

ENGINEERING AND ENTREPRENEURSHIP: IS IT AN OXYMORON?

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TAN SRI ENGR. DR FRANCIS YEOH

A civil engineer, Tan Sri Francis took over the running of YTL in 1988 and grew it into a global conglomerate comprising of six listed companies, with a combined market capitalisation of over RM30.9 billion and assets of over RM45 billion as at 31 August 2011.

Ranked as one of "Asia's 25 Most Powerful and Influential Business Personalities" by Fortune and Business Week, he is Founder Member of Malaysian Business Council and Capital Markets Advisory Council; and Member of Asia Business Council, London Business School, Wharton School and INSEAD.

He was the Judging Chairman of this year's Ernst and Young World Entrepreneur of Year in Monte Carlo; having been Entrepreneur of the Year for Malaysia in 2002.

A firm believer in Godly stewardship, Tan Sri Francis champions YTL as a force for good. He advocates environmental conservation and clean renewable energy, serving on Nature Conservancy's Asia Pacific Council. He is also Regional Chairman of International Friends of the

Louvre and the primary driving force behind Kuala Lumpur Performing Arts Centre.

In recognition of his many endeavours, Tan Sri Francis was awarded the Commander of the Most Excellent Order of the British Empire (CBE) by Her Majesty Queen Elizabeth II in 2006.

In 2010, he was made 'Primus Inter Pares' Honouree of the Oslo Business for Peace Award by a panel of Nobel Laureates, for actively advocating socially responsible business ethics and practices. He is also recipient of the Corporate Social Responsibility Award at the 2010 CNBC's Asia Business Leaders Awards.

Tan Sri Francis is holder of an Honorary Doctorate of Engineering from University of Kingston (UK), his alma mater.

He married Puan Sri Dato' Paduka Rosaline in 1982. They have 3 sons and 2 daughters.

SYNOPSIS

What good are ground-breaking engineering technologies and innovations if they hardly make it to the market and few benefit from them?

In this year's Professor Chin Fung Kee Memorial Lecture, Tan Sri Dr Francis Yeoh examined the complex correlation between engineering and entrepreneurship, arguing that they are intertwined but by no means easy bedfellows.

Contending that engineering carries its true worth only if it could be capitalised upon to help transform and better societies and individuals, the acid test he applies for all engineering is practical application, commercial viability and long term sustainability.

Tan Sri Francis enlightened the audience on how YTL became a conglomerate spanning 10 different engineering-based industries. How by sticking to its core competencies in engineering, YTL first became a pioneer in construction innovation and eventually, assumed the role of trailblazer in many of the industries it expanded into.

He revealed the rationale, criteria and process that YTL uses to earmark and adopt engineering technologies to ride with and excel in. Which, invariably, are always in concert with commercial savviness and solid business fundamentals. He also revealed how YTL capitalises on engineering competencies to shape, drive and scale respective YTL businesses.

The world will never know just how many ground-breaking technologies and innovations in history failed to see the light of day, because the engineers who invented them were not entrepreneurial or business savvy. For this reason, Tan Sri Francis argued: "Engineering and Entrepreneurship: it is not an Oxymoron".

1.0 INTRODUCTION

The best engineering feats and inventions transform human lives. Like electricity! We cannot imagine a world without it. Michael Faraday could never have conceived the impact of his electric motor upon all of civilisation after him. The challenge of developing sustainable energy is perhaps one of the most important goals for engineers today, precisely because of our dependency upon electricity.



Picture 1: Michael Faraday delivering Christmas lecture at the Royal Institution in 1856

(Source: Online and widely reproduced)

1.1 Main Argument

There is a subject vital to all great engineering innovations and inventions. A subject that many engineers do not take seriously enough and at their loss. It is 'Entrepreneurship'!

How many engineering ideas throughout history do we know that never came to being but could have made a difference to our world? We do not know, because they never came to being.



Picture 2: Is it always just an idea too far?

(Source: 'Metropolis 2106' by Nils Seifert at <http://thmc.deviantart.com/art/Metropolis-2106-34982873>)

If we had one drop of water for every bright idea and product that never made it, it would fill an entire ocean. Each one of these unfulfilled potentials is a missed opportunity to make a difference. If we value our profession and calling as engineers, this fact should eat into all of us.

It is my desire to affirm the engineering profession, especially as a trained civil engineer. Our passion for engineering is to be applauded. Our passion is God-given, noble and necessary. However, let me argue that engineering carries its true worth only if it could be capitalised upon to help transform and better societies and individuals. That is why we need entrepreneurship!

