

**ECONOMIC TRANSFORMATION
IN CAMBODIA AND ABROAD**

DIGITAL INSIGHTS



THE KONRAD-ADENAUER-STIFTUNG

Freedom, justice and solidarity are the basic principles underlying the work of the Konrad-Adenauer-Stiftung (KAS). The KAS is a political foundation, closely associated with the Christian Democratic Union of Germany (CDU). As co-founder of the CDU and the first Chancellor of the Federal Republic of Germany, Konrad Adenauer (1876-1967) united Christian-social, conservative and liberal traditions. His name is synonymous with the democratic reconstruction of Germany, the firm alignment of foreign policy with the trans-Atlantic community of values, the vision of a unified Europe and an orientation towards the social market economy. His intellectual heritage continues to serve both as our aim as well as our obligation today. In our European and international cooperation efforts, we work for people to be able to live self-determined lives in freedom and dignity. We make a contribution underpinned by values to helping Germany meet its growing responsibilities throughout the world.

KAS has been working in Cambodia since 1994, striving to support the Cambodian people in fostering dialogue, building networks and enhancing scientific projects. Thereby, the foundation works towards creating an environment conducive to social and economic development. All programs are conceived and implemented in close cooperation with the Cambodian partners on central and sub-national level.

© Copyright 2018
by Konrad-Adenauer-Stiftung, Cambodia

Konrad-Adenauer-Stiftung, Cambodia
House No 4, Street 462, Khan Chamkar Mon,
P.O.Box 944, Phnom Penh, Kingdom of Cambodia,
Telephone : +855 23 966 176
Email : Office.PhnomPenh@kas.de
Website : www.kas.de/cambodia
Facebook : www.facebook.com/kaskambodscha



DIGITAL INSIGHTS

12|2018

FOREWORD



Do we really have to leave our house to buy food in the future? Or will our smart fridge accomplish that by ordering a flying drone? So far, it is not the typical way to go shopping for dinner. However, digitalization undoubtedly is one of the leading topics of our time. Not a single day passes by without a politician talking about the importance of the issue or some expert mentioning the next digital trend that surely should not be missed. Reconsidering digitalization

and its consequences one can plainly assume that it affects both, the private person in their individual environment as well as all parts of our global economy. But even for experts the whole extent of the issue is still difficult to estimate.

If we take a look at the opportunities and various modifications digitalization generates in our daily life, one is tempted to join the praising chorus of optimists. For example, in the sector of education it is easily possible for students from the poorest and most remote parts of the world to attend online courses and gain education without ever setting a single foot in another country. Hard and uninflected work can be executed by robotics in order to promote occupational health for workers while offering additional new prospects. Automatic and smart manufacturing processes smooth the way to take on different jobs and contribute to an advanced form of prosperity. Mobility becomes autonomous and requires no human control as it's already the case in the field of commercial transport. Besides, communication is easier than ever in the history of humanity since there are plenty of channels to stay connected with family or business partners even if they're on a different continent.

As the examples clearly outline, digitalization has the potential to improve our daily grind in enormous ways. Nevertheless, caution is required. Many people find themselves under pressure because they cannot handle the tremendous speed and steady progress of innovation. Various surveys have already pointed out that even with its numerous benefits; many people feel an increasing amount of workload in conjunction with digitalization. The need of constant availability, the technical requirements of new services and the constant change of trends are not easy to handle. Furthermore, the development is not as unobstructed as it might look. For example, Germany is still struggling with the implementation of comprehensive high-speed Internet. In rural areas citizens often surf the web at a snail's pace. Concerning this, it seems difficult to transfer the theoretical potential of digitalization in a practical way.

Regarding these issues it is necessary for everyone to deal with the exigencies of digitalization and to form a view on the upcoming tendencies and challenges of the topic. As the field is continually evolving, there are many movements and ideas worth keeping an eye on. With this publication, the Konrad-Adenauer-Stiftung Cambodia offers some selected insights, useful graphics and well researched articles that focus on the impact of digitalization.

Finally, there's still an open question: How to classify digitalization? Well, let's try to see it in a more factual way. Digital development first appeared in 1990 and can be seen in a row of many groundbreaking revolutions in the history of mankind. Certainly, the changes and the potential for our society are enormous. Therefore it is important to continue researching, to assimilate to the new techniques without neglecting our fundamental values and to accept that we need digitalization in order to reinvent the way we want to live. But with all the euphoria and excitement, we should keep one thing in mind: The next innovation is already on the way and digitalization has just been one of them.

Dr. Daniel Schmücking
Country Representative
Konrad-Adenauer-Stiftung
Kingdom of Cambodia

CONTENTS

Page **06**

Cambodia's Journey to Become a Digital Economy: The Current Landscape

Kanika Montha

Page **18**

Embracing the Digital Economy: Policy Consideration for Cambodia

Pheakdey Heng

Page **34**

Using Data to Drive Business Growth in Cambodia

Christopher Treshan Perera & Chhaya So

Page **50**

The Future of Waste Management – Seizing the Potential of Digitalization

Lilli Tabea Albrecht

Page **62**

Women in Cambodia's Digital Economy: Key Challenges and Opportunities

Socheata Touch

Page **78**

Policy vs. Privacy and Data Protection Implications: A Case of Cambodia

Ngoun Somaly

Page **96**

Cambodian SMEs in the 4th Industrial Revolution: Government Policies and Opportunities

Lydet Pidor

Page **110**

Digital Transformation in SMEs: Understanding the Challenges of German SMEs

Robert Hör

Page **124**

China's Techno-Utilitarian Experiments with Artificial Intelligence

Dev Lewis

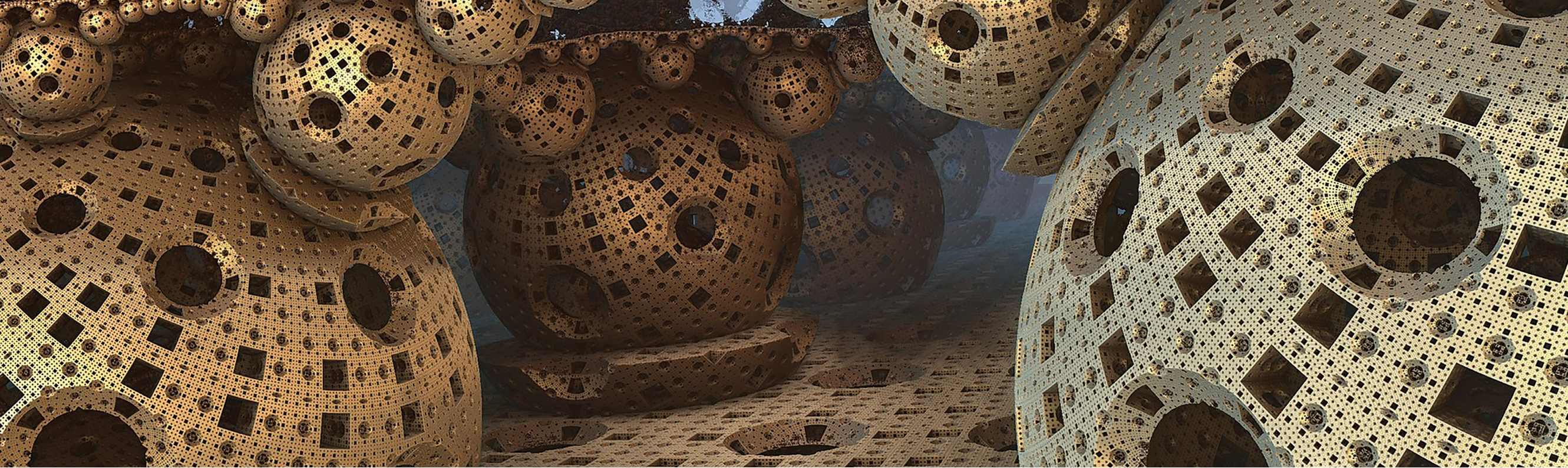
Page **136**

Content Popularity on Social Media Platforms: How Business Models and User Preferences Meet

Pablo Porten-Cheé

DISCLAIMER

The designated contributions do not necessarily reflect the opinions and views of the editorial team and the Konrad-Adenauer-Stiftung. Hence, assumptions made in the articles are not reflective of any other entity other than the author (s) – and, since we are critically-thinking human beings, these views are always subject to change, revision and rethinking.



DIGITAL INSIGHTS

Cambodia's Journey to Become a Digital Economy: The Current Landscape

Kanika Montha¹

Abstract

Cambodia's economy still highly depends on agriculture, but the government plans to turn the country into a successful digital economy by 2025. This paper seeks to answer the following questions: what is the current status of Cambodia's digital landscape? How does it compare to and relate to that of other countries in Southeast Asia?

In order to identify the country's potential the article explores emerging trends like the increasing level of mobile and internet penetration and the adoption of digital retail tools. The paper also highlights challenges that may hinder or slow down the country's transition to a more digitally-empowered economy, such as the lack of human resources and low tech literacy. Insights on online shopping penetration in Cambodia over the past ten years and the rising number of tech startups will be presented. Notably, more and more startups are starting to implement e-payment models and other digital services. This indicates an increased potential for an advanced fintech industry to blossom in Cambodia, and to create synergies that may facilitate other tech verticals. In short, this chapter provides a general overview of digital trends in Cambodia over the past ten years by looking at tech-based enterprises and a development of e-commerce ecosystem within the country. It will conclude with recommendations to help Cambodia maximize its opportunities, deal with its challenges and harness local trends in order to become a successful digital economy in the future.

¹ Kanika Montha is currently a data analyst at American University of Phnom Penh. Prior to her career in data science she was a project coordinator at Tech for Good of the Asia Foundation. She began her career as a computer programmer and got exposed to tech environment such as startups, entrepreneurs hub and incubation.

Introduction

The global economy is moving towards automation², which may be an immediate threat for low-skilled labor in low-skill sectors since some jobs will disappear as a result of this.³ More sophisticated technologies are being adopted, such as the Internet of Things (IoT) or the use of online services for banking, travelling, and booking. Also Cambodia has seen a boom in local tech enterprises which provide tech-based solutions and gradually change the way people live. This chapter considers the three most salient features of Cambodia's digital landscape today that may indicate whether it is on the right track to becoming a digital infrastructure hub and a digital economy by 2025. They are connectivity, innovation and skills, and the country's startup environment. With some background information on digital trends, this article intends to provide a concise view on the evolution of the economy from a conventional construction, footwear and textile industry to a modern, tech-powered digital economy.

In terms of economic activities, "digital economy" refers to a wide range of pursuits that utilize digitized information and knowledge as their main factors. The digitalization of the economy benefits and

creates efficiency in such activities. It creates jobs, drives innovation and sustainable economic growth. Digital economy also refers to the use of internet, cloud computing, big data, fintech and new digital tools to collect, store, and analyze information.⁴ There is no precise and generally agreed upon definition of digital economy which would fit all the circumstances. Digital economy is explained by the International Monetary Fund (IMF) as all economic activities that use digitalized data which could encompass an enormous part of most economies ranging from agriculture to R&D.⁵

Cambodia: Today's Digital Landscape

More and more people can benefit from access to online information and communication. There is an increasing level of mobile penetration in Cambodia and as more people go online, more opportunities arise for tech startups to serve them. In 2014 Cambodia enacted an ICT master plan which is known as "ICTopia Cambodia". ICTopia Cambodia aims to make the country an intelligent and comfortable nation with intelligent people, intelligent society and intelligent government by using ICT.⁶ This master plan has three major goals. The first is to ensure connectivity at national level, a strong ICT infrastructure, legal framework and cyber security. The second is to enable capabilities in innovation by investing in the ICT industry and digital research and development. The third is to

increase e-services such as e-government services, e-public services, e-economy services and e-education services. This ICT master plan wishes to create an e-economy ecosystem which will create a vibrant business climate to encourage competition.

Nationwide connectivity and broadband

Connectivity is the backbone of a digital economy because it provides an environment for e-consumers and digital commerce to emerge. The increasing amount of insights about digital consumption and infrastructure provide an intrinsic outlook of ICT development and capacity for digital economic activities in Cambodia. In particular, several indicators have shown that mobile connection, access to internet and broadband have increased significantly in Cambodia over the last decade.

Cambodia also has a substantial number of internet users. In 2017, there were 8.5 million internet users and 19 million mobile subscribers, a number even greater than the total population of the country. In contrast, the proportion of young internet users globally represent only one fourth of the world's total users.⁷ Hence Cambodia has a high internet penetration which is essential for the creation of a digital society. It is the rapid growth of mobile broadband availability and affordability which enables more sophisticated digital innovations. With a high internet penetration, more and more Cambodians have adapted to new digital platforms and tools in order to enhance their lives. The goal of the Ministry of Posts and Telecommunications (MPTC) is to reach total broadband coverage in urban areas by 2020 and at least eighty percent of Cambodians shall have internet access in the

next two years.⁸

Despite a mostly young population, Cambodia also has a high smartphone penetration at over 50%, with cheap data plans at just 1\$ for 20GB per week. Moreover, around 74% of the total population has access to internet broadband which means 11 million people, and 8 million of them have access to a mobile internet connection.⁹ Due to a high internet penetration level and the increasing number of e-consumers, the country starts seeing a boom in digital financial services, online booking services, and e-commerce in general.

Telecom Operator	Length of Fiber Optic
Telecom Cambodia (TC)	1,600 km
Cambodia Fiber Optic Cable Network (CFOCN)	7,611km
Viettel Cambodia	17,200km

Source: Ministry of Posts and Telecommunications, 2016

In 2016, the MPTC released data about the state of communication technology in the country. The telecoms backbone has been extended to over twenty-six thousand kilometers. In 2016, the total length of the fiber optic backbone was 26,411 kilometers which was provided by three telecom operators: Telecom Cambodia, Viettel (Cambodia) Pte Ltd, and Cambodia Fiber Optic Cable Network (CFOCN). The internet infrastructure has been expanded to fit the rapid growth of the internet usage. Kan Chanmeta, the Secretary of State

2 Ameh, S. (2018). *Why strengthening the global economy means closing the digital divide*. [online] World Economic Forum. Available at: <https://www.weforum.org/agenda/2018/03/closing-the-global-economy-s-new-digital-divide> [Accessed 29 Sep. 2018].

