

ASIAN



MANAGEMENT INSIGHTS

TRANSFORMING HEALTH SYSTEMS IN A POST-COVID WORLD

**Leadership
post-COVID
in Indonesia**

An interview with
Eddy Kusnadi Sariaatmadja

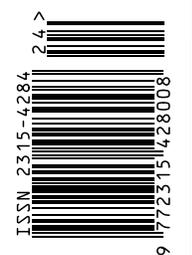
**Getting
AI Wrong**

It's all math.
Really.

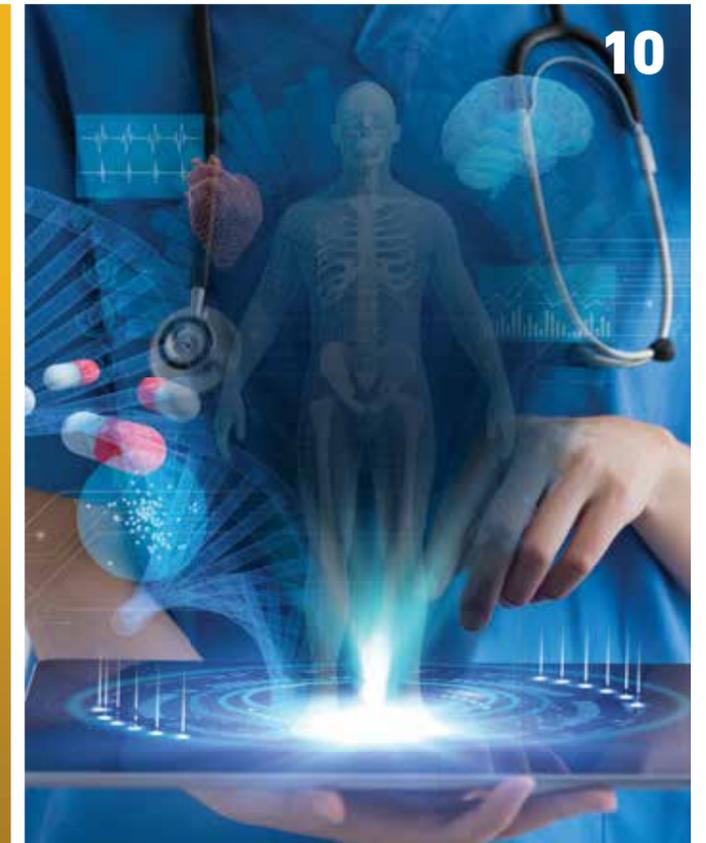
**Mission
Possible**

Bringing clean
water to rural India

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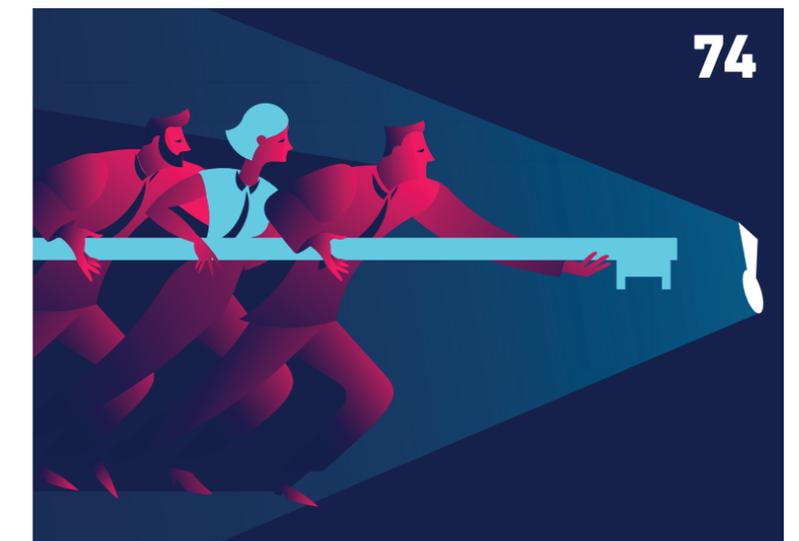
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FROM THE EDITOR

Beyond the COVID-19 pandemic

As COVID-19 infection rates stabilise throughout the world, countries have already begun to prepare for life beyond the pandemic. In this issue, leading academics and seasoned practitioners walk us through the challenges that lay before us, giving us insights into issues from public health and regulations revolving around Artificial Intelligence (AI) and automation, to challenges faced in implementing digital transformation and their implications for lives, livelihood, and society as we tread gingerly into the post-COVID-19 world.

We first turn our attention to Indonesia, where Eddy Kusnadi Sariaatmadja, Founder and President Commissioner of PT Elang Mahkota Teknologi (Emtek), a leading media, digital, and technology company in Indonesia, talks to Tan Chin Tiong about how his company and the country have coped with the pandemic over the last two years. The silver lining is that the pandemic has catalysed digital transformation, enabling both to take advantage of years of technology leapfrogging that otherwise may not have been possible.

In fact, the benefits of technology leapfrogging are also apparent in other Southeast Asian countries, where the pandemic has accelerated digital transformation by at least five years. The research undertaken by academics Chiraphol New Chiyachantana and Pattarawan Mai Prasarnphanich in six ASEAN countries charts the rise of digital entrepreneurship and offers ways to achieving success in this area.

As countries slowly emerge from the COVID-19 crisis, health systems globally must learn from these trying times, developing resilience in anticipation of future outbreaks and, at the same time, addressing longer-term challenges that predate the pandemic, such as chronic diseases and population ageing. Healthcare experts Joshua Tan, Leonora Liu, and Jeremy Lim offer three key recommendations for addressing these issues: building redundancy into health systems, enabling digital transformation of healthcare services, and making health part of all policy formulation.

Still on the theme of healthcare, even as AI tools for Health Information Technology continue to advance in exciting and incredible ways, healthcare organisations are paradoxically finding it harder to leverage and implement these newer, cutting-edge AI tools. In their article, academics Adrian Yeow and Foong Pin Sym offer three domain-focused prescriptions to smoothen out AI implementations in healthcare.

Access to clean drinking water is another cornerstone of public health. However, research shows that by 2025, 1.8 billion people globally would still face absolute drinking water scarcity. Shashank Shah and Vijaya Sunder M recount Sri Sathya Sai National Drinking Water Mission's success story of bringing clean water to rural India. They assure us that lessons gained through this impactful initiative over a decade and a half could serve as a useful model for other water-stressed developing economies in Asia that are facing similar problems.

Anurag Vij discusses the Achilles' heel of digital transformation—designing successful strategic partnerships in the digital realm, or 'digital evolution partnerships', which are typically alliances forged between an industry leader and a digital leader. While there is no one-size-fits-all playbook to ensure success for these partnerships, he believes that the research-based concepts and structures featured in the article can serve as a reference resource for leaders and managers.

Meanwhile, the proliferation of financial technology firms has led to the growth of the wealth management industry for the mass affluent market. Lee Guan Liu says that in a little over a decade since appearing in the US, the use of robo-advisors is starting to gain acceptance within the mainstream investment industry and predicts what it would look like in Southeast Asia.

As Singapore pivots to the next phase of wealth management focusing on the ultra-rich, an ecosystem is fast evolving to support the growth of family offices on the island. This trend has led to the symbiotic growth of the external asset manager industry in the country. Authors T. Mandy Tham, Esther Kong, and Juliana Koh report on opportunities for the industry and its challenges as it pursues growth.

Asia now has more ultra-high-net-worth-individuals or UHNWIs than any other continent in the world. Yet the region has only one third of the social investors that the US or Europe has, despite having a population four times more than the combined population of the latter. Naina Subberwal Batra, chief executive of AVPN, offers some suggestions on how we can do better.

With the Fourth Industrial Revolution unfolding at a furious pace, what does AI disrupting your industry look like? Jerrold Soh says your closest reference point is probably science fiction, especially of the Hollywood variety. He tells us how we have been getting AI wrong and highlights the risk of doing so from a managerial and law-making perspective.

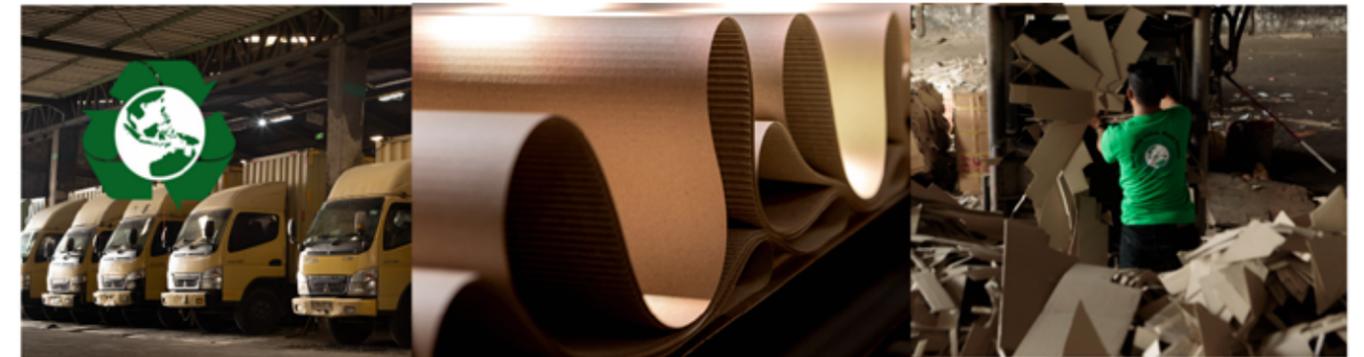
Lin Fengru, co-founder of TurtleTree, a company that uses cutting-edge stem cell technology to make healthier and more affordable dairy ingredients that are also kinder to animals and the environment, speaks about her entrepreneurial journey in the biotech space that was kick-started by her pursuit of the perfect wheel of cheese.

This issue's Case in Point is about NIO. Founded in 2014, it was one of the strongest competitors of Tesla in the electric vehicle market in China. Shantanu Bhattacharya and Lipika Bhattacharya recount how NIO launched battery-as-a-service (BaaS) as its unique selling point to attract consumers and compete against its rivals.

As the articles in this issue suggest, the COVID-19 crisis has presented opportunities for us to crystallise, consolidate, and apply the lessons learnt from the pandemic. As the world looks forward to a post-COVID world with cautious optimism, governments, businesses, and other organisations that form and shape society still have to contend with perennial issues, such as sustainable nutrition and digital transformation. But we are heading toward exciting times for sure.



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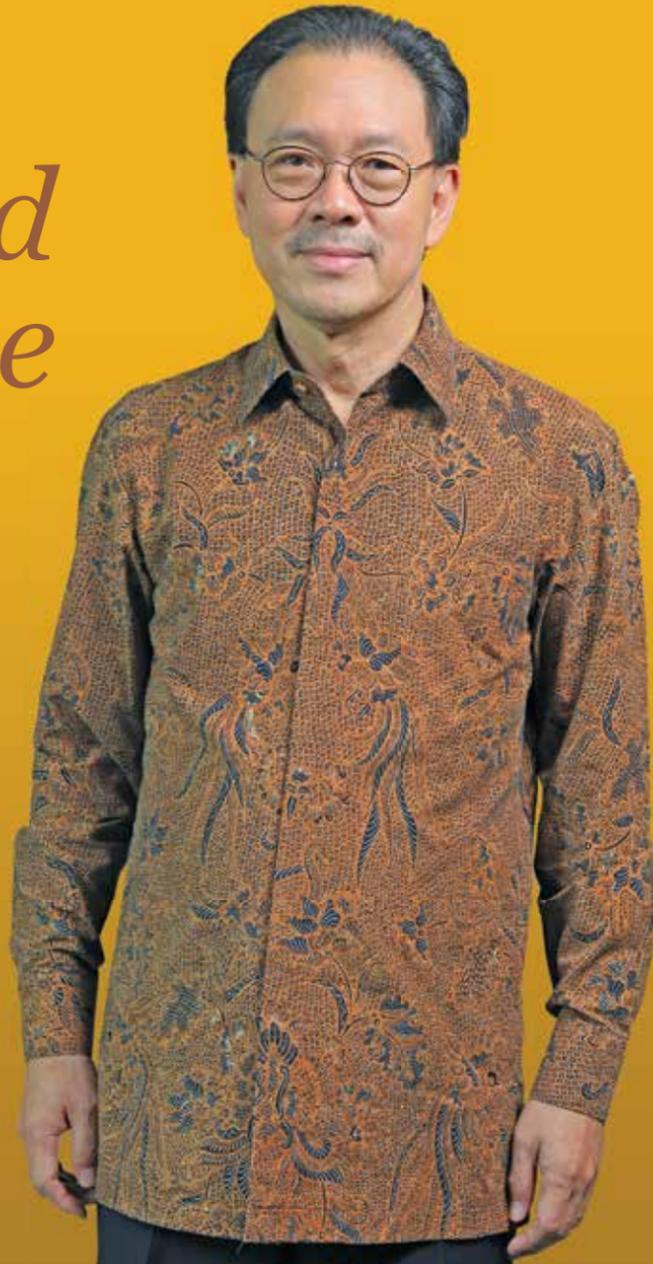
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Agility and Focus Save the Day

Eddy Kusnadi Sariaatmadja, Founder and President Commissioner of Indonesia's PT Elang Mahkota Teknologi (Emtek), tells Tan Chin Tiong how the company not only survived, but thrived during the COVID-19 pandemic.



How has the COVID-19 pandemic changed the way you run the Emtek Group over the last two years? What is the most significant change?

COVID-19 brought significant transformation to our business as we met the new aspirations of our customers, employees, and shareholders. As a leading media, digital, and technology company, we were probably more ready and flexible to adapt well to the drastically changing environment compared to other firms. That is why we have been able to conduct smooth, uninterrupted business operations over the

last two years. For example, we have always practised flexible operating hours at Emtek. The pandemic has turned out to be a timely reminder for us as a desired employer to continue being sensitive to the need for work-life balance, as well as offer flexible working hours and the option to work from home. Our leaders are now comfortable with such flexible work arrangements. I can attest that our work efficiency has either remained the same or even improved under such arrangements. This shift of attitude, mindset, and comfort level of my senior colleagues and

managers has been the most significant transformation. I believe we are also fully prepared to deal with any surprises coming from the virus or its variants.

On the business front, we have been leading transformation through the adoption of technology. During the pandemic, both Indonesia as a country and our business have gained several years through technological leapfrogging and advancement across all aspects. This is highly beneficial and effective not only for consumers in terms of the breadth of options available to them, but also for my nation with respect to more effective governance.

Indonesia has embarked on the right trajectory of inclusiveness, bringing all Indonesians along on this digital journey as we build a more digitally savvy and technologically enabled nation. Emtek's businesses, particularly in e-commerce, payment, content generation, and video delivery, have been at the forefront of driving digital change, and providing efficient and valuable choices to customers. We have also extended our reach beyond Tier 1 cities, such as Jakarta, Bandung, and Surabaya, to all of Indonesia. More importantly, we have kept the business going for more than 13 million micro, small, and medium enterprises (MSMEs) across the country.

In 2020, the first year of the pandemic, the number of users for Bukalapak, the Emtek-backed e-commerce company that functions as an online marketplace to enable MSMEs to go online, increased by over 20 million. There was also a rise on the seller's side, with the MSME seller group in Bukalapak growing from seven million in 2019 to 12 million by 2020 and 18 million by 2021, where 6.5 million are online merchants, and 11.5 million are Bukalapak partners and offline agents. The early bets have paid off. Bukalapak had its Initial Public Offering (IPO) in August 2021, which was the largest public offering in Indonesia to date, and has now signed up more than 10 million mom-and-pop stores.

In another example, according to the Media Partner Asia Q4 2021 report, Emtek's over-the-top (OTT) media service provider Vidio.com is currently the top OTT platform in Indonesia based on its monthly active users and watch durations figures. It was getting close to become a new unicorn in end-2021 after getting new investments. At the beginning of the pandemic, Vidio.com launched a Live Streaming Festival and became the pioneer in moving offline events to an online platform. Aside from having very popular local content, it is also positioning itself as 'the home of sports' with an

extensive sports content library. With Emtek having won the broadcasting rights for Qatar World Cup 2022 and the English Premier League from 2022 to 2025, it should have a firm grip on this position in the market.

Could you tell us more about how Pundi Amal Peduli Kasih Foundation (YPP), Emtek's Corporate Social Responsibility programme, has supported Indonesians during the pandemic? What do you find most heartening from this experience?

As a leading media group, Emtek is mindful of how we use our capabilities to influence the public and fulfil our duties to society as a responsible corporate citizen. Since the beginning of the pandemic, especially when the Delta variant was at its peak, we have rolled out virtual concerts, involving multiple top artistes, such as Agnez Mo, Rossa, and 300 other artistes, to raise funds. We raised IDR 27.4 billion (US\$1.9 million) from these events and subsequent fundraising campaigns. We also provided Internet and Wi-Fi access for students in seven cities for online learning.

YPP has been highly active in conducting multiple programmes to support Indonesia during the pandemic, such as donating personal protective equipment and providing accommodation, meals, and transportation to and from the workplace for healthcare workers. We have distributed medications and healthcare supplies to medical workers and hospitals across Indonesia to better equip them to fight against COVID-19. YPP also worked with the local and regional governments to support public vaccination programmes, and donated items such as ventilators and vitamin supplements. We operate eight hospitals in the Greater Jakarta Area, and I am personally very thankful to and proud of our doctors, nurses, and medical staff who worked tirelessly, putting their lives at risk to provide care and support to thousands of COVID patients.

We have kept the business going for more than 13 million micro, small, and medium enterprises across the country.

What are some of the top global and regional trends that you are now paying close attention to? And why so? What is Emtek doing to take advantage of those trends?

Due to its large and digitally savvy population, Indonesia is at the forefront of technology evolution in Southeast Asia. Our company is both a leader and an active player on this growth journey. We have a strong belief and vision of cooperating with all players, offline and online, to enable the country and our consumers to enjoy the best product offerings.

Our business is large and our teams are actively involved in several mega trends ranging from enhancing existing technology for merchant digitisation and data centres, to devising cutting-edge developments in Web 3.0, non-fungible tokens or NFTs, and the metaverse.

The key aspects of all the technologies and engagement boil down to building a deeper understanding of our consumer data. That is where the big tech companies and ecosystems are increasingly focused on. Naturally, these will be key priorities for Emtek as well, not only to understand our customers better, but also develop Big Data analysis that works in real time to meet their needs. Due to our large and diverse ecosystem, we are devoting our resources to this aspect, which can be the launching pad and enabler of many businesses in future. For instance, after partnering with Emtek's subsidiary SCM, RANS Entertainment led by celebrity/entrepreneur couple Raffi Ahmad and Nagita Slavina announced the opening period of its own metaverse platform RansVerse's pre-ILO (Initial Land Offering).

Emtek's business ecosystem is designed to serve everyone across the country, no matter where they are, from the big cities to remote areas.

How will the moving of Indonesia's capital from Jakarta to Nusantara impact Emtek? Will there be opportunities for it to gear itself for the Fourth Industrial Revolution?

We are supportive of the government's initiative to move the capital city to reduce the congestion in the Greater Jakarta Area and spread out the economic development to areas outside Java. The range of opportunities associated with such a massive project is enormous across both physical and technological infrastructure. Emtek's business ecosystem is designed to serve everyone across the country, no matter where they are, from the big cities to remote areas. For example, Emtek won the rights to broadcast Qatar World Cup 2022. Because we have the most complete range of media platforms to broadcast the matches, we can provide the most added value compared to our competitors. We have free-to-air TV that is accessible for the majority of the population, OTT for those on the go, and satellite pay TV, which can serve those in remote areas.

Recently, through our partnership with ride-hailing giant Grab and Bukalapak, we created a programme called Kota Masa Depan. It is an extensive accelerator programme that targets MSMEs in second- and third-tier cities with three priorities: vaccination, digital platform adoption or onboarding MSMEs to Grab and Bukalapak, and empowerment of MSMEs through digital technology training for their business development. The strategic partnership seeks to leverage the scale and unique strengths of Grab and Emtek Group's respective ecosystems to drive two objectives. First, accelerate digitalisation and create more income-generation opportunities for millions of small businesses and everyday entrepreneurs in Indonesia. Second, create more accessible digital offerings that provide greater convenience for ordinary Indonesians, even those living in the least digitised areas. With the increasing number of MSMEs, the backbone of the Indonesian economy, participating in the digital economy, it is hoped that economic progress will reach all levels of society in Indonesia.

While Emtek is not in the infrastructure business, we do have a few leading digital ecosystems that empower many Indonesian businesses to thrive in the new digital economy. For instance, in the area of e-commerce, we are empowering over 13 million warungs or mom-and-pop stores to gain cheaper access to their supplies through Mitra Bukalapak, the online-to-offline (O2O) arm of

Bukalapak, thus enabling them to provide a wider variety of services to our consumers. This will help grow and distribute the fruits of digitisation beyond Tier 1 cities to those in Tiers 2 and 3, effectively across the whole of Indonesia.

How can leaders be authentic in turbulent times when they need to strike a balance between risks and opportunities, staff welfare and the bottom line, the community and business, amongst other factors in the business world?

While the COVID-19 pandemic has been difficult for all of us in Indonesia, as well as across the globe, I am confident that we are making good progress and hope to see the end of it in due course. COVID-19 brought us closer as a company, and our vision of serving consumers has kept us going strong. The extent of support, teamwork, care, and patience that my colleagues displayed during our most challenging times was unimaginable.

At Emtek, we always believe in prioritising our staff well-being and safety above corporate profits. We provide superior medical support and COVID-19 testing to our staff, to ensure that they feel protected and well taken care of as they continue to perform their duties during the pandemic.

I strongly believe that my team has adapted to all the challenges that came along the way, and we have emerged from the crisis as a stronger company in all aspects. 

Eddy Kusnadi Sariaatmadja

is the Founder and President Commissioner of PT Elang Mahkota Teknologi (Emtek), Indonesia

Tan Chin Tiong

is Professor Emeritus of Marketing and Senior Advisor to the President of Singapore Management University

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TRANSFORMING HEALTH SYSTEMS IN A POST-COVID WORLD

Three recommendations for building system resilience.

by Joshua Tan, Leonora Liu, and Jeremy Lim

The ongoing COVID-19 pandemic has been devastating, with the virus causing systemic disruption unlike anything experienced in living memory. Health systems, the first to bear the brunt, continue to face repeated bouts of viral surges. Healthcare workers on the front line are tired, battle-worn, and uncertain about whether there is an end in sight. Government coffers, lighter after doling out repeated economic relief for citizens and businesses, necessitate fiscal tightening. However, health systems globally face a triple challenge—they must get through these trying times, they need to develop resilience in anticipation of future outbreaks, and they have to address longer-term challenges that predate COVID-19, such as chronic diseases and population ageing.

How should healthcare planners and policymakers respond? In this article, we discuss three ideas that health systems can adopt to progress in the post-COVID world. Although we focus our analysis on Singapore, these ideas are applicable to health systems everywhere. We also make a distinction between a health and a healthcare system in our discussion. A health system promotes healthy living and focuses on keeping the population healthy. On the other hand, a healthcare system aims to deliver medical services that improve the health outcomes of patients.

BUILDING IN REDUNDANCY

In an era of budget constraints and spiralling healthcare expenditure due to ageing populations and the ongoing pandemic, health systems are being forced into achieving maximum efficiency and minimal waste. Just-in-time processes, cost-containment measures, and lean management practices have worked their way into health systems. Against this backdrop, the concept of redundancy is deemed the antithesis of efficiency and conceived as ‘waste’ that needs to be eliminated. Redundancy is, however, important in highly dynamic environments, in which adverse shocks are frequent and surges in demand are unpredictable. Sadly, the last two years have shown us that healthcare fits this description to a T, and that moving forward, redundancy should be incorporated routinely into the design of future health systems.

Consider the systems on a commercial aircraft. Aircraft are designed and manufactured in a mechanically redundant way, with several potentially identical backup systems that increase the safety margin and reduce the risk of catastrophic effects following a single point of failure. In fact, the aircraft systems crucial for flight are often triple redundant. Does this increase costs? Yes, certainly, but when the consequences of failure are catastrophic, it is a necessary price to pay. What price then are we prepared to pay for healthcare?

Throughout the COVID-19 pandemic, we have observed how healthcare systems worldwide were swiftly overwhelmed because of the absence of redundant systems and the sheer ferocity of the virus. Within a month from the onset of the pandemic, many health systems were strained to the point where the scrambling and urgent construction of field hospitals were required to meet the surge in hospitalisations.¹ At the height of the first wave, the increase in demand for healthcare-related resources soon resulted in shortages of personal protective equipment (PPE), life-sustaining equipment, and critical bed capacity. The early waves overwhelmed many health systems, resulting in excess mortality² and potential fatalities among healthcare workers lacking PPE. From March to August 2020, approximately one in four COVID-19 deaths in the US could be attributed to hospitals strained by the overwhelming caseload.³ Fortunately, Singapore's carefully orchestrated COVID-19 response allowed the country to avoid significant excess mortality from the pandemic. However, its health system and redundancies were unavoidably strained.

As the pandemic drags on, its toll on global health systems has resulted in an exodus of healthcare workers. Singapore also saw a rise in healthcare worker resignations in 2021, with many expressing concerns about overwork and fatigue.⁴ Burnout amongst healthcare workers is a major concern as it affects attrition, quality of care, the efficiency of the health system, and most importantly, mental health. Building in manpower redundancy will enable shorter working hours, more time for rest, and a better work-life balance, all of which will help address burnout. This may be difficult to carry out in a tight labour market where it may take a decade to train the workforce. It is thus imperative to train, recruit, and retain a sizeable healthcare corps, if we are to

For a digital revolution to be realised in healthcare, regulatory and financial environments need to enable the innovation and uptake of novel digital health devices and services.

endure the long fight with COVID, and simultaneously address the health challenges of an ageing population.

