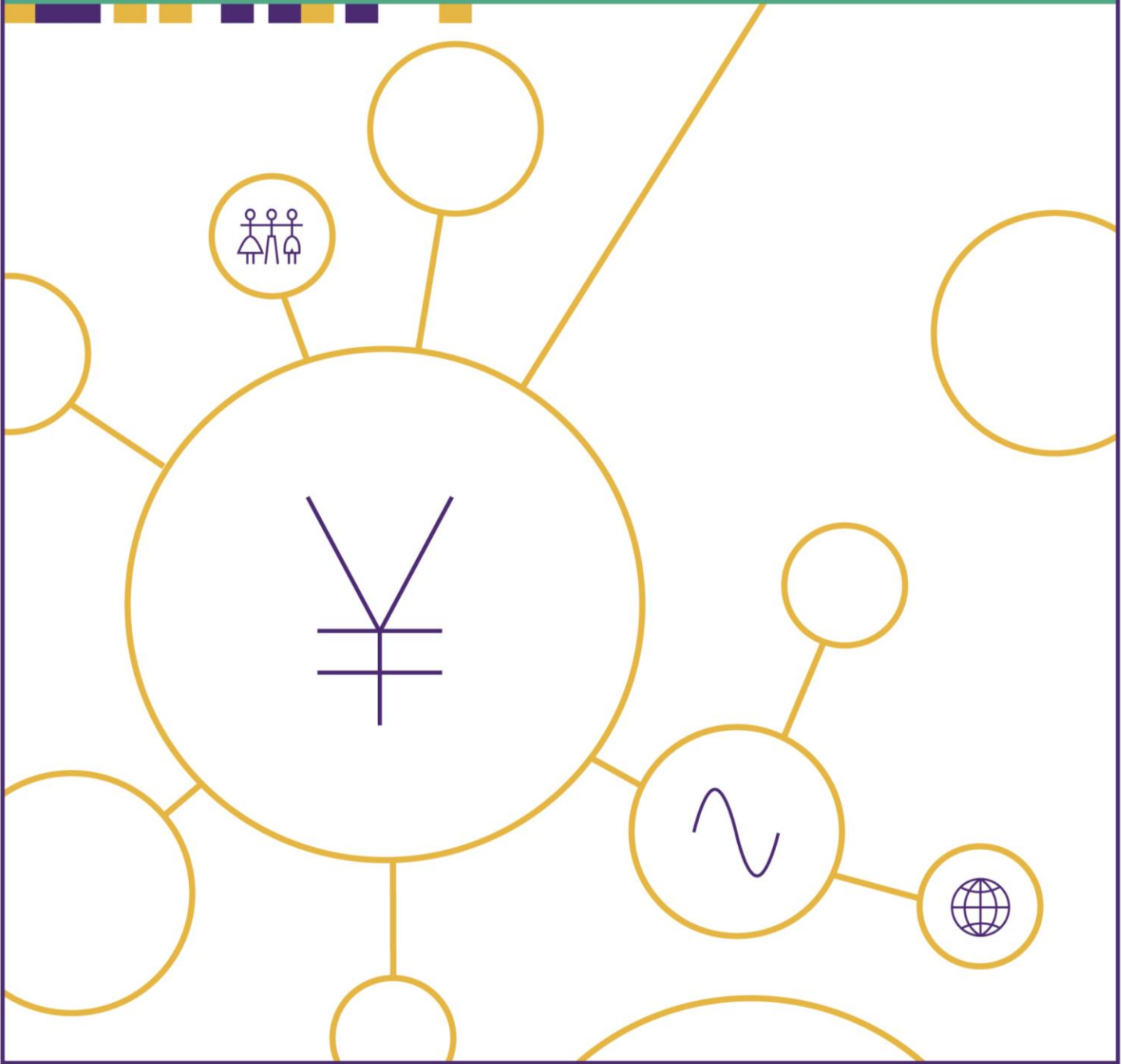


ECONOMY CLUSTER FINDINGS

THE FUTURE OF ASIA: IMPLICATIONS FOR CANADA

THE
FUTURE
OF
ASIA



Government
of Canada
Policy Horizons
Canada

Gouvernement
du Canada
Horizons de politiques
Canada

Canada

Table of Contents

INTRODUCTION	1
KEY CHANGES IN ASIA (INSIGHTS)	3
ASIA IS RISING	3
RISE OF THE ASIAN GIANTS	3
NEW EMERGING CONSUMER CLASS	4
ASIAN ECONOMIC LEADERSHIP	4
THE NEW DIGITAL ECONOMY	5
DIGITAL INFRASTRUCTURE 3.0	5
JOB UNBUNDLING	6
RISE OF ASIAN VIRTUAL SERVICES	7
THE COLLABORATIVE ECONOMY	8
OWNERSHIP UNBUNDLING	8
IP, FRUGAL INNOVATION AND TRADE	9
ECONOMIC CHALLENGES	10
POLICY CHALLENGES AND OPPORTUNITIES FOR CANADA	12
A NEW ECONOMIC CENTRE	12
DIGITAL INFRASTRUCTURE 3.0	12
CANADA'S DISRUPTED LABOUR MARKET	13
TAXATION PRESSURES	14
TRADE DILEMMAS	14
POLICY LEVER PRESSURES	15
REFERENCES	16

NOTE TO THE READER

This draft Economics Cluster Foresight Study explores key changes in Asia and related policy challenges and opportunities for Canada. The key changes are in the form of “insights”, which identify existing and emerging developments that may significantly alter the system under study. Insights help build our understanding of how an issue or system may evolve and what the consequences might be. A policy challenge or opportunity is an issue that current policies or institutions may not be ready or able to address. Identifying, analyzing, debating and clarifying challenges or opportunities help policy makers develop more robust strategies.

Part of the Horizons Foresight method also involves the exploration of plausible scenarios and the identification of robust assumptions. These are included in the MetaScan on “The Future of Asia” which integrates the high level insights and policy challenges and opportunities from all four cluster studies (economic, energy, geostrategic, social).

The key changes and potential policy challenges and opportunities explored in this study are intended to be provocative in order to stimulate thinking among public servants about the future. They do not reflect a view of the *most likely* shape of change in Asia or consequences for Canada, but rather plausible developments that merit consideration. While this study’s development involved participation and contributions from officials across multiple departments within the federal public service of Canada, the contents of the study do not necessarily reflect the individual views of participants or of their respective organizations.

PH4-149/2015E-PDF

978-0-660-03317-4

© Her Majesty the Queen in Right of Canada, 2015



Introduction

For most of human history, Asia was the center of the global economy. In the next 10-15 years, Asia will likely reclaim this distinction from the West. Over the same period, it is anticipated that technological innovations such as cheap virtual telepresence, artificial intelligence (AI), robotics and additive manufacturing will begin to strongly affect domestic and international economies. Concurrently, socio-economic changes driven by the sharing economy, growing use of digital services and the increased use of freelancing will dramatically change the nature of work. The interaction and interplay between these co-occurring forces of change – a rising Asia, the collaboration economy and an emerging digital economy – will have widespread impacts on global economic institutions and markets. Existing notions about the centrality of the U.S. to the global economic order, the autonomy and independence of Canada’s service economy and the viability of revenues for government operations may have to be modified or rejected.

