Engineering education must also focus on social aspects

By Lim Sun Sun and Roland Bouffanais

IN THE course of his studies, every engineer encounters – and attempts to solve – the travelling salesman problem. In essence, this is an optimisation challenge that involves helping an itinerant salesman visit a series of towns by covering as short a distance as possible, and without visiting any town twice.

What is truly fascinating about this decades-old puzzle is the clash between the utter simplicity of its formulation, and the sheer complexity of identifying the solution, especially when considering a large number of towns. Beyond the headaches this problem has caused engineering students, it has spawned considerable innovation in the fields of discrete optimisation and programming. On these rest the well-oiled supply chains, delivery services and manufacturing processes so essential to our lives today.

Although no educator will deny the elegance and importance of the travelling salesman problem, it runs the risk of being the overriding paradigm that courses through an engineer's educational experience – one that prizes, above all else, efficiency, resource minimisation, and speed.

Certainly, salesmen should cover as much ground as possible, and with the least distance expended (especially in the interest of minimising carbon emissions). However, even as students continue to grapple with the intricacies of this travelling salesman-constraint optimisation quandary, engineering education needs to be balanced by a growing focus on the human and social aspects of the landscape in which engineers operate.

> "Even as we drill into our engineering students the virtues of resource optimisation, we must also vest them with a broad grounding in the humanities and social sciences."

Bear in mind that in 2018, our proverbial salesman need not actually travel, and that even if he does, it would not be to sell products or services. After all, the wonders of connectivity have liberated salesmen from having to cover any ground at all. Drones can deliver products, sensors can collect data, and apps can communicate presence.

Nevertheless, the salesman should and must travel so as to appreciate the contours of the areas he is serving and more crucially, to build social capital with the people constituting these communities. He must interact with them to understand their traditions, norms and values, and to grasp what binds them, so as to engender a sense of trust between his company and the community. Better yet, he should visit each town more than once to nurture these links he has forged, and to empathise with their struggles!

Critically therefore, we need to sensitise our next generation of engineers and technologists to the social, cultural and political dimensions that exist in defiance of the rational, Cartesian, calculated planning undergirding technological systems. Consider how Amazon's AI (artificial intelligence) recruiting tool taught itself to reject women candidates because the historical data on which it was based was stacked against women to begin with.

Or mull over how Uber drivers in London and New York colluded to simultaneously log out of the app, thereby tricking the system into offering surge pricing. As such incidents amply demonstrate, neat algorithmic logic is often upended by the messy realities of society.

Furthermore, the ethical conundrums emerging around AI, machine learning and the growing shift towards Big Data necessitate greater social awareness among the technologists who are forging and moulding such digital and physical infrastructures. If history teaches us anything, it is that engineers and innovators often hold overly optimistic views of the impact of their inventions, without fully grasping their unintended consequences. For instance, Facebook was conceived over a decade ago on the premise that it would be a powerful platform to bring humanity and communities together. Of late though, this social network has fuelled intense polarisation among people in many countries around the globe, and become a key node in the spread of online disinformation.

ETHICAL PRACTICES AND PRINCIPLES

Felicitously, institutions such as the Massachusetts Institute of Technology are investing heavily in research and education on the ethical and responsible development of technology. Similarly, Mozilla's Responsible Computer Science Challenge will grant up to US$3.5 million to educators who creatively infuse computer science education with a deeper focus on ethical practices and principles. At the Singapore University of Technology and Design, 22 per cent of the engineering and architecture students' curriculum is dedicated to social sciences and humanities electives. Such strategic commitments can help ensure that our engineers of tomorrow do not have blind trust in the wizardries of technology, but can think critically about what the future holds if the humanity of our humble salesman takes the back seat.

Prime Minister Lee Hsien Loong has made a call for Singapore to expand its pool of engineering talent by heightening the profession's appeal. Several initiatives have been introduced including the revamp of salary structures and the introduction of the Public Service Commission's engineering scholarship. However, we must pay attention not only to the quantity but also the quality of engineers, by ensuring that they benefit from a well-rounded educational experience.

Hence, even as we drill into our engineering students the virtues of resource optimisation, we must also vest them with a broad grounding in the humanities and social sciences. Equipped with this wider perspective, they can be more conscious of the ethos, logos, and pathos that influence how people interact with each other, and with the technologies that pervade their built environment.