Although health systems are unlikely to incorporate aviation-type triple redundancies into their processes, they can benefit from an engineering-type systems dynamics approach. The latter identifies critical areas in which redundancy can help with adapting to changing circumstances, adverse shocks, and isolated failures. Important areas to build redundancy during this pandemic include material and personnel resources. For example, OSF HealthCare, an Illinois-based integrated healthcare network, has started manufacturing masks, gowns, and other critical pharmaceuticals to mitigate pandemic-related supply chain disruptions.⁵ Healthcare institutions should seek to increase their involvement in supply chains to build in redundancy for material resources. Furthermore, strategically locating shared PPE and pharmaceuticals stores, rather than hoarding these resources, can facilitate a timely, coordinated response during surges in the region.

ENABLING HEALTHCARE THROUGH DIGITAL TRANSFORMATION

Prior to the COVID-19 pandemic, the healthcare sector was a laggard in adopting technology. One need only think of our ubiquitous use of digital banking, ride-hailing, and e-commerce solutions today to realise how digitalisation has redefined the landscape in other sectors. No doubt, the pandemic has catalysed the uptake of digital solutions in healthcare in recent times—the mainstream use of

We can consider adopting two perspectives on the financing of digital health innovation: (i) funding the innovation process; and (ii) ensuring the financial viability of digital health solutions resulting from such innovation.

telemedicine, for example, now allows Singaporeans to seek healthcare remotely. However, the healthcare sector still has much progress to make if it is to harness the full potential of digital innovation. With our transition to COVID endemicity and with the spotlight now back on chronic diseases and the ageing population, Singapore finds itself in uncharted territory. To address this novel mix of public health issues, the innovation and translation of digital solutions in healthcare now need to take place at unprecedented scale and speed.

For a digital revolution to be realised in healthcare, regulatory and financial environments need to enable the innovation and uptake of novel digital health devices and services.

Favourable regulations for digital health innovations

Singapore's Health Sciences Authority (HSA) adopts a risk- and confidence-based regulatory approach for new medical devices, including hardware and software. Apart from new medical devices deemed to be of 'low-risk' and others that have received prior approval from reference agencies (e.g., regulatory agencies in Australia, Japan, and the US), many local and innovative healthcare devices will require between 100 and 300 working days for product registration.⁶

Singapore's regulation of innovative healthcare services, on the other hand, is guided by the Ministry of Health's (MOH) Licencing Experimentation and Adaptation Programme (LEAP), a regulatory sandbox initiative. It is within LEAP's test beds that telemedicine and mobile medicine have been translated from an idea into a new and innovative healthcare service in Singapore.⁷ However, it took three years—between 2018 and 2021—for the telemedicine regulatory sandbox to show success and for this innovation to transition to licensing, even with the time-sensitive need for such services amidst the pandemic.

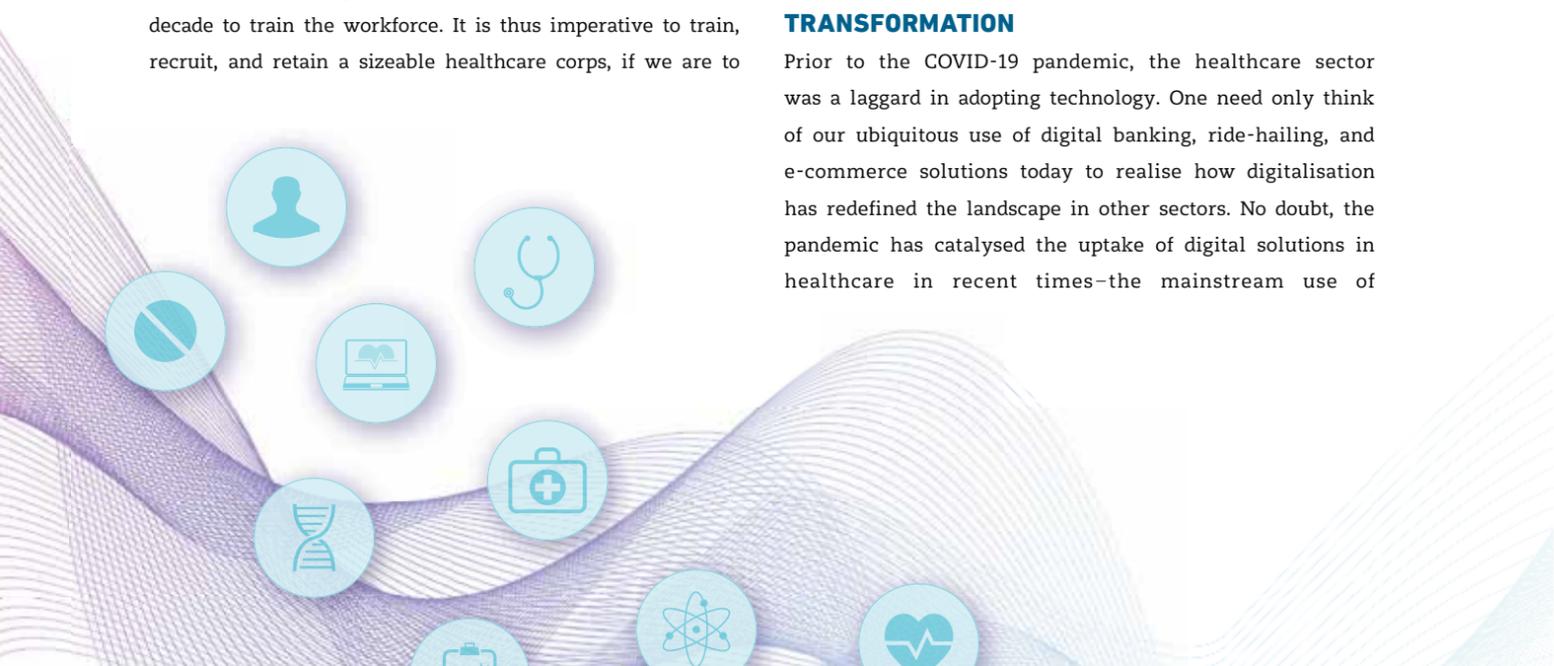
Singapore's efforts to ramp up the adoption of new and exciting digital health solutions have been commendable. However, the overarching regulatory approach has been very cautious—arguably too cautious—and may, ironically, become a stumbling block for digital innovation at a time when it should speed up.

Perhaps it is timely that we consider other ways of regulating digital health innovations. One such alternative would be through a self-regulatory framework. Harvard medical researchers Elena Rodriguez-Villa and John Torous, for example, have proposed a dynamic self-certification system for regulating digital health tools.⁸ Under this system, digital health tool developers would have to answer a set of questions adapted to contextual needs after considering diverse stakeholder input. Answers to this self-certification checklist would be publicly available, giving users—such as patients and clinicians—an opportunity to comment on the validity of answers or propose changes to scoring, thus drawing on real-world evidence. The researchers argue that this public, interactive approach to regulation would facilitate the design and building of digital health innovations that meet and respond to real needs, set a standard for transparency that protects users, and empower patients and clinicians to play an active role in shaping the future of digital health. Government agencies will still play a role in conducting random audits, and those triggered by patient and clinical concerns, thereby limiting harm to patients and consumers. Through a more self-regulating approach that does away with the need for the government to endorse specific digital health innovations, government agencies will free up significant bandwidth and resources for more pressing public health issues.

On Singapore's response to COVID-19, Director of Medical Services, Associate Professor Kenneth Mak, said in October 2021 that “[Singapore is] moving progressively from the Government doing everything to the importance of self-accountability, self-responsibility, self-obligation...”.⁹ If Singaporeans are to take greater responsibility for their health and healthcare, learning to make more informed choices about the digital health solutions they use will surely be aligned with this shift.

Financial support for digital innovation

We can consider adopting two perspectives on the financing of digital health innovation: (i) funding the innovation process; and (ii) ensuring the financial viability of digital health solutions resulting from such innovation. For the former, and much to the credit of the government, Singapore continues to recognise the importance of research, innovation, and enterprise (RIE) in its knowledge-based and innovation-driven economy.



The commitment of S\$25 billion—or about one percent of the nation's gross domestic product—to Singapore's RIE 2025 plan¹⁰ is indicative of the magnitude of fiscal support that the nation and industries, including healthcare, have for innovation. For the latter, innovators would benefit from buy-in and financial support from a more varied pool of stakeholders, including patients, clinicians, healthcare institution leaders, innovators, and policymakers, if they are to achieve rapid and widespread market uptake.

Assuming developers have innovated in response to existing demand, developed a useful digital health solution, and showed proof of concept through seed funding, the next big challenge for innovators is launching the product on the market and achieving sufficient market reach. This challenge may be particularly daunting for small health technology start-ups or businesses, whose budgets are smaller and business operations limited by a smaller workforce. To overcome this, collaborations among smaller players or start-ups and healthcare institutions, organisations, and government agencies will be a strategic move. By forging these mutually beneficial alliances, innovators can achieve the economies of scale needed for fiscal health, while clinicians, patients, healthcare leaders, innovators and policymakers reap the benefits of the digital healthcare solution.

MAKE HEALTH PART OF POLICY FORMULATION

All policies developed within and outside the healthcare sector affect health through multiple pathways and determinants,¹¹ and the need for considering the health implications of every policy is our third overarching recommendation. Traditional 'non-health' sectors and settings drive socio-economic, cultural, and environmental conditions which in turn impact health. To illustrate, consider the myriad ways COVID-19 has exploited vulnerabilities in society. In many countries, individuals of low socioeconomic status and blue-collar workers faced the greatest health risks and had fewer opportunities to minimise

their exposure to the virus. As white-collar professionals were shielded from the pandemic with work-from-home arrangements, blue-collar workers continued to return to their workplaces with little to no protective measures in place. This led to large outbreaks in agricultural and processing facilities, and a higher death rate amongst these workers.^{12,13} In addition, consider how environmental conditions such as crowded and unhealthy accommodations led to outbreaks in the migrant worker dormitories in Singapore. COVID-19 has demonstrated that policies, or the lack thereof, can exacerbate health inequalities.

Improving health and reducing population health risks require consideration of the wider impact of policies and decisions in all sectors. This concept is embodied in 'health in all policies' (HiAP), an intersectoral approach to public policies that systematically considers the health implications of decisions, seeks synergies, and avoids harmful health impact to improve population health and health equity.¹⁴ HiAP reflects the principles of legitimacy, accountability, transparency and access to information, participation, sustainability and collaboration across sectors and levels of government. HiAP is not a new idea, having been first described in the 19th century and routinely championed by the World Health Organization and other organisations in recent years.

However, a recent global status report by the Global Network for Health in All Policies demonstrated that advances in HiAP have been uneven, with disparities in political support, governance, and resources for HiAP across the globe.¹⁵ Furthermore, using COVID-19 as a litmus test, past failures to adopt a HiAP approach have exposed key vulnerabilities in important policies, and further disregard for the benefits of HiAP will perpetuate past failures.

Leaders in public and private institutions should embrace HiAP and engage medical and public health professionals routinely for major initiatives. Much like the environmental impact assessment done for major infrastructure projects, a simple

New policies for healthy urban environments could require new residential and business developments to incorporate healthy building designs with improved ventilation through higher ceilings, larger windows, and use of antimicrobial technology systems.

health and public health impact assessment could be implemented, given the lessons learnt from the ongoing pandemic.

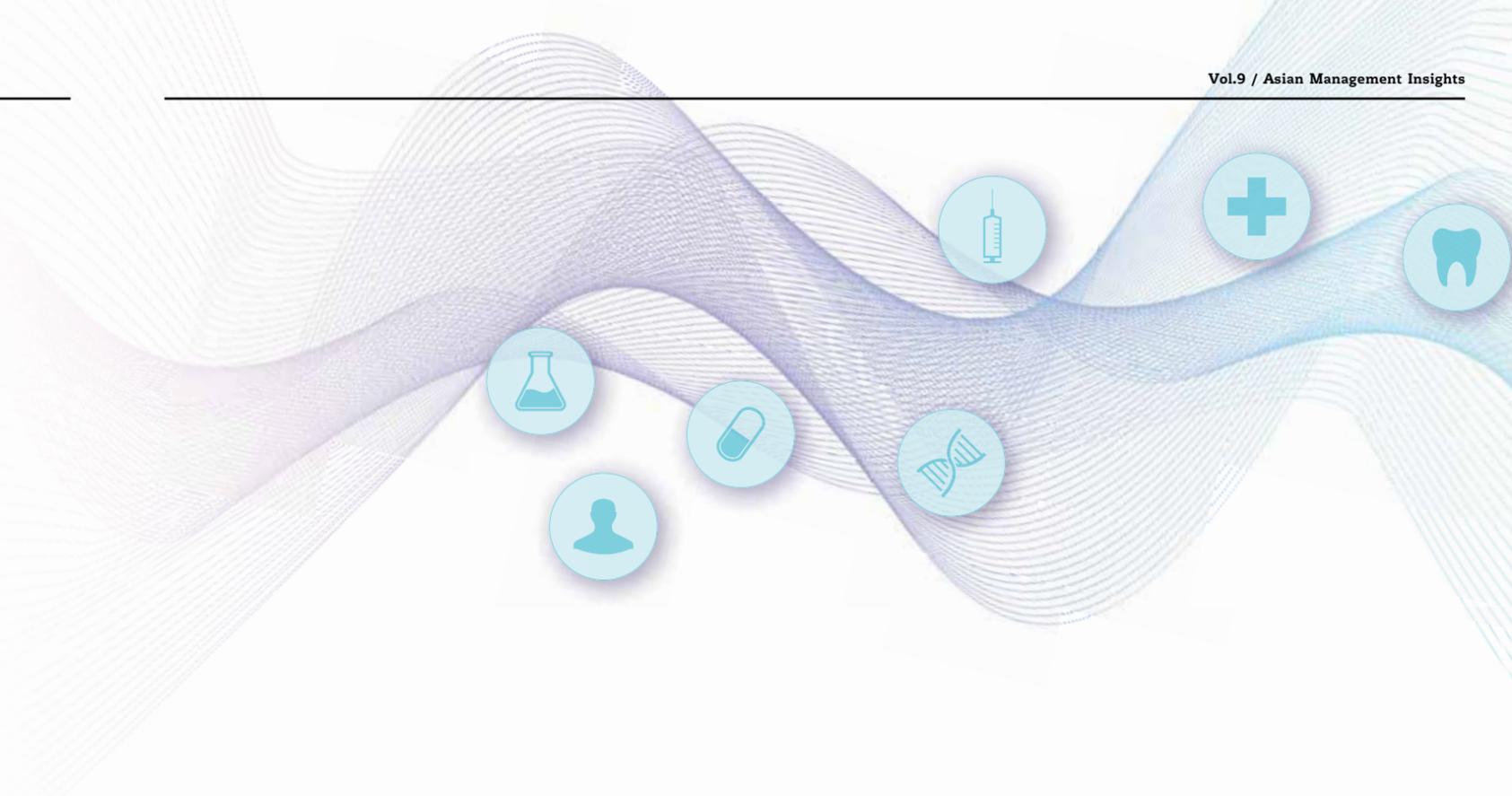
In practice, application of HiAP to urban infrastructure and public transport policies is required in the immediate future. In urban spaces, human-to-human connectivity associated with overcrowding of places, rather than population density, is a key factor for COVID-19 infection.¹⁶ Compact city development is key for cities to ensure people can access services, health amenities, and daily necessities within easy walking distance from their residence. Intuitively, reducing urban density seems like the foremost solution to consider. However, moving away from urban density to protecting public health will likely negate the various benefits accrued from the economies of scale brought about by compact living. Instead, a concerted effort to address urban inequalities, and develop healthy and sustainable urban environments is required. In the context of COVID-19, this could mean grassroots services to identify and support vulnerable individuals (e.g., those living in crowded housing or having multiple illnesses) and provide accessible physical distancing and sheltering-in-place facilities, so that exposed or infected individuals can isolate themselves from household members.

New policies for healthy urban environments could require new residential and business developments to incorporate healthy building designs with improved ventilation through higher ceilings, larger windows, and use of antimicrobial technology systems.¹⁷ Airflow studies could be conducted in existing buildings, which could then be retrofitted with engineering control preventive measures to mitigate

COVID-19 spread. In the interest of environmental sustainability, natural ventilation systems such as cross-ventilation or buoyancy-driven ventilation should be considered as alternatives to energy-intensive air-conditioning systems. Healthy building design will not only keep people safe from disease, but also reduce costs and improve worker performance and productivity.¹⁸

Public transport policies too need to be reviewed. As a result of the pandemic, there has been a reduction in mass transit due to work-from-home arrangements and fears of contracting the virus. As workers return to the office, there might be a rise in the use of personal vehicle transport and private hire vehicles. New public transport policies and infrastructure are therefore required. The bicycle has been recognised in many cases as a competitive alternative to mass transit. However, the uptake of cycling has been mostly limited to recreational activities, and widespread adoption of commuting by cycling has yet to gain traction in Singapore. Developing policies and improving the built environment to allow safe commuting by cycling is prudent from a HiAP perspective. Cycling will improve cardiovascular health, reduce obesity, avert crowding on mass transit, and reduce fossil fuel consumption and emissions.

Urban infrastructure and public transport policies are some of the public policies that need to be revised in a post-COVID world. Taking health into consideration during policy formulation will be beneficial to improving health for the whole population for the future and reducing the risk of future pandemics.



As Winston Churchill famously said, “Never let a good crisis go to waste”. We should capitalise on the momentum of change to effect further transformation that will strengthen our healthcare systems.

CONCLUSION

Implementing the above is no easy feat. It will require fundamental shifts in our mental models, acquiring of new skills by personnel in healthcare and non-healthcare settings, overhauling traditional manpower and space-planning norms, and finding novel ways of regulating and financing health innovations, among other changes.

Will our recommendations cost the world much more and divert resources from other sectors? Yes and no. There is a cost to building up system resilience, but as Indonesian President Joko Widodo noted in calling for a global health agency, “The costs [of doing so] are clearly much smaller than the world’s losses due to the fragility of the global health system”.¹⁹ Furthermore, the improvements in population health and the leaps in productivity from digitalisation will offset much of these upfront costs in the medium to long term.

As Winston Churchill famously said, “Never let a good crisis go to waste”. We should capitalise on the momentum of change to effect further transformation that will strengthen our healthcare systems. If done well, our efforts to future-proof our health systems today will herald a golden era of healthcare in time to come. ^{AW}

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How to Smoothen AI Implementation in Healthcare



Three domain-focused prescriptions.

by Adrian Yeow and Foong Pin Sym

In the field of precision medicine, where physicians aim to tailor medical treatments specific to individual patients, Artificial Intelligence (AI) tools are being used to augment complex medical decision-making. For example, in pharmacogenomics, the branch of medicine that studies how genetics affects medical treatment, the unique genetic profile of patients is used to determine whether they have genes that are clinically relevant in certain drug metabolisms.¹ To apply such therapy requires an understanding of the science that determines the epigenetic profile, as well as the data modelling that determines the adverse drug reaction data. Such convergence of advanced data modelling and medicine is a key feature of recent Health Information Technology (HIT) endeavours.

However, as training in genetics and data modelling among physicians is uneven, the development, testing, integration, and implementation of medical AI tools create many challenges. Such HIT challenges are also emerging in other sectors of healthcare. In this article, we describe these challenges and draw on current research, as well as our collective experience in developing AI-enhanced decision aid tools for HIT, to offer pointers on how to manage the challenges of implementation.

AI IN HEALTHCARE

Healthcare organisations have experimented with embedding AI tools in various diagnostics, administrative, and therapeutics tasks, e.g., medical imaging, clinical diagnosis, clinical skills benchmarking, and pharmacogenomics.² Healthcare AI tools are not homogeneous; rather, they encompass a broad range of technologies including biometrics, cognitive robotics, robotic process automation (RPA), machine learning (ML), natural language processing (NLP), and speech recognition. These technologies differ in terms of the specific technical platforms used, programming technologies, and their ability to learn.

While the underlying technologies for healthcare AI tools may be different, and how they support healthcare tasks can vary based on how they are integrated with the clinical work, the core of each AI tool is similar in that they are made up of two interrelated components—the AI model and data. For example, in medical imaging, the data would involve functional magnetic resonance imaging (fMRI) data. The AI model is an aggregation of this source data for identifying abnormal findings. In cognitive robotics or RPA, the model would be the sequence of tasks based on relationships between specific data inputs and specified output task data. Using this conceptualisation of the healthcare AI core structure, we discuss its development and implications for AI implementation.

How the AI model is developed

First, the AI team, comprising clinicians and data scientists, must define the application of the AI model. This involves determining the scope of the clinical tasks, analysis, and decisions.

Second, after defining the application scope, the AI team would need to simultaneously develop the AI model (a form of algorithmic classification) and acquire the necessary data for the AI model. The AI model can be based on human classification and domain expertise—this involves determining the potential predictors or data that relate to the clinical problem and ‘ground truth labelling’, i.e., assigning human-sourced labels to the algorithmic outcomes that reflect the correct outputs.³ For example, the AI model could include image recognition and classification models using ML for detecting breast cancer, brain tumours, or diabetic retinopathy. Ground truth labelling would involve labelling outputs based on the diagnostic decisions of professional radiologists. Alternatively, an AI model could include natural language text mining and use classification models to detect signs and symptoms of sepsis, make predictions of Intensive Care Unit transfers, or forecast the likelihood of hospital readmissions. The ground truth labelling here would be labelling outputs based on diagnostic decisions of clinicians. As part of developing the AI model, the AI team usually uses part of the data as training data, and another part of the data as validation data to test for predictive accuracy of the AI model.

Finally, the AI team must evaluate the AI model’s output. Part of this evaluation includes removing inaccuracies, such as those arising from spurious correlations and statistical biases. This may involve a highly iterative process of significant data cleaning and model refinement. One key aspect of this process

is how the AI team measures and evaluates the quality of the AI model. Most AI teams rely on output-based accuracy metrics that measure how well an AI model’s predicted outputs match the human classified outputs (ground truth labels) within the testing or validation data.

AI model development ends when the AI team can develop a model where the output-based accuracy metric is robust and above the industry standard. The industry standard is often based on agreed-upon measurements—in some cases, it is based on human experts’ performance or aggregate measures espoused in the industry’s analyses.

CHALLENGES IN IMPLEMENTING HEALTHCARE AI

Despite the considerable potential of AI, most healthcare AI tools are still in the development and proof-of-concept stages. Notwithstanding their high predictive accuracy, some models fail when they are used with new data; some others fail because they may not be easy to implement. These difficulties mean that there are still very few successful implementations of healthcare AI.⁴ As such, healthcare AI research institutions, governments, and industry groups have released frameworks and best practice guidelines to assist healthcare organisations in the development and implementation of healthcare AI technologies.^{5,6}

In Singapore, the Ministry of Health (MOH), in coordination with Integrated Health Information Systems (IHIS), a national healthtech agency, has developed best practice recommendations for the development and integration of healthcare IT systems that use AI. Their recommendations suggest that healthcare organisations need to invest in resources to test the data, validate the model with both retrospective and representative data, and ensure that the AI model works according to the ground truths. These are good practices, but we believe there are other concerns that must be addressed beyond model accuracy.

AI model development ends when the AI team can develop a model where the output-based accuracy metric is robust and above the industry standard.

A recent review study on implementing ML products for healthcare delivery highlighted that it is also challenging for AI products to move from *in silico* settings (where the AI model is tested on retrospective data) to actual care settings (where the AI model is evaluated in different ‘live’ settings).⁷ This could arise for multiple reasons, such as intrinsic differences in the data, the interactions between the AI model and local conditions, and other aspects of the ‘live’ context. The researchers behind the study also argue that the clinical integration step—where the AI model is linked to the clinical work—may be the most difficult step to execute in the entire model.

Drawing from current research, and our experiences in developing and implementing AI tools for various healthcare settings in Singapore, we highlight the following obstacles that healthcare organisations need to be aware of when embarking on this process of AI implementation.

Transparency of AI model

While the recommendations and reviews inform us of the need to ensure that appropriate data testing is done at different stages of development and track the ground truths during implementation, the reality is that the transparency of AI models remains a major obstacle hindering the implementation of those recommendations.

Specifically, it is often not clear how an AI model’s ground truth labels are established in development. In a study conducted in a US hospital system,⁸ the medical diagnostic AI evaluation teams were unable to access the source of ground truth labels in the AI model for some of the tools being evaluated. In other cases, the evaluation teams realised that there were significant discrepancies between the AI model’s ground truths and the ones used by their local experts. By digging deeper, they found that for certain AI models, the ground truths were labelled using only current images, which were limited or narrowly defined training data, instead of the typical practice of comparing current with prior images or using messier and nuanced data. Finally, for a specific set of AI models, the teams realised that the ground truths were hard to establish in practice as they were either determined by costly professional standards or there were no agreed-upon standards for the ground truths.

Context of AI model

Another key obstacle noted in current research and from our experience deploying AI tools is the significant data-related challenges present when contextualising the tool in view of local conditions. First, the process of integrating the AI model into actual operations (or what we call ‘production environment’) is not trivial. It requires the coordinated efforts of the AI team, health IT infrastructure team, and clinicians to test and validate that the AI model can work in the environment. Second, significant effort may be required to ensure the AI technology is compatible with the existing IT systems, and it is able to retrieve and transform the required data. For example, the data may be stored in different parts of the IT infrastructure. The coordination costs, development, and testing efforts

A key obstacle noted in current research and from our experience deploying AI tools is the significant data-related challenges present when contextualising the tool in view of local conditions.



required are not trivial and often hard to enact, given differences among stakeholders' organisational objectives.