The following table summarizes the key economic changes (insights) that are shaping Asia and the potential policy challenges and opportunities for Canada addressed in this study.

KEY ECONOMIC CHANGES IN ASIA (INSIGHTS)

ASIA IS RISING

RISE OF THE ASIAN GIANTS: In 2030, Asia will house three of the world's four largest economies.

NEW EMERGING CONSUMER CLASS: By 2030, Asia will have more consumers than the rest of the world combined.

ASIAN ECONOMIC LEADERSHIP: Asian businesses may determine the shape of global economics – drive innovations and set standards – with different rules and conventions than the West.

THE NEW DIGITAL ECONOMY

DIGITAL INFRASTRUCTURE 3.0: Massive and growing investments in digital infrastructure are positioning Asia to capitalize on growing technological trends and in so doing, dominate the global digital economy.

JOB UNBUNDLING: Job unbundling will drastically reshape the global service economies, and will hasten the convergence of global wage rates to the advantage of Asia.

RISE OF ASIAN VIRTUAL SERVICES: As the Asian manufacturing sector evolves, surging Asian participation in the global service sector may dramatically re-shape the provision of virtual services.

COLLABORATIVE ECONOMY

OWNERSHIP UNBUNDLING: The rise of the collaborative economy and ownership unbundling in Asia may significantly disrupt established government regulations, taxation, and traditional business models.

IP, FRUGAL INNOVATION AND TRADE: The rejection of customary western intellectual property agreements in Asia and the widespread adoption of frugal innovation may combine to threaten existing trade agreements, intellectual property laws, institutions and traditional high margin industries.

ECONOMIC CHALLENGES: The rapid adoption of new digital technologies in Asia and the emergence of a digital economy could lead to extended periods of economic disruption and possibly deflation.

POLICY CHALLENGES & OPPORTUNITIES FOR CANADA

A NEW ECONOMIC CENTRE: As Asia becomes the world's new economic center of gravity, Canada will need to further shift focus from trade with the U.S. to take advantage of growth in Asia.

DATA INFRASTRUCTURE 3.0: Canada will need to prepare itself to ride the next generation of digital infrastructure that will be the highways and railways of the 21st century.

CANADA'S DISRUPTED LABOUR MARKET: The impacts of technology (automation, 3D printing and AI), the unbundling of work and the emerging virtual service economy combine as a triple-threat to Canada's labour market.

TAXATION PRESSURES: The capacity of governments to redistribute wealth under the current taxation model is limited when confronting a disrupted labour market and the sharing economy.

TRADE DILEMMAS: Canada faces new challenges on the trade front as trade in services and digital trade of goods and services deepen their contribution to the economy.

POLICY LEVER PRESSURES: Government has traditionally had specific policy levers at its disposal, but this may be challenged by limitations driven by structural changes to the economy.



Key Changes in Asia (Insights)

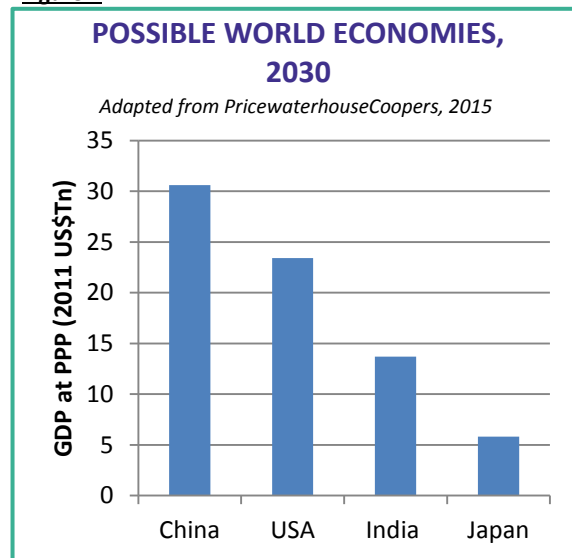
ASIA IS RISING

By 2030, Asia could be the world's new economic center of gravity. With some of the world's largest economies, an emerging digitally connected consumer class and world-leading corporations innovating to meet their needs, the rise of Asia could reorient markets and reshape the very nature of the global economy.

Rise of the Asian Giants

In 2030, Asia will house three of the world's four largest economies. China's GDP exceeded that of the U.S. in 2014¹ by purchasing-power parity (PPP), and it is projected to surpass the U.S.² using official exchange rates around 2021. India's economy has the potential to grow at an even faster pace, reaching $\frac{2}{3}$ the size of the U.S. by 2030³ (see Figure 1) and potentially surpassing China by 2050.⁴ With fast-growing countries such as Indonesia⁵ and the Philippines⁶, the ASEAN economies combined will likely be almost half the size of China or India.

Figure 1



New Emerging Consumer Class

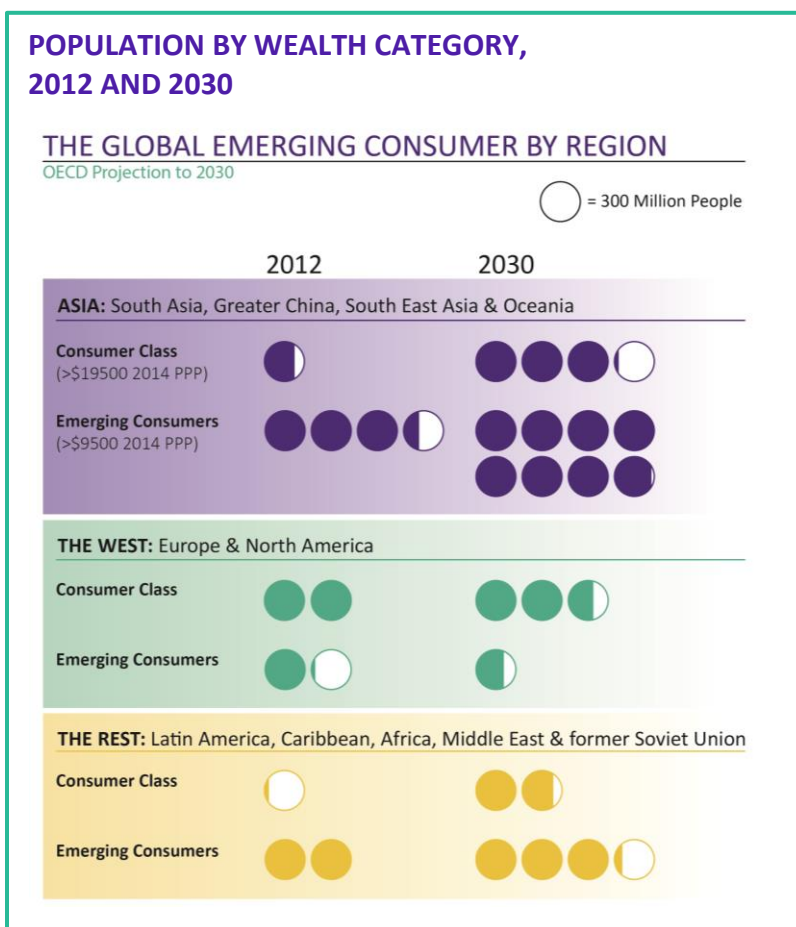
By 2030, Asia will have more consumers than the rest of the world combined. Asia's share of **global consumers** (defined as those with incomes over \$19,500 per year by PPP) will be larger than the West's by 2030. Combined with Asia's 2.4 billion **emerging consumers** (with incomes larger than \$9,500 by PPP) the overall number of consumers in Asia by 2030 will surpass both the West and rest combined (see Figure 2). Equipped with the tools and connectivity to participate in the global economy they will play an increasing role in shaping global consumption patterns and tastes. Emerging consumers in particular will create significant demand for affordable products, requiring frugal innovation.