3 Bank, T. (2018). *Cambodia Economic Update : Recent Economic Developments and Outlook*. [online] Documents.worldbank.org. Available at: <http://documents.worldbank.org/curated/en/888141543247252447/Cambodia-Economic-Update-Recent-Economic-Developments-and-Outlook> [Accessed 18 Sep. 2018].

4 Asian Development Bank. "Understanding the Digital Economy: What Is It and How Can It Transform Asia?" Asian Development Bank. October 11, 2018. Accessed November 06, 2018. <https://www.adb.org/news/events/understanding-digital-economy-what-it-and-how-can-it-transform-asia> .

5 Measuring the Digital Economy. (2018). [ebook] Washington, D.C.: International Monetary Fund. Available at: <http://www.imf.org/~media/Files/.../PP/.../022818MeasuringDigitalEconomy.ashx> [Accessed 29 Oct. 2018].

6 Summary on Cambodian ICT Masterplan 2020. (2014). [ebook] KOICA. Available at: <https://www.trc.gov.kh/wp-content/uploads/2016/10/Cambodian-ICT-Masterplan-2020> [Accessed 11 Oct. 2018].

7 Mok, K. (2017). *E-Government Status in Cambodia*. [ebook] Phnom Penh: Ministry of Posts and Telecommunication. Available at: https://www.itu.int/en/ITU-D/Regional-Presence/AsiaPacific/Documents/Events/2015/August-eGov2015/Session-2/S2B_Khamera_Mok.pdf [Accessed 25 Sep. 2018].

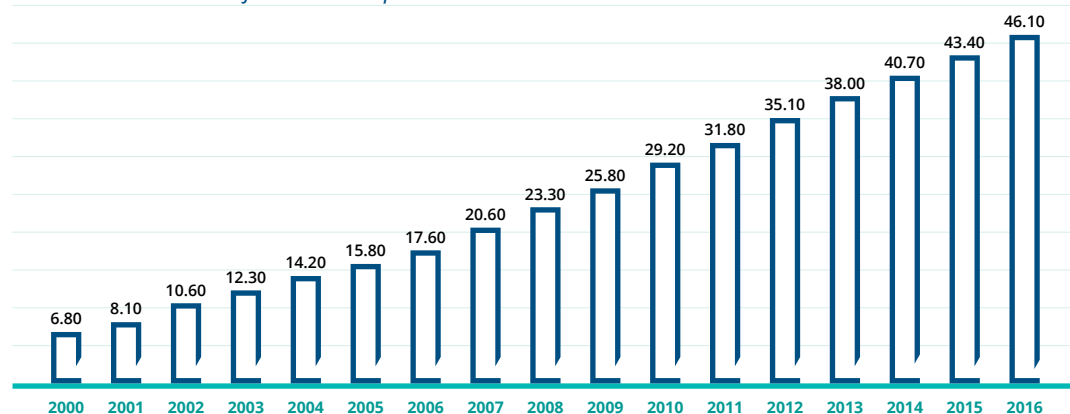
8 Sovan, N. and Pengfei, M. (2018). *Spotlight: Cambodia sees boom in e-commerce, to have law in place - Xinhua | English. news.cn*. [online] Xinhuanet.com. Available at: http://www.xinhuanet.com/english/2018-05/26/c_137207468.htm [Accessed 29 Nov. 2018].

9 Cambodia's Vibrant Tech Startup Ecosystem in 2018. (2018). 1st ed. Phnom Penh: Startup Kingdom.

at the Ministry of Post and Telecommunications, commented that “data users are increasing remarkably so if there is no strong infrastructure then data speeds will not answer to the needs of the people.”¹⁰In 2017, a project that constructed the main high-speed data conduits linking Asian, African and European countries was completed in a parallel with a 25-year agreement between the MPTC and CFCN. Online consumption has been rising, causes online traffic to increase.

An internet infrastructure with nationwide broadband allows for improved levels of mobile internet access which is important for a digital economy to function. The number of internet users or subscribers is the best indicator of digital service provision and of the potential for new economic opportunities in a certain area. Hence the internet infrastructure is crucial in supporting a platform and framework for advanced innovation to grow sustainably.

Internet Penetration of the Total Population



Source: Internet Live Stats

Oxford Economics also calls broadband a foundation for a digital economy. “Broadband is one of the basic foundations of the modern digital economy”, says Wai Leong Lui, Assistant Director of the Singapore Infocomm Development Authority. In Singapore, systematic strategies to build an information superhighway were introduced as early as 1980s. One of their highlights was the development of basic infrastructure and telecommunication architecture. A capable infrastructure facilitates the intense deployment of information technology (IT) in major facets of commercial and government applications.¹¹ The focus on strengthening the internet infrastructure is the first step to becoming a digital development ground for emerging new tech services and e-commerce applications. This is possible in Cambodia if it has enough capacity to handle millions of virtual connected applications.

¹⁰ Chandara, S. (2018). *Third undersea cable to plug Kingdom into data fast lane*. [online] Phnom Penh Post. Available at: <https://www.phnompenhpost.com/business/third-undersea-cable-plug-kingdom-data-fast-lane> [Accessed 17 Nov. 2018].

¹¹ Menon, Naveen. “Asean’s Digital Economy.” Ink.library.smu.edu.sg. November 2016. Accessed November 06, 2018. <https://ink.library.smu.edu.sg/cgi/viewcontent.cgi?article=1043&context=ami>.

Innovation and Skills

Innovation is an indicator of good investments in research and development, and digital startups. Due to its currency stability, low capital flow restrictions and openness to foreign direct investment, the investment landscape in Cambodia is improving. Nowadays, a number of local tech startups attract angel investments and publicly-disclosed startups investments. Private corporations play an important role in boosting innovation in Cambodia as they invest in local startups and support the sector to digitize business.

Having said all this, nationwide internet coverage is not enough to become a digital economy and several additional factors are required. Cambodia can achieve this goal by facilitating the growth of new tech-savvy entrepreneurs and tech companies, investing in research and development and making more competitive resources available. For example, the availability of open application programming interfaces (APIs), which are systems that allow integrating and tailoring different online applications to specific companies’ needs, would foster the development of more new tech solutions.¹² Human resources can be further developed by encouraging talented people to step into the tech sector, providing them with incentives, training, guidance and motivation to develop new cutting-edge digital solutions.

Evolving Environment for Tech Startups

Tech Startups in Cambodia: the rise of fintech and other developments

The number of tech startups in Cambodia has been increasing during the last five years. Startup-friendly communities like incubators and co-working spaces, the high

internet penetration and expanding internet broadband, as well as the supportive ICT master plan enable tech startups to thrive and sustain themselves. Although the digital market in Cambodia is still small, the emergence of local tech startups will gradually change the way people live or run their businesses. Notably, there are more than 50 fintech startups operating in Cambodia as of 2018. Based on Startup Cambodia databases, there are around 130 startups of various categories including fintech startups, logistics, online booking, and e-media startups.

Fintech, or financial technology, is a cutting-edge technology vertical that is helping Cambodia transform into a digital economy by shifting the society’s payment behaviors. It includes e-payment models, mobile banking, digital accounting platforms and blockchain. With fintech, startups can reach more customers at a lower cost and provide more secure transactions within a shorter timeframe. However, out of a total population of 15.3 million, only 5% of them have a credit card.¹³ Due to this low level of cashless payment adoption, many digital commerce actors still have to work with cash. To move beyond cash into electronic money is a very new concept to Cambodians, hence the number of customers using electronic cash is still very limited.

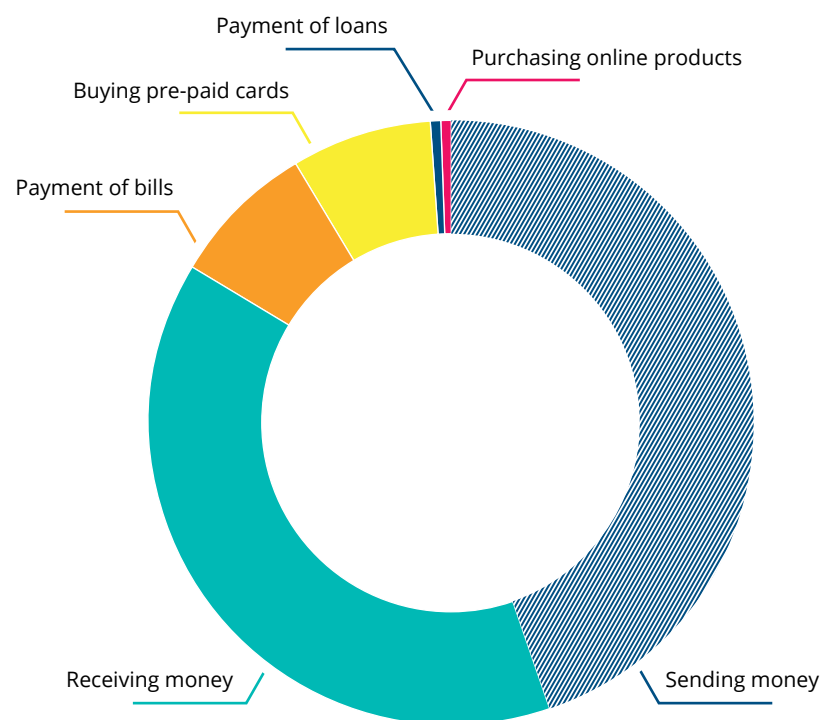
Data released by the Asia Foundation on mobile payment shows that 30% of respondents in a study claimed to have never used any form of mobile payment system. It was found that people who use them do so for six purposes as described in the following chart:¹⁴

¹³ “Fintech Cambodia Startup Report, Map and Infographic.” Fintech Singapore. October 26, 2017. Accessed November 06, 2018. <http://fintechnews.sg/12603/cambodia/fintech-cambodia-startup-report-map-infographic/>.

¹⁴ Phong, K., Srou, L. and Sola, J. (2016). *Mobile and Internet Use in Cambodia 2016*. [ebook] The Asia Foundation. Available at: <https://asiafoundation.org/wp-content/uploads/2016/12/Mobile-Phones-and-Internet-Use-in-Cambodia-2016.pdf> [Accessed 6 Nov. 2018].

¹² Johnson, S. (2014). Where good ideas come from. Kbh.: Nota.

Usage of Mobile Payment Services



Source: The Asia Foundation, 2016

To solve this problem and also to help reach out to the unbanked and under-banked, mobile banking services like *Wing* provide a service allowing customers to send, transfer, and receive money with the use of their mobile phone. Also *True Money* provides a similar service and currently operates in Thailand, Myanmar, Indonesia and Vietnam. Considering the mobile penetration rate of 166%, mobile banking services are starting to expand in Cambodia.¹⁵

Despite all these new services, people still seem less willing to keep and transfer electronic money. This may be down to two reasons: firstly, people have less confidence in

electronic transactions, and secondly, they lack financial literacy, which makes it inconvenient for them to use electronic money. Another fintech company is *PayGo*, which provides a digital wallet solution. Digital wallets allow about paying for services or products virtually. *PayGo* has a number of productive, time-saving features such as electronic money transfer, online shopping, travel ticket booking, online tuition fee payment and electronic invoice platform. Other aspects of personal and business finance are addressed by fintech startups such as *TosFUND*, *Karprak.com*, *Bima*, *Agribuddy*, *Banhji* and *CryptoAsia*. Business-to-business fintech solutions such as those provided by *Banhji* have shaped the scope, extended the business spectrum, enhanced productivity and improved the growth potential of other businesses and

startups. *Banhji* provides digital accounting solutions, which is a useful innovation for the financial management of both big companies and startups. Such solutions help leverage the growth potential and sustainability of many businesses in Cambodia.

Electronic transaction, e-payment and online accounting platforms are financial technology solutions that make it easier and more efficient to operate a business. Looking at the smart cities model in Singapore, financial technology is applied in everyday life, from public transportation to health care. Fintech allows people to buy with one click. Nevertheless, there are challenges due to the low level of online shopping penetration. Research indicates that currently only 8% of Cambodia's internet users engage in online shopping. With local electronic payment systems like *Wing* and *SmartLuy*, local businesses can reach out to more domestic customers, speed up payment services, and improve their business operations.

The impact of fintech on the way people shop and live reaches far beyond Cambodia. The world's top online retailer, Amazon, has been changing peoples' shopping behavior all over the world by making several investments in fintech. Amazon has become a leading online retailer due to convenient platform that allows people to check the product reviews and order online. A cashless checkout store called Amazon Go was launched in America in September 2018. Back when Amazon started, online shopping couldn't serve window shopping but with the right strategies Amazon has become the leading e-commerce for retail. Incentive strategies are enacted to encourage people to shop online. For example, Amazon offers prizes that are much better than those found at brick-and-mortar retailers. This model can be taken into consideration to incentivize online shopping in Cambodia. Besides, based on Model Law of E-commerce,

e-transactions have the same weight as paper counterparts¹⁶ which means online payment and e-transaction is crucial for trust building and is an element for a sustainable e-commerce. Therefore, having a trustworthy online payment platform can fast-forward the growth of all tech enterprises in a sustainable manner.

Also, convenient travel and hospitality technology services allow people to browse what they want to buy before they travel, whether they are in the province or in the cities. If they are connected, all available services and price lists can be checked in advance. There is no doubt that this is an additional reason for people to start using online booking platforms. From transportation to hotels and restaurants, there are mobile booking applications covering a number of services. At Echelon Asia Summit 2018 in Singapore, Cambodian local startups were able to show that "Cambodia's ecosystem is brimming with promise."¹⁷ Among the four qualifiers, three were online booking services. *SPARE* is one of the three online booking startups. Its vision is to provide a platform for users to rent meeting rooms, co-working spaces and offices online. Another successful tech startup is *BookMeBus*. It is among the most well-known bus booking services in Cambodia. The model includes end-to-end solutions from fleet management to e-commerce through mobile application. In addition to the online booking service, electronic payment is also integrated in their e-business model. For example, mobile payment services like *Wing*, *Smart Luy*, *eMoney*, *Pay&Go*, *PiPay*, *Visa*, and *MasterCard* are supported by it. The trend of enabling electronic payments is the first step

¹⁵ "Fintech Cambodia Startup Report, Map and Infographic." Fintech Singapore. October 26, 2017. Accessed November 06, 2018. <http://fintechnews.sg/12603/cambodia/fintech-cambodia-startup-report-map-infographic/>.