"Entrepreneurship is the act of being an entrepreneur, which can be defined as one who undertakes innovations, finance and business acumen in an effort to transform innovations into economic goods *at the right time*."¹ Whatever engineering technology, tool or even idea both past and present, the fact that we know about it, could see it, study it and use it – is because of entrepreneurs.

What do I mean? Someone has a bright engineering concept. But it takes an entrepreneur to put resources together to see this concept come to being. Therefore, we need entrepreneurial instinct. The vision to bring a common good into fruition. The smartness to use what is available. And the common sense to market products and services using the best marketing platform.

That is the story of Steve Jobs or Bill Gates!

Engineers should be entrepreneurial! Or, at the very least, appreciate its importance.

Naturally, we cannot all become Steve Jobs. We cannot all be engineering giant, innovative entrepreneur and marketing guru at once. However, we could all learn to identify market trends, tap commercial opportunities and adapt to complex business environment. Because at the end of the day, we want our engineering products and services shared by all, and be true to our calling.

In the humblest sense, this is YTL's story.

¹ Italicised words added by Tan Sri Francis Yeoh. ("Entrepreneurship" in Wikipedia.com).

2.0 ENGINEERING PEDIGREE

I am glad my father, Tan Sri Yeoh Tiong Lay is present in this lecture here this morning. In his days as Managing Director, my father was an ardent advocate of new ideas and technologies, and understood their importance. However, without sufficient training in engineering, my father had difficulties adapting to changing skillsets, methods and technologies. That was why he insisted my siblings and I pursued engineering degrees in the United Kingdom. Only then we can we come back, change the industry and make a difference.



Picture 3: Tan Sri Yeoh Tiong Lay (second from right) planning for the development of Kuala Selangor in the 1950s (Source: YTL)

With our university training in engineering, combined with my father's sharp entrepreneurial instincts, the YTL Group learnt to marry engineering with entrepreneurship. That was why we pursued many blue oceans and achieved many 'engineering firsts' in Malaysia! Needless to say, that also is why our acid test for all engineering is practical application, commercial viability and sustainability. Moreover, we always stick to our core competencies in engineering.

This morning, I will use some of our case studies to highlight the important entrepreneurial lessons we have learned.

3.0 CONSTRUCTION



Picture 4: Architect's drawing of The Capers in Sentul (Source: <http://www.capers.com.my/>)

3.1 Speed and Slip Forming Building Method

In construction, speed is the essence! There is an inherent commercial logic in expediting projects. In the 1980s, YTL was competing with Japanese construction firms that had both size and clout. We felt we could take them on. So we adopted the innovative 'slip forming building method'. It was safe, reliable and fast! Very quickly, it became the determining factor between us and our Japanese competitors.

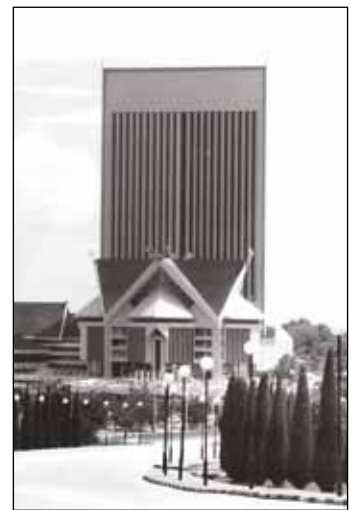
3.1.1 Seven-Days a Floor

With Slip Forming Construction, we were able to create 7-days a floor cycle, compared to others' 21-days a floor cycle. In other words, Japanese engineers took 3 times longer to erect one floor compared to YTL.

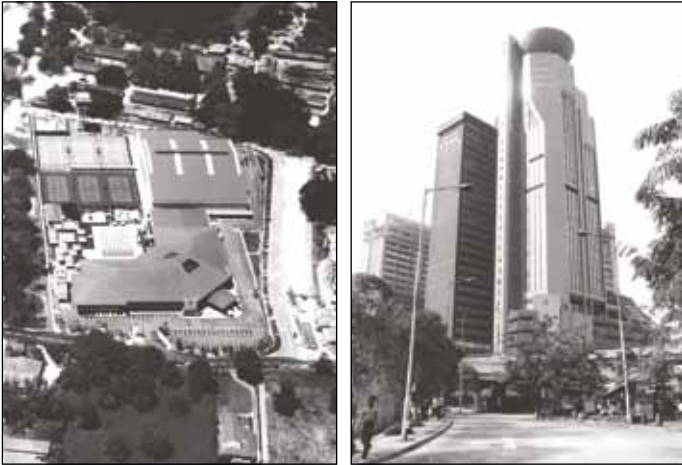
Comparing our building of the Malaysian Airlines System Headquarters and theirs of the Shangri-la Hotel, and all happening opposite each other, we shot up, whilst they languished behind. The Japanese engineers were stunned, because they cannot believe we could beat them. They eventually started studying our methods.