Asian Economic Leadership

Asian businesses may determine the shape of global economics – drive innovations and set standards – with different rules and conventions than the West. Large numbers of Asian firms are entering the

global marketplace, and evidence of this rise can be seen from the Forbes Global 2000 list, ranking the world's largest publicly-listed companies. Last year, Asia surpassed North America for the first time, with 674 companies to 629.⁷ While the Chinese economy is currently advancing at a slower pace than has been seen recently, China and India may eventually be considered the "[heartland of the global economy](#)",⁸ and expectations are that even in advanced markets such as the U.S., it is only a matter of time before industry leaders such as Ali Baba, Baidu, Tencent or Xiaomi⁹ demonstrate they are not just imitators or masters of incremental improvement, but technical leaders working at the cutting edge of research and innovation.¹⁰

Figure 2



THE NEW DIGITAL ECONOMY

The emergence of new technologies, building on the foundation of the digital communications infrastructure, will profoundly reshape the nature of work and commerce.

Digital Infrastructure 3.0

Massive and growing investments in digital infrastructure are positioning Asia to capitalize on growing technological trends and in so doing, dominate the global digital economy. While Canada ranks 8th internationally on the [Mastercard Digital Evolution Index](#), its score is essentially unchanged in the past five years while almost every major Asian nation has made significant digital advances. Active state intervention in key Asian countries such as China and South Korea¹¹ has led to rapid adoption of more advanced data infrastructure than in many parts of the West that rely on private providers. Asian nations are leap-frogging existing technologies, building a faster, cheaper digital infrastructure. For example, South Korea's Internet connections average speeds 2.5 times faster than those in the Canada for ¼ the price.¹²

These digital infrastructure investments will allow Asia to capitalize on many of the technological trends that will shape the global economy over the next several decades. While Taiwanese electronics assembler Foxconn's plans to replace workers with one million robots by 2014 have yet to be realized – they indicate the scale of the ambition for future automation.¹³ China is the world's largest robot market with a 20% share of the global total,¹⁴ and they expect to double their existing 30 industrial robot factories by 2017,¹⁵ with investments subsidized and encouraged by local governments.¹⁶ As industrial processes continue to automate through next-gen robotics and the deployment of evolving technologies such as 3D printing, the number of manufacturing jobs in the future is expected to decline significantly both in Asia and in the West.

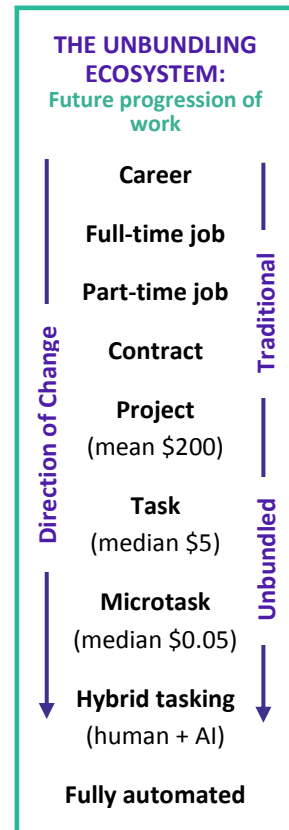
The challenge presented by artificial intelligence (AI) and the continued development of the Internet of Things represents a major disruption for the service sector. AI can already provide seamless English to Spanish voice-to-voice translation¹⁷; recognize faces and emotions¹⁸; objects¹⁹; write songs²⁰ and sports articles²¹; learn relationships between entities²²; optimize designs better than humans²³; and provide personal assistance.²⁴ Meanwhile, the Internet of Things²⁵ is breaking new ground in integrating dramatic advances in sensors, video, location information, networking and cloud computing to provide new capabilities. Over the next 15 years, AI and sensor networks will be seamlessly fused and incorporated into business processes as basic tools of the trade with

Asian Pacific spending forecasted to reach \$58 billion by 2020.²⁶ It is predicted that new corporate applications of web technologies could represent up to 22% of China’s productivity growth by 2025, potentially increasing China’s GDP by up to \$240 billion.²⁷ Combined with the impacts of automation and 3D printing, Asia is well positioned to capitalize on these trends and disrupt the current economic paradigm.

Job Unbundling

Job unbundling will drastically reshape the global service economies, and will hasten the convergence of global wage rates to the advantage of Asia. The first stage of job unbundling is well established in the workplace (career and full-time work shifting to part-time or contracts). Globally over the next 15 years, jobs and contracts themselves will be unbundled into a freelance, project-based economy, serviced by companies such as eLance.com, or even down to a task-oriented economy, where services such as Fiverr.com and Amazon’s Mechanical Turk deconstruct tasks to as low as \$5 or even \$0.05 (see Figure 3). Asia is already a leader in unbundled services, with Asian nations holding five of the top ten²⁸ positions on eLance’s top freelancing countries list. This market is projected to be a \$5 billion industry in 2015²⁹ and for some nations (such as the U.S.) freelance work may represent 50% of the fulltime workforce as early as 2020³⁰. Given that Asia currently has a significant wage-rate advantage over the West³¹, a global move down the unbundling curve will favour Asian workers and will likely trigger a convergence of global wage rates.

Figure 3



FUTURE FICTIONAL VIGNETTE

“North American Information Technology Federation”. Wikipedia. July 8, 2029. Web. Accessed May 4, 2030.

SUMMARY

The North American Information Technology Federation (NAITF) was launched in 2026 when the impacts of strong competition from both India and China drove down the cost of high-end IT services across western markets. The 2020's had already seen Microsoft's Cortana for Business and Google's Now+ effectively decimate the majority of customer service and tech support positions worldwide through scalable AI. Recognizing the inevitable, Asian IT outsourcing firms were already leveraging growing Asian education levels to move up the service value chain. Competition was fierce and with wages plunging and domestic unemployment rising quickly, NAITF found a surge of new members from the ranks of North American programmers, engineers, data scientists and security analysts. Flush with funds and a vocal membership, NAITF successfully lobbied for laws in both Canada and the US mandating minimum education levels and rigorous background checks, ostensibly to ensure data security. The response was swift. U.S. military sales to India plunged the following year while Canadian pork and potash sales to China nearly ceased. Further, Canada's attempt to join the Pan-Asian advisory board on harmonized telemedicine standards was summarily rejected. This triggered a three year economic conflict referred to colloquially by the media as the 'Service Trade Wars.'

