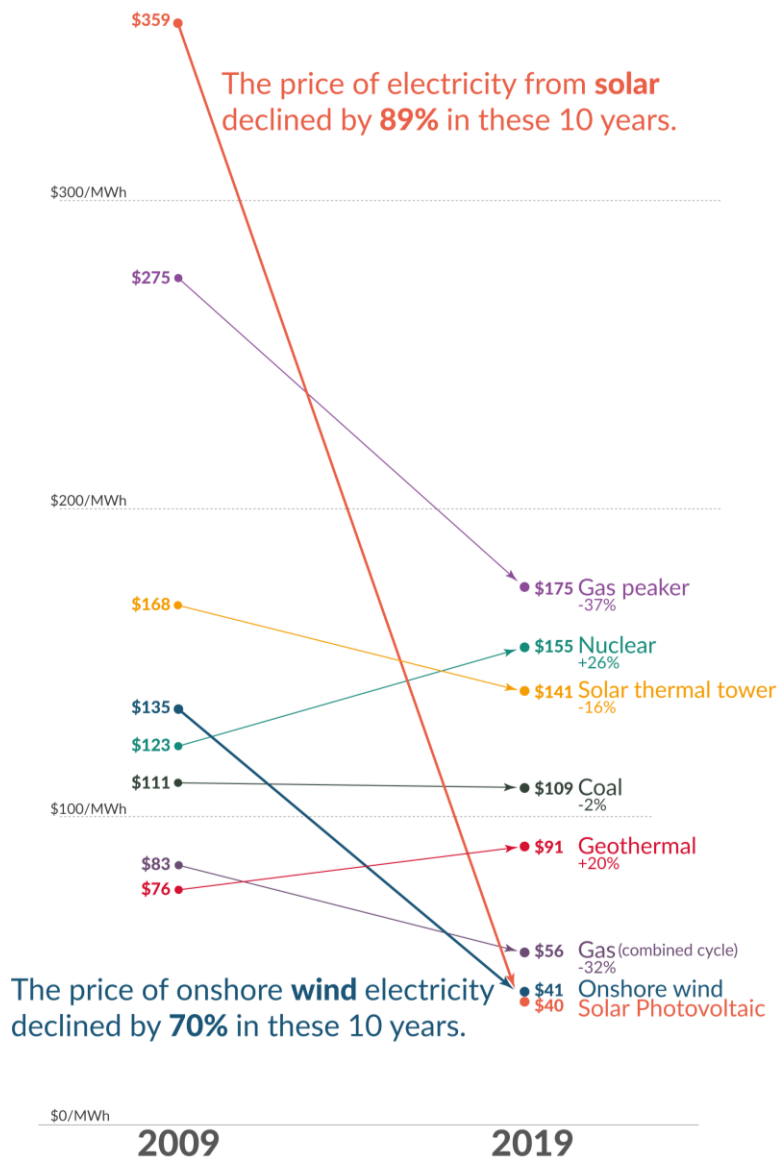


Fig. 2: Source OurWorldinData.org

The price of electricity from the solar and wind power has declined enormously during the last ten years. Today both solar and wind energy provide the lowest cost of electricity. And both of those energy forms are limitless. Lower cost of energy provides a higher living standard. So far, our high living standard has been based on fossil fuels: coal, oil and natural gas. But in the future, this will be done by the solar and wind energy and the new battery technology.

RethinkX, an American think tank, claim that the cost of combined solar, wind and battery systems will decrease by 2030, even further by another 70%. This makes disruption of the existing energy supplies inevitable. We are already today beyond the tipping point, and the bulk of disruption will unfold rapidly over the next decade. This means that new investments in coal, gas, or nuclear power are already financially unviable. The existing coal, gas and nuclear assets will be stranded at the end of this decade.

Technology disruptions are driven by reinforcing feedback loops. These loops interact with and amplify one another, accelerating the adoption of the new technology in a virtuous cycle, while at the same time accelerating the abandonment of the old technology in a vicious cycle. The net result of these system dynamics is that disruption tends to unfold with a surprising swiftness.