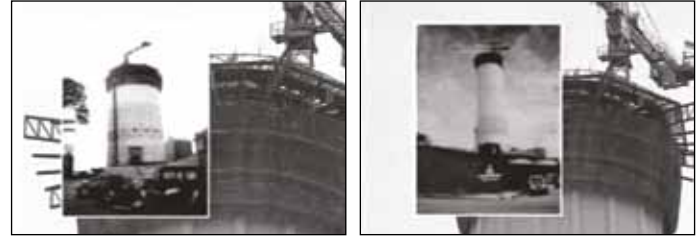
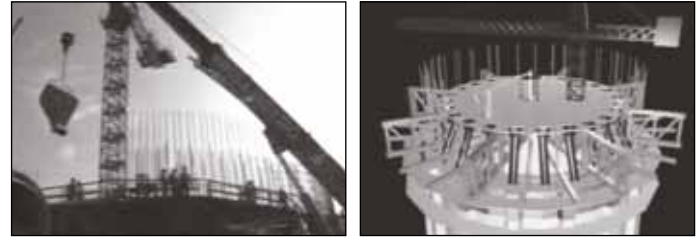
Pictures 5 and 6: Former Malaysian Airlines Systems Building and Shangri-La Kuala Lumpur (Source: Online and widely reproduced)



Pictures 7 and 8: Istana Hotel Kuala Lumpur and Majlis Perbandaran Shah Alam (Source: YTL)



*Pictures 9 and 10: Raintree Club and UMBC Tower Annex
(Source: YTL)*



*Pictures 11.1 to 11.8: Building of KL Tower
(Source: YTL)*

3.1.2 Synergy with YTL Cement

We took full advantage synergising our construction strengths with our cement division. Our quality ready-mixed concrete was an engineering prowess that gave us leverage, cost efficiency and of course, more speed. YTL Cement was responsible for the major pouring of KL Tower and Kuala Lumpur Convention Centre.

Buildcon (a subsidiary of YTL Cement) holds the Malaysian record for continuous production, delivery and placement of concrete for raft foundations of the Petronas Twin Towers.

- a) Raft 1 – 6580 cubic metres in 50 hours
- b) Raft 2 – 6500 cubic metres in 41 hours

*Feature 1: YTL Cement’s record breaking involvement in the building of Petronas Twin Towers
(Source: YTL)*

3.1.3 Flexible Working Hours

Another non-engineering factor also counted against Japanese firms. Changes in Japan’s labour laws meant Japanese companies were forced to operate only from 9.00 a.m. to 5.00 p.m. YTL capitalised on this and worked 24 hours to speed up projects.²

In property development, it is always financially more lucrative if contractors could handover finished products on time or earlier. YTL delivered projects on time and earlier. Subsequently, we won more high-rise building contracts from hospitals to office buildings and of course, the KL Tower.

The KL Tower was erected with phenomenal speed. Using slip form, the concrete shaft of the KL Tower which stands at 360 metres, took only 4 months to build.



*Picture 11.9: Using slip form, the concrete shaft of the KL Tower which stands at 360 metres, took only 4 months to build
(Source: YTL)*



3.2 Key Entrepreneurial Lesson 1

‘Be Faster Than Your Competitor!’

- a) YTL Corporation Berhad is the first ‘construction contracting’ company listed on the Kuala Lumpur Stock Exchange (now renamed Bursa Malaysia).

² YTL does not condone exploitation of labour, nor does the company allow for labour practices that jeopardise the health and safety of its employees. In the 1980s, it acted within the purview of existing Malaysian Labour Laws that permitted 24-hour construction work. Thus, gaining strategic upper-hand over Japanese construction firms that were not permitted to do the same.

- b) First construction contracting company to use the 'turnkey concept' in Malaysia, winning the first turnkey contract in 1983 to build the 750-bed General Hospital at Kuala Terengganu. This particular contract was tendered internationally and YTL faced stiff competition from Korean, Japanese and Western contractors. The company won with a competitive bid that promised the same high construction standards but with lowest-cost per hospital bed. This was not only achieved, the hospital completed 5 months ahead of schedule.
- c) YTL also introduced 'nucleus hospitals' to Malaysia based on UK National Health Service's nucleus hospitals. After Kuala Terengganu General Hospital, YTL built another 12 nucleus hospitals throughout the country with 2458 beds in total, and maintaining the same cost-efficiency.