See also

- [Artificial Intelligence](#)
- [Economic Sanctions](#)
- [Outsourcing](#)

Rise of Asian Virtual Services

As the Asian manufacturing sector is forced to evolve, surging Asian participation in the global service sector may dramatically re-shape the provision of virtual services.

Traditionally, low cost manufacturing was a required pathway for economic growth in Asia³² because it facilitated the movement of poor agrarian labourers to middle-class, urban jobs. However, in the context of declining centralized Asian manufacturing, driven by growing automation and 3D printing, success in the service industries must be explored as an alternative path to growing employment and rising incomes in Asia.³³ The current Indian service economy represents 62.5% of GDP,³⁴ while Hong Kong's economy is 90% service based³⁵ demonstrating this approach is feasible, even using the limited digital

technologies of the early 21st century. Fortunately, evolving digital tools such as telepresence technologies³⁶ and augmented reality, combined with the trend towards job unbundling, will greatly assist this transition. Despite their economic growth, almost 50% of China's³⁷ and more than 50% of India's³⁸ workforces remain agrarian based. As these and smaller developing economies further grow and urbanize, they will need to compete successfully in the global market for services, that in future will range from simple web searches up to traditional white collar work such as programming, engineering, accounting³⁹ and even the provision of complex health services.⁴⁰

THE COLLABORATIVE ECONOMY

The nature of capitalism may be changing. Businesses will continue to develop new ideas and commerce will continue to drive the global economy. However, what is sold, to whom and by what means may be changing as new consumption mechanisms and evolving values emerge.

Ownership Unbundling

The rise of the collaborative economy and ownership unbundling in Asia may significantly disrupt established government regulations, taxation, and traditional business profit models. Ownership unbundling reflects two significant forces impacting traditional ownership models – the sharing or collaborative economy and the open source movement. While Asian economies are rooted in a history of barter exchange, the Sharing Economy⁴¹ has quickly evolved, facilitated by social media and is growing in Asia and worldwide, an example of which is the recent \$18M U.S. investment in Korean ride sharing service Socar.⁴² Increasingly, people are willing to trade resources directly with others, so much so that the revenue gained by consumers sharing personal assets is expected to have surpassed \$3.5 billion in 2014, with annual growth exceeding 25%.⁴³

This trend overlaps in many ways with the growing power of open source software where traditionally a single author develops software code that is shared freely; it gets used and modified with the updated version freely shared as well. The market disruption potential is well established – versions of Linux have displaced Microsoft Windows on 67.2% of the world's web servers,⁴⁴ while Android now controls 84.4% of smartphones⁴⁵; these numbers are higher in Asia. Napster, transformed the music industry to a largely digital model with low/no profit margins while more recently, BitTorrent has extended this concept to video and software and itself is now facing competition in Asia from Xunlei.⁴⁶

In the next 15 years, ownership unbundling will expand into new areas, for instance through the sharing, [sale and production of 3D printing templates](#) or through synthetic biology forums such as the International Genetically Engineered Machine (iGEM) competition,⁴⁷ a worldwide challenge to build simple biological systems from standard, interchangeable parts called Biobricks.⁴⁸ In 2014, 82 Asian teams competed⁴⁹ (representing $\frac{1}{3}$ of the competitors). These forces serve to disrupt traditional business models, often moving faster than government regulation, taxation policies or existing business models can react.

Intellectual Property, Frugal Innovation and Trade

The rejection of customary western intellectual property agreements in Asia and the widespread adoption of frugal innovation may combine to threaten existing trade agreements, intellectual property laws, institutions and traditional high margin industries. The current western framework for intellectual property (IP) may not be appropriate or appealing for Asian nations.⁵⁰ Current western trade policy focuses on securing investor-state dispute settlement mechanisms and further strengthening IP protection. However, these elements may be rejected by large Asian powers as demonstrated by India and China's defense of domestic production of generic drugs⁵¹ at the World Trade Organization and India's Supreme Court's rejection of the Novartis patent on Gleevec.⁵² Compounding this trend, trade between Asian countries has grown rapidly over the past ten years, due in part to an expanding medley of crosscutting bilateral trade agreements between states that may further weaken interest in IP restricting agreements with the West.

Frugal Innovation: As Asian economies continue to evolve, consumer demand will drive companies to increasingly adopt frugal innovation processes (see box).⁵³ While technology leaders Apple and Samsung have fought globally over the high end of the smart phone market, new competitors have emerged to grab market share in developing Asia. Utilizing frugal methods, China's Xiaomi has emerged as a dominant

FRUGAL INNOVATION: As a process discovers new business models, reconfigures value chains, and redesigns products to serve users who face extreme affordability constraints, in a scalable and sustainable manner. It involves either overcoming or tapping institutional voids and resource constraints to create more inclusive markets. See video: [Rise of the Frugal Economy](#).

India's Tata Motors makes the *Nano* car, retailing at about \$3,000 USD.

The Aakash tablet created for the Indian market currently sells for as low as \$55 USD.

smartphone vendor in both India and China⁵⁴ while India has launched multiple home-grown frugal smartphone vendors of its own. These Indian competitors are making inroads in the low cost local market, but like Xiaomi, have aspirations for global distribution.⁵⁵ These companies are seizing market share by concentrating on overlooked consumers⁵⁶ such as the emerging consumer class, where firms expect volume will offset razor-thin profit margins.⁵⁷ If firms choose to pursue a frugal development path, this will impact all levels of society as many of the products will be equally appealing to traditional middle class consumers both in Asia and the West, potentially disrupting many traditional industries and business models. This may present another driver to resist Western pressure for strong IP protection in trade deals, as Asian nations may prefer the innovation and affordability benefits that come from a low IP, low margin environment.