Time-honoured values such as inclusiveness, fairness, accountability, transparency and trust must not be laid at the altar of efficiency, where engineers seek only to minimise the paths we take. Indeed, the travelling salesman requires more than just a clever GPS, he needs exposure to disciplines such as anthropology, history, literature, philosophy, psychology and sociology to fully comprehend what makes people and communities throb.

And one last thing – since our need for diversity in the technology sector has never been more pressing, how about we solve the travelling salesman problem instead?

The writers are both faculty members at the Singapore University of Technology and Design. Professor Lim Sun Sun is head of humanities, arts and social sciences and a Nominated Member of Parliament. Roland Bouffanais is professor of engineering and director of graduate studies.

Make cultural institutions accessible so more can benefit

By David Fleming

MOST people throughout the world never visit cultural institutions such as museums or the theatre. And yet, very often, these institutions are paid for or are subsidised heavily from the public purse. Which means that everyone is paying for them, but that too few are using them.

Not unnaturally, this is a cause of consternation, especially to politicians who authorise public spending, and who are under increasing pressure to deliver public services effectively and efficiently. Why, one might ask, are cultural institutions funded by all of us, when only a minority of us actually use them?

In the UK, we have seen free public libraries come under great pressure, and many have closed their doors, or have restricted opening hours, or are managed by volunteers rather than by qualified librarians.

This is a situation that calls into question what we might mean by "civilisation". How can a civilised society restrict access to libraries (or museums, or theatres etc)?

So, partially in order to prevent attacks on their (public) funding, partially because most people working in the cultural sector have a belief in the value of what they do, cultural institutions all over the world are trying to behave in ways that make them more useful (that is, more popular) with more people; it is, for some, a question of becoming more popular, more accessible, or of disappearing.

This approach – of becoming more popular in order to forestall reductions in public funding – has been characterised by some as an obsession with "bums on seats" at the expense of artistic integrity. Indeed, this is a complex issue, full of argument and polarised opinions.

For example, some cultural institutions attract mainly tourists. This might make them popular in terms of absolute number of users, but it doesn't necessarily mean that they are popular with, or valued by, local people.

ENGAGING THE PUBLIC

So what is happening, worldwide, is that cultural institutions are working hard to connect with people (not just tourists) by working with community and other interest groups, partially because they are under pressure to provide public value (or else), and partially because this is exactly what they wish to do. This means that homeless groups, groups representing people with disabilities, or other marginalised people, are increasingly being incorporated into the work undertaken by cultural institutions, as the latter work to engage with the bulk of society rather than merely with the better-educated, wealthier minorities to whom they have appealed traditionally.

At National Museums Liverpool in the UK, we increased our annual attendances from 710,000 per year in 2001 to 3.5 million per year in 2017 on the same budget. We achieved a massive increase in local participation through schemes such as the House of Memories programme, the essence of which is to link museum collections with those responsible for caring for the increasing number of people who live with dementia. This is an issue that is of growing significance all over the world, and is becoming the single major financial burden to all societies. It makes sense, therefore, for museums to use their collections both to engage with local people at the same time as helping to reduce the social and economic costs of ageing.

This is the accessible museum in action. The House of Memories programme has already been rolled out to other museums in the UK, and is currently under development in the USA.

Also in Liverpool, in 2007, we created the International Slavery Museum; our intention was overt right from the start. The museum's job is to increase awareness of the transatlantic slave trade at the same time as fighting against human rights abuses around the world, whether that be the use of child labour, or the plight of those working in domestic servitude, or racism in its many guises. These are important contemporary issues, and it is necessary for accessible, diverse museums to engage with them, however challenging such work can be.

This is the nature of change in the cultural sector; if anyone wishes to know how cultural institutions can broaden their appeal and their impact (and, therefore, their "value for money"), the answer lies in the willingness of these institutions to become more accessible to the diverse audiences who make up the public. Gone are the days when it was enough to superserve elites – we all have to be accessible nowadays.

The writer is professor of public history at Liverpool Hope University. He is a leading authority on inclusivity in museums. He is also president of the Federation of International Human Rights Museums.

Is corporate governance in Singapore on a downward trajectory?