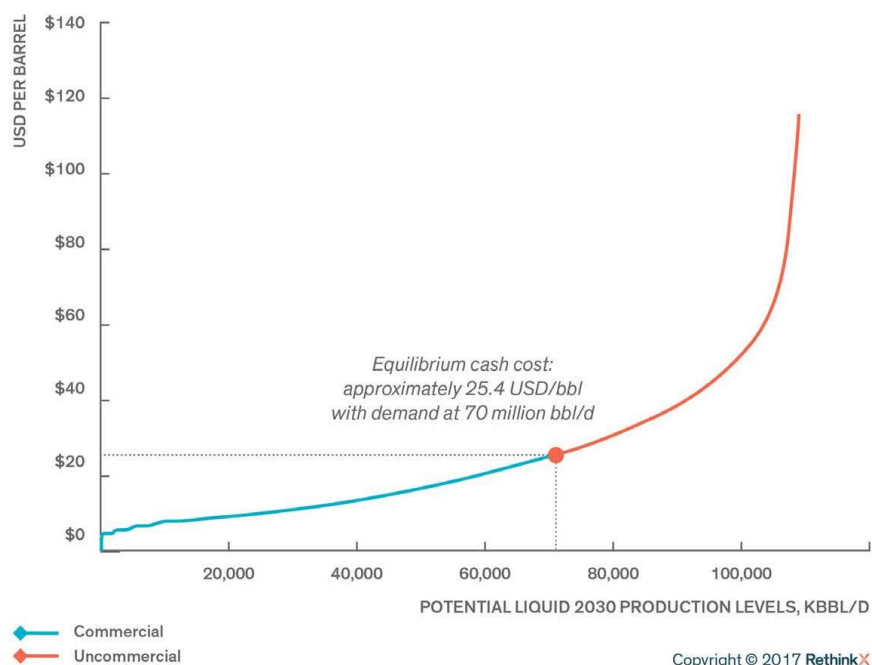


Fig. 3: Source RethinkX.com

As regards crude oil, the equilibrium curve shows the connection between demand and price. If there is less demand, the price goes down. Assuming the demand for oil drops to 70 million barrels per day by 2030, the market would reach an equilibrium at a cash cost of about USD25 per barrel. This scenario is based on the future electrification of the transport sector. The implication is that high-cost oil will be left in the ground and the corresponding assets, such as pipelines and refineries, will be stranded and without any value.

The Finnish Neste Limited has gone through several transformations, from a regional oil refinery to a global leader in renewable and circular solutions. They have shown that renewable fuels and plastics are much better business than fossil fuel products. It gets more and more difficult to make any profitable business with fossil fuels.

Battery Technology



Fig. 4: Source BroadBit, Finland

Broadbit sodium batteries have a high energy density and a wide operating temperature range. They are safe, non-flammable and cheap to produce. There are no rare elements such as lithium. This is a new invention: it has nothing to do with the old sodium-ion, saltwater or molten salt batteries. Broadbit technology is a natural choice for airplanes and smart grid technology.

Food and Agriculture

By 2050, the world's population will reach 10 billion. They all need to be fed. As the demand for food grows, the environmental impact related to agriculture is becoming an increasingly alarming problem. We need to find new ways to feed people within the planetary boundaries.