¹⁶ How Information and Communication Technology can Accelerate Action on the Sustainable Development Goals. (n.d.). The Earth Institute, Columbia University.

¹⁷ Ayden, M. (2018). *These four startups show why Cambodia's ecosystem is brimming with promise*. [online] e27. Available at: <https://e27.co/cambodia-has-chosen-goama-to-represent-them-at-echelon-asia-summit-2018-20180425/> [Accessed 15 Nov. 2018].

for the transition from conventional to digital-based business practice. Moreover, digital spillover occurs when one model has been replicated by many others. Digital spillover can create competition and boost innovations. Some include e-payment solutions and others include online-offline combinations. *Koompi*, who claimed their products as the first computer ever invented in Cambodia, is rising to get establish itself in the computer hardware sector. In order to put the product on the market and to announce sales promotions, online booking has been included in their marketing strategy. According to a report published by Mango Tango, "Cambodia has a vibrant ecosystem of micro-entrepreneurs who are finding ways to sell goods online – particularly in the area of social commerce."¹⁸

As the e-commerce sector has the potential to drive the future economic growth of Cambodia, e-commerce law will also be essential to keep up this momentum. Official e-commerce law is expected to be implemented soon. The latest draft of an e-commerce law covers a wide range of topics from credit card and debit card usage to the use of online signatures to purchase goods online. At present there is no law regulating the sector, especially to offer protection in case of online fraud, and any kind of trust is formed directly between sellers and buyers. The absence of such law leads many people to hesitate when shopping online. Safe and affordable logistics are also important. Many new online shops are online retailers who market their businesses through social media channels such as Facebook.¹⁹ Due to the inadequate physical infrastructure and lack of good logistics support, there is a high cost of delivery which some forms of digital commerce unsustainable.

¹⁸ "Chamber of Commerce Goes Global." *Focus Cambodia*, 2017, 14-18.

¹⁹ "Chamber of Commerce Goes Global." *Focus Cambodia*, 2017, 14-18.

Cambodia's Startup Community and Ecosystem

The Startup scene in Cambodia is flourishing. According to Aniwaa's founder, there are five variables that make Cambodia attractive to entrepreneurs.²⁰ First, Cambodia offers a great quality of life. Second, there are many affordable options of office and working spaces. Third, it is easy to register a company in Cambodia. Fourth, startup funding is increasing. Fifth, the ecosystem for startups is growing. "Cambodia is home to a blossoming startup ecosystem in Southeast Asia."²¹

Universities and training institute in Cambodia are introducing entrepreneurship, innovative design thinking and technical training programs. There is an increasing number in technology startups competitions, seed-stage startup programs and hackathons. Co-working spaces act as important players in holding together the entrepreneur community and startup networks. Examples include Impact Hub, Emerald Hub and Smallworld Venture. They also provide learning and training opportunities to seed-stage startups through mentorship, investor networking events and startup skill training. An increasing number of local ventures, technology startups training, university entrepreneurship programs and supportive legal frameworks have attracted more and more angel investors to Cambodia.

In comparison to its regional neighbors, Cambodia appears to be in a better state than Laos in terms of digitization in businesses and digital ecosystem for tech startups. Although e-payment and e-commerce are in their

²⁰ Martin, Lansard. "Why I Don't Regret Running My Startup from Cambodia." *Tech in Asia - Connecting Asia's Startup Ecosystem*. September 22, 2018. Accessed November 06, 2018. <https://www.techinasia.com/talk/running-my-startup-from-cambodia> .

²¹ Ayden, Marc. "These Four Startups Show Why Cambodia's Ecosystem Is Brimming with Promise." *E27*. April 26, 2018. Accessed November 06, 2018. <https://e27.co/cambodia-has-chosen-goama-to-represent-them-at-echelon-asia-summit-2018-20180425/> .

infancy in Cambodia, collaboration across all levels is important to keep the trend growing. But looking at the tech industry in Vietnam, Cambodia seems to be a few steps behind. Reports show that more fintech companies operate in Vietnam and that the ecosystem in Vietnam is growing faster. Understanding Cambodia's current position within the regional and global economy can help the country focus on its goals and become a more competitive digital economy over the next few years. It might not be that hard for Cambodia if local sectors succeed in implementing digital technology and innovation. However, it is unwise to rely solely on the government to develop strategies that would bridge the digital divide, provide digital infrastructures and increase investments in the digital economy. All stakeholders need to cooperate.

In 2018 the Cambodia Fintech Association was launched with the objective to make Cambodia a leading country in fintech innovation and investment. A community like Cambodia Fintech Association also provides advice to the government and regulators on policies that would support and encourage fintech innovation and growth. It is also a hub for other fintech startups to seek help, partners, networks and opportunities to scale up. Similar associations could be formed in other verticals and sectors, or the same associations could advise other verticals. For example, the CFA could teach other startups about electronic payments and secure transactions and help the overall population adopt more fintech services such as e-payment as discussed earlier.

Turning Cambodia into a new Silicon Valley might be a farfetched idea, but there are ways for it to become an international tech hub. "Cambodia needs to narrow down its focus if it wants to become a center for technology innovation", said US Ambassador to Cambodia William A. Heidt. A major force of Cambodia's drive toward a digital economy is the rise of fintech industry discussed earlier. Hence, action taken by the government in setting a supportive framework for local tech solutions is very important. Significant regulations have been enacted by the MPTC to provide incentives for local businesses to align with the global economy, such as a sub-decree on tax incentives for SMEs in priority sectors. Other stakeholders that collaborate to strengthen the digital landscape and community of Cambodia are individual and institutional investors, and support programs and capacity builders.

To conclude, one factor in Cambodia's journey to become a competitive digital economy is the deployment of ICT across all areas of business and entrepreneurship. Another is the government's resolve to nurture a business-friendly environment and competitive markets by offering instruments such as funding, grants, investments and tax incentives to help tech enterprises grow.²² Finally, competitive e-commerce startups will require secure electronic transaction technologies, which may be provided by the country's emerging fintech sector.

²² Huawei.com. (2017). *Digital Spillover*. [online] Available at: <https://www.huawei.com/minisite/gci/en/digital-spillover/index.html> [Accessed 15 Nov. 2018].

Conclusion

Over the past five years, Cambodia has been rapidly moving towards digitalization. A shift from an agrarian economy based on light manufacturing to a digital economy is a leap Cambodia pursues in order to benefit as much as possible from the fourth industrial revolution.

Government and other major stakeholders including individual and institutional investors, businesses, universities and training providers play a major role in shaping the digital landscape. To what extent Cambodia can compete in the region and globally depends on various local factors including tech-savvy human resources and robust connectivity. Fintech is emerging as a major enabler for Cambodian e-businesses and may produce significant spillover benefits and synergies for other tech startups. Policies and regulations are needed to encourage innovations: tax breaks, low startup registration cost, flexibility

in hiring skilled labor and other subsidies are some examples. By solving a number of different social problems tech startups are slowly changing the way people live and enhancing productivity at local businesses. This will make access to internet and computer literacy crucial aspects of Cambodia's future digital society. Data protection and privacy of people should also be taken into account and internet security will help more people trust and use online platforms.

In the near future, startups, competition and innovation will shape the digital landscape of Cambodia. Although much will rely on entrepreneurs, it must be recognized that the Cambodian government is putting in a lot of effort to digitize the economy. And even if the number of tech-savvy resources in Cambodia is still relatively low, it keeps increasing and with no doubt will continue to do so as long as there is trust and security.





DIGITAL INSIGHTS

Embracing the Digital Economy: Policy Consideration for Cambodia

Pheakdey Heng, Ph.D¹

Abstract

Recognizing the global trend and understanding the potential of technology in promoting sustainable and inclusive growth, Cambodia set out a plan to be ready for a digital economy by 2023. A fully functional digital economy fosters growth and productivity and offers gains for the society as a whole. But Cambodia currently lags behind its ASEAN neighbors on a number of digital fronts: technology infrastructure and adoption, digital ecosystem, human capital, and regulatory framework. Cambodia is categorized as one of the countries with the lowest stage of digital readiness in the Global Digital Readiness Index produced by Cisco and Gartner Research in 2018 and World Economic Forum's Networked Readiness Index 2016. At its current stage, Cambodia has considerable challenges to overcome before it can reap the benefits from digitalization. This paper analyzes Cambodia's digital landscape to understand where it stands on its digital transformation pathway and proposes policy recommendations to fill the gaps and move faster toward a fully functional digital economy.

Introduction

For the last two decades Cambodia has been one of the fastest growing countries in Asia with an average annual GDP growth rate of 8.1%.² Cambodia has been highly successful in embracing the 'factory Asia' model of growth, supplying its low-cost labor to export-oriented industries. Economic progress in recent years has allowed Cambodia to invest in physical and social infrastructure, attract foreign direct investment, create jobs and lift millions of its people out of poverty. The World Bank reclassified Cambodia in July 2016 as a lower middle-income country after its gross national income per capita reached USD 1,070 in 2015, surpassing the minimum threshold of a lower middle-income nation of USD 1,026.

Despite the good progress, Cambodia's long-term growth prospects might be hampered by its low competitiveness. The 2018 Global Competitiveness Report ranks Cambodia as one of the least competitive countries in ASEAN. Hampered by a poorly educated workforce, inefficient institutions, a lack of infrastructure and low levels of business sophistication and innovation, Cambodia ranked 110 out of 140 economies — falling from 109 in the previous year's report.³

It is clear that Cambodia can no longer depend on the same old growth drivers. For the last two decades, Cambodia has relied on garments, rice, tourism and construction as its growth-

supporting industries. This provides limited sectoral diversity and exposes the economy to demand disruptions and price shocks. To sustain long-term healthy growth, Cambodia needs to diversify and upgrade its economy.

To increase competitiveness and seize the opportunities of the rapid technological evolutions, Cambodia's government announced a plan in 2018 to be ready for a digital economy by 2023. Achieving this goal will lead to opportunities including competitiveness enhancement, economic diversification, skill upgradation and deeper participation in regional and global value chains. This paper analyzes the current digital landscape to understand where Cambodia stands on its digital transformation pathway and proposes policy recommendations to fill the gaps and move faster toward a fully functional digital economy.

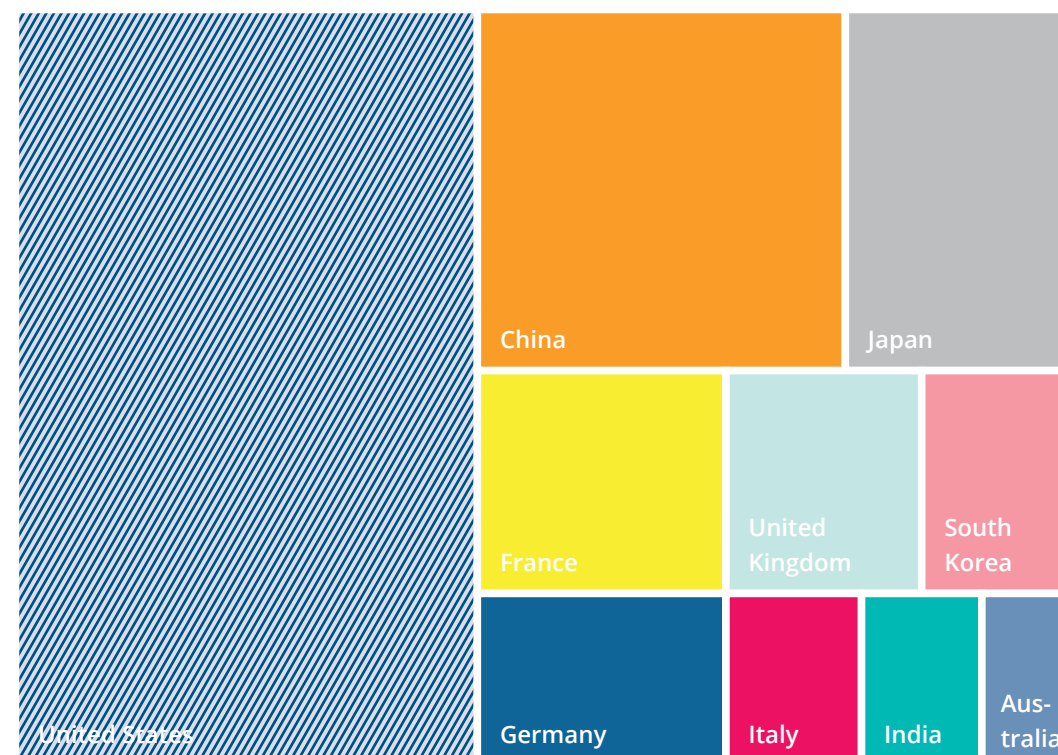
The promises and challenges of a digital economy

Although there are various definitions of the digital economy, it fundamentally refers to economic processes, transactions, interactions and activities that are based on digital technologies, which include electronic tools, systems, devices and resources that generate, store or process data. These include social media, online games and applications, multimedia, productivity applications, cloud computing, interoperable systems and mobile devices.