Feature 2: More facts on YTL's construction contracting

(Source: YTL)

4.0 POWER (ONE)

4.1 Innovation and Independent Power Producer (IPP)

Allow me to set the record straight on our IPP story, because it epitomises my argument to you this morning.

YTL's investment in IPP projects was a game-changer. But we did not benefit from lucrative government subsidies like many assumed. Malaysia had a major blackout in 1992.³ The blackout caused much embarrassment, as well as anxiety to the government because it eroded investors' confidence in Malaysia. Seeing the opportunity, and knowing its success elsewhere, we asked the government to allow YTL to generate power privately. We received the green light to build and operate two gas-fired power plants, and YTL became Malaysia's first independent power producer.

We have never built power plants before. But as engineers, we know how to build. We leveraged on our expertise. Our 1,212 MW combined cycle gas-fired plants were built in world record time of 22 months (14 months ahead of schedule). And we started operations much earlier. We also tapped Petronas' Gas. Petronas was openly flaring away the gas extracted from their oil drilling stations.



Picture 12: Paka Power Station

(Source: YTL)

We used Siemens' technology which was reliable. Siemens were also very good in sharing their technology and knowledge with us. The projects were completed on budget and 40% cheaper than any power plants previously built in Malaysia.

4.1.1 Financial Innovation

It is important to note that YTL financed the IPP with its own funds. And because we did not believe in borrowing heavily, we had to invent measures to ease our financial burdens. That was how many of our financial innovations and blue oceans came about.

- a) YTL became the 1st Asian IPP to introduce indigenous Ringgit-denominated project financing, setting the project template for subsequent IPPs in Malaysia. This proved very critical. Many Asian projects suffered throughout the Asian Financial Crises because they were financed in US Dollars. Many of the loans borrowed from Asian companies were also short term deposits. YTL was not badly affected by the Asian Financial Crises.
- b) At the time, Malaysia only had 5-year bonds. YTL successfully persuaded EPF (KWSP) and created the 1st ever long term 15-year bond. In the process, we created a very viable and liquid bond market. Our logic was simple. Projects like IPPs are long term. So long term infrastructure projects should be financed by long term money like savings and borrowings. Long term bond markets are common sense. Not short term money like short term loans or deposits.
- c) We pioneered the concept of Infrastructure Project Company (IPC) listing on the KL stock exchange. YTL Power was the 1st IPC to be listed in May 1997. From this listing, YTL Power raised RM2.1 billion, out of which it retired a RM1.6 billion floating rate note with a bank at 14% interests.

YTL made RM200 million in the first year of our operation by finding a solution to the problem of high gearing and also by being determined to remain a genuinely independent power producer.

Let me stress this point. None of the world's best technology or the world's fastest ever built power plant would have mattered, if YTL went bankrupt in the process.

4.2 Key Entrepreneurial Lesson 2

"Adopt Sustainable Financing!"

5.0 POWER (TWO)

5.1 Building Experience

There are also two very satisfying outcomes from our IPP projects.

- a) As a result of our engineering expertise in building, operating and maintaining power plants, YTL Power Services now manages an Operations and Maintenance (O&M) Portfolio of 6,500 MW in Malaysia, Singapore, Indonesia and Lebanon. Our engineers also travel around the world building and servicing Siemens plants. We have worked on new Siemens power projects in almost 30 countries

³ On 29 September 1992, Malaysia suffered a long and total power blackout caused by lightning striking a transmission facility and causing a rolling failure in the transmission and distribution system ("Power outages in Malaysia", in *Wikipedia.com*).

including Saudi Arabia, Korea, Egypt, Syria, Nigeria, UAE, New Zealand and Australia.

- b) The Malaysian IPPs gave YTL sufficient experience and confidence to invest globally and to expand in the energy sector. To date, with its operations globally, YTL Power is an integrated energy company. This includes Jawa Power in Indonesia, PowerSeraya in Singapore and ElectraNet in South Australia.



Picture 13: YTL Power Services engineer hard at work
(Source: YTL)

6.0 RAIL

6.1 Managing Costs and Express Rail Link (ERL)

YTL owns and operates the KLIA-Express and KLIA-Transit, sitting on top a premium 57 km high speed rail link between KL Sentral and KLIA. Yet, ERL charges RM35 for one journey on board the KLIA-Express when similar services globally charge way more than that. How is that possible?



Picture 14: ERL Fast Train
(Source: YTL)

The reason is simple! We built the rail link at RM35 million per kilometre, whilst others did not. Many had costs escalating over RM120 million per kilometre. When something is built expensively, invariably the cost is transferred to the consumer. Or, in many cases, when companies struggle financially or go bankrupt, the costs end up being absorbed by governments. This means that in turn, taxpayers suffer!