Apart from the data work required, the AI tool needs to be integrated with existing clinical user tasks and overall workflows. A workflow refers to a set of interlinked routine and novel tasks performed by clinicians and supporting staff as part of care delivery. This may require deliberate changes in tasks and even the workflow. For example, as part of the AI-enabled protocol, there may be a need to check the AI diagnostic scores and new procedures may be required, such as what the clinician should do when the scores are above a specified threshold. It may also require work on designing how the AI outputs are presented as part of the existing digital and physical work environment. A research study on the implementation of an AI-enabled readmission prediction model within a hospital system found that significant barriers emerge during the integration phase.⁹ In that study, the researchers found that variations in the readmission risk assessment workflow across different stakeholders (e.g., case manager, pharmacists, physicians and nurses, or social workers) led to different concerns about how the AI model should be integrated.

Supporting AI tool 'explainability'

As mentioned, a defining feature of using AI to create predictive models is that the AI model itself is inscrutable. The functions used to create the models are uninterpretable, or several different algorithms are applied in such a way that they cannot be broken into its parts. This is known as the 'blackbox' of AI. Thus, an AI-enhanced decision aid may have its internal logic hidden from the user. When applied to high-stakes medical decision-making, this opacity challenges both the patient and the clinician.

For example, in an AI project for a Singapore hospital, the team of one of the authors had built a highly robust NLP-based model for sepsis prediction. However, one key validation issue was the NLP variables that were critical to the model's high level of predictive accuracy. It was challenging to explain clearly and fully how these variables drawn from clinicians' patient notes could predict whether a patient will suffer from sepsis. Furthermore, these NLP-derived variables are partly dependent on the clinician's documentation in that hospital. Without further external validation, it was unclear how well this model would perform with other hospitals' clinician notes.

Because of these challenges in the explainability of the AI tool in justifying the diagnosis, clinicians are put in a position

where they take on the agency for the choice made by the AI model, without being able to grasp the conditions under which such a decision was made. This creates an undesirable situation where the authority of clinicians does not arise from examinable knowledge, but from their role as an AI tool operator. Patients are also placed in an untenable position because they are being asked to trust a decision that they cannot query, and one made by a clinician who may not have the expert skills to offer an explanation.

PRESCRIPTIONS FOR IMPLEMENTING HEALTHCARE AI

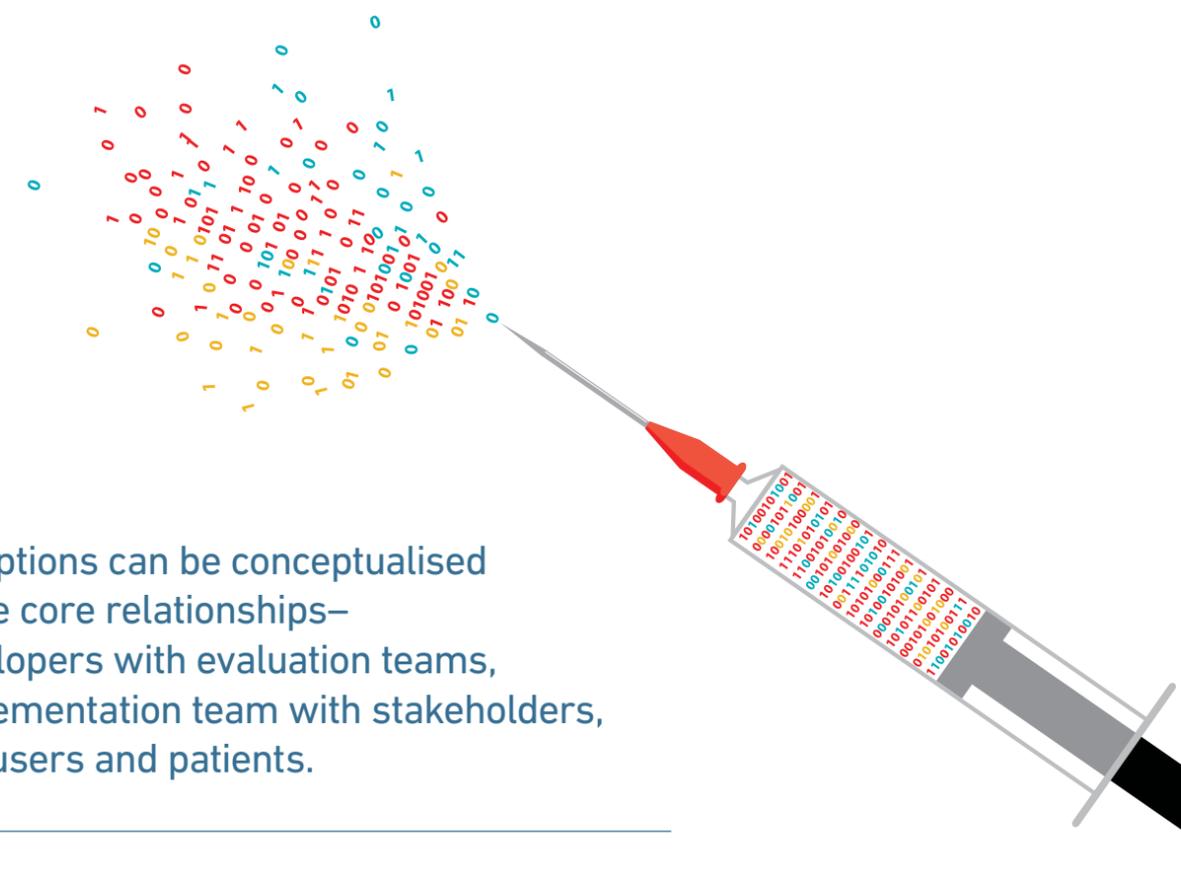
Having reviewed some of the key challenges of implementing AI in healthcare, we now explicate three prescriptions for healthcare organisations to consider as they start to implement AI tools for healthcare processes. These prescriptions can be conceptualised as three core relationships—AI developers with evaluation teams, AI implementation team with stakeholders, and AI users and patients.

1. AI developers with evaluation teams

The first set of prescriptions focuses on recontextualising the AI model within each hospital or healthcare organisation setting. As discussed, one of the biggest challenges faced by healthcare organisations is in evaluating a new AI tool for its internal use. While there are some existing guidelines provided by MOH and industry groups for recommendations concerning the understanding of how the AI tool was developed, the data used to train the model, and how to validate its predictive outputs, we argue that these should be explicitly codified as part of the AI evaluation team's work.

As such, the first prescription is to set up a cross-functional AI evaluation team, comprising clinical innovators, data scientists, and medical informatics representatives. The scope and responsibilities of this AI evaluation team is to understand and validate the AI model's performance, accuracy, and reliability. Given that there is currently no standardised model to measure the above, the team's responsibility is to understand and validate the AI model for the adopting organisation's local conditions.

The team's first task is to review the AI model's reported measures. The review would include collecting data on the AI model's reported output-based accuracy metrics, the sources used to establish the ground truth, the members who assisted in the ground truth labelling, and the data used in training and validating the model. This review should enable the team to answer questions concerning the AI model's core assumptions,



Prescriptions can be conceptualised as three core relationships—AI developers with evaluation teams, AI implementation team with stakeholders, and AI users and patients.

variables, relationships, and the data that it was based on. In certain cases, the AI evaluation team would require information on the different ML models used or core AI technologies utilised in the AI model. While these may not be fully interpretable, it provides the team some information on the method through which the data was used to predict the outcomes.

The team's next task would be to verify the AI model's performance with the organisation's local data. At the same time, the team should work with its local clinical experts to cross-check this version of ground truth labels for the phenomenon predicted by the AI model. After examining the AI model's performance using local data and cross validating the model's output with the local experts' version of ground truth labels, the team would be able to ascertain if the AI model can perform accurately and reliably within the current organisation.

By doing the above, the AI evaluation team would have a clearer sense as to how well the AI model works in the local context in terms of the difference, if any, between the AI model's ground truth labelling and the local expertise's ground truth, the ability of the AI model to work with local data, and its performance in local conditions versus its reported performance.

2. AI implementation team with stakeholders

The second set of prescriptions focuses on the integration of the AI tool with target departments' workflow and tasks. This integration challenge is a multi-dimensional problem as it encompasses the AI tool's integration with existing technical infrastructure, data, as well as operational and clinical tasks and workflow.¹⁰ Given that such an integration encompasses the clinical, technical, and operational domains, the AI implementation team must be carefully set up and managed by the senior members of the healthcare organisation. As such, the AI implementation team structure would follow other established enterprise system project structures. This may include a steering committee, an AI implementation working committee, and various AI implementation project teams.

The steering committee would usually be chaired by senior clinical and/or executive leaders, and should include senior clinicians, technical experts, operational executives, as well as legal and ethical experts. It would provide the leadership, oversight, and direction for the AI implementation for the healthcare organisation. As part of its leadership role, it can help to secure resources for the implementation team,

deliberate and approve budgets and plans, and get buy-in from the different stakeholders across all levels of the organisation.

The working committee would be led by the AI leads, and comprise target clinical department heads, senior clinical users, as well as the heads of the healthcare IT systems, medical informatics, technical infrastructure, clinic operations, and legal/ethics departments. It would focus on deliberating, designing, and overseeing the technical, clinical, and operational integration of the AI tool; developing appropriate process outcomes and goals to be achieved by the AI tool; as well as considering how the integration would address or mitigate privacy, ethics, and safety issues related to the implementation of AI tools. Specifically, we would expect this committee to focus on AI tool design such as the design of clinical systems to reflect specific AI inputs, the data indicators, and predictors and their thresholds. These in turn would lead to the AI tool's impact on a) changes in roles and responsibilities of clinical or non-clinical users, b) changes to coordination of tasks and handovers, and c) changes to intermediate process outputs and patient outcomes.

Finally, the approved AI-enabled workflows, protocols, and tasks would be implemented by respective AI implementation project teams. These teams would not just be responsible for the

actual deployment of the AI tool, they would also be responsible for evaluating and monitoring the process metrics to validate the efficacy and effectiveness of the AI tool. The implementation team should therefore take note of user issues, data drifts, unexpected outcomes, and data risk, and bring this up to the working committee. We should expect multiple iterations and adjustments for each AI tool implementation, and these would require close coordination between the working committee and the implementation teams.

3. AI users and patients

The last set of prescriptions focuses on the AI users—clinicians, and the patients affected by such AI-enabled healthcare processes. One possible approach to resolve the issue of the AI tool's explainability is to create interpretable explanations for the prediction using explainable models. This approach assumes that uninterpretable AI models may have interpretable statistical correlates that perform similarly. Explaining the model's prediction using the non-AI models may be more trust-generating than offering no explanation. If the model remains stubbornly opaque, another strategy is to enhance its interpretability by allowing the user/clinician to query the conditions under which the model was constructed.

An explainable AI model allows the clinician to query the data used in its training, and how well or badly it performed when the population changed.



Clinicians already use these strategies today in evidence-based medicine. They are often already aware of what assumptions were made in preparing the drug trial or how the drugs were applied only to certain sub-populations. Along the same vein, an explainable AI model allows the clinician to query the data used in its training, and how well or badly it performed when the population changed. In the same way, patient-facing decision aids for AI-enhanced tools may benefit from permitting patients to play with the input parameters to explore the response of the tool. While decidedly less scientific than statistical knowledge, the ability to 'get a feel' for the model promotes trust in the decision, and the physician who is acting as the agent responsible for wielding the AI tool.

The key takeaway here is that developing interfaces that support interpretability of an AI tool can be of benefit to the end-users—clinicians and their patients. We recommend creating interfaces that help users query the factors, the assumptions of the model, and the way the predictions change as the key factors vary. These will serve to increase trust and confidence in the shared medical decision derived from AI tools.

CONCLUSION

Even as AI tools in HIT continue to advance in exciting and incredible ways, healthcare organisations are paradoxically finding it harder to leverage and implement these newer, cutting-edge AI tools. We propose three domain-focused prescriptions, which can be used as practical springboards, as healthcare organisations embark on their implementation journey. We believe that by carefully following these prescriptions, healthcare organisations can successfully navigate known AI implementation pitfalls and challenges and be able to repeatedly implement AI tools in an effective manner. 

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**MISSION
POSSIBLE**

Overcoming challenges to bring clean water to rural India.

by **Shashank Shah and Vijaya Sunder M**

The United Nations Sustainable Development Goal (SDG) 6 emphasises the need for access to clean drinking water. Unfortunately, across the world, one in three people does not have access to safe drinking water; this is especially prominent in emerging economies.¹ Research shows that by 2025, 1.8 billion people would be living in countries or regions with absolute drinking water scarcity.²

For decades, both government bodies and non-government agencies in the development sector have been searching for and implementing solutions to resolve the water crisis particularly in rural areas. Such efforts often fail not due to lack of funding, but due to poor maintenance, contamination, or water source depletion in rural communities. Nearly two decades back, the World Bank Group had underscored this challenge: “The traditional approach of build-neglect-rebuild is unsustainable, inefficient, and largely responsible for the poor performance of an estimated US\$500 billion worth of assets in water resources and irrigation infrastructure.”³

In India, 91 million people lack access to basic water supply, and 600 million are under high or extreme water stress.⁴ In this article, we will discuss the social innovation model conceptualised and delivered by the Sri Sathya Sai National Drinking Water Mission as a possible means to provide a self-sustainable solution to the country’s drinking water crisis. With successful deployment of water purification systems in 108 villages across six states in India, the coping costs averted were about US\$100 million, when calculated over a 15-year sustainability life cycle. To this effect, the success story describes how financial and operational dimensions of sustainability can lead to a self-sustaining system. We identify three key takeaways from this social innovation initiative that may have broad application for other countries confronting similar water crises.

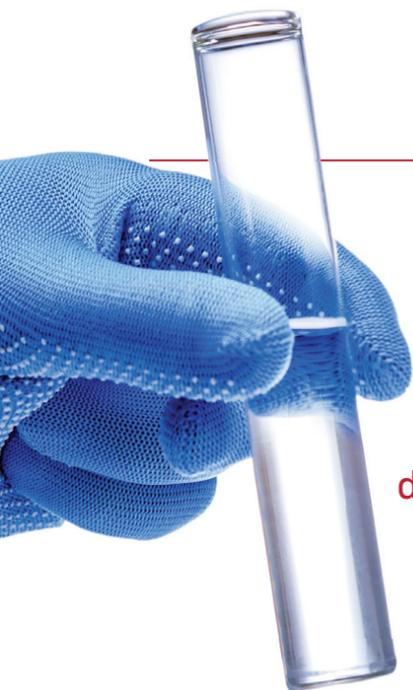
Research shows that by 2025, 1.8 billion people would be living in countries or regions with absolute drinking water scarcity.

THE PROBLEM OF WATER

Every summer bears down heavily on India and most of its 1.3 billion citizens. As predictable as the rising temperatures are the water woes in much of the country. In rural areas especially, women often trudge many miles to fetch clean water for drinking and other domestic purposes. While walking to the water source during dark, cold mornings, they might step on snakes and scorpions, and some could even lose their lives to venomous bites.

For many, their fingers become twisted because of fluorosis, an abnormal condition caused by the excessive intake of fluoride from water. In fact, contamination of available groundwater with various chemicals, minerals, and other pollutants makes accessing clean drinking water in thousands of Indian villages daunting. It is estimated that more than 62 million people from 177 districts in 21 states across India consume excessive fluoride from their water supply. Other water contaminants include nitrates, arsenic, and other heavy metals.

Lack of access to quality drinking water also takes an economic toll. Time spent on fetching water or waiting for water to be released by government sources means less time spent on livelihoods and income-generating activities. Children may be pulled out of school so that they can help fetch water. The health and well-being of women and children are also at peril due to the long distances travelled to fetch water when there is poor access.⁵



There are four parameters of critical importance with respect to groundwater for drinking: availability and accessibility, quality, and affordability.

Reliance on groundwater

More than 60 percent of India's irrigated farms and 85 percent of drinking water supplies are dependent on groundwater.⁶ Of the available groundwater, it is estimated that more than 90 percent is used for agriculture, and only the remainder is available for drinking and domestic use.

There are four parameters of critical importance with respect to groundwater for drinking: availability and accessibility, quality, and affordability.

Availability and accessibility

Severe depletion of aquifer levels, overdrawn of water due to irrigation and domestic needs, climate change, low rainfall, and drought in many areas of the country have reduced the volume of water available for drinking and domestic use.

Water quality

Even when there is availability of water and access is reasonably good, the quality of water may be highly compromised. Groundwater contamination could be due to the discharge of toxic effluents, salinity, pollutants like fertilisers and pesticides, and discharge of untreated sewage. The presence of arsenic, nitrates, and excess fluoride can also lead to highly toxic and unpotable water. In India, high concentrations of fluoride, nitrate, and arsenic in the water contribute to many health hazards, including fluorosis, weak bones and teeth, anaemia, and even death in several cases.⁷ Consuming contaminated water can lead to short-term waterborne illnesses like cholera and gastroenteritis, and chronic and irreversible musculoskeletal disorders (seen in areas with fluoride levels of higher than 3 mg/L in water for example).⁸

Affordability

The urban-rural divide, where about 65 percent of India's population reside in rural areas, poses the affordability problem: only 10 percent of rural Indian residents have the financial means to buy water from commercial vendors, and the rest, who cannot afford to do so, consume unclean and unsafe water.⁹

One solution for procuring drinkable water is through the open market where purified water is sold in bottles and cans. The market is replete with many companies that sell bottled water. However, from a development perspective, it is known that buying water at market rates is a huge burden for much of India's population, especially in the

rural areas.¹⁰ Buying water is a recurring expense, and where water distress already leads to economic distress, buying water for daily consumption is an added burden. The average daily income of a farmer in India is about INR 70 (US\$0.92) per day,¹¹ so a bottle of drinking water costing INR 20 (US\$0.26) per litre is just not affordable.

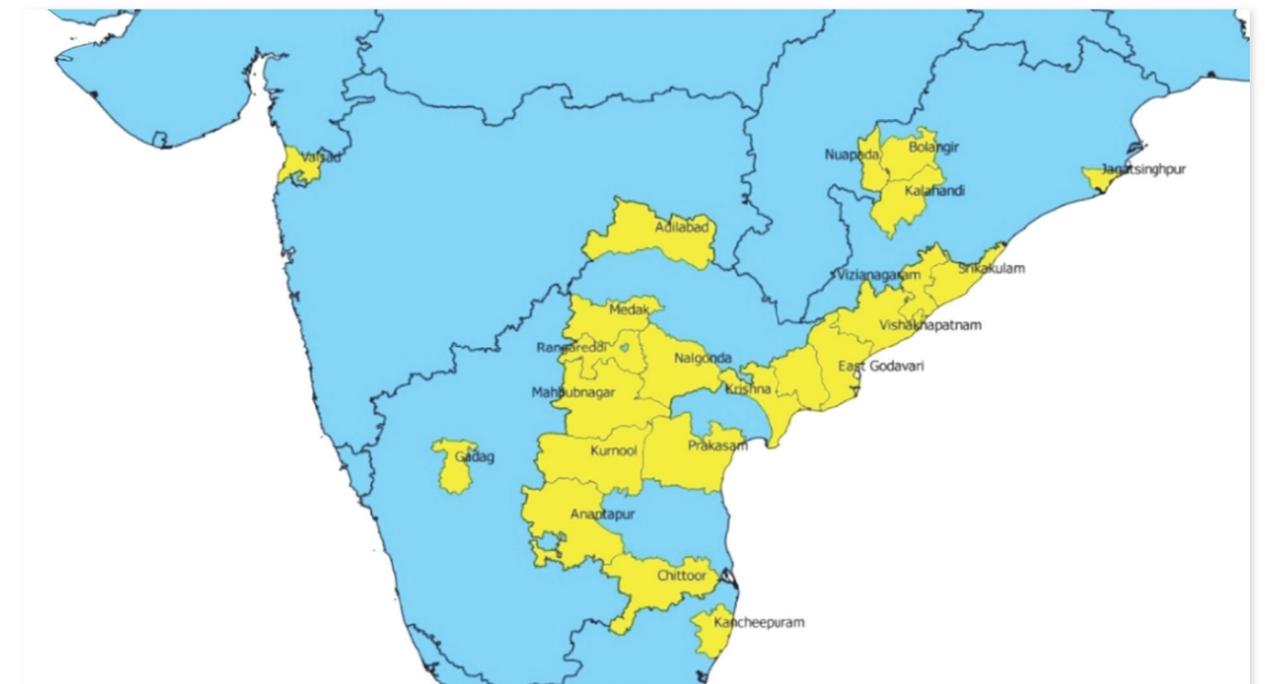
THE SRI SATHYA SAI NATIONAL DRINKING WATER MISSION

In view of the challenges that rural citizens face in obtaining clean and safe water, the Sri Sathya Sai National Drinking Water Mission attempted to provide an innovative and impactful solution that addressed all four parameters mentioned above. Between 2006 and 2020, the Mission installed 108 water purification systems in villages spanning six Indian states—Andhra Pradesh, Telangana, Odisha, Tamil Nadu, Karnataka, and Gujarat (refer to Figure 1).

Over a 15-year period, the Mission enabled an uninterrupted supply of pure drinking water to over 40,000 families (more than 200,000 direct beneficiaries) in areas of chronic water distress. Most of the installations were in the states of Andhra Pradesh (68) and Telangana (24), where fluoride contamination of drinking water is high, leading to severe health issues.

The design, planning, and implementation of the systems were carried out by the Technology Group of Sri Sathya Sai Seva Organisations, a public service ecosystem with a volunteer base of 600,000 people across 25 states and union territories of India, and which was supported by Sri Sathya Sai Central Trust, a public charitable trust headquartered in Andhra Pradesh.¹² Based on extensive research, the Technology Group concluded that a Reverse Osmosis (RO) system was more efficient in reducing water toxins to the desired levels. Retaining essential minerals during the

LOCATION OF WATER PURIFICATION PLANTS



6
States

22
Districts

108
Villages

Over
40,000
Households

Over
200,000
Users

FIGURE 1

Source: Technology Group of Sri Sathya Sai Seva Organisations

process could be done by controlling feed pressures and flow rates, so the RO system was adopted in the 108 installations.

The RO water purification systems were designed to cater to the daily needs of nearly 2,000 residents. This involved purifying water at the rate of 1,000 litres per hour, resulting in 10,000 litres of pure drinking water per day (at five litres per person). It was assumed that electricity would be available for 10 hours per day to run the plant. The plant and equipment, including electrical and civil works, cost about INR 500,000 (US\$6,617). Maintenance costs amounted to approximately INR 450 (US\$5.95) per day, and included the operator's salary, electricity charges, and the replacement cost of cartridges, membranes and other equipment used in the system.¹³

The design of the water purification system was such that it ensured that the plant was self-sustainable. The original model proposed by the Technology Group involved giving each household in the village that opted to use water from the purification plant a membership card and a container. The membership card could be topped up each month for INR 60 (US\$0.80). This amount would provide beneficiaries with 20 litres of water per day for a nominal cost of INR 2 (US\$0.03). This was 1/200th of the price of the existing commercial drinking water available in the market. If 80 percent of the village signed up for the service, the system would generate enough resources to pay for the costs of running the plant, and the rest of the money could go into a welfare fund to serve the needy in the village when required.

POSITIVE IMPACT OF THE WATER MISSION

Studies by eminent multilateral agencies in the water sector are replete with data on coping costs—where citizens incur costs to cope with inadequate and unclean water. Coping costs can be direct, such as the money spent to buy water or install borewells and water tanks; or indirect, such as time spent to fetch water, and loss of wages due to ill health or caregiving.

Direct gains

Based on wage data for the region, cost of water, and healthcare expenses, if purified drinking water was not available through the water purification plant, the coping costs incurred by members of the 40,000 households in 108 villages would add up to the tune of INR 490 million (US\$6.5 million) annually! For a one-time investment of INR 54 million (US\$714,071) by Sri Sathya Sai Organisations,

the villagers could avoid incurring losses of INR 490 million (US\$6.48 million) annually. A whopping 77 percent of these coping costs were due to potential losses in women's wages on account of waterborne illnesses and workdays lost due to water-fetching duties. If they could be avoided, it would be a phenomenal boost for the socio-economic empowerment of women in these villages. The other savings included men's loss of wages due to waterborne illnesses, household healthcare costs, and the cost of buying water. To avail itself of all these benefits, each household paid just INR 720 (US\$10) per year. Over the 15-year life cycle of the 108 water purification systems, the coping costs averted were INR 7.38 billion (US\$100 million).

Indirect gains

The indirect gains experienced by the households in the 108 villages have been much more than monetary in nature. For example, the time gained due to fewer sick days for the entire household and the savings in caregiving days and workdays together add up to nearly 100 days each year for the household members to engage in other activities—be they economic, social, physical, or religious. Venkateshwarlu, Village Head of Bahadoorpet in Telangana, shared his experience, “The government paramedical staff that used to visit this village every week for treating patients now come once in three months. Such is the positive impact of the water from this plant on villagers' health.”

In another example, after her village was covered by the Mission, Subbamma could tap the water facility for drinking and cooking. Within six months, her fingers and joints, which had become twisted because of fluorosis, became normal, and she was able to milk her cows without any problem and earn her livelihood. Women like her could spend more time on family, leisure, skills-building, learning and other productive activities. Even children benefitted as they could spend more time playing and learning. Keshav Patra, Village Head of Pradhangiri in Odisha, observed, “Since the plant installation, 400 school children benefitting from this purified water no longer suffer from ailments like frequent colds, stomach aches and headaches.”

THREE KEY TAKEAWAYS

The system implemented by Sri Sathya Sai Organisations was a welcome social innovation. We highlight three key takeaways from this model that may be applicable to other infrastructural projects in other developing economies.

Beyond covering operations and maintenance costs, there was a surplus that could be used to fund local village welfare activities.