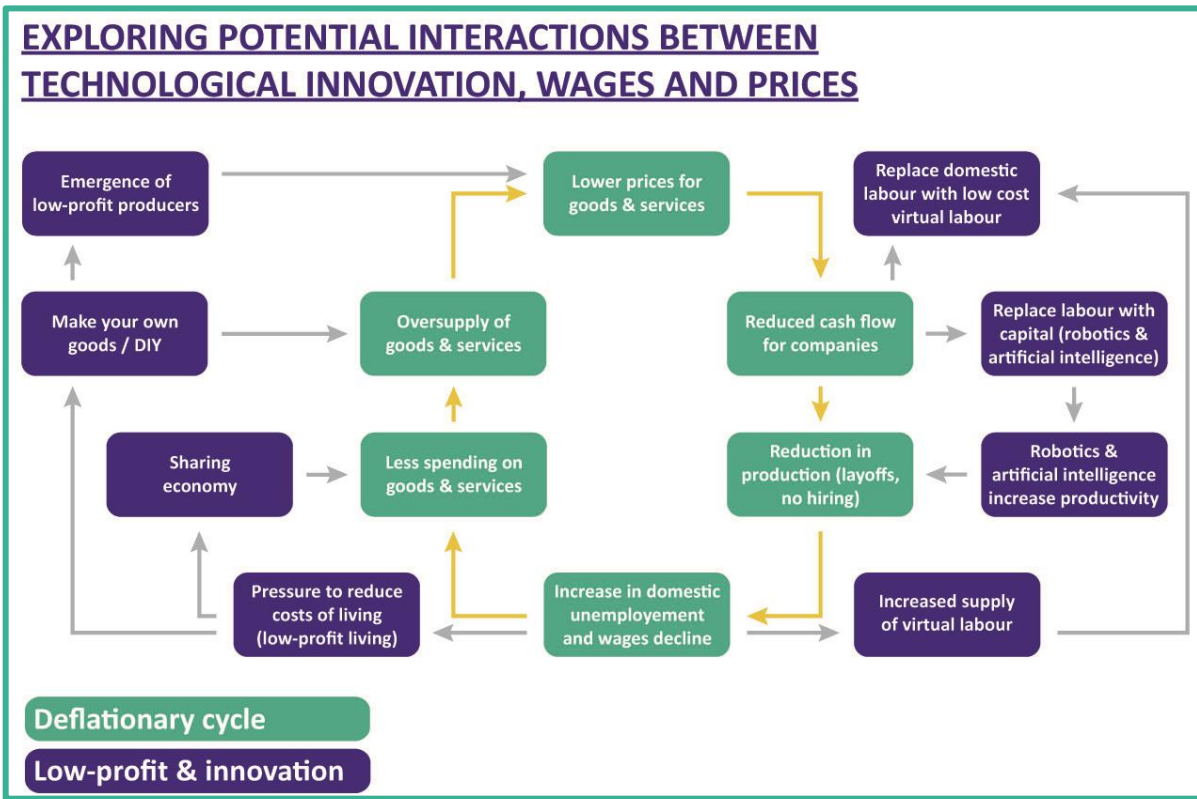
Finally, as the digitization of the global economy allows services traded through digital global value-chains to bypass state monitoring and control, many forms of state intervention in the economy will become more difficult to implement and increasingly irrelevant, including trade and investment controls, taxation, regulation, anti-trust and privacy protections, resulting in a de facto condition of trade liberalization.

Economic Challenges

The rapid adoption of new digital technologies in Asia and the emergence of a digital economy could lead to extended periods of economic disruption and possibly deflation.

Several factors could contribute to economic decline and deflationary pressures in Asia, including the accelerated continental rise as an economic power at the same time as a rapid transition to a digital economy, increasingly unbundled ownership, the impacts of AI, automation and work unbundling and more low IP/low margin climates. While lower prices may sound appealing to consumers and may partially offset some of the other negative economic events, it is a mounting concern for Asian economists that factory gate prices are falling. Some 82% of the items in the producer price basket are deflating in China, 90% in Thailand, and 97% in Singapore.⁵⁸ Sustained deflation disrupts the workings of an economy built on the assumption of continued growth, and can result in a number of self-reinforcing feedback loops that could result in a recessionary spiral of decreasing demand and employment. The extent and duration of a possible period of decline would likely be uneven, both globally and within Asia which may further amplify existing inequalities within the global economic community.

Figure 4





Policy Challenges and Opportunities for Canada

The rapid changes that may occur in Asia over the next 10-15 years will present Canada with a range of challenges and opportunities. This section highlights those that may be particularly surprising and unexpected.

A New Economic Centre

As Asia becomes the world's new economic center of gravity, Canada will need to further shift its focus from trade with the U.S. to take advantage of growth in Asia.

Trade in goods and resources may be mostly about opening markets, but the more lucrative potential of trade in services⁵⁹ may require significant reframing and internal change in engagement, mindset, and partnerships. Second, the world economy will increasingly be dominated by rising Asian powers. As Asia continues to grow, Canada will find itself in a new world where, as for most of recorded history, Asia is central. Canada, along with other countries, will need to increase focus to Asian partners,⁶⁰ paying greater attention to Asian consumers and particularly those in a fast-rising India, or alternatively, use existing partnerships to engage indirectly with Asia. This will have wide-ranging impacts on international institutions, the economic balance of power, and firm and state relationships.

Digital Infrastructure 3.0

Canada will need to prepare itself to ride the next generation of digital infrastructure that will be the highways of the 21st century. Canada, in 2014, confronts broadband pricing and speed that is middle of the pack internationally. This represents a major challenge as broadband and wireless are set to become the utilities upon which all future commerce is conducted, particularly telepresence. However, digital infrastructure extends beyond simply ensuring fast and inexpensive access. The Internet of Things and pervasive sensor networks with the corresponding flood of public and private information will radically change how consumers, businesses and governments interact while re-defining our current concepts of Big Data. The development and growth of this new digital infrastructure will be critical to ensuring the security and privacy of online transactions, and will support the provision of government services within Canada itself. While Canada's market-based approach to digital infrastructure has managed the first digital transition reasonably well, it contrasts with the government-supported approach adopted

in many Asian nations and may not be sufficient to meet Canada's growing infrastructure needs if it wishes to effectively compete in the growing global digital market.

Canada's Disrupted Labour Market

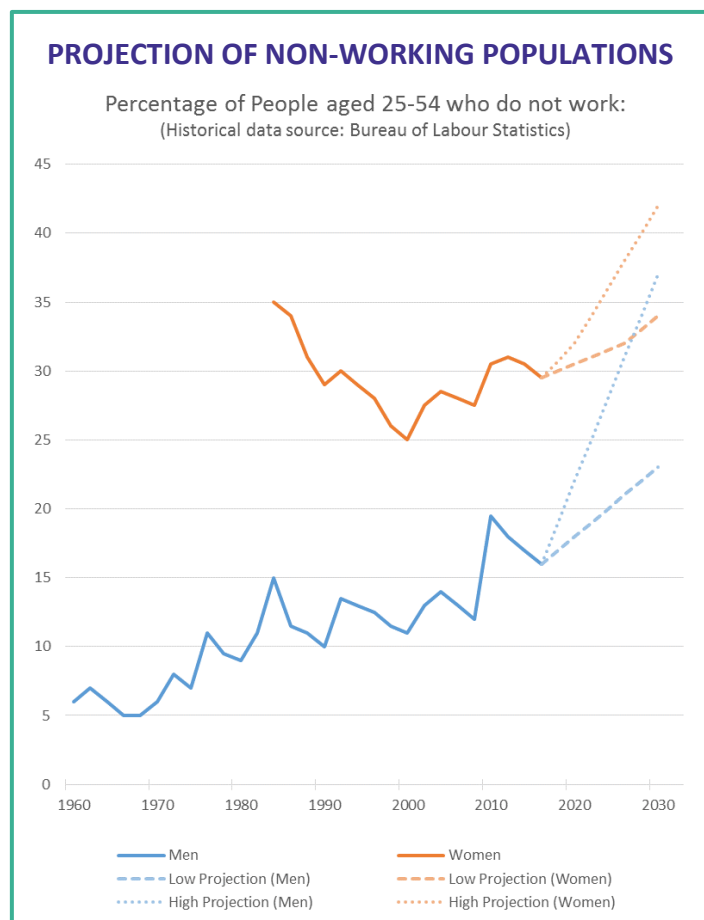
The impacts of technology (automation, 3D printing and AI), the unbundling of work and the emerging virtual service economy combine as a triple-threat to Canada's labour market.