	RM	US\$	€	£
KLIA Express	35	10	8	5
Heathrow Express	91	27	22	14
Hong Kong Airport Express	70	21	14	11

Feature 3: Ticket Prices of Major Airport-City Express Trains
(Source: ERL)

6.2 First Rate Express Train and Service

- a) Using reliable Siemens trains, ERL became the fastest rail service in Malaysia. It takes only 28 minutes to get from KLIA to KL Sentral, with 99.7% punctuality.
 - Since the service was launched, 30 million passengers have sat on it.
 - ERL is also the 1st standard gauge rail system in Malaysia.
- b) The train is highly energy efficient, environmental-friendly with no gas emission, and has very low noise levels.
 - Every year, our trains help take the equivalent of 3.5 million cars off the roads. We believe, the lower our costs, the better they are for our finances and consumers.
- c) However, we never compromise on quality and that is why we use the best Siemens' trains.

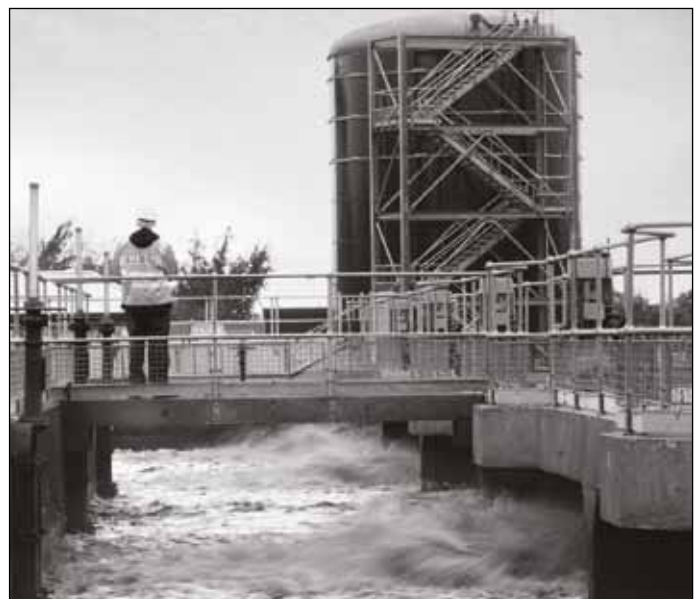
6.3 Key Entrepreneurial Lesson 3

“First Class Services at Third World Prices!”

7.0 WATER AND SEWERAGE TREATMENT

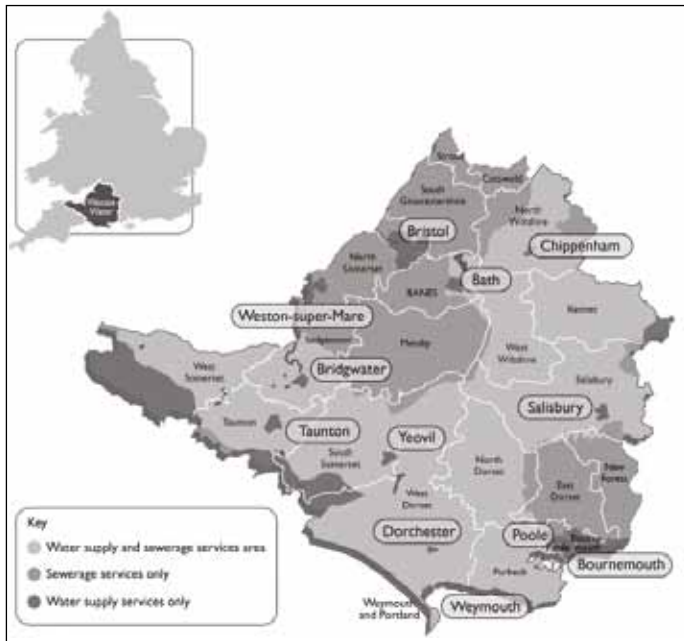
7.1 ICT Management and Wessex Water

Wessex Water has helped YTL to expand engineering expertise in water and sewerage treatment. We could deploy our skillsets and knowledge to build and operate water treatment facilities anywhere. However, our greatest challenge is managing this £9 billion asset.



Picture 15: A Wessex Water sewerage treatment facility
(Source: Wessex Water)

Wessex Water serves an area of the south west of England covering 10,000 square kilometres. We supply on average of 360 million litres of water each day to 1.2 million customers. This involves 105 water sources, 110 water treatment plants, 197 pumping stations, 368 service reservoirs and over 11,000 kilometres of mains.



