



Firstly, I would like to express my appreciation for the warm welcome. It gives me great pleasure to be back here again at UCSI University.

I was given the honour here last year where I spoke extensively on leading through innovation. And while today's topic differs greatly, I must stress that the need to lead and innovate applies more than ever as we prepare ourselves for the Fourth Industrial Revolution or Industry 4.0 – a revolution that will change society, economy and life as we know it.

The theme of this conference 'Shaping the Malaysian Industry for the Fourth Industrial Revolution' is of utmost urgency for Malaysia to address the impact of the revolution on our industry, economy and the competitiveness of the nation.



STI and the Fourth Industrial Revolution

A revolution is defined as a forcible overthrow of the current order in favour of a new system. The world has undergone revolutions in the past – all driven by the disruption through technology which led to growth and innovation.

The first industrial revolution was brought upon production powered by steam and water engines, second was driven by electricity energy and the third through electronics and information technology.

The fourth Industrial revolution is predicted to be unlike anything humankind has experience before in terms of its scale, scope and complexity. It will bring convergence of science, technology and innovation that changes the way we live, work, communicate and collaborate with one another.

The 4th IR has set tipping point in science, technology and innovation towards unprecedented advances. This fusing of the physical, digital and biological world is a hallmark of the fourth industrial revolution and it is impacting all disciplines, economies and industries, and even challenging what it means to be human.

Recent years have seen the advent of driverless cars such as Google's Chauffeur; IBM's Jeopardy beating computer; Watson; Baxter; a programmable robot and detailed knowledge of the human genome providing new avenues for advances in medicine and biotechnology.

Impact of Fourth Industrial Revolution

The impact will bring disruption in reshaping the manufacturing sector – long regarded as the backbone of the Malaysian economy. The manufacturing sector has a long and dominant history in the Malaysian economy. From a humble beginning in the 1960's industrialization era, it is now the largest economic sector, accounting for RM69bn and contributing around 23% to Malaysia's GDP



However, there is a strong need for our manufacturing sector to evolve to higher value add in order to remain competitive. Globally, the manufacturing sector is rapidly transforming with the advent of the fourth industrial revolution.

Breakthroughs in artificial intelligence, robotics, the Internet of Things (IOT), autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing are propelling the manufacturing sector towards greater productivity and efficiency.

Smart factories in which machines are augmented with web connectivity and integrated to a system that can visualize the entire production chain and make decisions on its own is now a reality.

The fourth industrial revolution holds both promise and peril for humanity. For example, with the rise of robots and 'thinking machines', how will future jobs be impacted? Automation will be the major disrupting factor that makes stable middle-class job obsolete. The role of the worker will no longer be sacrosanct with the rise of smart factories. In fact, it will be greatly diminished – or even made redundant.

To make things clear, let us take a look at the \$80 billion-a-year sports shoe industry that is dominated by Adidas and Nike. For decades, manufacturing has been offshored to countries like Malaysia, Indonesia, China and Vietnam in efforts to save production costs. But as labour becomes more expensive in developing nations, firms are turning to Industry 4.0 to revolutionise their operations.

Adidas recently launched the Speedfactory in Germany – a smart factory that is virtually fully operated by robots and virtual computer modelling systems. Employing additive manufacturing or 3D printing, the factory creates around 160 production jobs, compared to thousands at a typical offshore factory in Asia. Classified as a top secret facility, little is known about the smart factory apart from the fact that it can go from design to production immediately, shortening the supply chain and manufacturing time tremendously.

For now, Adidas has said that the Speedfactory will complement its existing Asian operations and not compete with them. But as 3D printing advances and overheads rise, how long will it be before conventional factories are overruled in favour of the smart variants? And when that happens, what happens to the workers who are currently employed?

“ The goalposts have changed. Change is already here and more uncertainty will come. Talk to the mainstream media and taxi companies in Malaysia for clear views of the changes. Clarion calls have been alerted to our industry – manufacturing and services which have served as the backbone of the Malaysian economy ”

What happens first in manufacturing will spill over in time to the services sector as new technologies that combine the physical, digital and biological spheres become more functional and ubiquitous. And when that happens, we will be forced to change the way we perceive work. We may even be forced to change the way we interpret life.