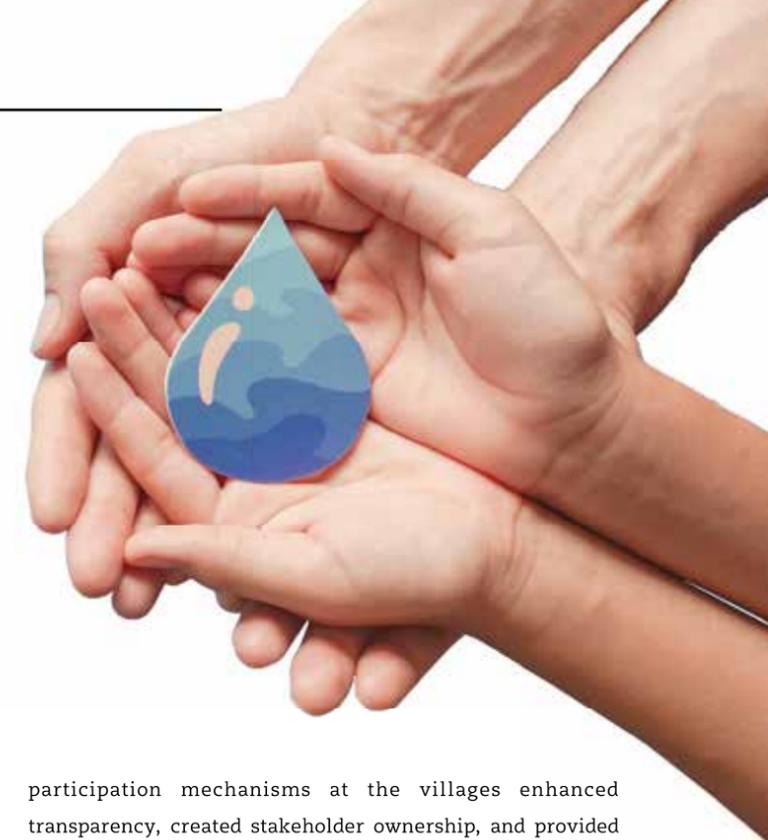
1. Treat community development as project outcome

Unlike commercial firms that sell water as a market commodity in villages, the project model presented here demonstrated the possibility of providing clean and safe drinking water at an affordable price, where the intent is to cover only the cost of operations and maintenance. Beyond providing safe, purified drinking water at a nominal cost, the project also puts in place a revenue model that benefits community development by design.

Another facet of community development that the project presents is the multiplier effect. With the successful deployment of water purification plants, the project sought further buy-in from village residents to bolster their confidence for the better welfare of villages. With community participation going hand in hand with community development, the project presents a non-linear bouquet of benefits. Beyond covering operations and maintenance costs, there was a surplus that could be used to fund local village welfare activities. The Technology Group reported that in some villages, the welfare fund had accumulated nearly a million rupees (US\$13,224) over a decade. For example, the Borivelli village in the Kurnool District of Andhra Pradesh, where the water purification system was installed in 2009, accumulated a fund of INR 800,000 (US\$10,579) by 2020, which was being used for the welfare of the most deprived sections of the village. At Chelluru, a village in the Nalgonda District of Telangana, the INR 400,000 (US\$5,288)-fund accumulated through the water system-related savings was used for children's education, senior citizens' medical needs, and food supplies for the destitute. Bahadurpet, another village in Telangana, used welfare funds generated from the water purification project to construct a primary school and a healthcare clinic.

2. Incorporate community participation into decision-making

A critical success factor is ensuring that the local community is involved in the decision-making process for the water project implementation. The decentralised and community



participation mechanisms at the villages enhanced transparency, created stakeholder ownership, and provided operational sustainability, i.e., sustained self-managed water resource systems. Furthermore, the model improved the implementation process as the village residents could provide more timely and candid feedback.

The project model is novel as it offers a management structure to ensure the continued functioning of plants in the long run. In each of the villages, the Technology Group helped to set up a village committee solely responsible for the operation, maintenance, and financial record-keeping of the water purification system. Srinivasulu Huggahalli, Head of the Technology Group, suggested, “The village committee should represent the diversity in terms of the gender and age of the village residents.” As a result, a typical village committee comprised two men, two women and youth members, chosen by the villagers themselves. A bank account was opened with the village committee's name, and a person from the village was employed to take care of the plant's complete operations on a daily basis.

Once a plant was installed by the Technology Group and declared functional, the Group ceased to have a role in the system's operation and maintenance, so the village committee was fully empowered. The Technology Group also conducted periodic audits to ensure that the water purification systems were fully functional.

3. Make the system self-sustaining

A valuable insight shared by the Mission's founder, Sri Sathya Sai Baba, with the Technology Group, is that a broader solution is needed to avoid the build-neglect-rebuild

trap of social projects. He said, "First, we should use the water purification project for broader rural welfare. For this, the net revenues that result from the pricing of INR 0.10 (US\$0.001) per litre should be used for rural welfare. Second, village residents should be considered as key stakeholders with ownership, and not merely as beneficiaries, at every stage of the project. This would enable operational sustainability and long-lasting social impact."

The novelty of the design encompasses both operational and financial sustainability dimensions, especially in response to the concern of 'build and neglect' by the World Bank. The self-sustaining and self-funding nature of the business model resulted in the smooth running of the water purification systems, as funds to pay the electricity bills, spare parts, and operator salaries were available from the user fee deposits. No external funding was required to keep the plants running. Villagers were also aware that the user fees were important to keep the plant operational.

Sustained management thus involved complete buy-in from the community, management by users and multiple stakeholders through a village committee, and a self-sustaining financial model. On June 24, 2020, the United Nations Economic and Social Council recognised the sustained management model and consequently granted special status to Sri Sathya Sai Central Trust for its exceptional humanitarian work.

CONCLUSION

The shortage of drinking water is an enduring challenge that will only become more acute as the world population explodes. Shrinking and polluted waterbodies, and the fast-depleting groundwater situation in most agri-based economies like India, coupled with a burgeoning rise in the global population by nearly 30 percent over the next 25 years, present a gloomy picture for the planet and its residents. This is because water is the very life force for human beings and the larger socio-economic ecosystem, as it is vital for good health and community well-being.

In this context, it can be said that the self-sustaining model of water purification systems set up by the Water Mission in 108 villages is replicable and could be scaled up in many more villages within India. The lessons gained through this impactful initiative over nearly one-and-a-half decade are insightful and could serve as a useful model for other water-stressed developing economies in Asia that are facing similar problems. Its social innovation model for community development and participation, as well as its

self-sustaining system, can also serve as a resource for implementing infrastructural projects with positive societal outcomes in rural regions.

The key takeaways are applicable to managers and development sector practitioners working on sustainability initiatives, government and non-government organisations, and policymakers to install a self-sustaining social system that could not only serve its purpose of enabling a solution for the communities in the short run (a water purification system in this case), but also create a platform to promote long-term community participation. ^{AM}

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EXECUTIVE DEVELOPMENT

Sustainable People Practices for Organisational Effectiveness

Leveraging the Competitive Advantage in Organisations

18-20 JULY 2022

Overview

People are the most valuable assets for any organisation. In a knowledge and service based economy like today, organisational human capital has been increasingly recognized as one of the major keys to competitive advantage.

In light of the 2020 pandemic, this has forced businesses to reset priorities and develop new operating models thrusting efficient and caring people practices again into the spotlight. This requires HR and Business Leaders to be agile and adapt their policies to the changing times. As norms continue to evolve, it is imperative to adopt a people-first mindset that prioritizes purpose, empathy, resilience, and tech enabled solutions. This programme of 3 days for senior HR and Business leaders will facilitate a strong network for the participants to learn best practices in the region and adopt these practices in their organisations.

Programme Highlights

1

EXPERIENTIAL
LEARNING

2

MULTIPLE
PERSPECTIVES

3

INTERFACE OF HR
AND TECHNOLOGY

4

SIMULATION
AND LIVE CASES

Who Should Attend

This programme is designed for seasoned and experienced HR leader with responsibilities for leading a HR function, designing and developing HR policies and programmes, and providing day-to-day guidance for HR service delivery. Consultants at an equivalent experience level whose work is directly relevant to HR are also eligible.

Visit our website to find out more!

<https://exd.smu.edu.sg/public-programmes/sustainable-people-practices-organisational-effectiveness>

For more information, please contact **Stephen Li** at +65 68261317 or via email, stephenli@smu.edu.sg

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A man in a light-colored shirt and dark pants stands on a small, dark, rocky island in the middle of a vast, blue ocean. He is holding binoculars to his eyes, looking towards the horizon. Below the water's surface, a large whale is swimming, its head and part of its body visible. The sky is a clear, light blue. The overall scene is serene and evokes a sense of exploration and discovery.

External Asset Managers

in

Singapore

Opportunities and challenges for the sector.

by **T. Mandy Tham, Esther Kong and Juliana Koh**

There has been a tremendous growth in individual wealth in the Asia-Pacific region over the past two to three decades. Singapore, with its strong standing as a financial hub, as well as its political stability and pro-business policies, has been a natural candidate to benefit from this growth. As the country pivots to the next phase of wealth management focusing on the ultra-rich, an ecosystem is fast evolving to support the growth of family offices on the island. In fact, Singapore has set its eyes on being a family office hub on the global stage and is rapidly gaining credibility as one. This trend has led to the symbiotic growth of the external asset manager (EAM) industry here.

Against this backdrop, Business Families Institute at Singapore Management University (BFI@SMU) conducted research that focuses uniquely on the perceived growth factors, challenges, and opportunities for the EAM sector in Singapore. It published the research report, which adopted a survey methodology, in January 2022. The questionnaire was launched online and collected a total of 41 responses between March and July 2021. Survey respondents ranged from senior executives to managers. They represented mainly the EAMs, fund management firms, and family offices. To add insights to and verify the survey findings, researchers followed up with exclusive one-on-one interviews with members of the Association of Independent Wealth Managers (AIWM), EAM representatives, and veterans managing the financial intermediaries at various custodian banks in Singapore. This article includes curated key insights from the research report,¹ as well as inputs from case studies written on the EAM business².

Singapore has set its eyes on being a family office hub on the global stage.

THE EAM BUSINESS MODEL

The EAM business relies on a unique business model that is different from the traditional private wealth management model. Typically, when a high-net-worth client opens an investment account with a bank, the bank's in-house investment professionals would manage the account. However, with the EAM model, an external party manages the investments, while the bank services the account. The EAM offers investment advisory, discretionary portfolio management, tax, and succession planning services, as well as advice to the custodian bank where the client opens the account. The client then appoints the EAM to manage the assets with the custodian bank based on a Limited Power of Attorney (LPOA) over the account. The model thus creates a tripartite relationship among the client, the custodian bank, and the EAM (refer to Figure 1).

The EAM revenue model

EAMs generate revenue through retrocession, management, and performance fees. Retrocession fees are commissions the EAM receives from the bank as an incentive to choose that bank for its clients. They are the easiest to generate.

EAMs generate revenue through retrocession, management, and performance fees.

Custodian banks also offer a rebate on a portion of their service fees to EAMs depending on the volume of trade executed for the clients. Some regulators require EAMs to disclose the retrocessions to their clients, while others may leave it to the EAM to volunteer the information.³ EAMs may also decide to pass a portion of their retrocessions to their clients to reduce the net fees incurred by the client.

Some EAMs charge management fees for handling client portfolios. This is exacted annually, based on a discretionary mandate. The third revenue source is the performance fee, which is paid by the client based on the pre-agreed performance benchmark with the EAM. All three revenue models can be concurrently adopted by an EAM.

THE EAM TRIANGLE BUSINESS MODEL

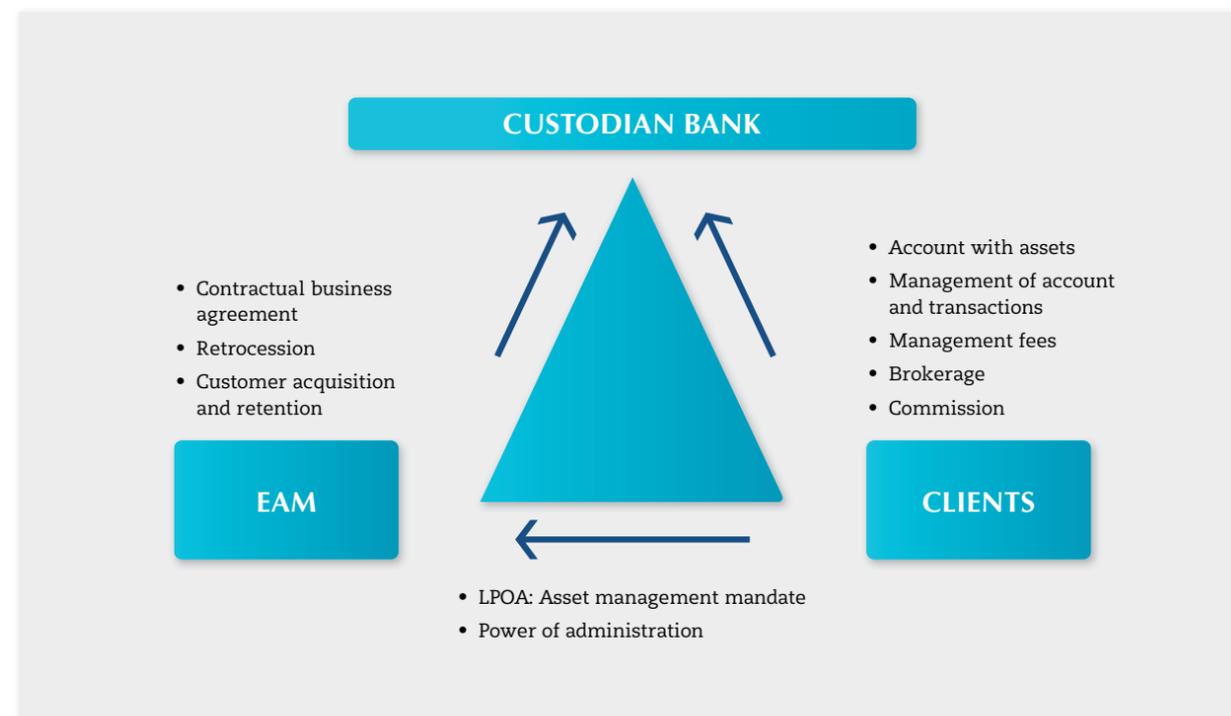


FIGURE 1

Source: Authors

GROWTH FACTORS FOR EAMS IN SINGAPORE

In our survey on EAMs in Singapore, we tried to assess the perceived growth drivers of the industry over the next five years and discovered that these come from mainly three sources: (1) the value proposition offered by the EAM, (2) the value proposition offered by Singapore for the business, and (3) support from regulatory and government authorities.

(1) Value proposition of the EAM

The primary value proposition that EAMs offer is a concentrated focus on building a long-term relationship with high-net-worth clients. EAMs do not face short-term revenue targets or the pressure of selling in-house products and are able to deliver long-term client-focused investment and wealth advisory solutions. They benefit from developing strong relationships with clients because of the independent and professional investment advice they offer.

The second value proposition stems from the gradual acceptance of the EAM model by clients. As the EAM sector matures, clients gain greater awareness and trust, and become more open to granting an LPOA to an EAM. Creating awareness continues to be an ongoing effort by the EAM industry.

The third value proposition is the EAM's ability to provide customised solutions to satisfy client needs. As independent advisors, EAMs can act as prime brokers and offer open architecture to clients. This means they can collaborate with many custodian banks, thereby gaining access to different capital markets, investment products, and solutions offered by their panel of partner banks. The wins come from the EAM's offering of bespoke investment management services for clients, owing to the open architecture nature of the EAM business.

The primary value proposition that EAMs offer is a concentrated focus on building a long-term relationship with high-net-worth clients.

(2) Value proposition of Singapore

Singapore is well-recognised as a reputable financial and fintech hub. The island hosts top global banks and boasts of reputable local banks. Global asset managers such as BlackRock, Nomura, and Franklin Templeton have a physical presence in the city. Hence, investors are able to source for depth and breadth of investment, banking, and wealth management solutions in Singapore through the myriad of financial institutions present. As a fintech hub, Singapore further provides high-net-worth investors with private investment opportunities in the start-up space.

Another key value proposition is the growth of Singapore as a family office hub. A family office is a dedicated private company set up to manage the wealth of an ultra-high-net-worth family. Family offices generally desire a wide range of investment offerings, as well as value-add and flexibility in their selection of investment partners. The EAMs provide an alternative to the private banks, and more than 80 percent of our respondents believed they add value to family offices through high-quality client relationship management and engagement, while 56 percent also highlighted their expertise to advise on intergenerational succession planning.

(3) Support from Singapore authorities

The Singapore government has made concerted efforts to develop the country into a credible family office hub. The majority of our survey respondents were aware of support such as grants and regulatory compliance, as well as support for digital platform know-how and grants from the Singapore government for EAMs to develop their digital wealth management capabilities. AIWM, a self-regulatory body which represents about 70 members from the EAM ecosystem, actively engages in dialogue with the Monetary Authority of Singapore (MAS) based on the needs of the EAM sector.

In addition, Singapore has also passed legislation on the Variable Capital Company (VCC) framework to spur the growth of family offices, which would drive the symbiotic growth of the EAM sector. Launched on January 15, 2020, the VCC is a new corporate entity structure under which several collective investment schemes can be gathered under the umbrella of a single corporate entity. The VCC framework offers operational flexibility, tax exemption, and cost savings to family offices for their fund management. For instance, the VCC structure can be adopted for open-ended or close-ended funds,⁴ as well as various investment strategies

that range from traditional to alternative asset classes⁵ such as private equity. It also allows for distributions to be paid from profits and capital⁶ to the investors. However, a VCC must be managed by a Singapore-based fund manager regulated or licensed by the MAS, as per the VCC legislation. These fund managers are also obligated to use a licensed custodian for the safekeeping of assets.

When an individual manages a fund on a discretionary basis in Singapore, it creates a taxable presence for the fund. However, under sections 13R and 13X of the Singapore Income Tax Act, funds managed by Singapore-based licensed fund managers will enjoy income tax exemption that also extends to VCC funds. As the VCC requires a Singapore-based licensed fund manager such as an EAM to manage its investments, the legislation helps spur the demand for EAMs. Since the launch of the VCC legislation, more than 260 VCC funds have been set up.⁷

CHALLENGES FOR EAMS IN SINGAPORE

There are some known challenges within the EAM industry which, based on our survey response, have been categorised under three areas: (1) operational and productivity challenges, (2) business challenges, and (3) relational challenges.

(1) Operational and productivity challenges

More than 60 percent of our respondents viewed the client onboarding time at custodian banks as time-consuming, and the compliance, legal and operational requirements as costly and difficult for EAMs to satisfy. The issue of the Know Your Client (KYC) requirement illustrates such challenges.⁸ Citing verbatim from a respondent, “There should be uniformity in requirements for all financial institutions and EAMs. Delegation of power on KYC matters should be increased to avoid the EAM and the bank doing the same tasks twice using different criteria.”

Currently, both the EAMs and custodian banks are required to conduct client KYC as per regulation, but often, there is duplication in the workflow. In addition, custodian banks generally uphold KYC standards above those required by the MAS, and EAMs must work with varying levels of stringency in KYC standards across their panel of custodian banks. One solution is for custodian banks to share their KYC standards with the EAMs and work collaboratively with the latter to reduce duplication of work. Based on our interviews with selected custodian banks, we found that many banks have already done so and intend to strengthen their engagement with the EAMs in the future.

More than 70 percent of respondents expected regulations such as technology risk management, KYC, and licensing to be tightened over the next five years. The heartening news is that, similarly, more than 70 percent believed that there would be greater support from the MAS to help the EAMs navigate the changing regulatory landscape.

Another challenge shared by almost half of our respondents was the lack of a robust end-to-end digitalised client data management system from custodian banks to handle client accounts. Digitalisation would also be a powerful enabler for an effective and efficient regulatory compliance process for the EAMs. As one respondent pointed out, “There should be some consolidation of portfolios and establishment of minimum digital standards that private banks need to meet, or for banks to set up standardised APIs (Application Programming Interfaces) for data sharing with the EAMs.”

On an encouraging note, custodian banks are increasingly setting up dedicated EAM desks to provide specialised services and investing in human capital and digital systems to support the EAMs. For example, the dedicated EAM desks would be staffed by a skilled team that understands the workflow of the EAM business, and are supported by a digital platform that provides the EAMs with pricing, execution, and monitoring in real-time. The EAM business is scalable and hence profitable for custodian banks. Both parties would benefit from working collaboratively in addressing these operational and productivity challenges.

(2) Business challenges

More than one-third of our survey participants ranked the following business challenges as their top three concerns: competition for talent from banks, fulfilling risk controls required as part of the overall technology risk management, and unwillingness of banks and brokers to consider the EAMs as wholesale clients deserving of institutional pricing.

More than 70 percent of respondents expected regulations such as technology risk management, KYC, and licensing to be tightened over the next five years.

Universities, through degree and diploma-granting programmes, can work collaboratively with the industry to build a pipeline of talent for the wealth management industry, including the EAM sector.



Indeed, the issue of talent attraction and retention is a challenge for the EAM sector, as it must compete with banks that have deep pockets for senior wealth professionals, and within the sector. The private banking industry in Singapore is maturing, and there is a greater supply of senior private bankers and investment professionals for the EAM sector to recruit from. However, being a salaried employee in a well-structured bank and enjoying the support from teams of specialists (e.g., product specialists, risk specialists, compliance and legal team, portfolio management, and research team) is very different from fulfilling almost all aspects of the job by oneself in a much smaller scale EAM set-up. The right candidate must have an entrepreneurial mindset and the skill set to be successful in the EAM business. Hence, the EAMs compete for talents with established banks, not just based on compensation and seniority, but also the right fit for the business.

This segment of talent is in demand both locally and globally. Organic talent development within the EAM sector could be a solution to this talent crunch. Universities, through degree and diploma-granting programmes, can also work collaboratively with the industry to build a pipeline of talent for the wealth management industry, including the EAM sector.

As for the second challenge, the AIWM regularly conducts educational programmes, and provides support for its

members on regulatory and risk control matters. It also engages the MAS in dialogue on such challenges facing the EAM sector.

For the last challenge, some EAMs are considering forming an alliance to increase their collective bargaining power in negotiating for institutional pricing with banks. In this business, pricing is a function of the quantity of trades, not unlike other non-financial wholesale businesses. As the quantity of trades increases, the buyer gains bargaining power to negotiate for greater discounts from the seller. Hence, an EAM with assets under management (AUM) in excess of \$1 billion would execute more trades with the custodian banks than an EAM with an AUM of \$200 million. The former would be able to enjoy more preferential pricing than the latter. As the average EAM outfit gains in size and hence, bargaining power over time, it will be a natural progression for the EAM sector to enjoy wholesale pricing from private and investment banks.

(3) Relational challenges

Relational challenges are defined as concerns impacting the EAMs' relationship with the end-clients. Top on the list are two challenges related to the support from custodian banks: client satisfaction is influenced to some degree by the custodian bank's service level, and the custodian banks' effectiveness in serving the EAM community can be improved.

NIO's Battery-as-a-Service Strategy



A game changer in the EV industry?

by Shantanu Bhattacharya and Lipika Bhattacharya

"Buying is a profound pleasure" commented Simone de Beauvoir, the noted existentialist author, on the salutary effects of material acquisitions on the human psyche.¹ While these words were spoken more than half a century ago, the impact of acquisitions on consumer utility remains relevant, but with a caveat. Deloitte research notes that while consumers have the same adrenaline rush from material acquisitions, the methods of acquisition have changed; over the last two decades, consumers have been reducing their purchase of physical goods as a percentage of their total household expenditure, and instead, spending more on services and experiences.² Is this change in consumer preferences permanent or transient? NIO CEO and founder William Li was likely betting that the change in consumer preferences was indeed permanent.

Founded in 2014, NIO was one of the strongest competitors of Tesla in the electric vehicle (EV) market in China. Although all of the firm's sales came from China, it had expanded globally in September 2021 by setting up a dealership store in Norway and teams in the US and Europe.^{3,4} Many investors

and stock analysts in the market were closely watching NIO to see if it could mirror the path Tesla had taken to become a strong global competitor. Although Tesla was the clear leader across all markets in the EV sector, the competition was intense and NIO had launched battery-as-a-service (BaaS) as its unique selling point to attract consumers and compete against its rivals.

While governments around the world had introduced incentives to support the diffusion of EVs, fossil fuel-based vehicles continued to dominate the automobile market. Range anxiety and long battery charging time were the twin pain points of consumers preventing EV adoption, and market players had implemented different strategies to address them. Although the battery swapping model was not new, and had been tried and abandoned by Tesla earlier, NIO packaged it differently with a BaaS offering to resolve the diffusion hurdles. NIO's primary aim of using BaaS was to reduce product price, make its EVs more attractive to its consumers, and sell more of them quickly. Tesla, on the other hand, had launched a supercharger network to address the two hurdles.

Despite its promise, NIO's BaaS strategy entailed a few shortcomings. Battery swapping was an expensive model, as it involved the construction of swapping stations, deployment of automated technology, maintenance of battery stocks, and collection of batteries at stations. Besides, battery technology had started to advance and batteries could last longer in terms of distance travelled based on a single charge, reducing the need for frequent recharging at swapping stations. Given this scenario, was NIO's BaaS venture a sustainable business model? Could it provide NIO with a strong competitive advantage?