Since the start of the 2000s, digitalization has transformed our lives and societies in many ways. The digital economy is now firmly established as a core driver of global growth. A recent study suggests that on average over the past three decades, a USD 1 investment in digital technologies has led to a USD 20 rise in GDP and for every USD 1 investment the average return to GDP is 6.7 times higher for

digital investments than for non-digital investments.⁴ Today's digital economy is worth USD 11.5 trillion globally, equivalent to 15.5% of global GDP and that has grown two and a half times faster than global GDP over the past 15 years, almost doubling in size since the year 2000.⁵ The lion's share of that value is produced in the world's largest economies, with 35% in the United States, 13% in China, 8% in Japan and around 25% collectively in the European Economic Area. Assuming current growth rates of digital investments over the next 10 years, the report estimates that by 2025 the digital economy will be USD 23 trillion globally, or 24.3% of global GDP.⁶

Figure 1: Share of the global digital economy by country in 2016



Source: Huawei and Oxford Economic (2018)

In Southeast Asia, digital economy is worth about USD 200 billion today, or 7% of ASEAN's total GDP. More integration could send that rocketing by an additional USD 780 billion to USD 1.13 trillion over the next seven years with ASEAN's GDP projected to hit USD 5.1 trillion by 2025.⁷

The digital economy fosters growth and productivity and supports inclusive development in a number of ways. The adoption of digital technologies by a large number of consumers, firms and

² ADB (2016): Here Comes Cambodia: Asia's New Tiger Economy.

³ World Economic Forum (2018) Global Competitiveness Index, retrieved on November 20, 2018 from <http://reports.weforum.org/global-competitiveness-report-2018/country-economy-profiles/#economy=KHM>

⁴ Huawei and Oxford Economic (2018) Digital Spillovers: Measuring the true impact of the digital economy, retrieved on November 20, 2018 from https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf

⁵ Ibid.

⁶ Ibid.

⁷ Bain and Company (2018) Advancing towards ASEAN digital integration: Empowering SMEs to Build ASEAN's Digital Future, retrieved on November 20, 2018 from https://www.bain.com/contentassets/37a730c1f0494b7b8dac3002fde0a900/report_advancing_towards_asean_digital_integration.pdf

governments raises the productivity of capital and labor and enables the participation in global value chains.⁸ Digital technologies allow companies and governments to offer products and services more effectively and efficiently. The digital economy also contributes to a more inclusive society by lowering transaction costs, reducing information asymmetries and exploiting economies of scale.⁹ Through these mechanisms, the digital economy has increased the accessibility to previously marginalized groups of a whole range of markets and services.

The rise of the digital economy is not without its challenges, however. Digitalization can disrupt the job market by creating new jobs, destroying old ones, and altering the composition of existing jobs. Workers who are fast to embrace digital skills will benefit from the trends but those who are slow or are unable to adapt will lose out in the job market. As such, digitalization might lead to unemployment and worsen existing disparities in the income distribution.

The non-traditional features inherent to the digital economy also present new challenges to policy makers. The cross-border production and consumption of digital goods and services, for example, challenges public policies on taxation and trade that are traditionally geographically based. The rise of the “gig” economy¹⁰ such as Uber and Grab challenge labor and social policies, such as health insurance, training, and working conditions, that are designed to be implemented by firms and organizations in many countries.

Data exchanges across borders and national jurisdictions raise issues around data ownership and privacy. There are debates on who own the data that are shared on digital platforms such as Facebook and Twitter and who should be responsible to keep those data secured. Governments’ and businesses’ increasing reliance on digital systems also leaves them more vulnerable to cyberattack. Without strong defense mechanisms, critical infrastructure such as financial systems, power plants, traffic systems, and health care facilities can be virtually attached (attacked?) which if unmanaged will lead to social and economic catastrophe.

Digitalization poses particular challenges for developing countries. Maximizing the benefits of the digital economy depends on a basic level of ICT infrastructure that many developing economies still lack. As such, developing countries need to engage in strategic planning to maximize the development impact of digitalization. Countries that fail to do so run the risk of falling behind in their international competitiveness and may find it increasingly difficult to improve the wellbeing of their populations.

Where does Cambodia stand?

Receiving a score of 8.6 on a range from 5.9 to 20.1, Cambodia is categorized as one of the countries with the lowest stage of digital readiness in the Global Digital Readiness Index produced by Cisco and Gartner Research in 2018.¹¹ The study measures the digital readiness of 118 countries around the globe. For each country, a digital readiness score was created based on seven holistic components critical for creating an environment where economic opportunity is possible for

everyone in an increasingly digital world. The seven components include: technology infrastructure, technology adoption, ease of doing business, human capital development, business and government investment, basic human needs, and the start-up environment.

The global average for digital readiness is 11.96. Countries with the highest digital readiness scores include the United States, countries in Western and Northern Europe, such as the United Kingdom, France, Germany, Switzerland, and the Netherlands, and those in Asia, such as Australia, Japan, and Singapore. Countries with the lowest digital readiness scores are primarily in Africa, such as Liberia, Nigeria, and Chad, and some in Asia, such as Cambodia. Countries in the middle stage of digital readiness were primarily in Latin America, such as Uruguay, Brazil, Chile, Mexico and Argentina, and Eastern Europe, such as Poland and Hungary. Some Asian countries also scored in the middle range of digital readiness, including Thailand and the Philippines.

Cambodia also ranked low in the World Economic Forum’s Networked Readiness Index 2016 which measures how well an economy is using information and communications technologies to boost competitiveness and well-being.¹² The index assesses the state of networked readiness of 139 economies using a composite indicator made up of four main categories (sub-indexes), 10 subcategories (pillars), and 53 individual indicators distributed across the different pillars. Cambodia scored 3.4 on a scale from 1 to 7 and was ranked 109 out of 139 countries.

To fully understand Cambodia’s digital readiness, the following section discusses

in detail key digital aspects included in the indexes above

Technology infrastructure and adoption

Digital infrastructure such as Internet backbone, fixed broadband, mobile telecommunication, network infrastructure, data center, platforms and user device are the foundation for digital connections and activities. Without the right level of infrastructure, countries are not able to advance in their digital journey.

By the end of 2017, half of Cambodia’s population has access to Internet connection and a relatively low growth rate of 12% compared to 28% 29% and 33% of Vietnam, Myanmar and Laos respectively.¹³ There are 29.2 million mobile phone connections, 52% of which has broadband connection (3G and 4G).¹⁴ Cambodia has a competitive telecommunications market. The mobile network provider market is dominated by Smart Axiata and Metfone, with Cellcard in third place for market share. The telecommunications market has consolidated, and the remaining businesses have indicated that they are committed to investing in upgrading their networks. Pricing is competitive and affordable, and both data and call plans are well below the global average. Ninety per cent of Cambodian mobile subscribers use pre-paid service.¹⁵ Smartphone penetration is increasing rapidly, estimated at 50% in 2016. It is expected that at least 80% of Cambodians to have Internet access by 2020.

8 Miller, B. and R.D. Atkinson (2014), Raising European productivity growth through ICT, The Information Technology & Innovation Foundation, retrieved on November 22, 2018 from <http://www2.itif.org/2014-raising-eu-productivity-growth-ict.pdf>

9 World Bank (2016) World Development Report 2016: Digital Dividends, retrieved on November 22, 2018 from www.worldbank.org/en/publication/wdr2016.

10 A gig economy is a free market system in which temporary positions are common and organizations contract with independent workers for short-term engagements.

11 Tae Yoo, Mary de Wysocki, and Amanda Cumberland (2018). Country Digital Readiness: Research to Determine a Country’s Digital Readiness and Key Interventions, retrieved on November 22, 2018 from <https://www.cisco.com/c/en/us/about/csr/research-resources/digital-readiness.html>

12 The report is regarded as the most authoritative and comprehensive assessment of how ICT impacts the competitiveness and well-being of nations. For more information, see <http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/>

13 DataReportal (2018) Digital 2018: Southeast Asia, retrieved on November 23, 2018 from <https://www.slideshare.net/wearesocial/digital-in-2018-in-southeast-asia-part-1-northwest-86866386>.

14 DataReportal (2018) Digital 2018: Cambodia

15 Ibid.

Table 1: Key digital infrastructure statistics in ASEAN (as of January 2018)

	Internet Users		Unique Mobile users		% of mobile connection that are broadband (3G or 4G)
	% of total population	Growth rate	% of total population	Growth rate	
Cambodia	50	12	90	6	52
Vietnam	67	28	73	0.1	34
Laos	35	33	91	6	42
Myanmar	34	29	101	7	63
Thailand	82	24	80	3	99
Philippines	63	12	58	4	56
Indonesia	50	0	67	1	54
Malaysia	79	14	68	2	80

Source: DataReportal 2018

In 2017, Cambodia had a total 27,100 kilometers of fiber optic backbone which is provided by three telecom operators: Telecom Cambodia, Viettel (Cambodia) Pte Ltd, and Cambodia Fiber Optic Cable Network (CFOCN).¹⁶ Three companies have been granted the submarine cable licenses, namely TELCOTECH, CFOCN and CHUAN WEI. The TELCOTECH's submarine cable has been operated since March 2017. It connects Cambodia, Malaysia, and Thailand directly and links in to the Asia-America Gateway (AAG). The CFOCN's submarine cable WA s expected to be operational by November 2017. It will connect Cambodia to the Asia-Africa-Europe-1 (AAE-1) submarine network.

There is sufficient bandwidth to support e-Business activities in the major cities in

Cambodia, and bandwidth in the provinces is getting better. There are many active ISPs, and they are increasing broadband capacity countrywide. There are estimated to be about a dozen active ISPs in the market, although consolidation is expected. The largest of these, S.I.Net and Ezecom, plan to expand their international connections to improve service and allow for faster online transactions. Second tier companies including Digi, ONLINE, WiCAM, MekongNet, OpenNet, and Today Communication offer competitive pricing. The government aims to reach total broadband coverage in urban areas, with at least 70% coverage in rural areas by 2020.

Digital Ecosystem: Platform and Services

Digital ecosystems that produce local content and apps are vital for building digital literacy, attracting local users and serving local needs. Digital services can be a big step towards addressing local problems and boosting competition in an increasingly international digital services market. Relevant local content and services that bring people into the economic and social mainstream provide a big boost to both usage and inclusion.

Although Cambodia's digital ecosystem is still small, the emergence of local tech startups has gradually changed the way people live and how they practice their businesses. Based on Startup Cambodia databases, there are around 130 startups of various categories including fintech startup, logistic and online booking startups. Local ride hailing apps such as PassApp, iTsumo, have disrupted the traditional taxi industry. SPARE, a new emerging startup, intends to provide a platform for users to rent meeting rooms, co-working spaces, and offices. BookMeBus is always among the most well-known transportation online booking services. The model starts with bringing end-to-end solutions from fleet management to e-commerce through mobile application. Tesjor launched early 2017, is an application that offers a wide range of online services from food ordering to hotel booking and reserving transportation.

Fueled by exploding Internet access, high smart phone penetration and a young, growing middle class, there is a growing number of online shopping websites that cater mostly to the small number of urban consumers with access to the Internet. Some of the locally known e-commerce websites include: Khmer 24 (www.khmer24.com.kh), LittleFashion (www.l192.com), and My All In One Mall (www.maiomall.com). Social media, such as Facebook, are also increasingly used as platforms for online shopping.

Although Cambodia is still a predominantly cash-based culture, there are also several cashless payment services, with more planning to enter the market. Some of the prominent services include: Wing, TrueMoney from Thailand, eMoney offered by Metfone, PayGo, and SmartLuy offered by Smart Axiata. These services allow people to send and received money, pay bills, top up their phone and are increasingly used for business to business payment.

There are, however, remaining challenges to improve Cambodia's digital ecosystem. First, many Cambodians have little trust in online transactions or in financial institutions, as a result most eCommerce transactions are not settled online, requiring cash-on-delivery as payment. According to the World Bank's estimate, only 22% of the total population has a bank account, 3% has a bank card, 13% receive or make mobile payment via GSMA and 0.6% make online purchases or pay bills online.¹⁷

¹⁶ MPTC (2018) Cambodia's ICT development, a presentation for the 5th Connectivity Forum on 28-30 November 2018 | Seoul, South Korea.

¹⁷ DataReportal (2018) Digital 2018: Cambodia

Table 2: Digital inclusion in ASEAN

	% of total population has a bank account	% of total population has a bank card	% of total population receive or make mobile payment via GSMA	% of total population make online purchase
Cambodia	22	3	13.00	0.60
Vietnam	31	2	0.50	9.00
Myanmar	23	n.a.	0.20	0.20
Thailand	78	6	1.00	4.00
Philippines	31	3	4.00	4.00
Indonesia	36	2	0.4.	5.00
Malaysia	81	20	3.00	19.00

Source: DataReportal 2018

Secondly, most of the financial institutions do not have sophisticated technology or IT departments that can provide the infrastructure and security to enable eBusiness processes for their customers. Only a few banks in Cambodia such as Aceda, Cathay United, Canadia and ABA offer payment gateways but they are slow and difficult to work with and they do not offer technical support for example to use the Application Programming Interfaces (APIs) that allow merchants access to their gateways. This is because payment gateways are a low priority for banks due to its perceived low profit margin.

Logistics are also a challenge in Cambodia. Delivery is inefficient and expensive. There is no post code system and house and business addresses are rarely sequential. With the massive construction expansion, more addresses appear daily and there's no one central point to coordinate the registration and update of addresses. Logistics in Cambodia

involves a complex web of interconnected companies, and even the largest logistics businesses rely on local MSMEs for "last mile" delivery.

Regulations

Progress towards an enabling legal environment is tangible in the ICT and infrastructure fields but remains patchy for e-commerce and e-payment, leading to conservative investment decisions by major e-commerce players.