Picture 16: Wessex Water region
(Source: Wessex Water)

- a) With advanced treatment techniques, automation, state-of-the-art control and monitoring systems, operations are supervised by only 50-60 people through Information and Communication Technologies (ICT) and the internet.
- b) Our Wessex Staff at the Claverton Down Control Centre could detect changing quality of the water in household pipes only by looking at their monitors. They could shut off entire catchment areas within minutes to avoid contamination.
- c) Claverton Down Control Centre staff could preamp water crises, prevent wastages, and accurately calculate water consumption and revenues.
- d) Wessex Water maintenance engineers communicate principally through laptops, mobile internet and satellite navigations. They are mobile and hardly have to visit their offices. As such, the company’s rate of efficiency in dealing with customer complaints is the highest. Customer satisfaction is also the best in UK.



Picture 17: Claverton Down Control Centre
(Source: Wessex Water)

- e) Wessex Water has been the number one water company in the UK for the fourth year running. When YTL acquired Wessex Water, it was languishing at 5th place in the UK.
 - When Wessex Water was named ‘Utility of the Year 2011’ for its continuous top performance and high standards of customer service, it topped OFWAT’s new Service Incentive Mechanism – which assesses company performance - for all areas of customer service and it continued to deliver high standards of customer satisfaction with 98% of customers who contacted the company rating its service as good or very good. It has consistently outperformed regulatory requirements and topped league tables assessing operational performance ranging from drinking water quality to compliance with environmental standards.
- f) In view of its ‘green initiatives’, Wessex Water is also the first water company in UK given the Queen’s Award for Enterprise in the Sustainable Development category in 2008.

I have said in the outset, engineering is meant to transform and better human lives. In Wessex Water, ICT and water treatment engineering have a symbiotic relationship. Not only are our customers happy with Wessex Water, our Wessex Staff love to work there.

Technology takes the heat for us, so that we could pursue a better quality of life. Now, just imagine if Wessex Water has the benefit of the most advanced nationwide 4G mobile internet network that we already enjoy here in Malaysia through YES.



Picture 18: Water Awareness Programme
(Source: Wessex Water)

7.2 Key Entrepreneurial Lesson 4

“Use ICT to manage and value add to the business.”

8.0 COMMUNICATIONS

8.1 Digitalising the Future and YES 4G

I have spoken many times on the importance and power of the internet. Let me share it again here because this is a powerful message that does not seem to register fast enough with many of us.



Picture 19: YTL Communications’ YES Logo
(Source: YTL)

8.1.1 Palaeolithic Cave Drawings

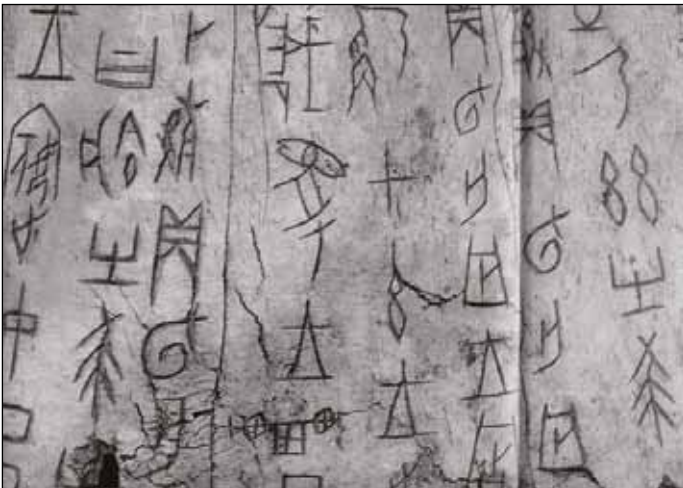
In Lascaux, south-western France, there are a number of 17,000 years old Palaeolithic cave drawings demonstrating hunting methods, much like instruction manuals. Successful hunts not only ensured tribes' survival but strengthened them one against another. In fact, this knowledge transfer on walls spawned civilisations.



Picture 20: Palaeolithic cave drawings in Lascaux
(Source: Online and widely reproduced)

8.1.2 12,000 Characters

With 12,000 characters copied onto tortoise shells and bamboos and later, paper, the Chinese spread their influence and dominated much of the world for 4,000 years. It was the world's largest economy until the 1800.



Picture 21: A Shang Dynasty oracle inscription on tortoise shell or 甲骨文 'Shell Bone Writing'
(Source: Online and widely reproduced)

8.1.3 26 Characters

However, with 26 characters, the Roman alphabets, the West conquered the world and gave us the Enlightenment, scientific and industrial revolution, and world imperialism – even invading China in the process.