DIFFUSION OF THE EV

While EVs had been around for decades, it was only in the early 2000s that governments and automakers started promoting them as a key technology to curb oil use and fight climate change.⁵ Subsequently, demand for EVs started to grow, and research reports predicted that the sale of EVs would overtake the sale of fossil fuel-based cars by 2035.⁶ Governments had started to increasingly promote EVs through subsidies, fuel taxes, and tighter environmental regulations. At the same time, the unit cost of manufacturing EVs and batteries was expected to fall significantly by 2027 due to advancements in technology.⁷

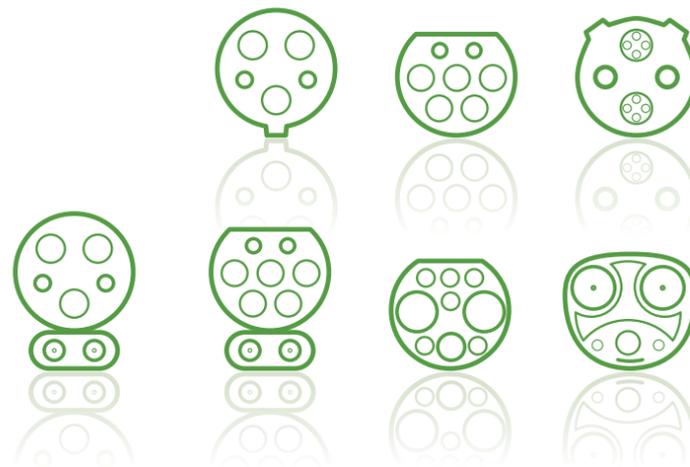
Despite the advancements, the diffusion of EVs had been persistently slow. The consensus was that this was due to the twin hurdles of range anxiety and long battery charging time. Without them, EVs would have been jostling for pole position much earlier. The significance of these hurdles was easier to understand by delving into the consumer psyche. For example, if consumers went for a long drive and were not sure that they could reach the next charging station with

their current charge, they would be hesitant to adopt EVs. Similarly, if battery recharging took a long time, it could significantly lower the utility from the journey. Hence, the need to alleviate these two hurdles using a mix of technologies and new business models was imperative for EVs to become the dominant mode of transportation in the future.⁸

Assessing the diffusion of fossil fuel-based vehicles helps throw more light on some additional factors. Fossil fuel-based vehicles faced slow adoption in the beginning as the complementary infrastructure, such as refuelling stations, the highway network, rest stations, restaurants, and facilities, took a long time to develop. Once the complementary infrastructure was in place, the diffusion of fossil fuel-based vehicles began to burgeon.

To tackle the EV diffusion problem, firms like Tesla and Better Place had also experimented with the battery swapping model. While Tesla had made significant inroads into the Chinese market, its primary market was still the US, where the lack of customer density meant that Tesla needed to set up a very large number of stations for customers to have easy access to battery swapping. The cost versus revenue possibilities from the battery swapping model for its key market had motivated Tesla to drop the strategy (Better Place too discarded this model eventually). In 2019, Tesla introduced Tesla V3 superchargers, which were much cheaper to install than battery swapping stations, to counter the battery charging time and range anxiety problem: the superchargers could reduce the battery charging time to under two hours, and a dense supercharger network could also alleviate the range anxiety problem.⁹

NIO started offering subscription plans for its batteries in early 2020, enabling consumers to buy its vehicles without the battery.



PRICE COMPARISON OF NIO MODELS WITH BAAS

NIO Model	ES8 (7-seater SUV)	EC6 (5-seater SUV)	ES6 (5-seater SUV)
Battery Specifications	70-100kWh	70-100kWh	70-100kWh
Manufacturer's Suggested Retail Price (MSRP)	US\$73,389 to US\$82,484	US\$57,736 to US\$66,836	US\$56,167 to US\$65,267
Post-Subsidy Price	US\$70,884 to US\$79,701	US\$55,194 to US\$64,012	US\$53,626 to US\$62,443
Price with BaaS	US\$59,901 to US\$59,619	US\$44,212 to US\$43,930	US\$42,643 to US\$42,361

TABLE 1

Source: NIO

NIO'S BAAS STRATEGY

NIO realised early in its business that batteries could add significant costs to EVs, which were competing against traditional fuel-run cars in the market. Removing the cost of the battery from the product and making it more affordable, accessible, and reusable was also necessary for realising the Chinese government's ambition of controlling pollution from fuel-based vehicles by having one in five vehicles powered by non-fossil/non-fuels by 2025.¹⁰ To this end, China launched a support scheme for EV manufacturing companies in 2020 to promote the setting up of swapping stations to lure more consumers to buy EVs.¹¹

Although NIO had home charging solutions for its batteries, very few homes in China had the infrastructure to support the installation of home charging points, as the majority of its EV consumers were from large cities and lived in high-rise condominiums. The infrastructure considerations, diffusion hurdles, government support schemes, and price challenge had acted as key motivations for NIO to establish its swapping station network and offer BaaS services.¹²

NIO started offering subscription plans for its batteries in early 2020, enabling consumers to buy its vehicles without the battery. Removing the battery reduced the purchase price of NIO vehicles by US\$10,834.¹³ Under the subscription plan, buyers paid a monthly fee of US\$152 to lease a battery and could use free charging and swapping services as part of the subscription.¹⁴ By 2021, NIO had executed more than two million swaps, and converted almost 40 percent of its consumer base to BaaS.¹⁵

The BaaS services were offered through a mobile-based solution that connected the entire network of battery swapping facilities. The swapping process was fully automatic: the car was driven into the station where it would be serviced by a car lift battery replacement system that replaced the batteries automatically. A cloud-based battery management system inspected every battery pack removed from a vehicle for

electrical performance before recharging it for the next user. If a fault was identified, the battery would be taken out of circulation and sent for repairs.¹⁶ In terms of footprint, NIO swapping stations were as large as three parking spaces, making them convenient to install in parking facilities and even crowded public places.¹⁷ By 2021, NIO had installed 301 battery swapping stations across China, with plans to expand to 3,000 swapping stations globally by 2025.

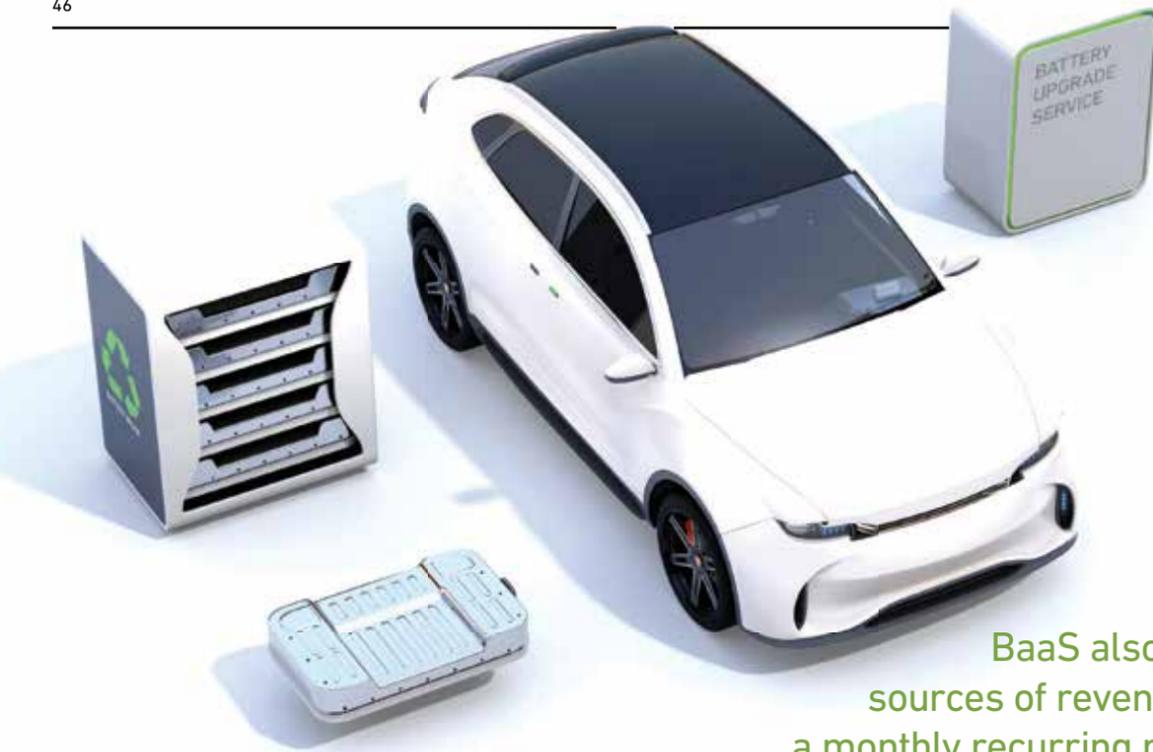
BENEFITS OF NIO'S BAAS SERVICE

NIO's bet on BaaS hinged on several key factors and accorded merit in terms of feasibility, profitability, and growth prospects for the company. Firstly, the battery swaps at the stations were fast. On average, it took three to five minutes to replace the existing battery in the vehicle with a fully charged battery, compared to 75 minutes for a full charge at a supercharger.¹⁸

Secondly, the battery swaps were also slightly cheaper than other battery alternatives for EVs. NIO's service offered six swaps a month for its monthly subscription price, which provided about 1,500 miles of range. This amounted to US\$0.10 per mile, which was slightly lower than the estimated US\$0.104 per mile cost for using Tesla superchargers.¹⁹

Thirdly, swapping batteries also motivated NIO customers to opt for battery upgrades when a more advanced battery pack was available, which helped preserve the car's performance and resale value, and mitigated broader concerns of battery degradation. To ensure that new batteries could fit with old cars, NIO standardised its battery sizes, thereby enabling its batteries to become a replaceable module in the broader construction of the vehicle.

Fourthly, batteries were an important consideration in the EV market; the market dominance of an EV producer was correlated with who could build the best battery technology. NIO's BaaS helped in this respect by allowing the company to invest in battery technology without worrying about replacing older batteries.



BaaS also created two sources of revenue—one from a monthly recurring revenue from battery service subscriptions, and the other from upgrade requests for newly launched batteries.

In terms of feasibility, NIO's BaaS strategy reduced the high capital outlay for batteries for its consumers by reducing the price of the vehicle by a significant amount, and at the same time, helped build a close relationship between the brand and its consumers.²⁰ In terms of profitability, the BaaS model could potentially enable higher sales due to the reduced price. BaaS also created two sources of revenue—one from a monthly recurring revenue from battery service subscriptions, and the other from upgrade requests for newly launched batteries.²¹ With approximately 75,500 NIO EVs on the road as of 2021, analysts estimated that the subscription service generated about US\$4.5 million in monthly recurring revenue or US\$54 million in annual revenue. This revenue was expected to increase further as NIO expanded production, increased subscription penetration among existing consumers, multiplied sales, and grew its network of swap stations.²²

EV AND THE CIRCULAR ECONOMY: THE BATTERY CONSIDERATION

EV sales had increased from 17,000 in 2010 to 2.1 million by 2019 (with China accounting for 47 percent of global sales), and the global EV market was expected to grow to 125 million

vehicles by 2030.²³ Many traditional auto manufacturers had started to focus purely on EV models and halt traditional car manufacturing for the future. For example, General Motors had set a target to stop selling new gasoline-powered cars and light trucks by 2035; Volvo had decided to pivot to a hybrid and all-electric line-up by 2030.^{24,25}

However, while EVs were expected to alleviate pollution from fossil-based transport, many materials used in the batteries were toxic and rare.²⁶ In addition, 250,000 metric tons of EV lithium-ion batteries were expected to reach their end-of-life use by 2025.²⁷ Despite being non-usable for vehicles, these batteries could still retain 70 to 80 percent capacity and potentially be used for other purposes. Finding a second life for disposed batteries was essential to making EVs sustainable, slowing down the resource cycle and improving EVs' contribution to the circular economy.²⁸ Capturing the value left in a product after use was the cornerstone of the circular economy.²⁹

When a battery was offered as-a-service by the manufacturer—NIO in this case—the ownership of the battery was transferred to NIO. By owning the battery, NIO could have 100-percent collection rates of the batteries, assess their quality and disposal

effectively, and allow customers to upgrade to new batteries of the next generation seamlessly. Therefore, the BaaS model was seen as a viable strategy to facilitate the circular economy.³⁰

COULD BAAS REALLY BECOME THE GAME CHANGER?

However, not all analysts believed BaaS to be beneficial. Some opined that while NIO's BaaS and large-scale implementation of swapping stations could provide the company with immediate advantages in the market, it was unlikely to provide much competitive advantage in the long run.³¹ This was primarily because battery technology was evolving rapidly and charging times were predicted to reduce dramatically in the near future.³²

EVs with lithium-ion batteries were expected to give way to vehicles with lithium-iron phosphate batteries and other technologies that could cut costs, extend vehicle ranges to 400 miles or more between charges, and enable batteries to last for as long as a million miles.³³ Moreover, new EV technology could make electric vehicles as cheap as those powered by petrol, and the EV price would no longer pose a cost barrier.³⁴ On a separate note, analysts had also raised concerns over NIO's battery swapping strategies, arguing that setting up battery swapping infrastructure and swapping stations was expensive, hence they had to fulfil the long-term needs of consumers to make business sense.³⁵ However, with battery technology advancing so quickly, it seemed unlikely that swapping stations would remain relevant over the long time horizon.³⁶

Amidst such strategic concerns, would it make more sense for NIO to halt its battery swapping infrastructure and focus on the battery technology itself? Alternatively, could NIO continue to benefit from its BaaS services, and make them its winning strategy? [▶](#)

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DESIGNING SUCCESSFUL STRATEGIC PARTNERSHIPS

The Achilles' heel of digital transformation.

by Anurag Vij

Every industry is experiencing a massive disruption to its traditional business models owing to digitisation, and the COVID-19 pandemic has accelerated this disruption multi-fold. Healthcare, financial services, telecommunications, and transportation have all seen their erstwhile business models uprooted by innovations in telehealth, digital banking, and over-the-top (OTT) services such as WhatsApp, Telegram, and digital ride-hailers. These disruptions have been further amplified by born-in-the-cloud companies ('digital natives') that move at breakneck speeds due to the absence of decades of capital, people, process, and technology legacies that established players have to deal with while trying to digitally transform and compete. To overcome these challenges at speed and with scale, traditional industry leaders have been seeking to partner with global digital leaders.

This would not be the first time that firms are forging strategic partnerships to take advantage of market opportunities that could range from entering new markets to repositioning themselves in existing markets by bringing together core capabilities, intermediaries, and supply chains. Yet, an estimated 40 percent of these partnerships fail.¹ As businesses, governments, and communities across the globe rapidly pursue their digital evolution, such strategic partnerships remain an elusive means to achieving success.

What exactly are these strategic partnerships in the digital realm (or 'digital evolution partnerships' as termed in this discussion)? How are different organisations approaching them? And what are the different outcomes they have in mind? Do the managers engaging in such partnerships know what drives success? Given that digital transformation spending for 2022 has been forecasted to reach US\$1.8 trillion and is further projected to grow to over US\$2.8 trillion by 2025, these are key questions that need to be addressed.²

DIGITAL EVOLUTION PARTNERSHIPS (DEP)

A DEP is typically an alliance forged between an industry leader and a digital leader. For the former, its aim is often not just to acquire new technologies but to re-engineer its existing business model and innovate future cash flows. A common way for these organisations to start this journey is by introducing new digital technologies within their existing environments and portfolios. This entails moving their legacy IT infrastructure, applications, and business processes to cloud technologies, often termed as 'modernisation' in the digital world. This requires investments in people, process, and technology. Given the complexity of the technical debt, internal processes, and people change management, the underlying projects not only incur significant costs but also carry the risk of failure. Therefore, industry leaders often look for a shared-risk model with their digital partners as they embark on their complex digital transformation journeys. For their part, digital leaders use a range of methodologies to support this expectation, such as discounting their services, making upfront investments in training and headcounts, and entering new go-to-markets.

As businesses, governments, and communities across the globe rapidly pursue their digital evolution, strategic partnerships remain an elusive means to achieving success.

For digital leaders, they benefit from organic growth as industry leaders start using their platform. As the objectives of the partnership mature, and should the breakthrough happen, digital leaders would benefit considerably. The usage of their platform or technology would increase as the resultant product of the partnership gains traction and grows. In the case of a connected-car platform that leverages the cloud for real-time traffic patterns, direction, safety measures, car maintenance, analytics, and such, the more the number of cars sold, the greater the usage of the underlying cloud platform, which in turn would drive inorganic growth for the digital leader. Other than enhancing and building new cash flows, digital leaders also see these partnerships as an opportunity for them to learn about and enter new industries. For instance, a cloud provider's partnership with a bank provides an opportunity for the former to learn the intricacies of the banking industry. This further helps it fine-tune its technology which may eventually even open doors for the provider to enter that industry with a disruptive digital technology.

However, given the unknowns of the legacy environments and the future possibilities, most of these partnerships start off as open-ended co-explorations to seek value creation. Moreover, unlike traditional alliances, DEPs require an open mind regarding the fate of the partnership. An alliance manager of a global organisation put it like this, "In these alliances, you haven't really tied into something very specific early on. It deserves some exploration first... so you start with a kind of cooperation and then see what happens later. Maybe it will lead to a joint venture or maybe it will turn itself off... these [alliances] are a different kind of animal compared to traditional strategic alliances."

We conducted interviews with tens of CXOs who are engaged with such digital partnerships across traditional industries, as well as with digital leaders, and concluded that DEPs encompass the following four key pillars.

Given the unknowns of the legacy environments and the future possibilities, most partnerships start off as open-ended co-explorations to seek value creation.

1. Early-stage strategic partnerships

DEPs start with an intent to co-explore potential opportunities that could be created at the intersection of the industry and digital domains. However, the objectives are unclear in the early stages. Hence, these partnerships could lead to more formal and structured partnerships such as joint ventures and acquisitions, or they may simply fade away if the firms fail to identify a material joint opportunity.

2. Co-exploration at the intersection of industry and digital leaders

As mentioned, industry leaders, with their businesses deeply threatened by digital disruption, are looking to partner with large digital technology players to survive this disruption. In addition to acquiring technology and expertise, they also hope to leverage their industry expertise, combined with digital technologies, to create new markets and find new cash flows. Meanwhile, the digital leaders are hoping to benefit by expanding the market share of their platform and services, with potentially unlimited upsides should the partnership result in a breakthrough. Consider the partnership between Goldman Sachs and Apple to create a new phone-linked credit card, the Apple Card, as an example that has proved to be a win-win for both firms.

3. New cash flows with risk- and revenue-sharing

The key objective of the DEP is to seek new cash flows that emerge at the intersection of the industry and digital domains, such that the partners mutually benefit through risk- and revenue-sharing mechanisms. In the case of a car manufacturer partnering with a digital leader to build a connected-car platform, both parties invest, share the risk, and realise upsides, should they achieve a breakthrough.



4. Open-ended governance mechanisms

DEPs are open-ended in nature, especially in terms of how the partners will achieve the objective of generating new cash flows. They are based more on a risk- and reward-sharing model with open-ended governance structures such as memoranda of understanding (MOUs), rather than stringent underlying contracts like in the case of a joint venture. While this approach injects high levels of uncertainty and unpredictability, it better supports the objectives.

SUCCESS DRIVERS OF DEPS

Alliances, in general, have a high historical record of failure. In the case of DEPs, where the product or the solution does not yet exist at the time of formation of the partnership and the partnership is open-ended, it is highly challenging to have governing mechanisms such as comprehensive legal contracts to provide a thorough coverage of risk factors and related mitigation. Therefore, it is even more critical to develop structured execution frameworks for things like decision-making, conflict resolution, milestone success, and exit criteria during the planning phases of the partnership creation.

Through our research process, we identified seven specific *ex-ante* decision points that are likely to enable managers to address these challenges and increase the chances of success.

1. Involve technical experts early for better alliance fit

Digital partnerships are often formed by chief executive officers (CEOs) or other senior members of the organisations, and are usually supported by a small group of business development teams. However, since these partnerships are technology-focused, it is exceedingly difficult for business development or sales teams to decipher deep technical nuances or undo commitments based on wrong assumptions *ex-post*. Early-stage involvement of technology experts helps the actors determine a better alliance fit from an engineering and technology standpoint by exploring, evaluating, and shaping the 'fit'. Not only would this help the

actors have a better assessment and understanding of the needs to meet the partnership objectives, but it also builds higher levels of confidence in the technical strategy of the partnership. It is worth noting that due to additional cycles required by the technical personnel to do due diligence, such early involvement of technical teams may lengthen the time it takes to close the deal. However, it reduces the time that technical personnel would take post deal-closure to understand the environments, the risk of wrong assumptions made *ex-ante*, and the time and resources required to mitigate these *ex-post*. Overall, it increases the probability of success of the partnership.

A sales director told us, "Executives typically don't understand their technical environments super well and rush for closure. We were given to understand they had the landing zones for cloud, they were already doing agile-based projects, had governance in place, and so on, only for us to discover later that all of that was at best in a sandboxed environment. The question then became who should pay to get the fundamentals in place. None of this was visible or discussed during the alliance formation. If we had taken the time to assess and address these upfront, it would have taken longer to sign but we might still have had a deal."

2. Extend deal team's involvement in alliance life cycle

The deal team consists of the senior executive who leads the deal conceptualisation and formation at the most senior levels, and is supported by others such as sales, finance, procurement, and legal professionals. Typically, the deal team's objective is to close the deal, and at deal-closure, it hands over the engagement to the delivery team and moves on to the next deal. In other words, the goal of the deal team diverges (i.e., pursuing a new deal) from that of the delivery team taking over the execution side of things.

DEPs are open-ended in nature, and are based more on a risk- and reward-sharing model with open-ended governance structures such as memoranda of understanding, rather than stringent underlying contracts.



It is critical to have a defined capped-gain for each party beyond which either the partnership terminates, evolves into other forms of alliances such as a joint venture, or leads to a renegotiation.



3. Align deal team's incentives to ensure alliance success

As the vice president of a deal approval desk commented, "You typically have corporate or business development teams doing the deal. Then they go away making whatever promises and it's someone else's job to make it successful. However, to ensure the success of the deal, I would say, 'Hey, if you did the deal, you need to stick around and run the deal to make sure it's successful after the fact.'"

Longer involvement of the deal team during the life cycle of the partnership helps in preserving the purity of the original commitments and the relationship. As the digital partnership evolves and encounters challenges, the deal team assists in overcoming the challenges involved in leveraging the insights and assets that typically delivery teams do not have knowledge of or access to.

For example, deal teams are privy to deep first-hand insights into the original commitments made by both sides, have relationships at senior levels where the deal was initially conceptualised, and have visibility of future potential multiplexity growth of the partnership between the firms (and, consequently, the related investments available). In contrast, delivery teams that are focused only on the execution of the partnership are usually challenged with a limited understanding of the promises made at the deal formation stages, limited executive-level relationships, and limited insight into the partnership multiplexity potential (and commensurate investment pools).

As a result, deal teams can yield better negotiation power, and assist with better resolutions and faster unlocking of trapped value during execution, as compared to delivery teams that might possibly view the challenges as constraints. Given their open-ended nature, the DEPs continuously evolve and surface additional opportunities. A deal team's ongoing engagement also facilitates faster identification and realisation of such opportunities.

Deal teams are typically incentivised at deal-closure with the size of the incentive tied to the size of the deal at the time of the deal announcement. The larger the deal size, the greater the signalling impact of the deal announcement, and the larger the incentives. Since incentives deepen goal commitment, the more the deal team's incentives are influenced by the size of the deal, the greater would be their focus on crafting and announcing the largest possible deal, rather than the execution details of the partnership. This, in turn, is likely to have an adverse impact on the performance of the partnership.

Consider the experience of the delivery executive of a global consulting firm who said, "The deal team signed this multimillion-dollar contract and threw it over the fence to us. The expectation is to realise the consumption of the deal in three years. It's a joke since none of the fundamentals are in place and by the time we get this done, half the period would have passed already. I can clearly see how we are walking on thin ice here and expect this to blow up in a few months when both teams realise how oversized this whole engagement is... if the deal team still had skin in the game versus collecting their cheques at announcement and moving on, the deal structure and size would be so different..."

Therefore, adjusting the deal teams' incentives to tilt towards post-announcement alliance performance will motivate the deal teams to consider tactical implementation factors appropriately,³ and accordingly structure and size the deal during the deal formation stages. This, in turn, will result in achieving alliance success not just at-announcement but also in post-announcement performance as it is more likely

that the promises can be delivered, bringing the deal teams' success criteria closer to alliance success criteria, i.e., cash flow generation for the actors.

4. Define risk-reward capping during alliance formation

Risk-reward capping refers to the degree to which the partners in a DEP conceptualise and agree on a financial framework that balances the downside and upside financial payoffs for both parties, and also outlines the limits of the same for each party.

For instance, the senior vice president of a global consulting organisation with extensive experience in such alliances noted, "These contracts start very loosely and are normally set up as MOUs. And even as they get more diagrammed, everyone is assuming that success is a given... and will be happy to share the pie in a certain ratio. However, this is where I think they must be clearer from the get-go-in the event of failure, it's about what's in the exit cost and criteria. And wild successes are equally troubling because then you get the sharing problem... so pre-define, as the pie grows, up to what size of the pie they are happy to share and what happens beyond."

Firms can develop the perception of imbalance in losses during the execution, especially as the losses become material and trust starts eroding. Similarly, as the alliance starts delivering success, firms can develop a perception of imbalance in fair-share beyond the initially expected upsides. This contention may not seem obvious amidst the excitement of the DEP formation. Therefore, whilst a progressively successful partnership may have a clearly defined proportion of gains that each party enjoys, it is also critical to have a defined capped-gain for each party beyond which either the partnership terminates, evolves into other forms of alliances such as a joint venture, or requires a renegotiation.

Correspondingly, it is also critical to have a defined stop-loss limit for each party beyond which the actors can decide on a termination or a renegotiation. Hence, a well-defined risk-reward capping during the alliance formation allows for increased predictability of deviation from original expectations and potential conflict for the actors, thereby providing a mechanism to protect their expected cash flow objectives.