The growth of automation and 3D printing may provide an opportunity for the reshoring of manufacturing to Canada. However, these technologies generally require few employees compared to traditional manufacturing and may serve to further disrupt other existing manufacturing

employment in Canada. The combination of AI and the rise of Asian virtual services will allow for further encroaching on the West's white-collar professions or licensed trades and may also open opportunities to provide advice and oversight via telepresence in areas that in the past have not traditionally been offshored (i.e. healthcare). Finally, the unbundling of work may not be solely an Asian phenomenon. While the price point of projects and tasks may not be initially appealing to Canadian workers, the volume of work available and a growing number of unemployed Canadian workers may eventually draw them into the unbundled employment world. These forces may combine to push the

percentage of Canadian's not working or those under-employed or comparatively underpaid to new highs, resulting in stresses on existing social, employment and pension programs. The accompanying graphic (see Figure 5) drawing from U.S. figures, documents the steady rise in the percentage of the population not working and extrapolates high and low projections to 2030.

Figure 5



Taxation Pressures

The capacity of governments to redistribute wealth under the current taxation model may be limited when confronting a disrupted labour market and the sharing economy.

There are three distinct threats to Canada's traditional taxation approaches. The growth of AI, automation and the rise of Asia's virtual digital services serve to eliminate or replace Canadian jobs, with a corresponding direct reduction in Canadian taxable incomes. Conversely, work unbundling and the sharing economy may create new employment opportunities, but these will either pay less than a comparable full-time position, or be much more difficult (if not impossible) to track and tax. Further complicating the taxation picture is the mobility provided by new digital technologies. The concept of "place" will increasingly matter less for commerce as the use of remote data centres, teleconferencing and AI will allow for operations to be conducted anywhere while servicing customers everywhere. This will allow Canadian corporate operations the flexibility to relocate when confronted by restrictive regulations or in the face of aggressive corporate taxation.

Trade Dilemmas

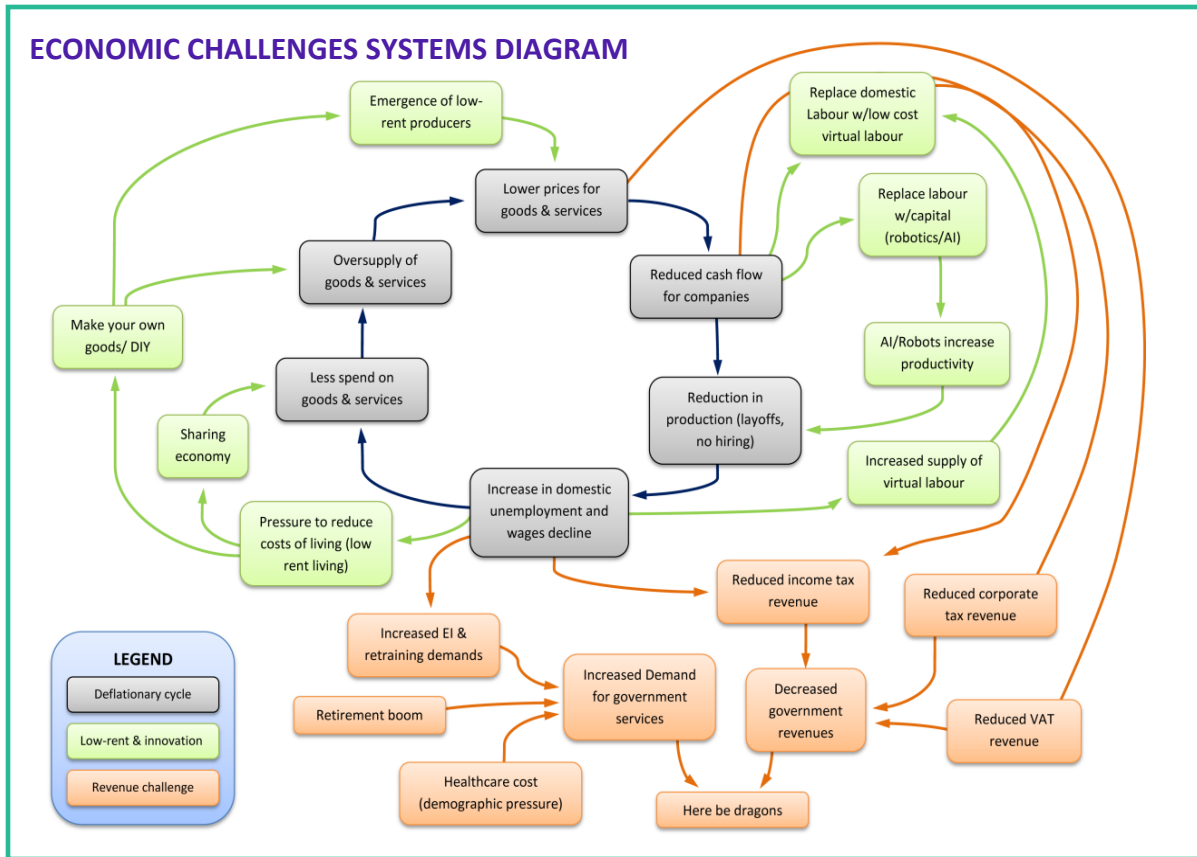
As Asia and the world increasingly shifts towards digital trade, traditional trade policy approaches may no longer be effective. A whole new world of trade in digital goods and services is emerging and growing fast. McKinsey estimates that global online traffic across borders could increase eightfold by 2025,⁶¹ with Asia leading the way.⁶² The potential impact of this digitization of trade is only beginning to emerge. For large corporations, digital trade increases efficiency, lowers operating costs, and facilitates tax optimization strategies. But perhaps the most dramatic change is for individual entrepreneurs and small- and medium-size firms, for whom digital trade can unlock huge new global markets. "Internet platforms are empowering these 'micro-multinationals,' enabling them to find customers, suppliers, funding, and talent around the world at lower cost. Digital platforms can cut the cost of exporting by 83% as compared with traditional export channels".⁶³ Digital trade in goods and services is likely to expand and co-evolve with the development of artificial intelligence, data analytics, sensors and the Internet of Things, and international digital services are likely to penetrate deeply into our lives and homes. In sum, the world is entering an era of enormous opportunity and intense competition. For governments the challenges are how to monitor regulate and enforce standards in areas such as finance, labour, health and safety in a rapidly evolving digital economy. Traditional trade protections and trade liberalization agreements may become less relevant as a greater percentage of global trade is able to bypass state monitoring and

control. Investment controls, taxation, regulation, anti-trust and privacy protections may also be affected. Canada has been successful in building ports and eliminating tariffs to prosper in the old trade regime, but may need to give more thought to preparing for the emerging era of digital trade.⁶⁴