Notably, they had books – printed on Johannes Gutenberg's printing machines from the 1440s. Including, the world's first printed Bible – Gutenberg's first major printed work. Knowledge and information disseminated with books that easily travelled everywhere. Not surprising, much of the technology of engineering mushroomed in this period.



Picture 22: The Intervention of the Sabine Women by Jacques-Louis David
(Source: Online and widely reproduced)



Picture 23: Johannes Gutenberg (1400-68), inventor of printing, examines a page from his first printing press – the technology that enabled both the Reformation and the Enlightenment.
Photograph: Hulton/Getty
(Source: Online and widely reproduced)



Picture 24: The Gutenberg Bible [Latin Vulgate. Ca. 1455]. Rare Books Division. From the Lenox Library
(Source: Online and widely reproduced)

8.1.4 0 and 1 (Binary Numbers)

Today, with just two numbers, 0 and 1, all of civilisation's knowledge is digitalised and squeezed into computers. With the internet, the power of civilisation could literally be at your fingertips.

8.2 Key Entrepreneurial Lesson 5

History reminds us when there is technology, individuals and societies progress.

“But those who are more successful in harnessing and capitalising on available technologies, will progress faster.”



Picture 25: Binary Numbers. Image Code: G94-165219.
Photographer: Carol and Mike Werner
 (Source: <http://www.agefotostock.com>. Rights managed)

8.3 Information and Communications Technology and Engineering

Most things today are driven by Information and Communications Technology (ICT) and disseminated over the internet. That is where engineering is heading!

For example, construction designs are more accurately drawn up using 3D engineering software than hand drawn. Later, the designs could be sent via email and read on an iPad, instead of on rolls and rolls of scribbled large papers that construction engineers have been used to.



Picture 26: Bird Island Zero-Energy Sustainable Home Designs by Graft Lab Architects designed for YTL's urban renewal 'Green Home Competition'

(Source: <http://www.designboom.com/weblog/cat/9/view/5244/bird-island-project-by-graft-architects.html>)

8.3.1 SMART Engineering

A smart engineer would use computer technology to advance his ideas, products and services, but also employ the internet fully to communicate and sell them. Overheads are not only lower, he could also reach a global audience and market far beyond his own geography.

Today, engineering that we could learn at universities are now available online. Found on Google search or iTunesU. Steve Jobs envisaged all that. That is why his most successful product is the iPad – essentially a portable mobile device that brings the internet to the user with ever greater ease.

That is what ICT really means. The Technology of Information and Communication, or put differently, the technology of 'communicating information'. Information has to be communicated fast. Because speed gives you competitiveness. Speed is the essence!



Picture 26: Apple's iPad2
 (Source: Online and widely reproduced)

8.3.2 SMART Mobile Internet Network

However, what good is a mobile device if the mobile internet network cannot carry it well? Especially, when there is no decent bandwidth?

At YTL, we not only know that, we created the solution for it.

a) Internet for All

In the late 1990s, together with many people, we persuaded the Malaysian Government not to censor the internet – to keep it free and vibrant. The internet must be an ecosystem that Malaysians could tap to better themselves.

b) YTL e-Solutions

We invested in technology incubators and listed YTL e-Solutions. We then invested in EXTIVA, a Voice Over Internet Protocol (VOIP) services. Even then, we already understood 'Digitalisation'. Using the Clarent Gateway, and by converting analogue to digital, we made considerable profits in the process. We even helped bring down IDD calls by 94% and mobile phone calls down by 50%!

c) YES 4G Mobile Internet

When the Malaysian Government issued the 4G license to YTL, we were blessed with the most powerful opportunity to transform ourselves and this country. We invited engineers from silicon valleys to come to Malaysia to build the *world's first ever nationwide 4G mobile internet network and ecosystem*. It is now a reality!

YTL Communications' YES 4G offers powerful bandwidth with speed, to access chunks of information over the internet throughout the country from north to south.

YTL has hot-spotted the country. Literally making it possible for civilisation to be placed at our fingertips anytime and anywhere – but only in Malaysia at present. In every sense, we have enabled the iPad or any smart mobile device to fulfil their genuine potential – true mobility riding on a powerful 4G mobile internet bandwidth. That is our contribution to ICT!

d) Broadband in the Tropics!

YES was recently awarded the global 'Best New Service' at the Broadband InfoVision Awards 2011 in Paris.

A recent International Data Corporation (IDC) study of the Malaysian mobile communications sector also indicated that the advanced nature and seamless connectivity of YTL Communications' WiMAX-based YES 4G network has superseded its Western counterparts. YES 4G comprised unique features and services not currently available anywhere else in the world. IDC added that the "YES 4G network is perfectly designed to meet the demanding explosion in mobile data usage, and is a model wireless network for the future."⁴

Essentially, we have made YES 4G very affordable so that Malaysians can enjoy our network to become the next innovators – the next owners of Alibabas, Facebooks, Twitters and YouTubes.