In 2014, Cambodia enacted an ICT master plan which is known as "ICTopia Cambodia". ICTopia Cambodia aims to make this country an intelligent and comfortable nation with intelligent people, intelligent society and intelligent government by ICT. The Masterplan is broadly aimed at building Cambodia to become an intelligent and comfortable nation through (1) empowering people, (2)

ensuring connectivity, (3) enhancing capacity and (4) enriching e-services. It will also play a crucial role in guiding strategy and policy framework for Cambodia's ICT sector.¹⁸ Two years later, The Policy on Telecom/ICT Development 2020 was developed to (1) provide vision, policy framework, coordination framework, and institutional arrangement for Telecommunication and ICT development in Cambodia. (2) address structural challenges and enhance the business and investment environment in Telecommunication and ICT sectors and (3) provide interlock measures and specific interventions as needed.¹⁹

Box 1: The 3 main objectives of The Policy on Telecom/ICT Development 2020

1. To improve and expand Telecommunication infrastructure and usage
 - > 100% broadband coverage in urban area;
 - > 80% broadband coverage in rural area;
 - > 100% Mobile Penetration;
 - > 80% Internet Penetration;
 - > 50% Broadband Penetration;
 - > 20% Household Internet Penetration;
 - > 26% Household Computer Penetration;
 - > 10% Internet of Things Penetration.
2. To develop ICT human capacity
 - > 95% ICT literacy Rate for national government officer;
 - > 75% ICT literacy rate for sub-national government officers;
 - > 100% High School Graduate with ICT Basic Skill;
 - > 15% Human Resource in ICT comparing to other skill;
 - > 30 per million people of ICT R&D Experts rate;
 - > 10 per million of ICT Researchers.
3. To diversify ICT industry and promote the applications of ICT
 - > 65% Telecom/ICT registered companies;
 - > 100% Rate of e-mail usage in the government;
 - > 100% of government bodies with websites.

Source: Policy on Telecom/ICT Development 2020

¹⁸ KOICA (2014) Cambodia ICT Master Plan 2020, retrieved on Nov 15, 2018 from <https://www.trc.gov.kh/wp-content/uploads/2016/10/Cambodian-ICT-Masterplan-2020.pdf>

¹⁹ MPTC (2016) Telecommunication and ICT Development Policy, retrieved on Nov 15, 2018 from http://www.cicc.or.jp/japanese/kouenkai/pdf_ppt/pastfile/h28/170201-3MPTC.pdf

Cambodia's most anticipated e-commerce law is likely to be passed in 2019. The latest draft has 12 chapters divided into 90 articles, covering a wide range of topics, such as E-Commerce, E-Signature, E-Government, Intermediary or service provider, online consumer protection, online personal information protection, unsolicited message, E-payment, E-evidence, and penalties. A new cybercrime law is also being drafted to protect both, buyers and sellers online from the threat of cyberattacks. This new law aims to implement anti-cybercrime measures by establishing the National Anti-Cybercrime Committee (NACC) that will be chaired by Prime Minister Hun Sen himself.

Human Capital

A well-functioning digital society requires that individuals obtain certain capabilities and skills so they can function effectively as digital citizens, consumers and employees who can use digital technology, handle large amounts of data and act with a high degree of flexibility and creativity.

In Cambodia digital literacy remains low among the general population which is one of the main barriers to moving toward a digital economy. Consumers' digital awareness is limited which explains the low penetration rate of online banking and e-commerce. Skill shortage plagues many job sectors. The IT sector, in particular, is considered to be the highest in demand for skills related to goods and services. Such a gap in skills is slowing the industry's development, increasing costs for businesses and affecting the competitiveness of firms in the Kingdom. According to the World Economic Forum, Executive Opinion Survey 2017, an inadequately educated workforce is one of the most problematic factors in doing business in Cambodia. Cambodia was also ranked one of the worst countries in the world for growing, nurturing and retaining talent in the Global Talent Competitiveness Index 2019. Cambodia still has a considerable challenge in building an educational program across the whole sector that would ensure an ongoing supply of digitally capable workforce.

Box 2: Skills that individuals will need to function in the economy of the future:

- › Higher-order cognitive skills—"the ability to understand complex ideas, deal with complex information processing, adapt effectively to the work environment, learn from experience, engage in various forms of reasoning, to overcome obstacles by critical thought."
- › Technical skills, including ICT skills—"those abilities needed to carry out one's job, such as the ability to repair a water leakage for a plumber, the knowledge to operate a machine for a worker at a factory, or the knowledge to work with a software for a person at a bank. ICT skills refer to the effective application of ICT systems and devices and range from ICT specialists who have the ability to develop, operate and maintain ICT systems, to basic ICT users, who are competent users of the mainstream tools needed in their working life."
- › Interpersonal skills—"a broad range of malleable skills, behaviors, attitudes and personality traits that enable individuals to navigate interpersonal and social situations effectively."

Source: World Bank's Digital Dividends 2016 report

Policy Consideration

The transformation of Cambodia into a digital economy is advancing with rapid improvements in Internet accessibility and affordability. Over the coming years, enhanced connectivity will continue to create new opportunities and online platforms for

Cambodian businesses to reach customers. If effectively harnessed, these opportunities can significantly improve financial performance and contribute to economic growth and sustainable development. The following are some policy suggestions:

Develop a national digital economy strategy

Cambodia needs a comprehensive strategy that builds on the existing plans, policy and regulation to transform the country into a digital economy. The strategy must combine strategic oversight with direct intervention. Direct actions include regulating against market failures, investing in infrastructure and incentivizing private sector activity. Private businesses will play a major role in delivering innovations using digital technologies. But governments need to create an environment in which these businesses can flourish. They will have to work with a wide range of stakeholders, including citizens, technology companies, educators, infrastructure providers and businesses, to enable digital spillovers to operate as effectively as possible. As discussed above, some of the traditional policies may no longer work in the context of the digital economy thus regulatory reform discussions should follow a bottom-up approach that takes entirely new approaches into consideration—and is willing, where appropriate, to discard old ones. Poor policy decisions, for example those that stifle innovation, the free flow of information and digital trade, or that allow dominant suppliers to undermine consumer trust, could hold countries back, at any stage of technology maturity.

Improve digital infrastructure

The transformative potential of digital technologies relies on having the necessary hard and soft infrastructure in place. Higher investment in hard infrastructure, like high quality telecommunications networks and supporting utilities, transport and cities infrastructure will incentivize a broader uptake of digital assets. Better hard infrastructure will facilitate digital spillovers by reducing the costs of connectivity in the supply chain,

increasing the potential of networking effects. Soft infrastructure, like skills, data availability and a supportive business environment are equally important to the productivity gains that digital investment can bring. Data infrastructure, including the institutions and governance procedures that help to create and share open trusted data, is another catalyst for innovation. Governments can play an active role in providing reliable data sources in convenient formats that are free to share. Examples include state-produced but publicly available weather, traffic and mapping data.

Boost digital literacy

Digital literacy is a critical issue that needs immediate attention. Without digitally competent citizens, a vision for Cambodia to become a digital economy cannot be realized. Education programs need to provide citizens with digital literacy skills so they can use the Internet to enhance their daily lives and navigate the online world with confidence in their ability to recognize and avoid abuses such as false data, fraud and offensive content. There is no question that new technologies will automate and otherwise obviate existing positions across all sectors. This requires continuous upgrading of relevant skills as a prerequisite to remaining employable. If Cambodia wants to maintain a competitive workforce, it must move quickly to upskill its citizens. Building a national digital literacy is a long-term mission and careful planning has to start now. Government can work with technology companies, media and universities to establish training programs that cater to different segments of the population. Incentives should be provided to firms to train their staff to keep their skills relevant and up to date. Ultimately, digital literacy should be mainstreamed into the national curriculum starting with primary education.

Promote entrepreneurship and innovation

Entrepreneurship and innovation are central to the development of the digital economy. Start-ups for example are valuable disruptors, injecting competition and new ideas across sectors. As they scale up, they become valuable investors in digital assets, employers and service providers to larger companies, contributing to dynamic industry ecosystems. Governments can incentivize entrepreneurship and reward innovation by providing information and guidance as to the opportunities in the digital economy and the challenges they will face in the early stages of growth. Regulatory policy can help create a healthy competitive market-place by tackling the barriers faced by small and growing companies (e.g. over burdensome regulation, planning and employment restrictions). And governments can encourage innovation through more targeted initiatives, such as:

- › Funding and grants: providing awards for particular projects or to fund specific investments aimed at high priority sectors.
- › Competitions: organizing competitions in core areas, with a prize offered to the winning concept, perhaps with additional business support (e.g. a partnership with an established company to help take the innovation to market).
- › Tax incentives: providing tax relief on research and development expenditure or other tax incentives (e.g. relief on payroll or corporation taxes for start-up and early stage companies).

Build trust and security in the use of ICTs

Whilst connectivity is key to the success of digital services, privacy and security are also a central consideration for building trust and confidence in the digital economy. Without this trust, no digital economy can thrive. Individuals and businesses will only use digital products and services when they feel that their online activities are safe and secure. As the number of digital services has grown and the level of risk individual users and providers are exposed to has increased, public and private sectors, and other stakeholders, including academia, should work together to enhance trust and security in the use of ICTs, while taking advantage of the benefits of modern digital systems. Investment must be made to upgrade safety and security infrastructure while digital literacy education must be provided on an on-going basis.

Demonstrate digital leadership

A digital economy requires digital leadership from the government. Government must demonstrate they are committed to promoting digital economy and are doing what they preach. They need to embrace e-government. Issuing digital IDs, enabling people to request official documents such as birth certificates, marriage certificates online, and to apply for driving licenses online is some example of the services e-government offers. The goal is to support the adoption of digital financial infrastructures and bring their services online, which both facilitates access and use and promotes digital engagement in their populations. As technologies advance, user expectations rise and new applications and models keep coming to market, governments can't rest on their success. They need to continue to push more services online and enable more complex and intensive online interactions.

Conclusion

Cambodia is facing a number of key challenges as it is embracing the global trend to transform its economy into a digital one. Currently only half of the population has access to the internet and the adoption of technology has been relatively slow due to the lack of favorable regulatory environment, small digital ecosystem, lack of investment from public and private sector and low digital literacy among the population. Before Cambodia can gain benefits from the age of digitalization, these barriers have to be removed as quickly as possible. A comprehensive digital economy strategy should be developed to incentivize investment in digital infrastructure, improve digital literacy, promote entrepreneurship and innovation, build trust and security in the use of online services. All stakeholders have a role to play in the transformation to a digital economy. Government should create an enabling environment and demonstrate digital leadership to encourage the adoption of technology, firms can invest in digital infrastructure and upskill their employees, NGOs and schools can provide education and training to bridge the digital divide.





DIGITAL INSIGHTS

Using Data to Drive Business Growth in Cambodia

Christopher Treshan Perera¹, Chhaya Som²

Keywords: fourth industrial revolution, digital economy, digital skills, big data, artificial intelligence, analytics, data-driven, data skills, data jobs, digital transformation, Cambodia

¹ Christopher Treshan Perera is a digital business strategist from London and MD of Worldacquire, currently working on digital product and business growth in Southeast Asia. Previously he headed data-driven growth marketing and product teams at American Express, Bloomberg and viagogo. He also founded London's largest tech and digital professionals association, Outreach Digital.

² Chhaya Som is a public sector consultant and Head of Growth at Worldacquire. He advised governments and public procurement organizations across Southeast Asia for almost 30 years. A Fulbright Scholar, Chhaya graduated from the SAIS at Johns Hopkins University where he studied under Henry Kissinger, the diplomat and political scientist.

Abstract

Data is the building block of growth and innovation in the age of digital transformation, A.I. and smart internet services; businesses that wish to tap into its opportunities need to get their human and technical resources right³. This paper aims to survey the current data capabilities (including people, software and their uses) in Cambodia. An emerging economy in Southeast Asia that experienced war, genocide and poverty since the 1970s, it was reclassified by the World Bank in 2016 as a lower middle-income country following rapid economic growth and now aims to become a high-income country by 2050, with tech and digital competitiveness among the government's top priorities.

Starting with nine case studies of Cambodian businesses, several successful data-driven implementations are reported, including at internet companies like *nham24.com*, and also at traditional organizations like the private *Zaman University*. Nevertheless, the interviewed senior executives rate the country-wide data capabilities at only 3 out of 10 points. A text analysis of nearly 285,000 online job posts in the last week of September 2018 reveals that data jobs make up at most 0.5% of all vacancies in Cambodia, compared to 1.3% in Malaysia, 2% in Thailand and 4.6% in Singapore. Moreover, in a drilled-down sample of 100 online job posts on Cambodian jobsite *pelprek.com*, only 12 vacancies which have data tasks were found to list knowledge about specific data tools or services among the job requirements.

Challenges called out by interviewees included the lack of wide-spread senior management support for a data-driven company culture and the difficulty to access fully supported or good quality data tools or services in the region. However, the growth of technically skilled professionals and entrepreneurs is trending in a positive direction.

³ Andrew McAfee & Erik Brynjolfsson, Big Data: The Management Revolution (Harvard Business Review, 2012), 8

Introduction

It is autumn 2018 in Phnom Penh. Over 100,000 people have installed *PassApp* to hail tuk-tuk rides negotiating the Cambodian capital's untamed traffic⁴; on their commute to work, they may listen to popular hits on *Khmer Song*, the Top 10 iPhone app of the country⁵, tailored to discover native music; and when they text their friends, the *K-Keyboard 5 Row* utility app will help them type in their native language's writing script; finally, they might order lunch on the *nham24.com* food delivery site and pay for it on delivery by cash or with the *Wing* or *Pi Pay* mobile payment systems. And if they are still unhappy after a long day at work, they can start job hunting on *bongthom.com*.

At present Cambodia counts over 300 tech start-ups startups, with hundreds more unregistered "projects"⁶. The Cambodian government, recognizing the importance of the worldwide "Fourth Industrial Revolution", has made it a regulatory priority to develop tech entrepreneurship and digital innovation as part of its long term goal of becoming an upper middle-income country by 2030 and a high-income country by 2050⁷.

As an ever increasing number of Cambodians interact and transact with foreign and locally built digital technology, the emerging Southeast Asian country adds to the global

explosion of data and the ensuing drive for automation, artificial intelligence and smarter products. Whether this boom will soon fuel insights for better driving routes, calculate tailored recommendations for new Khmer songs or auto-suggest sentences to type on *LINE*, *Telegram* or *Messenger* (the most popular instant messaging apps in the Kingdom), data is at the very least an essential ingredient in creating growth or improving business performance⁸.

Considering that global tech giants like *Facebook*, *Amazon*, *Apple* and *Google* have virtually endless capabilities to track, measure and capitalize their data to provide cutting edge insight-driven services⁹, how do businesses in a developing economy with just over 16 million people like Cambodia perceive the value of data? And, do they make the most of it? How is data being captured, who analyses it and does it influence decisions to act or improve different business functions? How do traditional brick and mortar companies adapt to the "Fourth Industrial Revolution" compared to the increasing number of internet and digital data-driven businesses?