In 2013, a study by Oxford University estimated that up to 47% of jobs in the US would be at risk from automation. Another survey in 2015 by McKinsey & Co showed the stark truth only 48% of the US's 300 manufacturing leaders considered themselves ready for Industry 4.0. If the world's leading economy and its industry champions are playing catch up, what about the rest of the world? Where exactly does Malaysia stand?

I am often asked if Malaysia is ready to embrace the fourth industrial revolution. In my view, the question should instead be, “What are we doing today to ensure that Malaysia succeeds in the fourth industrial revolution?”

Talent for the Fourth Industrial Revolution

When it comes to implementing ideas and creating value to realise innovation, the key factor is people at the heart of global networks. People are the prime movers of innovation. As such, I cannot over emphasise talent development.

I have told this on many occasions and I will state it here again, the new economy will be knowledge-driven and innovation-led, fueled by a robust Science, Technology, Engineering and Mathematics (STEM) talent.

The line between man and machine is getting blurred in this new revolution. According to the World Bank Group, two thirds of all jobs could be susceptible to automation in developing countries in the coming decade. Another estimate by Forbes stated that 47% of US jobs are at risk from automation.

The requirements of jobs are shifting into expert knowledge versus catering for physically demanding roles. Machines are expected to fully take over the cumbersome, dangerous and routine tasks as they would be able to deliver greater productivity and efficiency.

As for the role of people, how would this change in the new operating landscape? Their responsibilities will increasingly shift to knowledge work, process control and decision making.

In the Agriculture sector for example, with the advancement of connectivity and technology, we now have “telephone farmers” where sensors are being deployed to measure water tank levels or the amount of moisture in the soil. All this data is streamed to the cloud and farmers can access it through their mobile phone.

The Fourth Industrial Revolution will take farmers into an unprecedented new world where agriculture activities feed on data from GPS services and sensors to give farmers information on rainfall, crop yield, pest infection, and soil nutrition. This will result in better productivity and less waste of resources.

As such, to work in the agriculture sector does not mean that one has to be a farmer. Instead there is a need for sensor specialists, network engineers or biotechnology experts.

Emerging technologies and new operating systems require the development of a knowledge based, high skilled talent pool.





Having the best technologies or the fastest internet connection would be meaningless if we do not possess the right talent to harness them.

While the Internet is a powerful enabler for people to connect and collaborate, we cannot stop at only developing infrastructure but must invest in ensuring that people are empowered through knowledge, creativity, skills, networks, values to bring about disruptive innovation. Higher education must purposefully facilitate this.

According to an Infosys survey in 2015 of young people in nine industrialised nations, 70% reported being prepared to learn a whole new skill-set to get a job. Do our young people have the same attitude?

Young people are open to change and are prepared to embrace the idea of on demand learning and personal flexibility but they must be rightly facilitated and nurtured to acquire the knowledge, skills and experience needed to succeed in the fourth industrial revolution.

The workforce of 2050 will be made up of today's Generation Z (or, Gen Z), the post millennials and Generation Alpha (Gen Alpha) comprising those born from 2010 onwards.

Technology is a defining factor of Gen Z and Gen Alpha. Gen Alpha is predicted to be the most formally educated generation ever, the most technology supplied generation ever and the generation with the greatest wealth at their disposal.

“ In order to remain competitive, our industries must embrace industry 4.0 and our talent must move to the knowledge paradigm. This calls for shaping of a new mindset and sharpening of skillsets. ”

When they enter the workforce, spatial cognition, robotics, and artificial intelligence would be common place.

Are our youth and young children being prepared for this future now? Will what they are being taught or learning today be relevant then?

In the book, 'The Industries of the Future', the author Alex Ross emphasises the importance of investing in nurturing a creative and entrepreneurial spirit among the young generation. We need them to become job creators not just job seekers.

However, does our system support risk taking? Are those who fail encouraged to learn from mistakes, improve and not quit? We need such an ecosystem to enable STI based start-ups to flourish. Institutions of higher learning have a very important role to play in shaping young people for the future of learning and

the future of work.

This is perhaps the reason President Obama challenged US educators to go beyond measuring students cognitive ability to assessing if they possess 21st century skills such as problem solving, critical thinking, entrepreneurship and creativity.