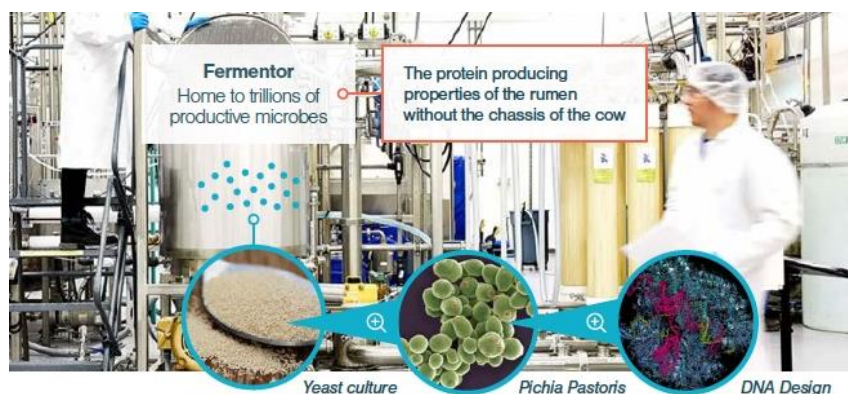


Fig. 5: Source RethinkX.com

The feedstock efficiency of a cow is only 4%. In other words 96% of the feedstock gets wasted in the process. The feedstock efficiency of precision fermentation is 40% to 80%. In other words at least ten times better than the cow. With this technology feedstock production can be reduced by more than 90% and we can still secure the existing production levels of milk proteins. Precision fermentation is a simple process. Anywhere where you can make beer, you can make protein.

Singapore has become the first country in the world to approve the sale of lab-grown meat. In Finland a start-up is producing egg-white without chicken.

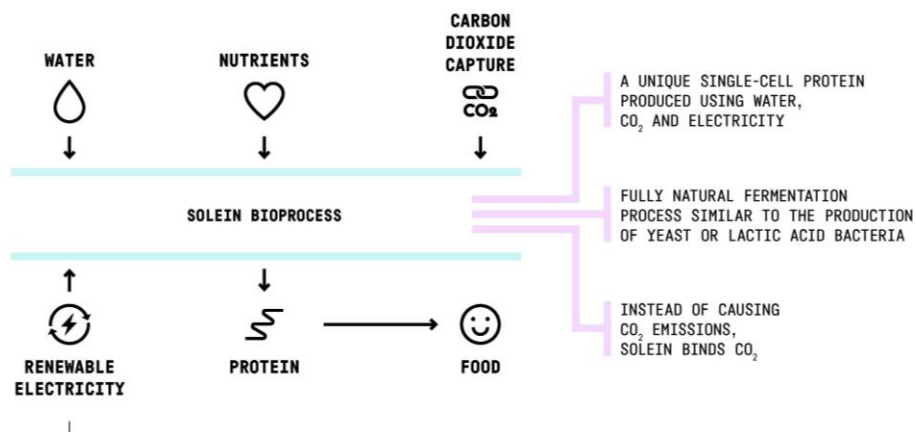


Fig. 6: Source Solar Foods Ltd, Finland

But protein can be produced from thin air as well, without feedstock. You only need electricity and water and CO₂ directly from the air, and some nutrients. It sounds revolutionary, but if you think about it: in order to grow, plants and vegetables need only solar radiation, water, CO₂ and some nutrients. In this case the solar radiation has been replaced by electricity. This is in all respects a fully natural fermentation process but in this case the microbes are able to take their energy directly from electricity instead of solar radiation. But although it's a natural process, it's still a radical system change: We get the protein from thin air, without any fields, plants or vegetables or animal production.

	GREENHOUSE GAS EMISSIONS kg of CO ₂ equivalent per kg	FRESHWATER WITHDRAWALS litres per kg	LAND USE m ² per kg	
MEAT*	Beef [herd]	99.5	1 451	326
	Pork	12.3	1 796	7.8
	Chicken	9.9	660	6.7
BEYOND MEAT	3.5	9.7	2.7	
IMPOSSIBLE BURGER	3.5	107	2.5	
SOLEIN**	0.2	5.5***	max. 1.0	

Fig. 7: Source Solar Foods Ltd, Finland

This new protein, called Solein, compares very well with the other known protein sources, such as soybeans or beef. Compared with the production of beef or chicken, there are almost no greenhouse gas emissions. The production needs a little freshwater and some land surface only for the solar panels. This means that the production of food is now free from any agriculture. Food can be produced in controlled production facilities as any other industrial product.