This paper aims to provide a snapshot of how current firms in Cambodia work with data in practice – whether they are internet companies or non-internet ones - and to highlight the perspectives, doubts and expectations that senior management level leaders in business have formed specifically about modern data capabilities (human talent and skills, tools and resources), while also exploring the different opportunities they could tap into by bringing up to speed their standards of managing, measuring and making decisions with data.

Nine case studies of Cambodian businesses and a sample of 100 online job posts form

the main empirical basis of this research. The case studies are based on semi-structured interviews that were conducted with senior executives and decision-makers of a variety of fully operational Cambodian organizations. The job posts were collected from a popular Cambodian jobsite with paid advertisements called *pelprek.com*. While the interviews help grasp the bigger picture of the data landscape through senior management perspectives, the job post datasets are analysed to provide a more factual and objective country-wide indication of which specific skills companies are actively seeking and willing to invest in, as well as the relevance of data-specific roles.

Additional time was spent on collecting and analysing original raw data from other publicly available online sources, including to lay out a cross-country comparison using nearly 285,000 online job posts from ten jobsites in Cambodia, Thailand, Malaysia and Singapore. This has been partly necessary to form insights by proxy due to the lack of such industry metrics both in the region and in this domain of knowledge.

Following the two empirical studies, the conclusion and discussion about opportunities also makes a few recommendations based on global academic literature and leading business white papers or reports.

Empirical Research: Case Studies

The senior executives or major decision-makers of nine Cambodian organizations from a variety of sectors were asked to discuss their perspectives on data in a semi-structured interview, with a particular focus on how their organizations actually work with data, what resources are employed to do so, and how they expect to invest in newer data resources, whether human or technical, in the future. The interviewee roles and organizations are listed on Table 01.

Table 01:

Organization	Type	Description	Interviewee Level	Intw. Origin
Nham24	Internet	Food delivery site and app	CEO/GM/Founder	Cambodian
(anonymous)	Mixed	Recruitment site in Cambodia	CEO/GM/Founder	Cambodian
Monument Books	Traditional	Book retailer with multiple stores	CEO/GM/Founder	Foreign
Zaman University	Traditional	Private university	CEO/GM/Founder	Cambodian
YK Art House	Traditional	Boutique hotel and apartments	CEO/GM/Founder	Foreign
Reantamchet	Internet	E-learning site	CEO/GM/Founder	Cambodian
xl Consulting	Mixed	IT consulting firm	CEO/GM/Founder	Foreign
(anonymous)	Traditional	Cambodia chapter of a global NGO	Senior Manager	Foreign
CamboTicket	Internet	Bus, ferry, taxi ticket booking site	Senior Manager	Foreign

⁴ Mobile app statistics extracted from Google Play as of early October 2018

⁵ Mobile app statistics for Cambodia on SimilarWeb as of early October 2018

⁶ Mekong Strategic Partners & Raintree, Cambodia's vibrant tech startup ecosystem in 2018 (report sheet)

⁷ Royal Government of Cambodia, Rectangular Strategy Phase IV (2018)

⁸ McAfee & Brynjolfsson, Big Data, 5-6

⁹ McKinsey Global Institute, The Age of Analytics: Competing in a Data-Driven World (McKinsey, 2016), 5, 26

It should be noted that five out of the nine interviewees are of foreign origin, and one organization is a foreign NGO with extensive operations in Cambodia. This should make for a broad and diversified range of perspectives about a very specific focus area. Only one of the leaders is a woman. Two of the interviewees requested anonymity.

Data roles and tasks

The first questions revolved around which human talent is currently employed to operate with or analyse data, whether the organization employed data-specific specialist roles (including business intelligence and research)¹⁰, and/or whether other employees or departments with different titles covered the same tasks that would be fulfilled by such data roles.

As one might expect elsewhere in the world, the larger organizations as well as the “digital natives” (internet companies) tend to have more human talent covering such specialist roles¹¹, whereas the smaller or more traditional firms report a more varied composition of staff.

Nham24, the food delivery site and app, has been operating for nearly three years and employs around 100 people. Having a large website-based business model makes it necessary for the company to have a “Database Administrator” on their IT team. It also employs four people as “Data Analysts” or “Marketing Analysts”, and it encourages the digital marketing and customer service personnel to work with the customer database. Most of the number-crunching effort is directed towards the information flowing from sales and social media data, which also the CEO

himself vigorously checks on an hourly basis as he admits.

Similarly, the *anonymous recruitment site* with a staff size of 30 people has a strong IT core team that is well-versed in SAP, the German enterprise software, and an “Online Media Officer”, who together look at employee and employer data originating from the registration forms of each group.

Monument Books, founded in 1993 and considered the largest bookstore chain in the country, has around 70 employees, of which various marketing roles cover analyst and research tasks and a “Database Administrator” manages the records of book sales, both online and offline.

CamboTicket, the bus and ferry booking site, is an internet start-up with less than 20 people, and has “Data Analyst”, “Business Analyst” and “Marketing Executive” roles conducting the analysis of sales-related data.

At *Reantamchet*, another internet start-up, and *YK Art House*, a boutique hotel in central Phnom Penh, the capital, all data research is done by the founder, CEO or general manager themselves on an ad hoc basis, with occasional support from assistants and front desk staff. However, there are no data, business intelligence or research-specific roles.

A special case is *Zaman University*, the private university in Phnom Penh with about 100 staff including its part time academics: aside from its marketing department, which primarily focuses on various forms of content generation and design, there are no employees specifically dedicated to data analytical roles. However, its IT staff of six, who also teach some of the university’s courses, created and maintain the university’s database which is mined ad hoc for reports and insights on student performance and academic progress, among other things.

Another non-internet organization with highly specialised data capabilities is the *anonymous US-headquartered NGO*, which for its Cambodia operations has assigned two “Data Analysts”, three “Monitoring & Evaluation Specialists”, two “Database Architects” and two “Database Administrators” as well as a “Digital Media Specialist”. A big part of their data resources is spent on measuring the impact of the NGO’s programs on their target group’s income and livelihoods, as well as understanding their own cost-effectiveness.

Except for *xl Consulting*, which is specialized in providing data-focused IT solutions, none of the businesses reported having a “Data Scientist”, which is by now widely considered one of the most advanced big data roles and “sexiest” jobs of the 21st century¹².

Data-driven decisions

The next phase explored in detail what specific data is collected, reported or analysed, and whether and how the businesses make decisions based on the insights formed from that data.

Nham24 personnel keep track of real time visitor traffic on their website and app as well as their sales indicators in order to decide which restaurants (or other food establishments) to promote on their social media marketing channels. Aggregate restaurant order information is categorized by individual restaurants, by hour or by day, to help better decide when and what to promote. The business also pays attention to the customers’ names to infer nationality and tailor the website or app content, or change the entire product or service, accordingly. As a matter of fact, *Nham24* was only a Khmer website in its early stages, but after seeing an exponential growth in expat user names, the

company decided to create the English product and other foreign versions, which turned out to yield a high return on investment. Also operational decisions were made on the basis of such data. For example, it was thanks to such customer insights that also revealed the origin of visitors that the company decided to hire Chinese call centre staff. Current efforts at the company try to evaluate the utilization of new payment methods like Wing and Pi Pay. This approach to using data for business growth is very similar to that of other global internet natives like *Netflix* that use big data analytics to make fast, new product decisions or changes¹³.

The *anonymous recruitment site* runs an approval and verification system for potential candidates and also closely follows the recruitment demands of the employers. Data from each group is used to create reports for different departments of the business and helps inform how many new employers should be contacted in order to close new recruitment deals, how many job candidates are predicted to be required in the future, as well as to get insights about successful matching of employers and employees.

Zaman University evaluates its marketing performance and shapes future campaign decisions based on the data it gathers. For example, it determines the effectiveness of campaigning at each of the different schools from which it hopes to source new students and whether it’s worth continuing to pursue them. The university has also developed a system to keep track of the trend of student performance and warns students who are at risk of not performing up to standard, especially those who need to fulfil certain ongoing performance criteria in order to keep their scholarship. In an even more innovative twist, its IT staff turned the university premises

¹⁰ A. De Mauro et al., Human Resources for Big Data Professions (Information Processing and Management 54, 2018), 811-812

¹¹ Stefan Debortoli et al., Comparing Business Intelligence and Big Data Skills (Business & Information Systems Engineering, 2014), 290

¹² Thomas Davenport & D.J. Patil, Data Scientist: The Sexiest Job of the 21st Century (Harvard Business Review, 2012), 70-76

¹³ Zhenning Xu et al, Effects of big data analytics and traditional marketing analytics on new product success (Journal of Business Research 69, 2016), 1562-1566

into a “smart building” by using class schedule data to automate the operation of the air conditioning timing. This has proven to be very efficient and cost-saving.

YK Art House keeps track of occupancy to ensure it doesn't drop and there are always guests in the hotel and serviced apartments.

CamboTicket, *the anonymous NGO*, and *xl Consulting* all stated that they glean insights from data and make decisions, but no specific examples were discussed.

Reantamchet reported that they are not making any decisions based on internal data yet due to the low volume of information at such an early stage. However, they do use external and public data for their market research purposes and product design decisions.

Monument Books explained that although they do gather some data, most of their decisions are based on low or no tech analysis. Customer feedback given on the shop floor or over the phone, discussions with teachers and parents at schools, and ad hoc conversations at the 4-5 book fairs they organize provide them with the “few comments that drive big decisions”. The qualitative information is recorded on spreadsheets and reviewed by the buying department whenever buying strategies are shaped. The interviewee admits that its current process is an inexact science, but that the margins of the company would not justify investing in a more tech-driven solution as of now.

Data tools and services

The interviewed executives were asked which software, tools or services they use in relation to managing, reporting and analysing data, as well as their feedback on the value that those tools provide. On top of surveying the different categories of data technology used

at Cambodian companies, this question also had the implicit purpose of sensing how close senior management (or management in general) in the country is to the data-related functions and tasks, both in terms of their familiarity and their supportiveness.

Nearly all companies use Microsoft Excel, the standard office spreadsheet application, although at least one company prefers using the more collaborative Google Sheets for the basic collection and recording of data.

Microsoft SQL Server, a widely adopted relational database management system (DBMS), and MySQL, an open-source counterpart, can be operated both in their essential form as database infrastructures to keep records, store and update information, as well as for their reporting and analytics features thanks to the powerful functions and calculations that can be performed on the data that they store. Other widely used relational DBMSs include Oracle and PostgreSQL¹⁴. None of the interviewees mentioned using any of the more advanced data management infrastructures such as Hadoop, MongoDB or other NoSQL database programs, which are widely regarded to perform better for big data use cases¹⁵ including artificial intelligence and deep learning.

Nham24, *Reantamchet*, *the anonymous recruitment site* and *Zaman University* use these systems as their database and at least for part of their basic reporting needs. Much of *Nham24*'s data analysis starts on MySQL which has a feature to generate reports on Excel. *Zaman University*'s IT staff develops custom-made business intelligence reports and dashboards based on the functions of Microsoft SQL Server. It is assumed that the other internet companies also use these or

very similar database systems, even though the interviewees didn't confirm this.

Microsoft Power BI is one ready-made business analytics software that helps users easily create visualizations and dashboards without having to understand the powerful but complex workings of the above-mentioned database management systems. This is the tool in which *xl Consulting* is specialized and offers services.

Most of the other interviewees mentioned having various types of enterprise resource management software which can also be used like databases, but are mainly known for their range of ready-made analytical features and digitalized business actions that are particularly tailored to the needs of specific industries or company functions.

Among probably the most well-known of these is SAP, used by *the anonymous recruitment site* especially for its SAP CRM (customer relationship management) application which helps manage the interaction with current and prospective clients through customer data insights. A widely available competitor to this application is Salesforce.com which is the CRM chosen by the *anonymous NGO*.

All these cloud computing-based “Software-as-a-Service” (SaaS) applications provide ready-made solutions that can be accessed from the internet and reduce the need for complicated in-house database development (or any IT) resources, and therefore also lower operational and maintenance costs¹⁶.

SAP is also used by *anonymous recruitment site* to manage its staff, whereas *Zaman University* and the *anonymous NGO* have developed their own in-house software to perform such tasks. Microsoft Dynamic NAV was cited by the *anonymous NGO* as an additional enterprise

resource planning software it uses. It can help with finance, supply chain and manufacturing functions.

YK Art House gets the Quickbooks accounting software to handle its sales, operational and financial data, whereas the *anonymous NGO* uses SunSystems for the same purposes.

Moreover, *YK Art House* has installed the Hotelogix property management system to monitor hotel occupancy, understand sources of guest bookings and to set or change room prices on the different hotel listings and booking sites like *Booking.com*, *TripAdvisor* and *Agoda*. One of the features offered by the Hotelogix system is to integrate with the different tourism websites' data in order to implement a revenue-maximizing dynamic pricing system.

Another family of data software and tools are platforms for website and e-commerce sites that facilitate the management of online content, products and transactions. These are mostly used by small scale websites. *Reantamchet* uses WooCommerce, a plugin for the popular WordPress blog site platform, whereas *Zaman University* builds the back-end of its website on the Drupal open source content management system.

The most popular data tool of this part of the research, mentioned by seven out of nine interviewees and adopted to varying degrees of expertise by their organizations, is Google Analytics. This nearly ubiquitous web service tracks and provides high level statistics about a website's traffic, including information that is not generated inside the company but by Google search engine users. The tool is a popular component in web analytics that helps analyse and inform digital marketing strategies¹⁷. Several businesses are not entirely happy with Google Analytics: both

¹⁴ DB-Engines.com database engine ranking as of October 2018

¹⁵ Seyyed Aboutorabi et al, Performance evaluation of SQL and MongoDB databases for big e-commerce data (International Symposium on Computer Science and Software Engineering 2015)

¹⁶ Dan Ma, The business model of 'Software-as-a-Service' (IEEE International Conference on Services Computing, 2007), 1

¹⁷ Joel Jarvinen & Heikki Karjalainen, The use of Web Analytics for digital marketing performance measurement (Industrial Marketing Management 50, 2015), 117-127

Nham24 and *YK Art House* observe that the data provided by Google tends to be inaccurate and thus only gives a directional idea of different trends. *Monument Books* laments the fact that it is not entirely straightforward to connect the dots between a click (or like) and a sale, and therefore web traffic data could be exciting but misleading.