5. Establish financial renegotiation mapping

Financial renegotiation mapping is the degree to which the DEP partners envision, outline, and agree on the set of future contingencies that will trigger renegotiation of the financial terms and conditions of a DEP. Given that the DEPs are open-

ended in nature and carry diffused objectives, adaptability by both parties and the ability to renegotiate are critical during partnership evolution.

For instance, if the new-to-world product ends up delivering significantly lower returns for one of the actors, financial renegotiation mapping will trigger a renegotiation arrangement enabling the firms to revisit prior assumptions and make amends to address financial asymmetries. Several other scenarios may emerge about the investments and other factors impacting financial interests of the firms during the alliance evolution, as explained by the alliance director of an emerging market IP firm, "Had we had the foresight during deal negotiation to agree on specific criteria which drives amicable renegotiations when an imbalance in investments versus returns occurs, the alliance might still be alive. We felt like we were being taken advantage of... they were maximising their returns based on a very loosely defined playbook. One must have the hard discussions upfront before embarking on the alliance."

Therefore, financial renegotiation mapping provides a mechanism for the partners to plan for the contingencies during partnership formation, to enter expected renegotiations during execution as triggers are reached, and thereby avoid the undesired costs and increase cash flow generation.

6. Institute structure renegotiation mapping

Structure renegotiation mapping is the degree to which the DEP partners envision, outline, and agree on the set of future contingencies that will trigger renegotiation of not only the roles and responsibilities, but also the hierarchies and reporting relationships of the personnel involved in the DEP. For example, in the advanced stages of a DEP between a brick-and-mortar retail firm in an emerging market and a global digital leader to create an online retail business, the latter will not have enough power parity to prevent the retail firm from integrating its supply chain with other competing digital firms, thereby impacting the final product.

Similarly, a digital leader may want the product's positioning, and look and feel to be consistent with its global branding while the industry leader may want a more local flavour. Similar imbalances in hierarchies of relationship or roles and responsibilities, such as who makes the decision on underlying technology, the look and feel and the cultural appeal of the interface, ecosystem integration aspects, and so forth, can emerge throughout the evolution of a DEP, disrupting its embeddedness and triggering managers to take undesired actions.⁴ As the president (Asia) of a Fortune 50 company noted, "... they have a culture of 25-minute-long meetings. We do

30 minutes. Whose word prevails? This is the smallest example but consider that you are making very different and impactful decisions depending on the stage of the alliance evolution. It's critical to be clear who leads in which situation, and equally critical to know when you need to collectively go back to the drawing board to redefine the roles and responsibilities, and the authority structure... If not, you can lose a lot of time and money, not mentioning the obvious opportunity cost..."

Structure renegotiation mapping provides a mechanism to address these asymmetries in a systematic and expeditious fashion, thus preserving and fostering a sound relationship between the partners and avoiding adverse impact to the cash flow generation objective.

7. Use alliance exclusivity wisely

Exclusivity in alliances can be conceptualised in terms of a continuum—from unilateral constraints on one party to reciprocal constraints on both parties over the duration of the alliance. The US\$750-million exclusive agreement between Google and ADT demonstrates such a continuum.⁵ As part of the agreement, Google picked up a seven-percent stake in ADT. In return, ADT, which previously sold various types of smart-home hardware, would exclusively sell Google's Nest products to consumers and small businesses. Depending on meeting certain conditions, the two companies are expected to invest another US\$150 million over the coming years in marketing, training, and product development, and ADT will have access to specific Google technologies.

Although the extent of investments, the intent to co-create, the multi-year nature, and the hype involved in signalling benefits with DEPs may suggest that the actors desire a high degree of alliance exclusivity as a safeguard against expropriation of specific investments and other forms of opportunism, restrictive contractual arrangements or alliance exclusivity is uncommon. In most cases, these alliances seek to build their exclusivity by means of co-creating something unique while seeking new cash flows, and not through restrictive contractual agreements that block them from partnering with other firms. As the business leader of a digital consulting firm averred, "Contrary to popular belief or even the desire, you won't find a ton of exclusivity in such agreements around the world. You will find some exclusivity when equity is involved but even then, it's not truly exclusive in most cases. The only exclusivity that makes sense in these kinds of alliances is when you create something unique together that others can't replicate."

Consider the case of the multibillion-dollar Microsoft and AT&T non-exclusive alliance where AT&T will use Microsoft's cloud services, and the two firms will work together on developing tools for Artificial Intelligence and high-speed 5G wireless for their mutual customers.⁶ In the same week, AT&T and IBM announced another multibillion-dollar alliance where AT&T will use the IBM cloud for its business applications. The two firms will team up on developing cutting-edge computing platforms that harness 5G networks and Internet-connected devices.⁷

As the agreements are non-exclusive, AT&T is able to attract both Microsoft and IBM to enter into agreements that drive risk-sharing for AT&T, achieve technology diversification (across Microsoft and IBM clouds), gain higher signalling impact by expanding the target ecosystem than it would have by entering into an exclusive agreement with just one digital leader, and create a healthy competitive environment that will motivate digital leaders to offer their best to AT&T. These include benefits such as emerging technologies through the duration of the alliance. Collectively, these benefits have a positive impact on AT&T's cash flow generation objectives.

As seen from these examples, an industry leader can increase its attractiveness and deal negotiation power by adopting a diversified technology strategy, and desiring a lack of or a lower degree of alliance exclusivity during the alliance formation stages. In such cases, digital leaders tend to dig deeper into their pockets and use a range of their assets from across their ecosystems (e.g., training, reach, assisting with initial cloud transition, and joint media activities) in the form of investments to win over the industry leader.

Digital leaders consider these investments necessary for them to win the logo in the short term and open doors for the long-term potential, even when the deal sometimes may not seem profitable in the short term. For digital leaders that have high levels of niche that overlaps with their competitors (e.g., Google Cloud and Amazon Web Services), this effect can be even more pronounced.

Interestingly, this is not a one-time event in the relationship. Industry leaders use the lack of exclusivity and their multi-technology strategy as an ongoing lever for negotiations with digital leaders, especially as the degree of alliance success and/or multiplexity grows. They would also try to avoid committing too much at the same time, keeping the pressure on the digital leaders, and enhancing their chances of ongoing negotiation through the duration of the partnership. While the digital leader consequently experiences a lower signalling benefit than it would have, had the partnerships been exclusive, those that approach with lower or no expectations of exclusivity increase their attractiveness, compared to those that expect high degrees of exclusivity. Once the alliance is formed, digital leaders strive to gain share and increase cash flow generation using various strategies, including platform enveloping.⁸

CONCLUSION

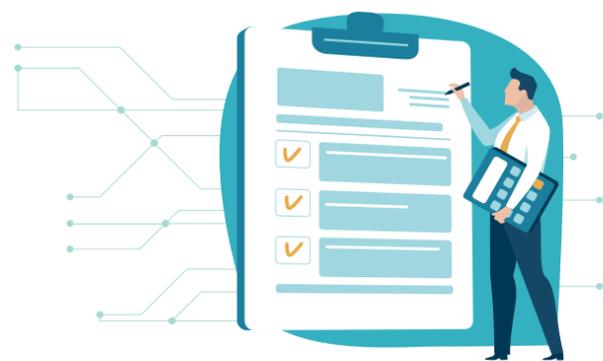
Over the last decade, organisations have generated US\$3 trillion by making digital investments in growth and innovation in platform-based business models and improving operational efficiencies.⁹ It is expected that digital transformation will continue to disrupt industries and businesses at breakneck speeds. As a result, firms will continue to form DEPs at an increasing rate in the foreseeable future. While there is no one-size-fits-all playbook to develop successful DEPs, research-based concepts and structures noted in this article can serve as a reference for leaders and managers engaged in such partnerships to enhance their chances of success. 

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Structure renegotiation mapping provides a mechanism to address asymmetries in a systematic and expeditious fashion.

Digital Entrepreneurship in ASEAN



Capitalising on the COVID-driven digitalisation phenomenon.

by Chiraphol New Chiyachantana and
Pattarawan Mai Prasarnphanich

Thailand-based QueQ CEO Rungsun Promprasith, or Khun Joh as he is commonly known, had to act fast when COVID-19 struck in 2020. The value proposition of his firm, which was centred on providing a mobile app for bookings and queue management, had suddenly become non-viable. With customers home-bound and only stepping out for essential services, demand for the app dried up as hardly anyone was placing restaurant reservations or fixing medical appointments.

To survive, Khun Joh had no choice but to pivot his business. In 2021, he saw an opportunity to manage the overflowing queues at the vaccination centres in Thailand. The situation was getting dire by the day as the number of COVID-19 cases soared, and overcrowding had become a common issue at the centres with people clamouring to get their vaccination shots. He quickly reached out to the authorities to offer them a queue management system.

By June 2021, he had adapted the QueQ app to address this issue at a few select vaccination centres. Thereafter, the app trialled at several centres, and was subsequently deployed across Thailand. Overcrowding became a thing of the past.¹

Pivoting was critical for digital entrepreneurial firms like QueQ in order to capitalise on the opportunities that had arisen from COVID-19. Unlike traditional brick-and-mortar businesses, digital entrepreneurial firms are more resilient, as digital technologies enable them to innovate, experiment, test, and improve quickly before scaling their businesses. For this article, we will draw upon our research on digital entrepreneurship in Southeast Asia, specifically six ASEAN countries (refer to box story for details on the research project). We will be using examples from our fieldwork in Thailand to illustrate our arguments.

ASEAN STUDY ON DIGITAL ENTREPRENEURSHIP

We interviewed 685 digital entrepreneurial firms, either owner-helmed or managed by a team of entrepreneurs, in six ASEAN countries, namely Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam, which have adopted a digital business model. The research project was sponsored and coordinated by the Asian Development Bank and conducted in collaboration with research teams from six leading academic institutions across the six ASEAN countries. It focused on the entrepreneurs' adoption of digital technologies in their business models, as well as their business model experimentation activities, and explored the implications of these processes for their business performance.

COVID-19 AND THE ACCELERATION OF DIGITALISATION

Given the penetration of digital technologies into so many domains, one simply cannot avoid having a full or partial digital business model. No longer is embracing digital technologies a 'nice-to-have'; it is a 'must-have' today. In the six countries where we conducted our research, all the 685 digital entrepreneurs have leveraged digital technologies as the backbone of their firms' strategy. Furthermore, COVID-19 has accelerated the digital phenomenon, bringing forward digital transformation by at least five years.

It was found that a massive 40 million people in ASEAN went online for the very first time in 2021.² This sudden jump in digital adopters increased the total number of Internet users to 440 million or 75 percent of the population in the six countries we studied.³ This was a huge jump in Internet adoption as the base just five years prior was only 190 million users.⁴

Another indicator of how rapidly digital technologies have spread is the size of the region's Internet economy which reached US\$170 billion in 2021. At this rate of growth, it is predicted to reach US\$360 billion by 2025.⁵

The pandemic has not only moved many businesses online, but also created new digital businesses that did not exist pre-COVID-19. Digital technologies are clearly shortening the idea-to-market cycle as firms can now easily test and refine their business models to either achieve the desired outcomes or improve their business performance.

The constant experimenting, testing, and learning has made the digital firms more resilient and adaptable to change. This is why we see many firms extending their offerings in the digital realm, as well as new digital firms popping up in the past two years. These firms have also been shown to cater to new digital habits and home-based lifestyles, as well as address societal shifts such as conducting commercial activities through mobile devices.

THE RISE OF DIGITAL ENTREPRENEURSHIP

Things are changing so fast that all businesses, whether big or small, have no choice but to make use of innovative digital platforms to constantly innovate, build, introduce, grow, and scale their businesses.

While few will ever reach the same heights as Jack Ma's Alibaba or Jeff Bezos' Amazon, just about anyone can be a digital entrepreneur because the barriers to entry are so low. There are many digital platform solutions that are 'plug-and-play'. Platforms such as Amazon, Alibaba, Lazada,

The pandemic has not only moved many businesses online, but also created new digital businesses that did not exist pre-COVID-19.

Shopee, and Shopify provide digital entrepreneurs an easy way to participate in economic or commercial activities without a huge capital outlay. To get onto the digital entrepreneurship bandwagon, entrepreneurs simply choose a subscription plan that suits their needs. These platforms also offer add-ons for e-commerce stores—for example, to enable a feedback mechanism, a product review app could be plugged in to give digital entrepreneurs important information to adapt, incorporate, and improve their value propositions for their customers.

However, digital entrepreneurship is not only about digital commerce or e-commerce activities.⁶ An important aspect of digital entrepreneurship is constant innovation.⁷ Digital entrepreneurs need to continually create new products, processes, services, and solutions to stay ahead of their competition. In other words, they have to be flexible in pursuing new ventures, and be willing to make fundamental, even drastic, changes to their established business models, even when these may still be working well for the business.⁸

Technology-wise, there exists a plethora of no code or low code development platforms for digital entrepreneurs to build amazing digital products or enhance their existing products with no coding or very minimum coding skills and knowledge.⁹ For example, to implement robotic process automation, simple rules can be written to automate workflows for simplifying a process.

BENEFITS OF DIGITAL TECHNOLOGIES FOR ENTREPRENEURS

Entrepreneurial dynamic

One huge benefit that digital technologies provide is what we call 'entrepreneurial dynamic'. In short, entrepreneurial dynamic means quick adaptation of the business model during a period of sudden change. The onset of COVID-19 was such an event of sudden change, which radically transformed everything from the way we learn, to the way we work, and the way we live. Firms that demonstrate strong entrepreneurial

dynamic would be able to benefit from the pandemic by turning this crisis into new opportunities, by adapting their business operations in a very short period. They would be able to discover new customer segments by taking their core digital services, realigning their business operations, and presenting their offerings to new customer segments.

One example of a Thai firm that displayed entrepreneurial dynamic is Locanation. Initially, it was set up as an online real estate portal for attracting foreigners to invest in properties in Thailand. However, when COVID-19 struck, the market for foreigners disappeared. The firm converted its original portal to a one-stop portal that provided important entry information for returning Thais and foreign visitors. Additionally, the firm provided information such as special promotions, and also developed a reservation portal for those who were interested in finding and booking the Thailand Alternative State Quarantine hotel of their choice.

Hungry Hub is another example of a Thai entrepreneurial dynamic firm. At the onset of COVID-19, the Bangkok-based firm changed its business model from offering buffet deals and reservations to dining patrons, to offering curated delivery meals at special prices instead. When the pandemic situation improved, Hungry Hub pivoted again by collaborating with selected hotels in Bangkok to offer staycation deals.

Process efficiency

Just as digitalisation can enhance the efficiency of an automated process, a digitalised business model can also improve the process efficiency while, at the same time, lowering operating costs.¹⁰

One process efficiency that has made electronic transactions seamless in ASEAN is the use of QR (Quick Response) codes. Wherever you look across the region, you will notice that QR codes are used to facilitate the entire process from ordering to payment. They are used for ordering food, unlocking shared city bikes, sharing contact details, and enabling contactless payments. The use of QR codes is so

pervasive in ASEAN that it was reported that 15 million QR codes were scanned in 2020.¹¹

Another process efficiency that digital technologies provide is the ability to make real-time changes. For example, when a business runs a very successful promotional campaign and its physical stocks are running low, the digital entrepreneur can easily change the terms in real time and end the promotion early on its e-commerce or social commerce store.

Food outlets that have a digital business model can also take advantage of real-time updates. When it is almost closing time, and the food outlet has a lot of food unsold, a digital entrepreneur can easily put out a promotion on the e-store and spread the word through social media to get customers to buy the unsold food at a reduced price.

Dynamic capabilities

Digital technologies help to enhance a firm's dynamic capabilities. David Teece, the originator of this concept, says that dynamic capabilities are essentially "the firm's ability to integrate, build and reconfigure internal and external competencies to address the rapidly changing environments".¹² Dynamic capabilities are idiosyncratic. This means they are unique to each firm and are rooted in the firm's history. These capabilities are not only captured in routines, but also in business models that are difficult to imitate by other firms. Dynamic capabilities are not the same as functional or zero-level capabilities, which are common capabilities that can be found industry-wide. According to Teece, zero-level capabilities are akin to 'best practices' whereas functional capabilities refer to the organisation's operational and technical abilities.¹³

There are three ways through which firms can develop their dynamic capabilities: sensing, seizing, and transforming. Sensing requires an assessment of the market opportunities and attuning to changing consumer needs. Seizing refers to how a firm reacts to market needs while at the same time, developing complementary capabilities to create value. Transforming is about how the firm is renewing its processes while maintaining its relevance to customers.

From the earlier example of QueQ, we can see how the sensing of the overcrowding situation at the vaccination centres led to the seizing of an opportunity when Khun Joh reached out to the relevant authorities to solve the problem. QueQ then transformed itself by adapting its retail queue management system to become one that could liaise seamlessly with both government facility managers and healthcare authorities.

Digital entrepreneurs need to continually create new products, processes, services, and solutions to stay ahead of their competition.

Another interesting example comes from Horganice. Pre-COVID-19, it was a cloud-based real estate leasing company. Its market shrivelled during the pandemic. Sensing an opportunity to address the issue of insufficient beds and facilities for COVID-19 patients, the firm reached out to the Thai authorities to propose the use of its apartment management portal for managing field hospitals. In so doing, Horganice transformed its business model from leasing real estate to managing field hospitals.

THE IMPLICATIONS FOR DIGITAL ENTREPRENEURSHIP

Our research revealed several implications for digital entrepreneurship.

The need to integrate digital technologies into the business model

As the examples in this article show, firms that have been able to pivot quickly to capture new market opportunities are the ones that integrated digital technologies into their business model. Other than enhancing the firms' resilience, these firms have an enhanced ability to innovate quickly, experiment, test and learn, grow, and improve before scaling their businesses.

Since there are benefits to be gained from public-private partnerships, regional governments can play three important roles. First, governments can help digital entrepreneurial businesses develop further by investing in digital infrastructure

and ensuring affordable accessibility to it. The digital resources can be organised around a defined geographical region for better accessibility and fit with the local context. Second, they can help build entrepreneurial ecosystems that are similar to the technological ecosystems found in Silicon Valley, New York, and London.¹⁴ Third, support programmes that are put in place should focus on the business justification for digital technology adoption, rather than the technology alone or strictly technology-led investment decisions. In such instances, experienced angel investors can play a vital role in helping entrepreneurs develop the requisite business skills, especially to view digital capabilities through the lens of their own business. In addition, the digital resources should be organised to reflect the special needs of various sectors with differing business models and activities.

The importance of entrepreneurship mindset and digital assets

The cultivation of the entrepreneurship mindset is best served through education. Thus, it is important that education systems develop entrepreneurial skills such as opportunity recognition, action orientation, experimentation, teamwork, and collaboration. Supporting structures such as accelerators and co-working spaces should be promoted to support knowledge sharing regarding digitalised business models. Cross-border flows of entrepreneurship talent and knowledge can enhance the regional knowledge base and encourage

knowledge spillovers. The combination of mindsets and digital assets has helped digital entrepreneurs use their digital business models to turn crises into opportunities while continuing to create economic value for their respective firms. Mechanisms to speed up business model experimentation should be further explored and promoted. The entrepreneurs whom we studied showed us that the pandemic crisis was a strong incentive in forcing them to rethink their business models, and experiment quickly to seize the opportunities available. It is worth further exploration to determine how we can speed up the sensing-seizing-transforming cycle during normal times to constantly innovate and stay competitive. Likewise, we should think about providing the right support, such as access to knowledge/skills, finance, and digital resources, and turning them into innovation assets at each of the three stages.

The significance of cross-sector collaboration

Digital entrepreneurship can apply across a range of industries. As evidenced from the QueQ example, what was originally designed for retail can be rapidly deployed in another field—in this case, healthcare. Similarly, Horganice's rental property management solution was redeployed to help the Thai healthcare sector manage field hospitals during the pandemic. Thus, engaging entrepreneurship communities and cross-fertilising across sectors should be promoted.

Moreover, promoting cross-sector networking and collaboration could uncover synergies among different start-ups, thus producing more innovative business models that may deliver even greater positive impact on all stakeholders. Government and related stakeholders could provide financial and non-financial incentives, supporting programmes, or partnership matching for entrepreneurs to help them look beyond a single sector and adapt or pivot their business models to serve various industries to further expand their market size. Creating co-working spaces, establishing associations and councils, and carving out innovation districts that can pull solution-seekers and providers across sectors together are some ways to power this endeavour.

CONCLUSION

With the Internet economy growing by almost two-fold by 2025, the future of digital entrepreneurship is promising. The use of digital technologies not only helps entrepreneurs to accelerate the idea-to-market process, but also provides different permutations of organisational arrangements for value creation, delivery, and capture. Digital technologies

can help entrepreneurs develop entrepreneurial dynamic, in order to adapt quickly to change while, at the same time, building up resilience in their business models. ■

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Firms that have been able to pivot quickly to capture new market opportunities are the ones that integrated digital technologies into their business model.



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Pivoting to Robo-Advisor Services in Wealth Management

A white space for digital banks.

by Lee Guan Liu

The proliferation of financial technology firms (fintechs) has led to several interesting developments, one of which is the growth in the wealth management industry for the mass affluent market. Fintechs offering robo-advisor services have opened new frontiers in wealth management, resulting in possible applications for digital banks.

Changes in banking regulations in the wake of the 2008 Global Financial Crisis (GFC) forced many global banks to pivot from a high capital-intensive wholesale and investment banking business to capital-light wealth management activities. This invariably led to intense competition for assets under management (AUM) and wealth advisors, which further drove up the cost-income ratio and impinged on banks' operating margins.

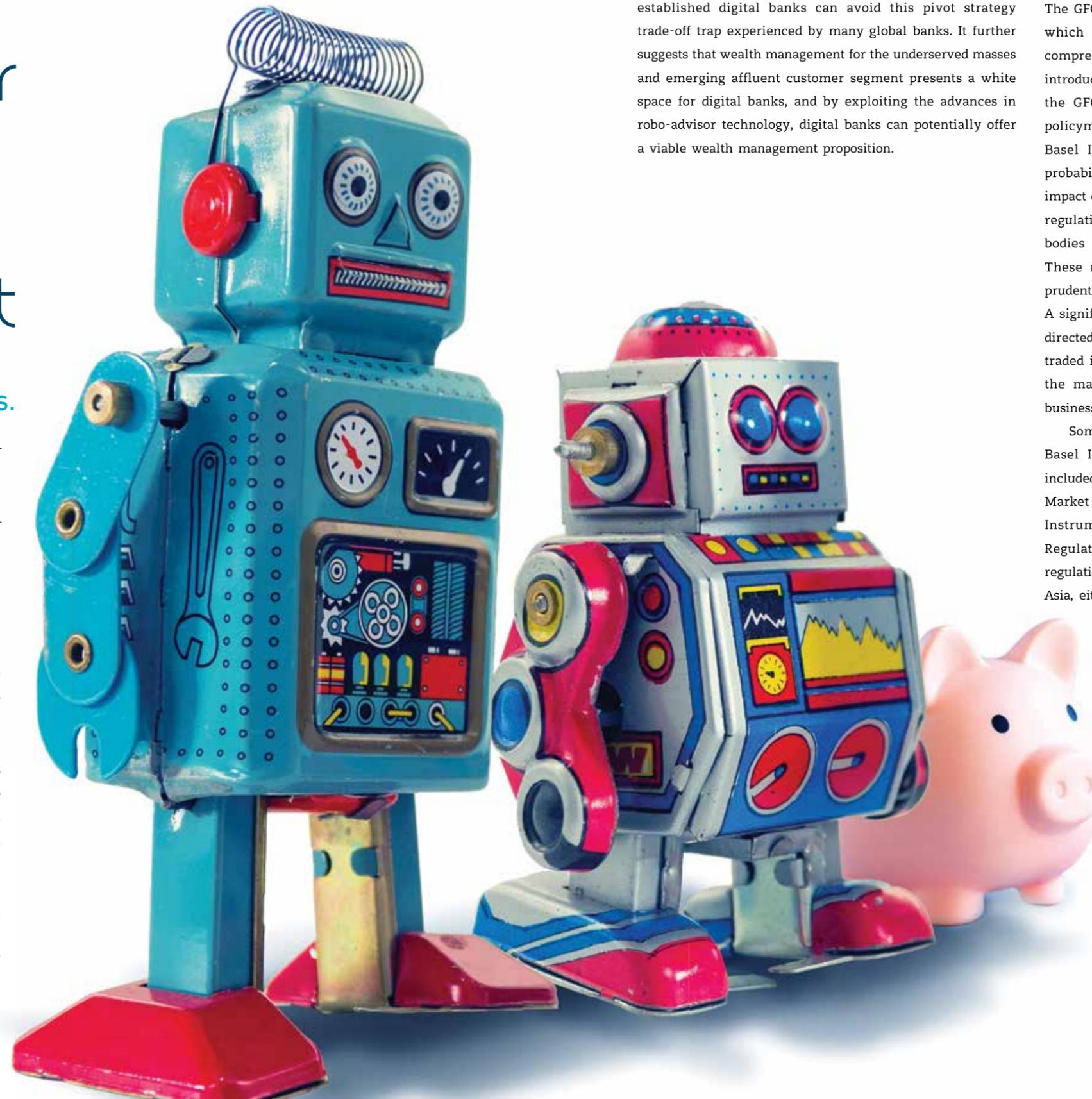
Does this mean that a 'pivot strategy' trades off a lower capital requirement for a higher cost-income ratio? And in the process, does it blunt any improvements on an enterprise

return on tangible equity? This article provides a brief history behind this development and explores how newly established digital banks can avoid this pivot strategy trade-off trap experienced by many global banks. It further suggests that wealth management for the underserved masses and emerging affluent customer segment presents a white space for digital banks, and by exploiting the advances in robo-advisor technology, digital banks can potentially offer a viable wealth management proposition.