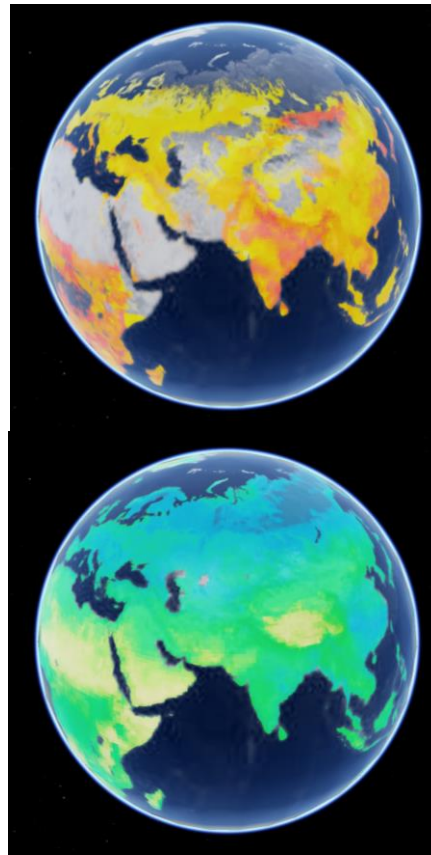


Fig. 8: Source Solar Foods Ltd, Finland

The first map shows in red and yellow the best production areas today, based on traditional agriculture. And the second map the protein production of the future: everything in yellow would be the best locations for production, and everything in green the second best. The map is based on low cost of solar energy, because electricity and some water are all you need in the process. The happy farmers of the future are located in Tibet, Saudi-Arabia and in Sahara. And India as well.

Transportation

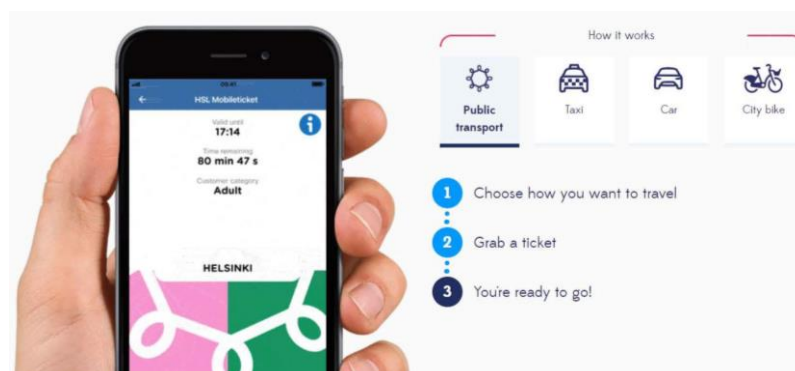


Fig. 9: Source CBINSIGHTS

Integrated transportation is coming. This is one example: Mobility as a Service. With this application, you can use all modes of transportation, easily, under one payment system.