This is a subject of much discussion in the global digital marketing industry known as “attribution modelling”. It studies how to measure the value of each interaction of a customer with a company’s different marketing touchpoints and would estimate the exact revenue contributed by a click or a like. The difficulty lies in the fact that there is no “one size fits all” method and each business may require a different model depending on its processes and goals¹⁸.

Like Google Analytics measures the traffic of visitors to a site from the *Google* search engine, other big internet platforms like *Facebook* and *Instagram* provide equivalent tools to analyse their users’ interactions with the businesses, and the interviewees whose businesses have strong marketing activities on those social media sites also actively look at the data provided by those applications.

YK Art House, as one might expect from businesses in the industry, regularly checks the insight tools provided by the major hotel booking and travel review websites. However, the interviewee expressed disappointment in the reliability of information provided by *TripAdvisor* and *Airbnb*, noting for example that there are many inconsistencies in how reviews are approved and aggregated by those websites. It would thus seem, according to the interviewee, that the actions recommended by those services to the individual hotels might be misleading and biased and have undisclosed

interests at heart. The interviewee reported experiencing a situation where *Airbnb* approved and justified a fake rating about the *YK Art House* hotel.

Other data tools or services that are currently used by the interviewees’ businesses include *Google Ads* (formerly *AdWords*), the application to manage paid advertising on the *Google* search engine and related online properties, and reports its campaign performance; and *TaroWorks*, an interface to collect information from mobile phones or tablets on the field.

Finally, the only organization out of the nine case studies that uses advanced statistical software is the *anonymous NGO*. The NGO uses the *SAS* statistical package to properly analyse the data of its program’s impact.

The same NGO is also the only organization that reports using the *Cambodian Government’s Gazetteer* as an external database of market information.

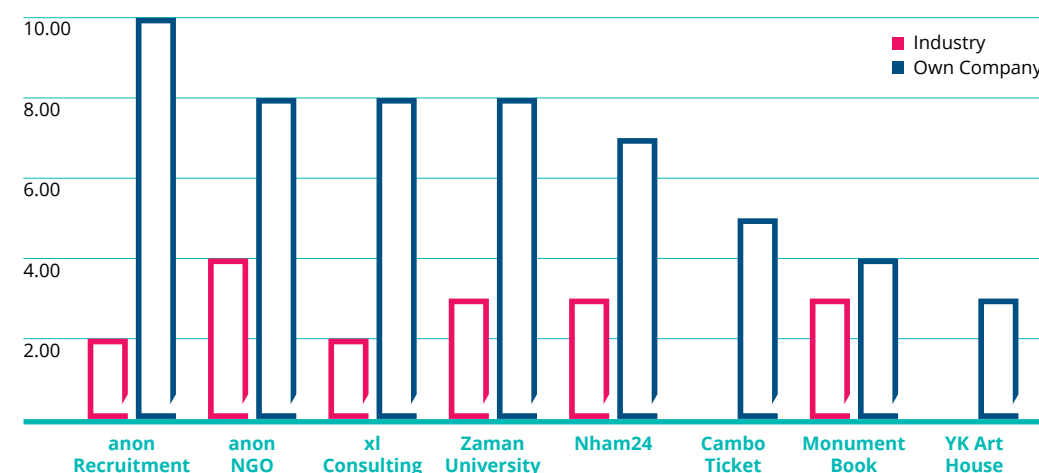
Senior Management’s Perceptions about the Maturity of Data Capabilities

The interviewees were asked to rate the data capabilities of their own company and that of other companies within their same industry in Cambodia on a Likert scale of 1 (very poor) to 10 (excellent), and to elaborate on their ratings.

The ratings are displayed on Figure 01:

The average rating given for their own company was 6.9 (“average to good”), whereas the average for other companies in their industry in Cambodia was 3 (“poor”). Two businesses did not comment on the rest of their industry, and one business omitted both questions.

Figure 01:



Among those who scored their own company with a good to very good rating, *Nham24* sees its own primary area of improvement as big data and statistical capabilities, which would, for example, help further segmenting customers and predicting their eating behaviour and purchasing patterns. *Zaman University* attributes its achievements to a young and modern tech-savvy staff, whereas the *anonymous recruitment site* reports to have experienced an increase in computer science talent and consultancies in Cambodia which has been beneficial to the company. On the other side of the spectrum, *Monument Books* believes it could do better with data and digital technology altogether if it had more buy-in from more senior stakeholders. However, being a leader in a sector with high costs of entry appears to make it less of an urgent need at present. *YK Art House* appeared to be the most self-critical of all; despite already using a range of digital and data technologies, the interviewee feels that multiple areas of the business could be standardized and automated, and that the systems in place have not yet grown to their fullest potential.

With regards to perceptions about other companies in Cambodia that are within

their same industry, *Nham24’s* CEO, a native Cambodian who studied Marketing and previously worked at *Coca Cola* and *British American Tobacco* in market research and online marketing capacities, puts his low score down to the lack of a research-friendly culture at local businesses; while bigger foreign subsidiaries of Western companies have always engaged in some form or another of systematic market research, Cambodian firms would not spend money on that and instead rely on anecdotes heard “at the coffee shop”, or just try to copy each other. He adds that, aside from academia, professionals with an advertising agency background are the most likely to have strong data skills.

Monument Books echoes the above sentiment, emphasising that many other book retailers appear to display ranges very randomly. The interviewee adds that his industry may also suffer from the low interest of Cambodian natives in buying books and the relatively small amount of Cambodian publishers. *Monument Books’* own customer share showed that only 5% was composed of Cambodians ten years ago, 15% five years ago and only recently did Cambodians make up 35% of the readers buying at their bookstores.

18 C.H.W. Jayawardane et al, Attributing conversion credit in an online environment (3rd International Symposium on Computational and Business Intelligence, 2016), conference paper

YK Art House more emphatically explains that “people here care more about opinions, feelings and intentions rather than data and facts”, adding that where new technologies are invested into, these appear to be done just for the sake of the digital innovation hype rather than to fund practical and useful applications.

The *anonymous recruitment site* itself had many difficulties during its digital transformation phase over the past ten years; the CEO reports that his own staff was initially unwilling and resistant to learning new skills and technologies until they saw how it helped them. This might be even worse at other Cambodian companies. Adding to his previous comment about the growing pool of computer science talent in Cambodia, the CEO elaborates that while many data tools and services are available globally and in Cambodia thanks to the internet, most of those products offer little to no customer support in Cambodia, thus making them less functional. *Monument Books* had a similar experience with providers of data or marketing research services who, moreover, struggled to convince the company of their efficiency.

Zaman University observes that most other universities still have old paper-based processes, and that private universities in particular have no incentive to adopt digital and data technology because it is expensive or because they feel too comfortable in their own space. *Zaman University* reaches out to other educational institutions to share its own technical capabilities.

These senior leadership perceptions partly resonate with more general industry reports that Cambodia still requires more higher-skilled technical talent as of present¹⁹.

Investing in data-driven growth

Finally, all senior managers were asked whether they intend to invest in additional data capabilities in the future, and why and how they would do so.

Most respondents who intend to invest plan to dedicate their resources to two broad categories: improving their existing functions or expanding to new functions.

Among those whose objective is to improve their existing functions, *Nham24*, as stated above, plans to improve its statistical analysis or big data analytics capabilities, and also wants to enable remarketing, i.e. marketing to existing or prospective customers based on data about their online behaviour. The *anonymous NGO* will continue building new database systems for each different impact program internally, especially for use by different target groups. And *xl Consulting* will keep innovating its use of Power BI.

Bigger investments and transformations are expected at the companies that wish to expand beyond their existing data capabilities: the *anonymous recruitment site* sees value in putting their entire product on a cloud computing-based system, for example by using AWS (Amazon Web Services), essentially a set of powerful online storage and hosting services that would add speed, reliability and scalability to all their data-driven operations²⁰, enable the operation of A.I. features, and more generally put the company at the same level as many global internet businesses (the industry calls these systems “Infrastructure-as-a-Service”, following the naming convention of the other cloud-based applications²¹). The company envisions to provide reliable and

real time insights about human resources to both current and potential employer clients. Moreover, the CEO plans to cover 80% of all company functions with analytical dashboards and SAP-driven systems (or similar) in the short run.

The smaller businesses and start-ups also wish to explore new pastures, with *CamboTicket* about to implement the Zoho CRM tool, *Reantamchet* preparing to test multiple data services and YK Art House envisioning to set up a system for similar companies to share insights about the market and its dynamics.

While *Monument Books* and *Zaman University* don't have any specific plans or structured budget for such capabilities, both are willing to invest if a business case is proven or if further needs arise due to expansion.

Empirical Research: Job Posts

Ten jobsites in Cambodia and other neighbouring countries in Southeast Asia were examined to get a sense of the prevalence of data-related jobs in the region and one particular Cambodian website was used to draw a sample for a more in-depth analysis of job requirements. While job posts don't necessarily reveal the full extent of how companies work with data, they can provide a factual and quantifiable indication of what skills companies are actively looking for and willing to pay for at a given point in time.

The first step was to count the frequency of job posts where the job title contained any of the words “Data”, “Research” or “Intelligence”. While there may be other jobs with data-intensive responsibilities, counting only the posts that have these words in the title is a simple and standardized way to gauge prevalence across multiple different sites and different countries.

Table X lists the unique count of data roles found on each of the four Cambodian jobsites, along with the proportion expressed in percentage of the total number of posts at that point in time. Table Y shows the same figures for the six jobsites in Singapore, Malaysia and Thailand. This data was collected during the last week of September 2018.

Cambodian Jobsites

Jobsite	Data Roles	Total Roles	%
Pelprek	4	804	0.50%
Bongthom	8	2,420	0.33%
Topjob Cambodia	1	320	0.31%
CamHR	15	5,341	0.28%
Total	28	8,885	0.32%

Other Southeast Asian Jobsites

Jobsite	Data Roles	Total Roles	%
Indeed Singapore	2,290	50,383	4.55%
Jobstreet Singapore	1,569	60,789	2.58%
Indeed Malaysia	445	35,030	1.27%
Jobstreet Malaysia	335	27,981	1.20%
JobsDB Thailand	416	20,350	2.04%
Indeed Thailand	488	81,551	0.60%
Total	5,543	27,6084	2.01%

The proportions reveal that the prevalence of data-related job roles in Cambodia is at most 0.5%, behind Malaysia's highest observation with 1.3%, Thailand's at 2% and Singapore's at 4.6%. The absolute number of roles may also indicate that these regional neighbours are far ahead.

When considering the broader economic realities of each country, these figures make more sense. At the same time, holding everything else equal, they may serve as a benchmark to strive for as Cambodia's different industries continue to grow.

¹⁹ Mekong Strategic Partners & Raintree, Cambodia's vibrant tech

²⁰ Qi Zhang et al, Cloud computing: state-of-the-art and research challenges (Journal of Internet Services and Applications, 2010), 13

²¹ Alexander Lenk et al, What's inside the Cloud? An architectural map (ICSE Workshop on Software Engineering Challenges of Cloud Computing, 2009), 23-31

A sample of the 100 latest job posts on *pelprek.com*, the Cambodian jobsite with the highest percentage of data roles, was further analysed to check what kind of data-related responsibilities, tasks and tools are required by employers in Cambodia across a variety of different sectors and functions (regardless of whether the roles themselves are purely data-focused); this was to complement the case study interviews with more factual industry-wide information about Cambodia. It should be noted that these job advertisements from *pelprek.com* are paid for at a premium, thus signalling higher intent and urgency by the businesses to hire sooner, as well as stronger reliability of the information on the job description.

Out of the *pelprek.com* sample, 48 were found to have job responsibilities or tasks with some form of data processing, analysis, reporting and data-driven decision making. Table Z below categorizes these roles by the different dimensions or angles from which they were observed, including the industry, function and seniority level.

Industries	#
Social Enterprise	5
Automotive	5
Real Estate	5
Marketing Services	4
Banking	4
Food & Restaurant	4
Internet	4
Supply Chain	3
Electronics	3
Gambling	2
Insurance	2
Retail & Distribution	2
Architecture	1
Waste Management	1
Air Conditioning	1
Software Development	1
Materials	1

Seniority	#
EntryLevel	19
Intermediate	19
Middle Management	8
Senior Management	2

Functions	#
Sales & Business Development	15
Customer Service	7
Operations	6
Inventory	6
Marketing	5
Finance	3
IT Admin	3
Human Resources	1
Software Development	1
Security	1

Altogether only 12 jobs out of these 48 pinpoint specific data tools or software among the requirements. Interestingly, none

of those roles were digital marketing-related (usually a highly data-driven area). Only two were primarily data-focused roles (“Database Administrator” and “Market Research Specialist”) and both vacancies were at foreign subsidiary companies. Two more IT roles at local companies had responsibilities close to database management system technology work (SQL, see above) but used it in order to fulfil a different primary function. One of them is at an online gambling company called Kelutree.

Because there was a nearly equal number of roles at foreign subsidiary and local companies within the selection of 48, the two segments were compared for differences; almost all attributes were equal, except for the fact that foreign subsidiary companies had 50% more roles requiring specific software or tools for the data-related responsibilities. The group of foreign subsidiary companies also tends to represent a variety of industries, whereas the local companies are internet businesses and social enterprises with IT-specific roles.

Another dimension with a nearly equal number of roles and allowing for a comparison was jobs with versus without significant decision-making responsibilities. Those without are mostly entrylevel and also have a much lower amount of positions (52%) requiring basic computer literacy as opposed to those who do have decision-making tasks (78%). 37% of decision-makers require specific tools, compared to only 10% of non-decision makers. Conversely, decision-makers are less likely to be required to perform data collection tasks, yet spend more time on monitoring and reporting.