More discussion about investor protection and minority shareholder rights is needed. **BY MAK YUEN TEEN**

ON Dec 5, the Asian Corporate Governance Association (ACGA) released the 2018 edition of *CG Watch* which covers 12 Asian markets. The report includes a "top-down" market survey undertaken by ACGA and a "bottom-up" environmental, social and governance (ESG) survey of companies by CLSA.

This survey now uses seven categories that are broadly based on the different stakeholders in the corporate governance ecosystem. They are "Government and public governance", "Regulators", "CG rules", "Listed companies", "Investors", "Auditors and audit regulators" and "Civil Society and media". The "Regulators" category is further divided into "Funding, capacity building, regulatory reform" and "Enforcement". These seven categories replace the five "thematic" categories of CG rules and practices, enforcement, political and regulatory environment, accounting and auditing, and CG culture, that have been used since the first survey in 2003.

Other than the changes in the categories, there are also changes in the number of questions used and scoring rubric compared to 2016. This means that the 2018 scores are not comparable to the 2016 scores.

With Australia now formally included in the ranking rather than merely for benchmarking in 2016, Singapore's ranking has fallen to third. Without Australia, Singapore would have been pipped by Hong Kong this time round. In 2016, Singapore was ranked ahead of Hong Kong and behind Australia.

Australia is well ahead on its own with an overall score of 71 per cent, even though it had its problems in the banking sector. Some way behind Australia is a cluster of other countries, each separated by an overall score difference of 2 per cent or less. In descending order, these are Hong Kong (60 per cent), Singapore (59 per cent), Malaysia (58 per cent), Taiwan (56 per cent), Thailand (55 per cent), and India and Japan (54 per cent). Another cluster comprising Korea, China, Philippines and Indonesia follows, with Korea the best of them with a score of 46 per cent. Malaysia is the greatest improver, moving from seventh to fourth, while Japan fell from fourth to seventh.

ENFORCEMENT OVERSIGHT

The fact that Hong Kong and Singapore now permit companies to list with dual class shares (DCS) has weighed down their scores. DCS runs counter to certain fundamental corporate governance principles so a negative impact on the scores is not surprising.

For Singapore, the report said: "Singapore has … suffered reputational damage due to DCS, while policy contradictions abound in other areas, such as its new CG Code. Underperforming on enforcement despite the creation of a new regulatory entity under SGX. A series of corporate scandals have highlighted the weaknesses of its CG regime and limitations on minority shareholder rights."

Some may quibble about whether the ranking fairly reflects the quality of corporate governance here compared to other markets and grumble that the overall summary of our current state is too harsh. I would say that there has been increasing dissonance in recent years among international investors and stakeholders I have met about the true quality of corporate governance of listed companies here. This is something that I have rarely encountered in the past, when a mention of "Singapore" used to be almost automatically greeted with commendations about its high standards of corporate governance.

Corporate governance problems here are now much more than just an "S-chip" problem. We have seen foreign listings that are not S-chips, such as Noble Group and YuuZoo, large local companies such as Keppel Corp and Singapore Post, and smaller local companies such as Datapulse Technology and Trek 2000, running into significant corporate governance problems. Add to that the number of contentious delistings, the questionable quality and poor performance of many recent IPOs, and certain companies using defamation suits against shareholders or being highly antagonistic towards shareholders at AGMs, it is difficult to put up a convincing case that we are as good as we used to be.

Meanwhile, other markets such as Malaysia and Taiwan seem to have greater momentum and appetite for improving corporate governance. The report warned that fast movers such as Malaysia may soon catch up with Hong Kong and Singapore – after all, it is just a percentage point behind the Republic now. There are a number of areas that Malaysia excels in, such as well-structured mandatory and continuing training for directors, strong enforcement by the stock exchange and securities regulator, an active retail investors body that participates actively in AGMs, and healthy board renewal. Taiwan has mandatory online electronic voting for all listed companies and strengthened investor protection through its Securities and Futures Investor Protection Centre which helps mediate disputes and litigate on behalf of investors, with funding provided by the stock and futures exchanges, securities firms and futures firms.