Manufacturing

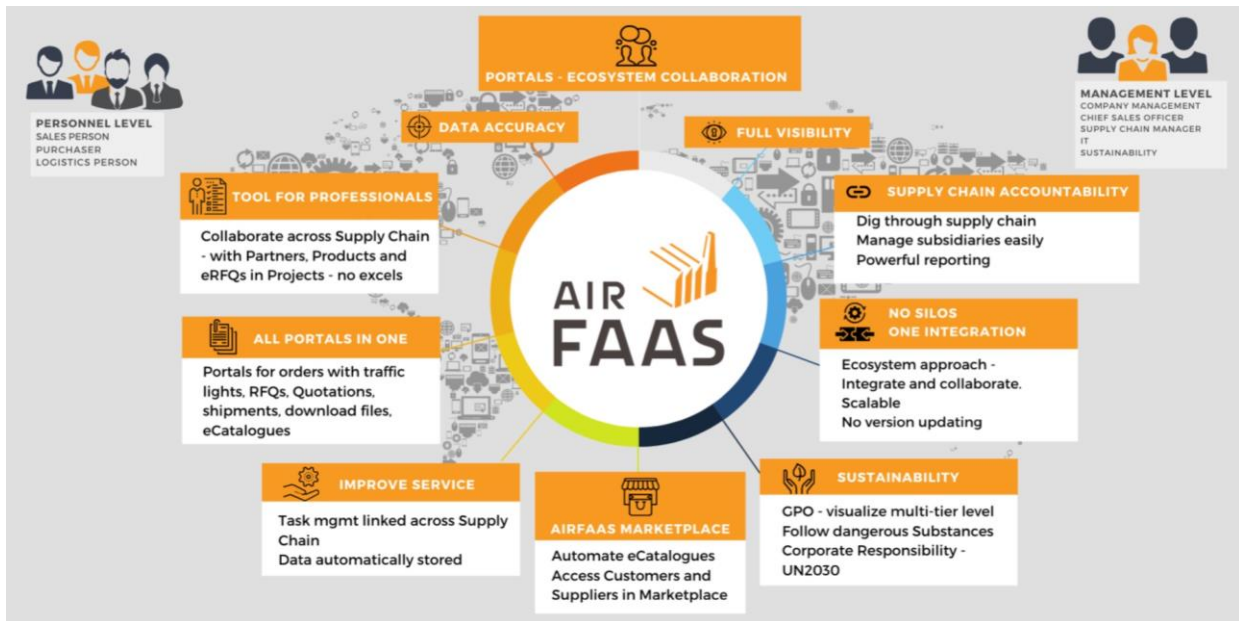


Fig. 10: Source AIRFAAS, Finland

One example of disruption in manufacturing is the new business model called AirFaaS, a shortening of Factory as a Service. This is a similar idea to Mobility as a Service, or the business models used by Airbnb, Skype or Uber. You don't need to own anything in order to provide manufacturing services. Through AirFaaS you can start your own business. All services you need come from the FaaS ecosystem. All functions are combined into one system, including supply chain and project management.

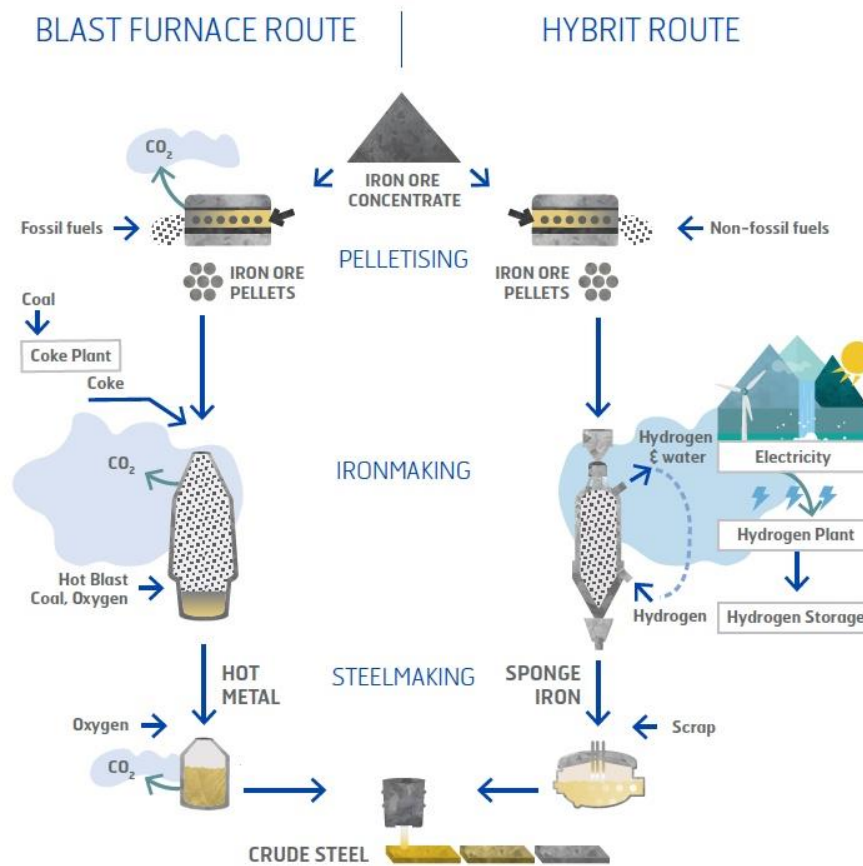


Fig. 11: Source SSAB, Sweden

The Swedish steel producer SSAB is spearheading the development of fossil free steel. This so-called clean steel is produced using fossil-free hydrogen. There is no need for coal. The first pilot plant has started very recently in Sweden. The next pilot plant will be located in Finland.