We need to invest in nurturing the workforce of the future, in particular by developing science, technology, engineering and mathematics (STEM) talent. It has to be talent by design and not by chance.

The Fourth Industrial Revolution Calls for Collaboration

This is the age of collaboration. The premise of control and conquer is no longer relevant. Today it is about platforms, networks and connectivity in a shared value ecosystem.

The rise of the collaborative economy is demonstrated by examples such as Uber, the world's largest transportation company, Airbnb, the world's largest hotelier, Alibaba, the world's largest retailer and many others.

The information and communication technology (ICT) revolution has made the collaborative economy not only possible, but economically viable. ICT has enabled effective engagement and collaboration to form mutually-supporting, value-creating systems.

Ultimately, the collaborative economy is a socio-economic system built upon resource sharing in supply and value chains that empower all participants in the quadruple helix through ICT-enabled networks to produce high value-added goods and services.

As we usher the fourth industrial revolution, we need to synergise the different aspects to deliver value for the nation and people. We need dynamic collaborative platforms across sectors and regions to generate impact.

The theme of this conference that focuses on strengthening industry-academia partnership is much needed. We must foster closer linkages for demand-driven R&D and market driven delivery system.

In a recent study mandated by the National Science Council chaired by the Prime Minister, the Academy of Sciences Malaysia and the National Professors Council proposed collaborative networks as the mechanism to leverage new economic opportunities in emerging markets.

The benefits of collaborative networks are multifaceted such as breaking down traditional barriers to interactions; creating new markets for our innovation; enabling development of new knowledge; sharing of knowledge leading to the formation of knowledge clusters; enabling non-conventional institutional arrangements that defy traditional hierarchies among others.

“ The new economy that underpins the fourth industrial revolution has brought about a paradigm shift from being resource focused to being knowledge intensive; labour intensive to high skilled talents, requiring control to requiring collaboration; vertical to horizontal trust orientation; mass production to mass customization; proximity focused to location becoming less significant, rigidity to flexibility and knowledge transfer to knowledge sharing. ”

Three key success factors for collaborative networks to drive value creation are leadership, effective collaborative strategies and knowledge intensiveness.

We need to ensure an enabling ecosystem for Malaysia to prosper in the fourth industrial revolution. This requires everyone to come together and play their part. Communication

and collaboration must become the order of the day.





Navigating Malaysia to thrive in the Fourth Revolution

We need to raise our game to be competitive. Knowledge is the currency of the new economy.

As such, in order to bring the Malaysian economic sectors to the next level, we must ensure the proliferation of knowledge intensive enterprises that leverage on science and technology. This will ensure disruptive innovation by our enterprises.

Under my leadership, I am positioning the Ministry of Science, Technology & Innovation (MOSTI) to be the backbone for Malaysia's sustainable economic growth as we navigate through the fourth industrial revolution.

MOSTI through the Academy of Sciences Malaysia is also developing a National STI Master Plan that would serve as an overarching Strategic Plan for STI in the nation over the long term from 2020-2030. Such an STI Master Plan would articulate the vision, targets, policy measures, mechanisms and synergistic action plans across all ministries and sectors to advance STI in Malaysia.

It would be a crucial governance tool to harmonise, consolidate, and focus all of the nation's STI related initiatives in consonance with the national aspiration to become a high income, developed nation with an innovation-led economy.

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SIRIM Berhad, an agency under MOSTI is facilitating SMEs through advisory services and assistance. SIRIM has carried out a technology audit on 360 SMEs and has found that most of these companies were still at the Industry 2.0 level. The company has since introduced new processes, technology and products to about 60-70 of these companies to help them move forward.

Believe me when I say, Malaysia has all the right components to ride with the giants in the current wave of the Fourth Industrial Revolution. We have a talent base, infrastructure, funding system and natural resources.

In shaping a Malaysia of tomorrow, firstly, the old mould of

thinking and working must be cast away. As Albert Einstein once said, "We cannot solve problems by using the same kind of thinking we used when we created them".

The challenge is to migrate to the new way of doing things rapidly enough and increase innovation capacity to create significant impact.

With that, I would like to wish you all success in your deliberations at the conference and once again thank UCSI for inviting me. Thank you.