Policy Lever Pressures

Government has traditionally had specific policy levers at its disposal, but this may be challenged by limitations driven by structural changes to the economy. The taxation pressures, described above, would limit government capacity for spending at the same time as demand would be increasing. Government services and assistance would be ever more sought after due to, among other things, higher unemployment, restructuring of entire economic sectors, periods of deflation, an aging population, and subsequently higher health care costs. A growing segment of society, increasingly disaffected and disadvantaged, would be seeking assistance from governments that would have fewer tools to help achieve its objectives. Figure 6 depicts this relationship and the convergence of increased demand for government services with decreased government revenues; however, two key elements cannot be demonstrated: the speed and scale of how these effects could transpire. Consequently, governments may be afforded the opportunity to seek new methods to help achieve societal objectives.

Figure 6





References

- ¹ Bird, M. 2014. *China Just Overtook The US As The World's Largest Economy*. <http://www.businessinsider.com/china-overtakes-us-as-worlds-largest-economy-2014-10>. Accessed Feb 17, 2015.
- ² The Economist. 2014. *Catching the Eagle*. <http://www.economist.com/blogs/graphicdetail/2014/08/chinese-and-american-gdp-forecasts>.
- ³ PwC Economics. 2013. *World in 2050 The BRICs and beyond: prospects , challenges and opportunities*. <http://www.pwc.com/gx/en/issues/the-economy/the-world-in-2050.jhtml>
- ⁴ Citi Private Bank. 2012. *The Wealth Report 2012*. https://www.privatebank.citibank.com/pdf/wealthReport2012_lowRes.pdf
- ⁵ McKinsey Global Institute. 2012. *The archipelago economy: Unleashing Indonesia's potential*. http://www.mckinsey.com/insights/asia-pacific/the_archipelago_economy
- ⁶ AG Reporter, Arabian Gazette. 2014. *Philippines to become trillion dollar economy by 2030*. <http://www.pacifichub.net/news-articles/philippines-to-become-trillion-dollar-economy-by-2030>.
- ⁷ <https://www.sc.com/BeyondBorders/waiting-wings-asias-next-tata-alibaba/>
- ⁸ <https://www.youtube.com/watch?v=y3WjLdDaDqU>
- ⁹ Pilling, D. 2015. *Corporate China not yet ready to rule the world*. <http://www.ft.com/intl/cms/s/0/6a89acf6-ac58-11e4-9d32-00144feab7de.html#axzz3RSaYfuUw>.
- ¹⁰ Ong, Y. 2014. *The Ten Most Innovative Companies in Asia 2014*. <http://www.forbes.com/sites/yunitaong/2014/08/20/the-most-innovative-companies-in-asia-2014/>.
- ¹¹ Neal, M. 2014. *South Korea's Internet Is About to Be 50 Times Faster Than Yours*. <http://motherboard.vice.com/blog/south-koreas-internet-is-about-to-be-50-times-faster-than-yours>.
- ¹² OECD. 2014. *OECD Broadband Portal*. <http://www.oecd.org/internet/broadband/oecdbroadbandportal.htm>
- ¹³ MacRumours. 2014. *Foxconn Robots Proving Unsuitable for iPhone Assembly, Updated Versions in the Works*. <http://www.macrumors.com/2014/12/05/foxconn-robots-iphone-assembly/>
- ¹⁴ Bastian Robotics. 2014. *Robotics by the Numbers*. <http://www.bastiansolutions.com/blog/wp-content/uploads/2014/12/robots-by-the-numbers.jpg>

-
- ¹⁵ Young, A. 2014. *China Now Has 30 Industrial Robot Factories, Could Double Robot Population By 2017*. <http://www.ibtimes.com/china-now-has-30-industrial-robot-factories-could-double-robot-population-2017-1713813>
- ¹⁶ Holcombe, C. 2014. *Owners looking at robots to replace workers prone to rioting*. <http://www.scmp.com/business/economy/article/1519789/owners-looking-robots-replace-workers-prone-rioting>
- ¹⁷ Bright, P. 2014. *Skype Translator is the most futuristic thing I've ever used*. <http://arstechnica.com/information-technology/2014/12/skype-translator-is-the-most-futuristic-thing-ive-ever-used/>
- ¹⁸ Dormehl, L. 2014. *How Machines Learned To Recognize Our Faces So Well—And What's Next*. <http://www.fastcolabs.com/3032386/how-machines-learned-to-recognize-our-faces-so-well-and-whats-next>
- ¹⁹ Clark, L. 2012. *Google's Artificial Brain Learns to Find Cat Videos*. <http://www.wired.com/2012/06/google-x-neural-network/>
- ²⁰ Hochberg, W. 2014. *When Robots Write Songs*. <http://www.theatlantic.com/entertainment/archive/2014/08/computers-that-compose/374916/>
- ²¹ Hodson, H. 2014. *AI knows a great sporting moment when it sees one*. <http://www.newscientist.com/article/mg22429982.000-ai-knows-a-great-sporting-moment-when-it-sees-one.html#.VJQ6tf-DA>
- ²² Hof, R. 2013. *10 Breakthrough Technologies 2013*. <http://www.technologyreview.com/featuredstory/513696/deep-learning/>
- ²³ Genetic Programming. 2014. *The Annual "Humies" Awards — 2004–2014*. <http://www.genetic-programming.org/combined.php>
- ²⁴ Trenholm, R. 2014. *Next generation of personal assistant takes a step towards 'Her'-style super-Siri*. <http://www.cnet.com/news/next-generation-of-personal-assistant-takes-a-step-towards-her-style-super-siri/>
- ²⁵ Chui, M. 2010. *The Internet of Things*. http://www.mckinsey.com/insights/high_tech_telecoms_internet/the_internet_of_things
- ²⁶ Jeremiah, D et al. 2014. *Rapid growth of connected devices expected to drive adoption of Internet of Things (IoT) in Asia Pacific*. <http://www.frost.com/prod/servlet/press-release.pag?docid=291420110>
- ²⁷ Woetzel, J. 2014. *China's digital transformation*. http://www.mckinsey.com/insights/high_tech_telecoms_internet/chinas_digital_transformation?cid=other-eml-nsl-mip-mck-oth-1408
- ²⁸ Elance. 2013. *Global Online Employment Report*. https://www.elance.com/q/node/1578?mpid=cj_10777892_4003003