A series of corporate scandals have highlighted the weaknesses of Singapore's CG regime and limitations on minority shareholder rights. FILE PHOTO

Let's look at the seven categories and see where we are found wanting, and possible areas for improvement. While Singapore is one of the markets lauded for its public governance, legal system and judiciary under "Government and public governance", with an overall fourth-place ranking, contradictory government policy on CG weighed down its ranking in this category. This is partly due to the "DCS" effect. The DCS factor also negatively impacted the second category of "Regulators", but in addition, other countries such as Hong Kong, India, Korea, Malaysia and Thailand are seen to do better in terms of funding for, and capacity building by, the securities regulator.

Singapore does lack a separate securities regulator unlike most other markets, and funding for the securities regulation function that currently resides within the Monetary Authority of Singapore is not known. It is also important that other regulators such as SGX Regco, Commercial Affairs Department and Corrupt Practices Investigation Bureau are adequately funded. As the market develops and grows, it is important that the mandate and capacity of the regulators keep pace.

Securities regulators and stock exchanges are also seen to have done relatively better in Korea, Malaysia and Thailand when it comes to regulatory reform, which the report attributed partly to better funding.

When it comes to enforcement by the securities regulator and the stock exchange, Singapore is ranked around the middle among the 12 markets. Enforcement is an area that requires urgent attention in Singapore in my view. Enforcement is obviously also dependent on whether regulatory agencies are adequately funded. Hopefully, recent regulatory action in the Noble Group case is a sign of enhanced enforcement across the whole market.

In terms of CG rules, Singapore is ranked sixth and one of four countries singled out for good ESG and sustainability reporting standards. There are rules in place for many of the key areas mentioned, but disclosure of executive and director remuneration and share pledges by controlling shareholders (other than pledges tied to change of control covenants in debt agreements, for which disclosure is already required) are some possible areas for improvement. Further, while we have strict rules on disclosure of price-sensitive information in place, compliance with these rules in practice leaves much to be desired in my view – with companies often making incomplete or inaccurate disclosures which are then "clarified" without any apparent repercussions.

In the "Listed companies" category, Singapore is ranked joint second with Thailand, behind Australia. This is based on an assessment of CG reporting by a sample of large- and mid-caps and therefore may not reflect practices in the entire market. The positive ranking is somewhat tempered by the statement that "with the exception of Australia, scores in this category were more mediocre than we expected".

LIMITED IMPACT

The "stand-out underperformer" among all categories in the survey is "Investors". This is largely because very few asset owners and managers take their ownership responsibilities seriously, with Australia being an exception. While many markets have introduced stewardship codes, Hong Kong and Singapore are singled out for being two markets where regulators or other national bodies have not actively promoted their adoption by institutional investors. This assessment squares with my own views about the limited impact of the stewardship code in Singapore. Herein lies part of the answer as to why the "comply or explain" approach to improving corporate governance has not worked well in Singapore and many other markets – the lack of institutional investor activism.

The category of "Auditors and audit regulators" is usually the area where Singapore hits it out of the park. While this is the category that has consistently elicited the highest scores in many markets, the report made it clear that this has more to do with regulation rather than audit quality itself. Other markets are catching up or have caught up with us in key areas such as convergence with international accounting standards, long-form auditor reports and independent audit regulator. In fact, the report has now placed us third in this category, behind Australia and Malaysia. It is unclear whether increased regulation has resulted in an increase in audit quality. Public criticism and public sanctions against auditors of listed companies are still relatively rare in Asia. This contrasts with the more developed markets such as UK and US where the performance of individual accounting firms, including the Big 4, is publicly highlighted.

Finally, for "Civil society and media", Singapore is ranked fourth, behind Australia, India and Japan. The emergence of other not-for-profit organisations holding listed companies accountable, such as a "corporate watch" body, a domestic proxy advisory firm focusing on small caps, or an investor protection body that litigates on behalf of aggrieved investors, would in my view be welcome additions to our corporate governance ecosystem. However, the risk of the media, commentators and civil society organisations being sued for defamation by companies and boards may well limit their role in improving corporate governance.

Overall, there are some areas where we appear to have gone backwards. In other areas, other markets have caught up or overtaken us either because we have remained static or others have more momentum.

One key message in the report is that while a belief in transparency and accountability remains largely intact in the region, some markets are showing a striking lack of interest in fairness. This could well apply to Singapore, with the move towards DCS and very little discussion about investor protection and minority shareholder rights.

The writer is an associate professor of accounting at the NUS Business School where he specialises in corporate governance. The views in this article are his personal views.