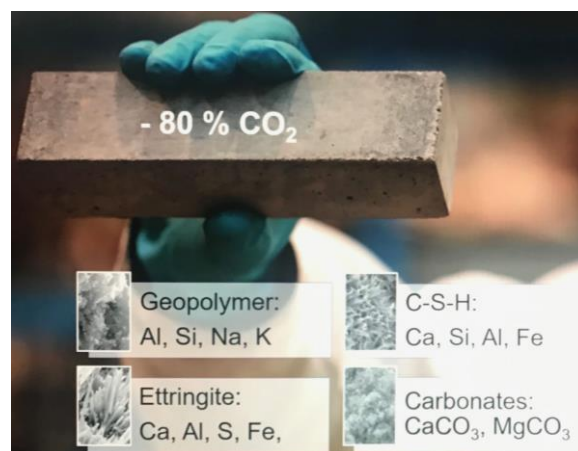


Fig. 12: Source University of Oulu, Finland

The University of Oulu in northern Finland, has developed a new type of concrete without cement. Only the most common elements on earth are being used: aluminium, silicon, sodium and potassium. With this new so called geopolymere concrete, carbon emissions are 80% smaller than with the traditional cement. In addition, waste material from steel and mining industries can be used in its production. The first geopolymere concrete was cast in Finland only two months ago in connection with a housing project.

Conclusions

The on-going climate crisis has initiated a tsunami of R&D projects. It is very encouraging to see how many of them are good business as well: 'Save the world and make money'. But the truth is that if something is not profitable and investable, it will not get realized in a larger scale. Through science and technology, we need to find new products and business models, which are profitable and sustainable at the same time.

The on-going big changes create big problems. We have to ensure a just and fair transition from the old to the new. As a guiding principle we need to accept that the growth in the human and ecological wellbeing is always good. It is not something that should be resisted. My optimistic view is that food prices will decrease worldwide, and transportation and energy costs will go down as well. This means that standard of living and quality of life will increase globally. But still, the next twenty years will not be easy, but very interesting indeed.

About the Author



Veikko Väilä

Past President, Project Management Finland
Past President, Chair, IPMA

Helsinki, Finland



Veikko Väilä has more than 35 years' experience in project risk management, gained in employment with Kone Corporation, Industrial Mutual, Ministry of Trade and Industry, Hansa Industrial Insurance B.V., If P&C Insurance Co. Ltd, Marsh & McLennan Inc., International Project Management Association (IPMA), Aon Finland Ltd, Fennovoima Ltd, Legal Lounge Ltd and Howden Finland Ltd.

Veikko has provided consulting and risk management services for a number of large corporations in the areas of power generation (including thermal and nuclear power), pulp & paper industry, high tech companies and large infrastructure projects (including harbor, metro, airport, rail- and motorway projects).

Veikko has served in a diplomatic position as a Scientific and Industrial Commissioner of Finland. He established a new operation based in Hong Kong and created more than 50 new industrial and scientific co-operation projects between Finnish and Chinese & South-East Asian enterprises and institutions.

Veikko has participated in starting up new and successful businesses, such as Soredex, a high-tech medical X-ray company, and Hansa Industrial Insurance, an insurance underwriting operation in the City of London. During his career he has lived in 5 countries and worked in more than 50 countries.

Veikko Väilä has served the International Project Management Association (IPMA) as the President and Chair of the Executive Board, and thereafter as the Secretary General of the organisation. IPMA is a global federation of over 70 national project management associations (www.ipma.world).

He is a co-founder of the Climate Leadership Coalition, the largest non-profit climate business network in Europe, created in Finland in 2018. He can be contacted at veikko.valila@gmail.com.