HEIGHTENED REGULATORY DEMANDS IN POST-GFC WORLD

The GFC occurred not long after the introduction of Basel II, which in itself was meant to be a significantly more comprehensive risk supervision framework than Basel I¹, introduced almost two decades earlier. In the aftermath of the GFC, it became eminently clear to supervisors and policymakers that the risk supervision framework under Basel II did not adequately address 'tail risks' (of low probability and high impact events) and their systematic impact on the financial system. Hence Basel III and a slew of regulations were introduced by supranational and national bodies to close off the gaps believed to be in existence. These moves massively raised the standards of banking prudential management and financial conduct of the industry. A significant portion of the enhanced regulatory effort was directed at controlling financial instruments and derivatives traded in the over-the-counter (OTC) markets², which was the mainstay of the investment and wholesale banking business of global banks.

Some of the better-known regulations, in addition to Basel III, that were introduced in the developed West, included the Dodd Frank Act & Volcker Rule (US), European Market Infrastructure Regulation (EU), Markets in Financial Instruments Regulation (EU), and the Margin Reform Regulation (US and EU). Invariably, many parts of these regulations found their way to the major financial centres in Asia, either because those Asian central banks are members



of a supranational body such as the Bank for International Settlements (BIS), or they were considered best practices that should be customised to suit their local context.

Collectively, these regulations demand that banks set aside more capital resources for assuming market, liquidity, and credit risks. Additionally, to implement the enhanced standards, banks must invest heavily in staffing risk, control and compliance teams, and implement new processes and systems. This plethora of regulations imposed on the banking industry has severely crimped the profitability of banks. The higher levels of capital and increased cost of operations in a deleveraging post-GFC world have also meant that while revenues are declining, costs have seen a steep and inelastic increase.

GLOBAL UNIVERSAL BANKS: PIVOTING TO WEALTH MANAGEMENT

Global universal banks categorised as Systematically Important Financial Institutions (SIFIs) bore the brunt of this post-GFC development. “Universal banking” is a term often used to describe the full continuum of customer/client segments that a bank caters to, and is commonly broken down into the following six segments: Personal, Mass affluent, Private, SME (Small and Medium Enterprises), Commercial, and Corporate and Institution. These six segments have differing banking product needs, and conversely, the various banking products place different demands on the operational capacity and risk capital of a bank (refer to Figure 1).

Traditionally, the main challenge to a retail bank arising from serving the left extremity of the customer continuum is operational efficiency, measured by a business’s cost-income ratio. Because of the low value of the ticket size versus the high fixed costs associated with having to maintain a physical branch network and staff, this business inherently has a high operating leverage and must rely on scale to achieve profitability.

On the other hand, at the extreme right of the continuum, wholesale banking of corporate and institutional clients involves high-value tickets and does not need to rely on an extensive branch network. Thus, a wholesale banking business typically has a much lower cost-income ratio compared to retail operations. However, there are trade-offs. Because of the complexity of the products and the long-term nature of their credit exposure, more risk capital is required by regulation. For instance, while a long-term financial derivative transaction may appear to be highly profitable, when seen through the lens of ‘revenues less costs’, the capital required to be set aside for assuming market, credit and liquidity risks could be very high, causing the transaction’s return on capital to be low.

The client segments that reside between the two extremities of the continuum will have varying demands on the operational capacity and risk capital of a bank. Typically, demands on operational capacity decrease as we move from the left to the right of the continuum while regulatory capital demands increase.

TRADE-OFF IN CAPITAL AND OPERATIONAL INTENSITY

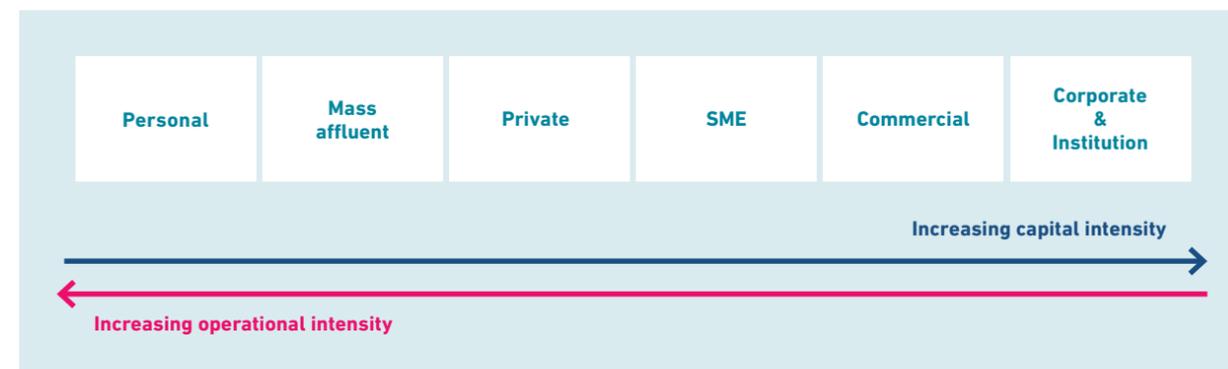


FIGURE 1



The post-GFC regulatory landscape has placed massively higher demands on both the operational capacity and capital of a bank.

In sum, the post-GFC regulatory landscape has placed massively higher demands on both the operational capacity and capital of a bank. It is anecdotally estimated that the amount of regulatory capital required to support the same wholesale banking balance sheet today is 2.5 times higher than what it was in 2008. This is assuming a like-for-like comparison is possible.

This has invariably resulted in a squeeze on the return on tangible equity (RoTE), a key measure of profitability for banks. Equity analysts have estimated the long-term cost of equity capital for a bank to be 10 percent. As can be observed, market capitalisations of global banks that have failed to consistently achieve a RoTE of at least 10 percent trade below their book values. For example, two SIFIs, Credit Suisse and Deutsche Bank, have tried to reshape their business models in the past decade with limited success. Despite the occasional bouts of optimism, the two firms have struggled to push their RoTE above single digits and their stock prices have stayed below book values over much of the same period.

GLOBAL BANKS' PIVOT STRATEGY

Faced with an existential threat to their business model, and the need to improve their RoTE, many global banks have adopted a strategy of pivoting their business model away from the right extremity to the left of the continuum, albeit in various forms. Invariably, many of these global banks have chosen private banking/wealth management as their focus. Private banking is often viewed as a business adjacent to wholesale banking, given the nature of the clientele and the core competencies involved.

Wealth management, which is the core business of private banking, is lighter on regulatory capital requirements. Even with Lombard lending facilities, which refers to a form of credit extended to clients against securities and eligible collateral pledged to the bank, wealth management provides a good return on risk weighted assets (RWAs). However, private banking is traditionally a high touch business with a high

cost-income ratio. Because of its high touch nature, the business is difficult to scale up without a corresponding increase in the number of advisors and ancillaries. Therefore, it is not unusual for the business to focus on high value accounts at the expense of the smaller accounts to achieve short-term profitability.

At first blush, it would seem that a pivot strategy trades off a lower capital requirement for a higher cost-income ratio. Does this also mean that this trade-off washes through the financials and offers no discernible improvements to the enterprise RoTE?

ENTER THE DIGITAL BANKS AND FINTECHS

The rapid ascent of digital banks and fintechs in the decade following the GFC has started to change the competitive landscape of the banking industry. With naturally low overheads, such as minimal staff and no physical branch network, and the willingness to embrace advances in technology, digital banks are starting to bank the underserved customer segments that many traditional banks today find uneconomical (that is, the left end of the continuum). These digital banks typically start by accepting deposits and offering loans. With time, some of them may move the client base up the value chain through cross-selling, with the aim of building customer ‘stickiness’.

Wealth management, with its lower capital requirement, represents a white space for digital banks. However, because of the pivot strategy adopted by many global banks, wealth management has become what analysts describe as a ‘crowded trade’ in the banking industry. The intensity of competition for clients, AUM, and advisors continues to ratchet up, further driving up costs.

To be able to fully tap this white space, digital banks must find a wealth management proposition at a fraction of the cost offered by traditional banks that can meet the demands of the currently underserved customer segments. And this is where robo-advisors enter the game.

Over the past decade, several fintechs have been able to exploit the greatly reduced cost of computing power to develop robo-advisors that produce investment portfolios that are customised for the individual client. Instead of advisors or relationship managers, robo-advisors rely on algorithms (mainly rule-based, sometimes enhanced by Artificial Intelligence) to advise an investor based on an assessment of the investor's goal, risk appetite, knowledge, experience, and other key attributes.

Leveraging on modern portfolio theory, robo-advisors can construct customised discretionary portfolios to optimise expected returns at a given level of risk or minimise risk at a given level of expected returns. This is achieved at a fraction of the cost of traditional discretionary portfolio management offered by banks today. Traditionally, to be economically viable, discretionary portfolio management is only availed to high-net-worth individuals (HNWIs) with sizeable AUM. Providers of such services may charge about 1.5 percent per dollar of AUM. This is in addition to the fees embedded in the constituent funds. Taken in total, the effective cost to the investor could be closer to three percent. On the other hand, robo-advisors typically charge a 0.5-percent management fee and may use low-cost passive exchange-traded funds (ETFs) to construct portfolios. Taken in total, the effective cost to the investor is typically below one percent. Fees are an important consideration as the return that truly matters to an investor is one that is net of fees.

One such fintech was Bento Invest, a business-to-business (B2B) firm that was acquired by the Grab Financial Group in 2020. As a B2B fintech, Bento provided a 'white label' robo-advisor service to institutional clients like banks, securities, and insurance companies. Under a 'white label arrangement', the institutional client, say a bank, would continue to face its end-client base, but would use the fintech robo-advisor as the engine to manage the

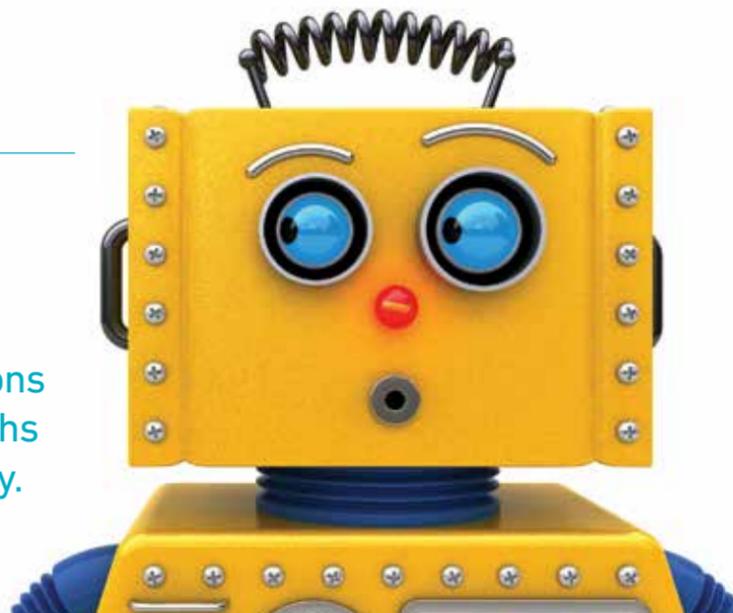
client's investment portfolio. Leveraging on the work of Henry Markowitz, the 1990 Nobel Prize laureate for Economics, Bento developed a robo-advisor that was able to create an 'efficient frontier' that optimised a portfolio's risk versus expected return for a given investment universe. Once the client's risk appetite and investment horizon were determined, a customised portfolio could then be created on the efficient frontier. Because the portfolio optimisation process was machine- and data-driven, the cost of management was significantly reduced, making it commercially viable for Bento's institutional client to provide this service to retail customers. Thus, discretionary portfolio management services which have hitherto been available only to high-net-worth private banking clients can now be made accessible to the underserved customer segments.

However, for the independent business-to-consumer (B2C) robo-advisor fintechs, it may be a different story.

Like any consumer business, brand recognition is paramount. Furthermore, it has proven to be difficult to convince end-customers and investors to move away from well-capitalised and highly regulated banks and financial institutions to lightly regulated robo-advisor fintechs with a relatively short operating history.

Take the example of betterment.com, a successful US-based early-mover robo-advisor, whose evolution best characterises this conundrum. While it is still the largest independent B2C robo-advisor, its AUM is dwarfed by the robo-advisory portfolios of Vanguard, a US asset management firm, and Charles Schwab, a US stockbroker. Both Vanguard and Charles Schwab are well-established financial firms with very strong client franchises but were relative latecomers to the robo-advisor game. Yet, despite their late adoption, they could still leapfrog betterment.com.

It has proven to be difficult to convince end-customers and investors to move away from well-capitalised and highly regulated banks and financial institutions to lightly regulated robo-advisor fintechs with a relatively short operating history.



Another early B2C robo-advisor entrant, UK-based Nutmeg, was acquired by US banking giant JP Morgan in June 2021. At the point of its acquisition, Nutmeg had an AUM of just under US\$5 billion and was still unprofitable. This again demonstrates the challenge for independent B2C robo-advisor fintechs when competing against financial institutions with established franchises and recognised brands.

SERVING THE MASS AFFLUENT MARKET

Acknowledging the difficulty and high cost of customer acquisition, several fintechs, betterment.com included, now seek growth through a B2B business model and partner with firms that have established franchises.

On that corollary, the digital banks in Asia, many of whom are owned by parent firms with strong brand names and established customer franchises in domains such as e-commerce; technology, media and telecommunications; finance; and insurance, make good partners for existing fintechs. Three of the four digital banking licences issued by the Monetary Authority of Singapore in 2021 were awarded to applicants with Grab/Singtel, SEA, and Ant as their parent companies respectively.

Independent robo-advisors looking to grow via a B2B business model will find it compelling to partner with these digital banks. Likewise, digital banks can avoid the escalating costs faced by global banks in their pivot strategy while moving up the value chain of a capital-light wealth management proposition. One approach these digital banks could take would be to 'white label' the robo-advisor services from B2B fintechs to produce low-cost model portfolios, using ETFs to meet the needs of retail investors. For the mass affluent with higher AUM per capita, digital banks may find it commercially viable to construct portfolios customised to the individual's risk appetite and investment goal, again leveraging on 'white label' robo-advisor capabilities.

For B2C robo-advisor fintechs with a recognised brand, digital banks may also consider a 'joint labelling' approach to partnership. Here, both parties enter a symbiotic relationship: the digital bank leverages on the credibility and expertise of the fintech and, in return, the fintech relies on the distribution capabilities of the digital bank. Careful product development and selection of the target customer segment will reduce the risk of market cannibalisation for both parties.

Alternatively, digital banks could follow in the footsteps of JP Morgan and Grab Financial—acquire the fintechs and integrate them into the banks, instead of trying to develop this capability organically.

CONCLUSION

In a little over a decade since appearing in the US, the use of robo-advisors is starting to gain acceptance within the mainstream investment industry. In 2020, robo-advisor funds accounted for about US\$766 billion³ of the US\$49 trillion professionally managed AUM in North America³. Some analysts have opined that robo-advisor funds have now reached a tipping point and will soon enter an accelerated growth phase, with predictions of US\$1.9 trillion in AUM by 2025.⁴

Judging from the evolution of the industry in the US, it is reasonably safe to predict that the use of robo-advisors will gain acceptance in Singapore and presumably in Southeast Asia (SEA) over time. The current lack of viable offerings for the mass and emerging affluent customers in investment and portfolio management augurs well for the future of robo-advisors. Rather than for robo-advisor fintechs to gain market share through expensive customer acquisition, a more compelling alternative is to seek partnerships with established firms with existing franchises. In SEA, the digital banks would appear to fit this criterion comfortably. 

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Endnotes

- ¹ The Basel Accords are a series of sequential banking regulations (Basel I, II and III) set by the Basel Committee of Bank Supervision (BCBS). The BCBS is the primary international body that sets the standards for the prudential regulation of banks. It is also the platform for central banks and bank supervisory bodies to cooperate on banking supervisory matters.
- ² The OTC market is a decentralised market where participants, mainly financial institutions, trade financial instruments and derivatives amongst themselves without going through an exchange. The OTC market was largely unregulated before the GFC.
- ³ Statista, "Global Assets under Management in Selected Years from 2008 to 2020, by Region", August 25, 2021.
- ⁴ Statista, "Assets under Management of Robo-advisors in the United States from 2017 to 2025", August 21, 2021.



TurtleTree

Cultivating Food Sustainably

Lin Fengru, co-founder of TurtleTree, speaks about her entrepreneurial journey in the biotech space.

Before Lin became an entrepreneur, she was a recreational fromager. Her passion for making artisanal cheese led her on a pilgrimage to Vermont in the US, a famous cheese-making region, home to triple brie and extra sharp cheddar. This pursuit of the perfect wheel of cheese prompted her to find more sustainable food production methods. She subsequently founded TurtleTree, a company that uses cutting-edge stem cell technology to make healthier and more affordable dairy ingredients that are also kinder to animals and the environment.

TurtleTree focuses on creating functional components naturally found in milk and has plans to use them to fortify food products ranging from plant-based milk to yogurt. Since winning the Entrepreneurship World Cup and Liveability Challenge in 2020, TurtleTree has established offices in Singapore and the US.

WHY DID YOU DECIDE TO START TURTLETREE?

I studied Information Systems Management in university, and after I graduated, I worked at Salesforce and Google, both tech companies. When I was working for Google, I was also learning how to make cheese as a hobby. I studied cheese-making for a couple of weeks in Vermont with the intention of replicating the process in Asia. I then went to Indonesia and Thailand to look for good sources of raw fresh milk. However, I could not accept the practice of contract farming in these countries, where cows were fed antibiotics and growth hormones to increase milk production. They were also susceptible to diseases when housed in crowded holding facilities. I realised that without a good supply of milk, the cheese quality would suffer and so gave up on pursuing my hobby.

About four years later, in 2018, I met my co-founder Max Rye at Google. While we were chatting about different technologies at a conference in Singapore, I found out from him about companies like Memphis Meats (now Upside Foods) and BlueNalu. They were groundbreaking companies producing plant-based meat and seafood. I started thinking about using similar methods to make milk, which nobody was doing back then. We pulled in some scientist friends and did a lot of our own research. In 2019, we started the company with six people.

We spent considerable time brainstorming how we should name our start-up and decided to go with 'TurtleTree'. Trees and turtles are symbols of longevity. Our logo looks like the cross section of a tree or a thumbprint, thus symbolising humans' imprint on nature. And its shape is inspired by the shell of a turtle. TurtleTree believes in preserving the longevity of the planet and its animals.

WHAT HAVE BEEN SOME OF YOUR KEY LEARNINGS WHEN STARTING A BUSINESS?

Personally, the most difficult part for me was taking that first step to start TurtleTree. After that, there's just no turning back, and I don't think about it anymore. Every challenge thereafter is something that we work around, or we have a team discussion to see how we can tackle it.

My previous roles in tech have been in business development or sales. I have never had an issue speaking to new people and sharing the vision of my company. But at TurtleTree, I have become more receptive to working as a team. When we do our pitches, it is always a team event. Collectively, the team will write up the talking points and customise the presentation deck. Then we will rehearse

and share our feedback. We are fortunate that our current investors are also our mentors, so they share their thoughts on how we are performing or how we should adjust our pitch.

From the start, when we set up operations in Singapore, Max and I acted more like scouts to find new locations and ensure that the work environment is ideal. And we made sure we hired strong leaders who could drive the business independently. Our human resource business partner Fionna, for instance, is key to building a strong company culture. Using her vast experience, she built a strong support system to help our employees succeed. When people are happy at work, they will tell their peers about the positive environment. Almost half of our hires have been through referrals; we believe good people attract other good people. If you look at the statistics of companies like Google or Facebook, these tech companies have a large referral proportion of their cohort as well, usually about half. We are also constantly looking to expand. Currently, we are working off shared labs while we build our own facility in California.

One major challenge I faced was summarising the three-year history of the company as a three-minute elevator pitch. I learnt how to make it 'sticky' and also that you don't have to share everything, just the key points. The difficult part was to distil everything so concisely and precisely that even a 12-year-old would understand.

Early on, we faced many sceptical investors. They told us, "You guys are not scientists. What business do you have starting a biotech company?" We even had one investor who told us, "If you have a Nobel laureate on your team, then I will invest in you." Fast forward to today, we have made good progress. And this is because besides science, there are many areas the company needs to excel in. To build a strong business, we need to develop capable marketing, finance, and legal departments. Our strength is in our ability to attract the best scientists and lawyers to form the best team in the world. We have senior folks from firms like Novozymes, Merck, Thermo Fisher on the science side, and also fresh graduates from Singapore Management University and the University of California, Davis, which has one of the most comprehensive milk research teams in the world.

WHAT PRODUCTS IS TURTLETREE CURRENTLY WORKING ON?

We started by looking at whey and casein, which are nutritious proteins present in cow's milk. However, they are traded as commodities, priced at around US\$0.80 per kilogram. We

Almost half of our hires have been through referrals; we believe good people attract other good people.

do not want to go there because if we try to replicate it, the only advantage that we can get is being able to extract them more sustainably, but price pointwise, we wouldn't be able to match up to what the industry is offering. We wanted and needed to build something that was readily acceptable in terms of price for us and use case for the industry. So we decided we should look at functional nutrition using milk ingredients like lactoferrin, alpha lactalbumin, and complex sugars. Lactoferrin is a bioactive protein found in human milk with antiviral and antimicrobial effects; it helps with the gut-brain axis, promoting healthy bacteria in the gut, and stimulating the immune system. Alpha lactalbumin is another protein found in human milk that controls the production of lactose.

Our first product uses lactoferrin and a blend of 'better-for-you' ingredients; our business-to-business partners would include this special blend in their plant-based milk, regular milk, yogurt, and other different food products. Lactoferrin supplements are also being trialled as a treatment for COVID-19. It currently trades on the market from a few hundred dollars to US\$3,000 a kilogram because it is scarce. Globally, most of the lactoferrin supply goes into infant nutrition, but there are many opportunities around adult health and nutrition. We began to craft this blend after talking to our customers because it is important to create products that they want. Many start-ups make the mistake of first building a product and then finding customers for it.

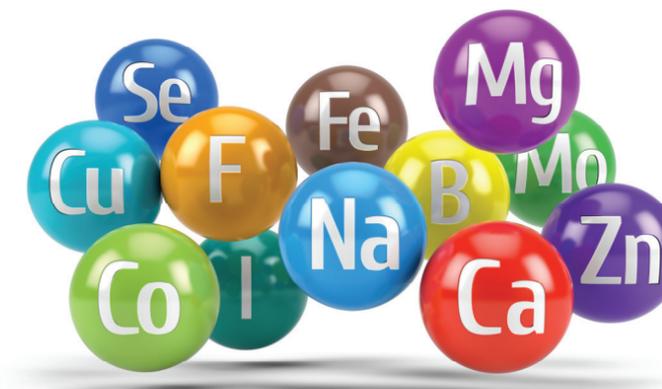
WHAT ARE SOME OF YOUR PIVOTAL MOMENTS WHEN BUILDING TURTLETREE?

In 2020, we won the Liveability Challenge organised by Singapore's Temasek Foundation which promotes sustainability. Later that year, we also won the global Entrepreneurship World Cup competition. These events helped validate our business idea and our ability to compete in the global market. A food tech company triumphing over

other companies from different industries in these global competitions highlights the importance of food security. Solutions like ours can help countries that do not have a lot of land for agriculture, such as those in the Middle East. Besides, during the early days of the COVID-19 pandemic, the supermarket shelves were swept clean in many countries. Singapore obviously was very much affected, but so were many other nations. The crisis really helped us explain our aspiration and function more easily because people can connect with this story. It definitely helped us to spread our message.

WHAT DRIVES YOU TO BE SUCCESSFUL IN THIS BUSINESS?

We have an excellent team with the common goal of increasing food quality in a sustainable manner. One day, I hope to have TurtleTree's offerings used in most food products. We are not just talking about food ingredients. I think even for your day-to-day food products, a lot of engineering goes into putting this can of food or that pack of chips on your table. TurtleTree has the opportunity to contribute better engineering, ingredients, and raw materials; all these different things that promote sustainability and will be better for human health and animal welfare. I want this in most food products out there.



TurtleTree has the opportunity to contribute better engineering, ingredients, and raw materials; all these different things that promote sustainability and will be better for human health and animal welfare.

WHO ARE SOME OF THE GREATEST INFLUENCES IN YOUR ENTREPRENEURSHIP JOURNEY?

My greatest influence is my mom. She always tells me, "It's not whether or not you can do it; it's whether or not you want it. If you want it badly enough, you can get it."

My former boss also provided good advice. Back when I was in Salesforce, she always told me, "Think about how that person you're sending the message to would receive it. It could be an investor, it could be a customer, it could be a boss, it could be a teammate." This really helped me to better scope out my responses and requests to people.

WHAT ADVICE DO YOU HAVE FOR YOUNG ENTREPRENEURS?

For a new entrepreneur, your network is going to be very important. In Singapore, for example, we have A*STAR (the Agency for Science, Technology and Research), a national government agency that drives technology research and development to support research in areas that meet the country's needs. In the biotech space, the universities have many resources and will be able to connect entrepreneurs with scientists who conduct research in their area of interest, as well as principal investigators to help with grants.

I would advise entrepreneurs to talk to as many people as possible. I know it sounds simple, but it really helps. When we first started, I was new to the industry. I would reach out to people on LinkedIn, find out who the investors in this space are, who the potential customers are, and start bouncing ideas off them. I think most people are happy to share their thoughts if they feel they can make a difference or contribute something. In fact, I spend a couple of hours every Saturday talking to new business founders, just to bounce off ideas. This is always valuable for budding entrepreneurs. [AM](#)

Philanthropy in Asia

Its changing face and evolution.

by Naina Subberwal Batra



Over the last two decades, personal wealth across Asia Pacific has seen around a 70 percent net increase.¹ The region now has the fastest growth of ultra-high-net-worth-individuals (UHNWIs), more than any other continent in the world.² Given its exponentially growing population with associated social and economic issues, it is more important than ever for Asian philanthropists to lead the way. At the same time, as more Asian countries move into the middle-income bracket, development institutions are shifting their funding away from Asia to other more ‘deserving’ countries. With several Asian governments unable to step up and fill the gap, there is an urgent need for philanthropists and private wealth players to do so. After all, the privilege of being a philanthropist is the ability to take risks on programmes that have been untested and provide upfront capital for innovation that holds the potential for systemic change.