Picture 28: Jacob Yeoh, Deputy CEO of YTL Communications receiving the award from Gavin Whitechurch, Director of Broadband World Forum 2011
(Source: YTL)

8.4 The Power of Digital Economy

There is intense competition in the internet/ICT world. You have to become competitive and market-savvy online in order to sell one's products and services.

The internet is a realm of speed, efficiency and also 'smartness'. It requires much more thinking to convince the rest of the world that one's products and services are worth the purchase. Even if you have the best engineering product or service.



Picture 29: Closure Notice at Borders Bookstore, Oxford
(Source: <http://blog.quintinlake.com/2010/01/29/the-death-of-the-book-borders-bookstore-in-oxford-closed-and-apple-ipad-launched/>)

However, the alternative, a reluctance to embrace both the digital and internet challenge, either out of ignorance, laziness or for whatever reason is in my opinion – unwise!

Look at Borders Bookstore. They recently went bankrupt. Yet, Amazon is going strong. The internet has given Amazon the flexibility to function, coordinate and operate, that physical bookshops cannot do.c.

And just a few days ago (8 November 2011), Baidu (China's biggest search engine) reports a profit surge of 80% in the third quarter, USD295 million in 3 months. They must be getting something right.

8.5 Key Entrepreneurial Lesson 6

The digital economy powered by the internet is no longer an option to ignore. Businesses must have their presence on it and capitalise on what it has to offer. It is the smartest engineering technology to date and all engineers must capitalise on the internet and mobile internet to advance.

“Capitalise on mobile internet technology and the digital economy to advance engineering businesses!”

9.0 CONCLUSION

Let me conclude by leaving you with two arguments:

9.1 Be Business Savvy Engineers!

I am not suggesting that entrepreneurs are more important than engineers. Nor am I asking engineers to quit engineering in order to go into business.

I was told that too many young people are not going into engineering, but into investment banking. There is more money to be made there. Then again, the recent crisis in Wall Street shows that *financial engineering is not real engineering*.

As engineers, our profession is based on substance. We build and create using what is real and tangible! Much of financial engineering is based on clever manipulation of facts and statistics, if they are not lies i.e. selling to people what does not exist.



Picture 30: About two thousand peaceful protesters filled St. Paul's Square next to the London Stock exchange, protesting against the wrongs of the global banking system on 15 October 2011

(Source: <http://dalje.com/en/foto.php?id=19&rbr=23845&idrf=941457>)

⁴“Case Study: YTL Communications' 4G WiMAX Network,” INSIGHT, Volume 1, March 2011 (International Data Corporation).

Of course, many forego engineering dreams for investment banking or other professions, because engineers are not paid well. Engineers are often forced to compromise on standards and quality for the sake of a better living.

This is unfortunate. And that is why I believe it is so important for engineers to be business savvy. They must be business equipped! The best engineering in the world will sell. We just need to learn how to do so.

9.2 Epitome of Beauty

Steve Jobs mentioned that one of his inspirations for making his devices was admiring the beauty and intricate details of civil engineering, especially European bridges and the Eiffel Tower. Their inherent beauty grips his imagination.

When he asked his engineers what was ugly about the mobile phone, they said 'buttons'. He instructed them to find a solution and to make mobile phones beautiful. As a result, we now have 'touchscreens'! Gone are ugly mobile phone buttons!

In fact, most smart devices these days have touchscreens. The touchscreen has become a standard. A prerequisite for any mobile device seeking to be rendered beautiful and 'smart'. All because of beautiful bridges and the Eiffel Tower!

I wish to encourage our Malaysian engineers to take pride in what they do. Please excel in your profession and skillsets, and light up the world by contributing to engineering achievements that will last a few civilisations.

Do not compromise and produce cheap, tatty and uninspiring engineering work!



Picture 31: Eiffel Tower by Ed O'Keeffe
(Source: <http://www.edwud.com/tag/eiffel-tower>)

9.3 Summary

The engineer-entrepreneur is not an oxymoron! Entrepreneurship has and will always be the facilitator of grand engineering becoming real before our eyes.

Put simply. We do not all have to be Steve Jobs. We cannot all be like Steve Jobs. But at the very least, we Malaysian engineers could be using our iPads; selling engineering products and services online via Alibaba.com; twittering to everyone that we have the next engineering sensations; and all the while riding on YTL's YES 4G – the fastest nationwide mobile internet in the world.

That is being a smart engineer! ■