-
- ²⁹ Magdirila, P. 2013. *Elanse records 90% more jobs for Philippine freelancers this year*. <https://www.techinasia.com/elance-jobs-philippine-freelancers-trust-global-businesses/>
- ³⁰ Forbes. 2013. *How An Exploding Freelance Economy Will Drive Change In 2014*. <http://www.forbes.com/sites/grouphink/2013/11/25/how-an-exploding-freelance-economy-will-drive-change-in-2014/>
- ³¹ Wikipedia. 2015. *List of countries by average wage*. http://en.wikipedia.org/wiki/List_of_countries_by_average_wage
- ³² Asian Development Bank. 2013. *Asia Cannot Bypass Manufacturing on Path to Prosperity - ADB Report*. <http://www.adb.org/news/asia-cannot-bypass-manufacturing-path-prosperity-adb-report>
- ³³ Park, D and Shin, K. 2012. *The Service Sector in Asia: Is It an Engine of Growth?* <http://www10.iadb.org/intal/intalcdi/PE/2013/10825.pdf>
- ³⁴ Altius Directory. 2015. *Indian Economy 2015*. <http://www.altiusdirectory.com/Business/indian-economy.php>
- ³⁵ Wikipedia. 2015. *Economy of Hong Kong*. http://en.wikipedia.org/wiki/Economy_of_Hong_Kong
- ³⁶ Olson, P. 2013. *Rise of The Telepresence Robots*. <http://www.forbes.com/sites/parmyolson/2013/06/27/rise-of-the-telepresence-robots/>
- ³⁷ Economy Watch. 2010. *China Agriculture*.
- ³⁸ Wikipedia. 2015. *Agriculture in India*. http://en.wikipedia.org/wiki/Agriculture_in_India
- ³⁹ Blinder, A. 2007. *How Many U.S. Jobs Might Be Offshorable?* <http://www.princeton.edu/~blinder/papers/07ceps142.pdf>
- ⁴⁰ Biesdorf, S and Niedermann, F. 2014. *Healthcare's digital future*. http://www.mckinsey.com/insights/health_systems_and_services/healthcares_digital_future
- ⁴¹ Wikipedia. 2015. *Sharing economy*. http://en.wikipedia.org/wiki/Sharing_economy
- ⁴² Tay, D. 2014. "Korean ride sharing service Socar lands massive \$18M investment". <https://www.techinasia.com/socar-18m-investment-ride-sharing/>
- ⁴³ Geron, T. 2013. *Airbnb and The Unstoppable Rise Of The Share Economy*. <http://www.forbes.com/sites/tomiogeron/2013/01/23/airbnb-and-the-unstoppable-rise-of-the-share-economy/>
- ⁴⁴ W3 Techs. nd. *Usage of operating systems for websites*. http://w3techs.com/technologies/overview/operating_system/all
- ⁴⁵ IDC. 2015. *Smartphone OS Market Share, Q3 2014*. <http://www.idc.com/prodserv/smartphone-os-market-share.jsp>

⁴⁶ Wikipedia. 2015. *Xunlei*. <http://en.wikipedia.org/wiki/Xunlei>

⁴⁷ iGEM. nd. *Synthetic Biology Based on Standard Parts*.
http://igem.org/wiki/index.php?title=iGEM/Learn_About

⁴⁸ Wikipedia. 2015. *BioBrick*. <http://en.wikipedia.org/wiki/BioBrick>

⁴⁹ iGEM. 2014. *Jamboree Results for iGEM 2014*.
<http://igem.org/Results?year=2014®ion=Asia&division=igem>

⁵⁰ Endeshaw, A. 2010. *Intellectual Property in Asian Emerging Economies*.
<http://www.ashgate.com/isbn/9780754674597>

⁵¹ Sen, A. 2012. *India, Brazil & China defend generic drugs at WTO*.
http://articles.economictimes.indiatimes.com/2012-06-25/news/32409062_1_counterfeit-medicines-fake-drugs-generic-drugs

⁵² Kilday, L. 2013. *Global IP Reaction to India's Rejection of the Novartis Drug Patent*.
<http://www.ipwatchdog.com/2013/05/28/global-ip-reaction-to-indias-rejection-of-the-novartis-drug-patent/id=40778/>

⁵³ Bhatti, Y. 2011. "What is frugal innovation? Definition." Frugal-Innovation.com. July 25.
<http://www.frugal-innovation.com/author/yasserbhatti/>

NESTA video, Rise of the Frugal Economy. <https://www.youtube.com/watch?v=NTZem7ICRww>

Tata Motors: <http://www.ibtimes.co.in/tata-nano-twist-active-spied-testing-again-expected-launch-price-feature-details-623077>

Aakash tablet <http://www.akashtablet.com/>

⁵⁴ The Economist. 2015. "The Xiaomi Shock." <http://www.economist.com/news/business/21645217-chinas-booming-smartphone-market-has-spawned-genuine-innovator-xiaomi-shock?frsc=dg%7Ca>

⁵⁵ The Indian Express. 2014. "Xiaomi now third largest smartphone maker, Indian companies more dominant at home: Canals." <http://indianexpress.com/article/technology/mobile-tabs/xiaomi-now-no-3-globally-indian-companies-becoming-more-dominant-at-home-canals/>

⁵⁶ Fannin, Rebecca. 2013. "Frugal Innovation Evolves in the the Next Phase of China's Rise as Tech Economy." *Forbes*. November 19. <http://www.forbes.com/sites/rebeccafannin/2013/11/19/frugal-innovation-evolves-in-the-next-phase-of-chinas-rise-as-tech-economy/>

⁵⁷ Yarrow, J. 2015. "Apple is taking 93% of the profits in the smartphone industry now." *Business Insider*. March 13. <http://uk.businessinsider.com/apple-is-taking-93-of-the-profits-in-the-smartphone-industry-now-2015-2>

⁵⁸ Evans-Pritchard, A. 2014. *Spreading deflation across East Asia threatens fresh debt crisis*.
<http://www.telegraph.co.uk/finance/economics/11226558/Spreading-deflation-across-East-Asia-threatens-fresh-debt-crisis.html>

⁵⁹ The State Council The People's Republic of China. 2015. *Healthy growth for foreign trade figures*. http://english.gov.cn/news/policy_briefings/2015/01/16/content_281475039981533.htm

⁶⁰ The Governor General of Canada. 2015. *Keynote Address at Vancouver Board of Trade — The Next Spike: Innovation as the Key to Building a Smarter, More Caring Canada*. <http://www.gg.ca/document.aspx?id=15934&lan=eng>

⁶¹ Manyika, J., et al., 2014. *Global Flows in a Digital Age*. McKinsey Global Institute. April. http://www.mckinsey.com/insights/globalization/global_flows_in_a_digital_age

⁶² Chen Y., et al. 2015. *China's rising internet wave: wired companies*. McKinsey & Company. January. http://www.mckinsey.com/insights/high_tech_telecoms_internet/chinas_rising_internet_wave_wired_companies

⁶³ Commerce 3.0 for development: The promise of the Global Empowerment Network, eBay, 2013, ebayinc.com.

⁶⁴ Goldfarb, D. 2011. *Canada's trade in a digital world*. Conference Board of Canada. April. <http://www.conferenceboard.ca/reports/briefings/tradingdigitally/default.aspx?pf=true>