Asia has only one third of the social investors that the US or Europe has, despite having a population four times more than the combined population of the latter. Hence, we should be able to do much better. If Asians were to donate the equivalent of two percent of their gross domestic product, more than US\$580 billion worth of resources would become available.³ This represents 12 times the net foreign aid and nearly 40 percent of the additional US\$1.5 trillion that we need to spend as a region to achieve the United Nations Sustainable Development Goals (SDGs) by 2030.

EMERGING TRENDS IN ASIAN PHILANTHROPY

We believe that the COVID-19 pandemic has pushed at least 75 million more people in developing Asia into extreme poverty as of 2021,⁴ compared to what would have happened without the pandemic. This is a time when hidden cracks are surfacing, not just in healthcare systems, but also in supply chains and gender norms. When women and girls are empowered, we not only achieve gender equality but also accelerate the adoption of solutions to accomplish the rest of the SDGs, including access to education, poverty alleviation, climate change, and more. Asian philanthropists have started

to lead the way to address these issues, and some of the emerging trends we see are highlighted below.

Greater awareness of the importance of giving

The pandemic motivated many philanthropists—including first-time ones—to give. But philanthropy has to be a strong part of civil society at all times, not just in emergency situations. Philanthropists have shown during this pandemic that they are willing to not only take risks and step out of their comfort zones, but also to go beyond programmatic funding and look at root causes, thus transforming the value chain in the process.

Even in the best of cases, philanthropic capital tends to make up a very small proportion of a person’s wallet. No matter how rich or generous the philanthropists are, most of their money is spent outside of philanthropy. So, if we do not look closer at tapping into the rest of their portfolio, say 95 percent of that individual’s income, then we will always be reliant on the five percent to create social impact. It is therefore encouraging to see how some philanthropists, especially the UHNWIs, are looking at how they invest. They now scrutinise their investments through a social or environmental lens.

Rising importance of climate change

We are seeing a lot more interest from philanthropists in tackling climate change and funding nature-based solutions, which we had not seen before. Before the pandemic, we found that our members funded the following key areas in descending order of importance: education, health, livelihoods, gender, and youth empowerment. Climate came in at number six. That has changed: climate has now become much more important.

Rise of blended finance

Blended finance structures—models that combine public or philanthropic capital with private sector funds—not only provide an option to expand the pool of accessible funding, but also attract private investors with varying return expectations to participate in social financing. In Asia

today, climate finance is a particularly promising area for blended finance projects, with China, India, and Japan leading the call for more renewable energy solutions.

There has been a recent uptick in interest across different groups in blended finance. One example is the Hong Kong-based RS Group, a family office which launched what it calls a natural capital design funding window in partnership with Convergence, an Indonesia-based venture capital firm. Grantees get funding to conduct feasibility studies to provide proofs of concept for blended finance solutions across Asia, which look at supporting upstream solutions that protect natural ecosystems and resources. In Singapore, for instance, they have explored ways to increase employment and education among youth at risk.

The emergence of intertwined issues

As philanthropists uncover and target root causes, and become more willing to innovate, they are increasingly funding efforts aimed at the intersection of issue areas. For example, the Tanoto Foundation is primarily committed to funding education and has done a lot of good work in partnership with the Ministry of Education in Indonesia. But it has recently extended its focus to include nutrition, after concluding that nutrition and education are intimately intertwined. It is therefore looking at not just funding education, but also working with partners that are funding nutrition to examine interwoven themes and issues.

In fact, nutrition is one of the least funded sectors in the world, even in Asia where the number of children suffering from malnutrition-related stunting issues in their first three years of life is among the highest in the world. In September 2021, the Bill & Melinda Gates Foundation announced a commitment of US\$922 million over the next five years to improve global nutrition, stating that “the foundation will continue to invest in proven approaches to improve nutrition for the world’s most vulnerable, including a focus on the 1,000-day window of opportunity from conception through age two.”⁵

ASIAN PHILANTHROPY NEEDS TO EVOLVE

There are two key issues for Asian philanthropists to address: the quantum of capital that flows towards impact, and how the money gets there. At the beginning of this article, we made the point regarding the relative lack of giving in Asia versus the US and Europe. That is not to say that we do not give. If you look at the ‘giving’ or ‘doing good’ indexes compiled around the world, Asian countries come up among the top annually.

As Asians, we have been giving our whole lives; for example, we give to temples, we give to mosques, we give to churches.

But while Asians do give, we do not give—not yet anyway—in structured or systematic ways. Giving continues to be ad hoc. One day, it may be helping children to return to schools; another day, it could be supporting the homeless following a typhoon in the Philippines. So it is not something that produces recognisable change on the ground.

At the same time, the effectiveness of the capital that is deployed is diminished by the fact that wealth holders continue to define the agenda. Given the complex issues this region faces, we must have a more inclusive and equitable approach to philanthropy. If there is anything we have learned from the West, it is this: how do we include the voices of the end-beneficiaries that this philanthropic capital is meant to reach? How do we include their voices on the table? Unless we do that, we can never address the root cause of the issues that manifest in the symptoms that we see on the surface.

Finally, we need to talk about what is currently an abused word: ‘partnership’. Philanthropists are not the ones going out and making change happen; it is the organisations that are doing that on the ground. We are now seeing more funders rethinking the way they define collaboration. It is less about ‘what I can achieve’ and more about ‘what we can achieve together’. This enables philanthropic collaborators to develop more effective solutions to address complex problems that no single funder will be able to accomplish alone.

Philanthropy needs to go beyond transactional relationships to adopt a more transformational approach, built on the premise of trust, empathy, and deeper connections. When Asia’s philanthropists are able to do so, they will be in a strong position to usher in a new era of giving. 

Naina Subberwal Batra

is the chief executive officer of AVPN

Endnotes

- ¹ Net wealth per adult, as derived from the Global Wealth Databook 2021. The figure does not consider inflation. Credit Suisse, “Global Wealth Databook 2021”, 2021.
- ² From 2016 to 2021, Asia’s UHNWI population grew by 99.5 percent and that of Australasia increased by 126.7 percent, according to The Wealth Report 2022. Knight Frank, “The Wealth Report 2022”, 2022.
- ³ The Centre for Asian Philanthropy and Society, “Doing Good Index (DGI2020)”, June 17, 2020.
- ⁴ Asian Development Bank, “COVID-19 Threatens Asia and Pacific’s Progress on SDGs, ADB Data Show”, August 24, 2021.
- ⁵ The Bill & Melinda Gates Foundation, “The Bill & Melinda Gates Foundation Commits \$922 Million to Advance Global Nutrition to Help Women and Children”, September 23, 2021.



The Executive's Guide to Getting AI Wrong

It's all math. Really.

by Jerrold Soh

Unless you've been living on a deserted island, you've probably been told that Artificial Intelligence (AI) will 'disrupt' or 'revolutionise' your industry in some way or other. In this Fourth Industrial Revolution, livelihoods will be up-ended, old ways of working will go the way of the dinosaur, old revenue streams will shrivel, and new ones will emerge. So your organisation had better start planning for AI's impact on you, and start building AI into its key business units, processes, and workflows. It comes highly recommended that you do this under a consultant's expert guidance.

What does your mind's eye see when you hear this? Specifically, how does AI disrupting your industry *look* like? Unless you belong to the vast minority of decision-makers

with specialised training in AI technology, your closest reference point is probably science fiction, especially of the Hollywood variety. Call this 'Hollywood-style AI': Marvel's J.A.R.V.I.S. (Just A Rather Very Intelligent System), Disney's Wall-E and, for sci-fi aficionados, HAL9000, Robocop, and Terminator. Perhaps you imagine one or all of these characters reporting to work one day, clad in metallic grey suits.

This article explores how we see AI and argues that we mostly get it wrong. In the process, it explains the reasons backed by social science research on why we tend to get AI wrong and illustrates the dangers of doing so from a managerial and law-making perspective. Some readers may

also find the article useful as a guide on how and when to manipulate portrayals of AI in your favour.

GETTING AI WRONG

Hollywood-style AI systems are, almost without exception, instances of what philosopher John Searle classically termed 'strong AI': systems which think, act, and quack as humans do.¹ The only difference is that they are manufactured, not birthed. By contrast, 'weak AI' refers to systems programmed to do, and thus capable of doing, only specific tasks. Thus, they are also commonly known as 'narrow AI'. For example, you may be acquainted with basic statistical regression methods. The regression, you may be surprised to learn, is a kind of

narrow AI. The first three lessons of AI pioneer Andrew Ng's famous massively open online course on machine learning are devoted to linear and logistic regressions.² If you have taken a business or statistics 101 course that involves regression coursework, you might have trained AI without even knowing it.

Today, strong AI remains well in the realm of science fiction. Despite what Tesla or other 'AI companies' occasionally claim, no such system exists. Moreover, weak and strong AI are qualitatively quite different. There is no clear path to strong AI from the weak AI systems we have today; simply adding more and more computing power to a weak AI system does not make it strong. On the contrary, some AI researchers have argued that present methods which work for building weak AI positively cannot lead us to strong AI.³ Buying even the most advanced, state-of-the-art AI software will probably not eventually lead to an army of pseudo-Terminators taking over your company.

Conflating the strong AI of the movies with the weak AI you are being sold is deeply problematic. At its heart, it is a category error,⁴ like thinking potatoes are fruits, birds are planes, or smoking is good for you. In turn, these category errors lead one to carry misaligned expectations of what the software can do for you. The more one thinks of AI as 'basically human', the more one may start associating other human traits with the software, however (un)warranted. Expectations can be over-inflated, such as when one believes that the AI can autonomously identify and fix any problem you direct it to. They can also be understated, such as if one begins to think that the software would need to be given regular breaks and other employment benefits. Treating software as if it were human is both factually and functionally wrong.

WHY WE GET AI WRONG

The tendency to wrongly attribute humanity to AI, it turns out, is deeply human as well. It is so well-documented in the literature that it goes by different names in different fields. Oxford philosopher David Watson calls it 'AI anthropomorphism'.⁵ Washington University law and computer professors Neil Richards and David Smart call it the 'android fallacy'.⁶ Social psychologists have long termed the folk tendency to see in inanimate objects personalities, wants, and preferences, as a kind of 'dispositionism',⁷ that is, to see a kind of internal disposition towards and against certain things. This is related to the equally well-documented phenomena of humans tending to see faces

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in everything from rocks to clouds and even toast.⁸ The scientific name for this is 'pareidolia'. It happens within milliseconds,⁹ in what Nobel Prize Laureate Daniel Kahneman and his colleague the late Amos Tversky might park under System 1 thinking.¹⁰

It is hardly surprising, then, that we are quick to see faces in AI. After all, 'Artificial Intelligence', read plainly, records humankind's best efforts at synthesising (human) intelligence. Thus, most definitions of AI incorporate some concept of a system that thinks or acts like us. Moreover, often AI makers do not leave pareidolia any work to do. They install AI into overtly humanoid forms. The most prominent example is Hanson Robotics' Sophia, a chatbot to which Saudi Arabia awarded citizenship,¹² which has been criticised as a publicity stunt meant to drum up hype and funding.¹³

Indeed, when it comes to seeing personality in AI, hardware may not be required at all. Just ask Jamie on your nearest government website.¹⁴ Even within technical AI research, computer scientists have taken to using anthropomorphic metaphors like 'neurons', 'attention', and 'memory' to describe what they are building.¹⁵

WHAT'S WRONG WITH GETTING AI WRONG

But why is seeing faces in AI a problem? It is difficult to object to this if we are talking about strong AI. However, today's weak AI systems are most often powered by machine learning (ML) and, contrary to its name, the focus of machine learning is not on any physical 'machine'. Nor does it fully approximate how humans actually learn. Rather, ML involves putting datasets (Excel sheets, if you will) through statistical algorithms—often a great many of them—to compute correlations and factor weights. At the risk of oversimplification, this is linear regression writ large. Seeing faces in Robocop or C3PO is one thing; seeing faces in ordinary least squares is quite another.

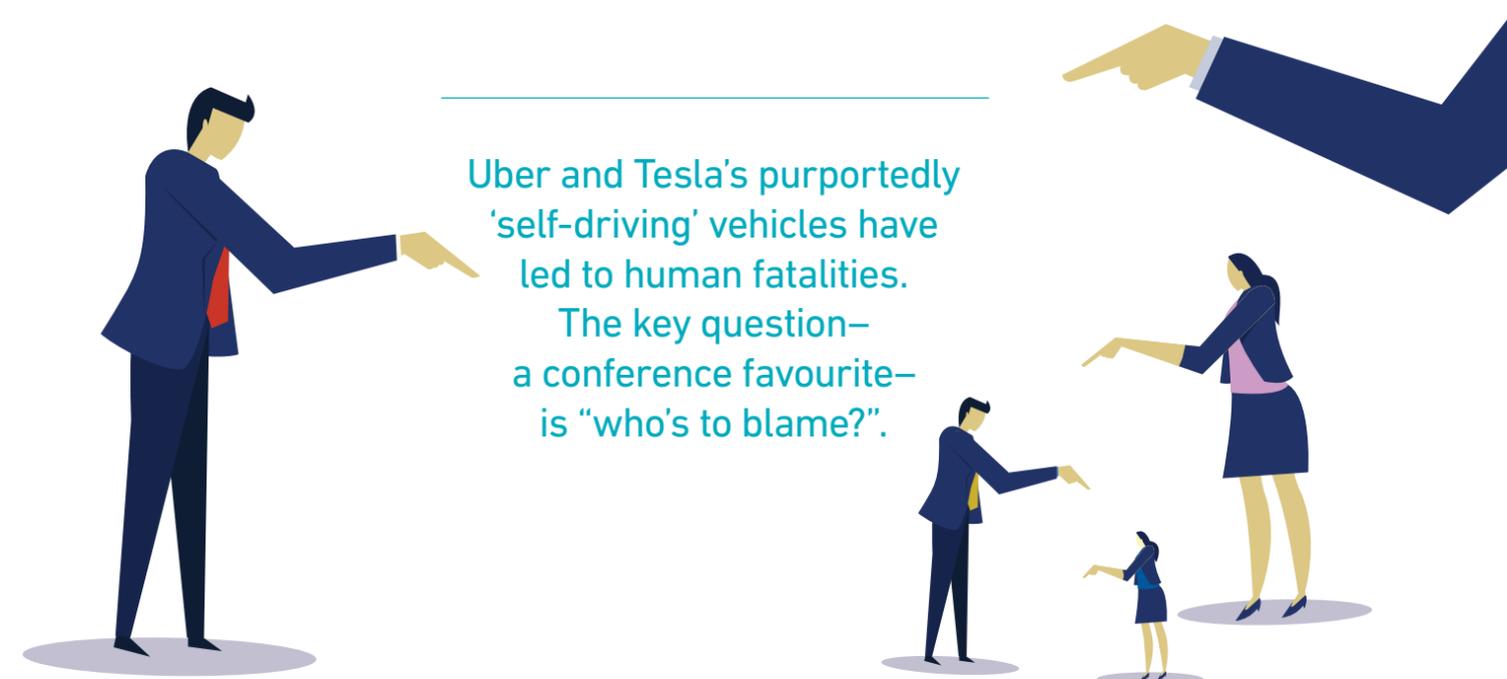
Whenever social scientists and lawyers identify instances of AI anthropomorphism, it is criticised. For instance, Watson calls such rhetoric "at best misleading and at worst downright dangerous".¹⁶ More broadly, social psychologists argue that dispositionism leads us to commit a logical mistake so basic that it is simply called the 'fundamental attribution error'.¹⁷ This refers to a fundamental bias we have towards attributing someone's (or something's) actions to its internal disposition, even when such behaviour may be mostly driven by its external circumstances. Applied to AI, reading too much into the software's apparent personality means we often mistakenly forget about those who have made the software dangerous to begin with: developers, operators, and possibly even users.

Consider in particular questions of moral blame and legal liability for AI-related harm. You would probably know by now that Uber and Tesla's purportedly 'self-driving' vehicles have led to human fatalities.¹⁸ The key question—a conference favourite—is "who's to blame?". And, further, who should pay? Notice how the term 'self-driving' already implies that the *car* has some kind of Cartesian self that might (or should?) be responsible for the entire incident. Of course, cars don't have bank accounts. So it is easy for the parties involved to say, "blame the car, not me". This leads to the convenient result that no actual human

or organisation is at fault, and no one has to pay. Victims are thus left to pick up the pieces.

This is, on quick reflection, hardly a satisfactory result.¹⁹ The crux is that how strong we think the above argument is correlates almost perfectly with how strong we think the car's AI is. If a robotic Arnold Schwarzenegger had indeed been driving, the case is certainly arguable. But if the car's systems had been controlled by a linear regression, or perhaps even a more sophisticated arrangement of statistical algebra, one might probably do a double-take. Should it matter if the algebra had been named 'Harold', or that the company had painted a human face on the car's bonnet?

To illustrate the problem with statements like the "self-driving car caused the accident", consider these alternative examples: the pipe caused the leakage; the toaster burnt the toast; the piano fell out the window; and the gun killed the victim. Each of these statements might be *factually* and *grammatically* correct, but by making an inanimate object the subject of the sentence, we are gently guided towards blaming that object, not its makers and/or users. Because our attributions of moral and legal responsibility are intertwined with and influenced by our assessments of causality, this seemingly innocuous sentence construction that attributes causality to the object holds the power to shape what, and who, we blame for the harms 'it' apparently causes.



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HOW TO MAKE PEOPLE GET AI WRONG

This leads us to a deeper, more concerning issue: our tendency to get AI wrong can easily be manipulated by those who want us to reach a certain conclusion. Where AI is concerned, we are particularly vulnerable to narrative manipulation for three reasons. First, few have formal training on what AI is. Second, our points of reference come from Hollywood and pop culture. Third, AI by definition, *tries* to act and look like us.

For these reasons, it has become fashionable, and likely profitable, for companies to hype up what their AI systems are capable of, in order to manipulate our inner pareidolia in their favour. In February 2022, OpenAI's Chief Scientist Ilya Sutskever tweeted that "[i]t may be that today's large neural networks are slightly conscious". Recall that neural networks are, in essence, a metaphorical description of what essentially are linear algebraic operations. (For those less familiar with vector math, picture computations across multiple Excel data columns.) Coming from a seemingly reputed institution, this comment was quickly picked up by tech blogs and news outlets. *Futurism* published an article titled 'OpenAI Chief Scientist Says Advanced AI May Already be Conscious'.²⁰ The

Daily Mail ran an even more sensational headline 'Artificial Intelligence Expert Warns that There May Already be a "Slightly Conscious" AI out in the World'.²¹

In the eyes of AI experts, however, the claim that linear algebra might be even slightly conscious was strange, to say the least. Meta Chief AI Scientist Yann LeCun disagreed in a direct response to the tweet.²² Criticism on Twitter and elsewhere was so forthcoming that the next day, there was enough material for *Futurism* to publish a follow-up piece entitled 'Researchers Furious over Claim that AI Is Already Conscious'.²³ What these researchers expressed ranged between (sarcastic) dismay at the idea of conscious algebra²⁴ and indignation at AI anthropomorphism being peddled once again.²⁵

But the damage has probably already been done. In an age of misinformation and press sensationalism, executives and corporate decision-makers are probably far more likely to read the initial, viral hype than see any subsequent, technical rebuttal. This is why the false story that Samsung paid Apple a billion dollars in five-cent coins still has its adherents.²⁶ A minute's reflection should have disabused one of this myth, since in many countries it is illegal to pay for anything with more than a set number of coins.²⁷

GETTING THE LAW WRONG TOO

False narratives like this shape the path of the law far more than they should. To see how false AI narratives threaten policymaking around AI, let us first study the relatively simpler case of *Liebeck v. McDonald's Restaurants* in 1994, more widely known as the McDonald's 'Hot Coffee' case. Stella Liebeck was a 79-year-old woman in New Mexico, US, who had been driven by her grandson to a McDonald's drive-through.²⁸ She was served coffee at 190°F (88°C), 30 to 40 degrees higher than that adopted by other coffee vendors. While drinking it in a parked car, she spilled the coffee on herself. The coffee turned out to be so hot that she suffered third degree burns (the most severe kind) and nearly lost her life.

Liebeck demanded that McDonald's pay her medical bills of around US\$20,000. McDonald's counter-offered US\$800, so Liebeck sued the fast food giant. Evidence produced at the trial showed that McDonald's had over the past decade received about 700 reports of people being burnt by their coffee. Nothing had been done. The jury awarded Liebeck US\$2.7 million in 'punitive damages', that is, damages meant to teach McDonald's a lesson. McDonald's appealed, and Liebeck eventually settled the case for less than US\$500,000.

You might have heard of the case before. Only, the version you heard was based on a narrative spun by fast food (and other) companies in the wake of the jury's ruling. The story told was one of how selfish, greedy individuals had been filing frivolous lawsuits against helpless companies in a bid to win million-dollar jury awards, threatening the livelihoods of American businesses and their employees. As the website of the law firm which represented Liebeck explains, "once corporations gained control of the story, Stella Liebeck became a newly-minted millionaire grandmother, who got an easy payday".²⁹

American corporations and their lawyers would spend years running a 'disinformation campaign' about this in order to lobby for laws to be enacted to protect businesses from a 'supposed epidemic of frivolous lawsuits'.³⁰ The news cycle happily amplified this narrative. As University of Oregon law professor Caroline Forell explains, "Twenty-six leading newspapers immediately announced that a woman had won a huge verdict against McDonald's for spilling coffee on herself. The headline for the AP story read 'Woman Burned by Hot McDonald's Coffee Gets \$2.9 Million'. This pithy version of Liebeck's case was repeated over and over by the media."³¹

Having created a public outcry over the apparent problem of frivolous lawsuits, corporate America successfully

persuaded the US Congress to pass laws limiting how much individual plaintiffs could recover from businesses through tort lawsuits.³²

AI is quite different from coffee, but the present discourse and rhetoric over who should be responsible when AI systems 'burn' people follows a similar playbook to what we have seen with *Liebeck v. McDonald's*. We start by twisting facts to portray intentionality on one side and vulnerability on the other. Just as Liebeck was made to look like a greedy, self-interested coffee-spiller, AI systems are clothed with autonomy and self-determination. To the extent that anyone gets hurt, it is because *they* wanted it to be so, not anyone else. Meanwhile, the companies serving the coffee, or building the AI, plead that they are themselves victims of what the former intentionally or recklessly did.

Next, not knowing much about the subject (of either tort litigation or AI systems), the public easily buys into the narrative, not least because it is simulcast everywhere in the news. AI systems are particularly amenable to sensational headlines like those we have seen above, headlines which proudly declare them to be 'slightly conscious', evil, and soon to come for your job.³³

This warped perception eventually percolates into public and policymaker support for laws and regulations meant to address problems which exist more in narrative fantasy than reality. Rather conveniently, these laws also happen to benefit the organisations responsible for spinning the narrative, particularly by shielding them from liability for any dangerous products they serve.

In this light, one wonders how many AI systems today have been, and are being, sold as 'slightly conscious' to would-be clients and/or funders. It is also clear that hyping up one's AI is not just good for the top line. This narrative helps companies avoid liability for what will invariably be described as 'the AI's' actions. To deflect responsibility for harm caused by the AI you made, sold, or used, draw everyone's attention to how autonomous and independent 'it' is. Conversely, if someone else's AI has harmed you, call it out for what it probably is: a linear (or logistic) regression writ large, or perhaps even a collection of if-else statements.

AI systems are particularly amenable to sensational headlines.

At this point, I should admit that when I was still in the business of selling AI to legal organisations, I often analogised the AI systems we were offering to “babies who knew very little about the world except the data we gave them”. I knew this would help with sales, though I also knew it was an imperfect analogy. In my defence, whenever I offered to explain the (undergraduate level) math to stakeholders, I was mostly refused. Only once, I managed to take the client through a brief (one-hour) introduction to statistical learning. I was promptly told that I had wasted their time, as these academic technicalities were irrelevant to the project. Or, as Dr Teddy Oglethorpe tells Dr Randall Mindy in Netflix’s 2021 film *Don’t Look Up*, “Keep it simple. No math.”

BUT IT’S ALL MATH

AI anthropomorphism sells, and given how our minds are wired, it is *easy* to sell. Few want to know the math anyway. Organisations and decision-makers want something that is ‘turnkey’ and can easily be ‘leveraged to deliver synergistic value’. Considering all this, the problem should only persist, with the result that organisations continue to buy AI with over- and also under-stated expectations of what AI will do for (and to) them. So too should we expect legal and regulatory discussions to continue in the language of informal, anthropomorphic metaphors, rather than formal mathematics.

But for those who want better, a useful refrain to keep close to heart is that today’s AI systems are mostly just math. Advanced and sophisticated math, sure, but nothing more than math. The next time someone tries to sell you AI, ask yourself if their math is really as strong, in the Searle sense, as they are making it out to be. Be wary of those who would appeal to your innate pareidolia. In documenting the impact that dispositionism has on us, Harvard law professor Jon Hanson speaks of Tom Hanks’ character in the classic film *Cast Away*, who gets so deeply enamoured with ‘Wilson’, a volleyball with a face, that when ‘Wilson’ gets lost to the tides, it is a tearful moment not just for him, but for the audience as well. So even if you’ve been living on a deserted island, you probably cannot run away from seeing mysterious faces in AI. [AM](#)

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Endnotes

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