Similarly, when comparing the seniority level of the different roles, it emerges that increasing seniority brings less requirements in terms of data collection but more in terms of data reporting or monitoring responsibilities.

Only half of all entry-level roles require basic computer literacy.

Function-wise, most of the roles in the selection are in Sales & Business Development. Nearly all of them have data collection and reporting tasks, and the job descriptions reflect a need for performance-driven people who monitor operational KPIs (key performance indicators) and sales forecasts against defined targets, though without necessarily specifying whether these responsibilities require the use of digital technology and data tools.

Customer Service roles take the second place, and interestingly *pelprek.com* itself, a local internet company, has a role for a “Customer Service Manager” who should work with CS software, databases and tools as well as understand the latest industry applications. Operations and Inventory roles have more specific software and tool requirements due to the need to keep track of operational and inventory performance. The SAP software is required in two such roles. The Marketing roles include one of the most data-intensive jobs which is at *Honda*. Finance roles also mention several ready-made function-specific tools with data-processing features such as the Quickbooks accounting software.

The Human Resources role in the selection, at *Tonle Bassac Restaurant*, stands out as a local and traditional business that requires the use of an HR information system tool and employee database. The restaurant’s warehouse management role also appears to have a strong performance-driven remit.

Finally, the Security role in the selection, a “Trainee CCTV Operator” at *Nagaworld*, one of the most visible casino brands in the country, requires a heavy focus on analytical skills to strengthen surveillance and risk management, for example to monitor gamblers, identify and predict cheating techniques and ensure security of the premises. The role at *Nagaworld*

Source	
Jobsite: pelprek.com	
Sample size: 100	
Roles with data tasks	48
Number of businesses	26
Ownership	#
Local companies	25
Foreign subsidiaries	23
Decision-making tasks	#
Yes	27
No	21

specifically requires the use of a software called iTrak to keep track of incidents and other events.

Conclusion

It is clear from both the case study interviews and the job post text analysis in this research that Cambodian businesses strive to improve their data capabilities and, to a certain extent, have also produced a number of successful practical examples in which data has fuelled business growth and efficiency, whether at internet companies like *nham24.com* or at traditional organizations like *Zaman University*.

While foreign subsidiary companies in Cambodia may on average score higher in terms of having access to specific data-related skills and tools, this is something that could actually spur cross-pollination of know-how and experience between them and local companies, just like what may happen when there are foreign staff and leadership at Cambodian companies who are willing to foster genuine exchange with local staff.

One of few corporate brands that is often present in the promotion of tech innovation in Cambodia is *Smart Axiata*, a telecommunications service provider that is a subsidiary of the Malaysian company *Axiata*. It frequently organizes or sponsors programs and competitions aimed at tech start-ups and entrepreneurs of the country and also partakes in the investment in local tech (and other) start-ups. *Smart Axiata's* C-level team is comprised of executives from Germany (CEO), Sri Lanka, Croatia, Russia, India and the United Kingdom²². This kind of partnership activities between foreign corporate subsidiaries and smaller companies could, if run effectively and fairly, facilitate deeper levels of knowledge and technology sharing.

Systemic issues which probably affect the Cambodian economy overall explain the low industry maturity score of data capabilities given by senior management in this research. It remains to be seen how this will improve in light of the increasing number of tech companies and the Cambodian government's active focus on the "Fourth Industrial Revolution", and whether the country's organizations will catch up with their regional neighbours across all other areas of digital skills. Much needs to be done if Cambodia aims to become a high-income country by 2050, and becoming competitive with data and analytics will be one of its top priorities. Specific actionable steps that can be recommended to businesses of all types include:

- › Fostering and encouraging a more evidence- and data-driven organizational culture right from the top²³. This is considered to be one of the most critical steps worldwide.
- › Starting to measure multiple performance metrics across different functions and spending time to clean up, categorize and observe all kinds of data flowing into and generated by the organization.
- › Being open to test and introduce a variety of free and open-source data-related software across the different functions of the organization, in order to explore the multitude of opportunities offered by analytics applications^{24 25}.
- › Establishing more partnerships or spaces for discussion to facilitate a genuine exchange of know-how about processes and operations between internet and traditional businesses, as well as between

foreign subsidiaries and "purely" local companies.

- › Filling the advanced data skills gap, for example by hiring or training more Data Scientists or Data Analysts, which would include graduates from an array of technical and scientific subjects who are willing to understand both technology and business²⁶.

²⁶ Davenport & Patil, Data Scientist, all

²³ McAfee & Brynjolfsson, Big Data, 8-9

²⁴ Teradata White Paper/Report, The Digital Analytics Handbook

²⁵ Teradata White Paper/Report, The Digital Analytics Handbook

²² Smart.com.kh, Corporate Information, The Team as of October 2018

DIGITAL INSIGHTS

The Future of Waste Management – Seizing the Potential of Digitalization

Lilli Tabea Albrecht¹

¹ Lilli Tabea Albrecht studied political science in Hamburg, Germany and at the University College London, United Kingdom. She's previously worked as a research assistant at the University of Hamburg and was a visiting research associate at KAS Cambodia, where she worked on her thesis about health care governance and foreign aid in Cambodia. She's interested in governance and public policy and the impacts that digitalization will have on power structures and the state.



Introduction

Imagine, selling your waste via platforms or getting a notification when the CINTRI truck is coming closer. Sounds far - fetched? With digital transformation happening all around us these scenarios are no longer out of reach in Cambodia.

Cambodia is a young, developing country on the rise. Having endured a gruesome regime and years of conflict in the seventies, today Cambodia's economy is soaring. Foreign investment is increasing, more small and medium enterprises are being founded and the Cambodian GDP has seen a rise from USD 10.352 billion in 2008 to USD 22.158 billion in 2017². Cambodians are getting wealthier and more people are moving to the bigger cities like Phnom Penh, Sihanoukville and Battambang.

Not exempt from the economic growth is Cambodia's digital economy. Apps like *Nham24*, *Mealtemple* and *PassApp* have gained a strong hold on the Cambodian market. Online ticketing platforms like *Bookmebus.com* are gaining traction and more Cambodians have started using Fintech apps such as *Wing* and *PiPay*. With a digital transformation happening all around the globe, Cambodia can also reap the benefits of going digital.

Due to rapid - and still ongoing - innovation of technology during the last decades, digitalisation offers many solutions to streamline everyday life and make daily

processes much faster, cheaper and easier. Digitalisation has happened and can happen everywhere from e-governance, to e-economy and cybersecurity to smarter solutions for households and production chains. It is not limited to a certain group or class of people, digitalisation aims to be accessible to everyone. If you look at Cambodia's society today, there are more mobile phones in Cambodia than Cambodia's population³. In 2017 there were nearly seven million internet users, which make up nearly half of the population⁴. Smartphones and cheap internet/data usage are a way to reach almost everyone— no matter where they are.

While digital tools are being applied to many sectors in Cambodia, like tourism and the finance sector, waste management so far hasn't received much attention in regard to digitalisation.

Even though there has been an effort by the government, businesses and civil society to improve the state of waste management in Cambodia, waste management still needs to be made more efficient and sustainable in the Kingdom of Wonder. With Cambodia growing, more tourists coming into the country and the living standards on the rise, a new approach to the waste management system can complement and reinforce the existing one. This need is underlined by the newest UN climate report stressing that the world only has 12 years left to keep global warming under 1.5C⁵. Digitalisation does not only offer more efficient ways to manage waste, it can also help make waste management much more

sustainable and environment friendly.

Therefore, this paper will illustrate how digital tools can transform and help to reshape the waste management system in Cambodia. Tackling waste management is an issue not unique to Cambodia and there have been several new initiatives and innovations on how to efficiently and properly manage waste. The first part will look at the current state and challenges of waste management in Cambodia. Next, it will be explained how digital transformation can enhance waste management systems. To do this, examples of successful applications of digitalisation to waste management will be shown. Finally, this paper will draw some conclusions on what is next for waste management in Cambodia and give some advice on how exactly digital tools can be utilized to improve Cambodian waste management.

The Challenges of Waste Management in Cambodia

While Cambodia has seen a steady rise in economic growth over the last decade; it has also seen an immense increase in waste generation. This is especially visible in the bigger cities. Even though most of Cambodia's population still lives in rural areas, more and more people flock to the cities in search of better jobs and better living conditions. The population of Phnom Penh has doubled from 1998 to 2017⁶. In 2015 Cambodia had an urbanization rate of 22% compared to 17% in 1995⁷. With this increase of population and growth of cities it comes as no surprise that

Cambodia produces about 10,000 tonnes⁸ of municipal solid waste on a daily basis. As people consume more and more, their consumption leads to an increase in waste generation.

According to the annual report of the Ministry of Environment (MoE) from 2017, 1.423.923 tonnes of waste are deposited in the 79 landfills in Cambodia per year. Broken down this means around 3,900 tonnes of waste per day⁹. Phnom Penh alone generates 2,500 tonnes of waste a day.¹⁰ Phnom Penh's waste is currently brought to two landfills, Dangkor Landfill for municipal solid waste (MSW)¹¹ and a landfill for industrial waste in Phnom Penh's Por Sen Chey district¹². Phnom Penh City Hall estimates that Dangkor Landfill will reach its full capacity by 2020¹³.

It is common practice to use plastic bags for every little purchase; water is mainly sold in plastic bottles which are commonly thrown away after a single use. Unless one actively guards against it, it is nearly impossible to go a day in Cambodia without producing waste. This does not only include the use of single-use plastic products but also the generation of household waste.

The increase in people living in cities, like Phnom Penh, has had a severe impact on infrastructure systems. With rapid population growth, the city's waste management

² World Bank, GDP (current US\$) Cambodia, <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=KH>, last accessed November 16, 2018.

³ Jade Sacker, Banks capitalise on Cambodia's high mobile phone usage, Phnom Penh Post, September 12, 2017, retrieved from: <https://www.phnompenhpost.com/supplements/banks-capitalise-cambodias-high-mobile-phone-usage>, last accessed November 16, 2018.

⁴ Ibid.

⁵ Jonathan Watts, We have 12 years to limit climate change, warns UN, The Guardian, October 8, 2018, retrieved from: <https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>, last accessed November 16, 2018.

⁶ Open Development Cambodia, Urban administration and development, October 29, 2017, <https://opendevdevelopment.com/cambodia.net/topics/urban-administration-and-development/#ref-80449-1>, last accessed November 16, 2018.

⁷ National Council for Sustainable Development; Royal Government of Cambodia; Phnom Penh Capital Hall; Global Green Growth Institute; International Centre for Environmental Management, Phnom Penh Green City Strategic Plan 2016-2025, (Phnom Penh: 2016), 9.

⁸ Pech Sotheary, Waste Production Continues to Rise, Khmer Times, October 4, 2018, retrieved from: <https://www.khmertimeskh.com/50539241/waste-production-continues-to-rise/>, last accessed November 22, 2018.

⁹ Ministry of Environment, Summary Report of 2017 Environmental Achievement and 2018 Working Targets, (Phnom Penh: 2017).

¹⁰ Ibid.

¹¹ Rajeev Kuma Singh; Dickella G. J. Premakumara, Ran Yagasa and Kazunobu Onogawa, State of Waste Management in Phnom Penh, Cambodia (Phnom Penh, IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) of Institute for Global Environmental Strategies (IGES), 2018), 11.

¹² Ibid., 17.

¹³ Asia Foundation, Reforming Solid Waste Management in Phnom Penh, (Phnom Penh: 2016), 17.

services need to adapt to a rapidly changing infrastructure. More buildings are being built, the city is spreading to the outer Khans — Phnom Penh is expanding. More people also mean that much more waste is created.

Challenge One: No separation of waste hinders recycling and easy collection

Urban solid waste has become more and more of a challenge for Cambodia. Urban solid waste is made up of waste generated by household consumption, business activities and services. It is comprised of general waste; bulky waste; construction and demolition waste; as well as hazardous waste. Usually this waste is mixed and either disposed at open dumpsites or disposed illegally.

Waste Composition at Generation Point in Phnom Penh

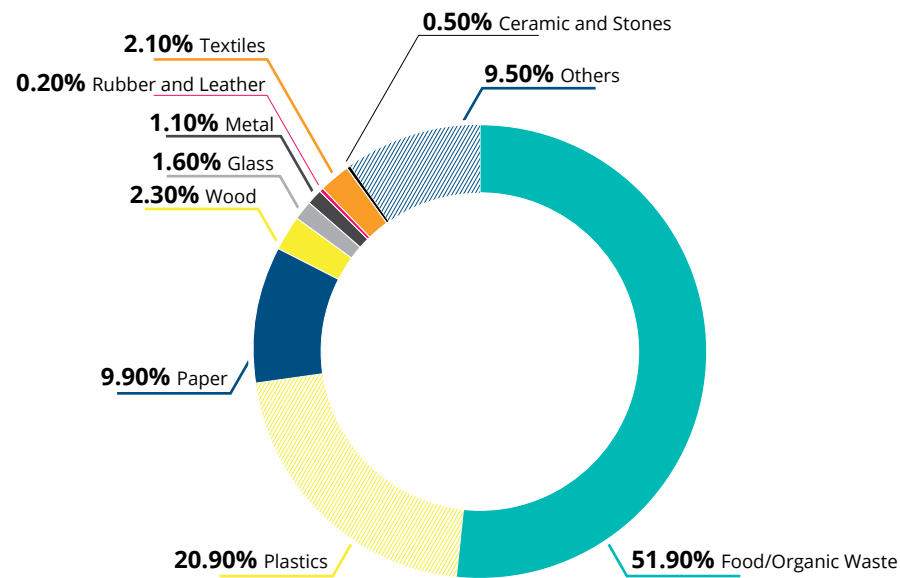


Figure 1: Waste Composition at Generation Point in Phnom Penh (based on Keng 2015)

Figure 1 shows the composition of waste in Phnom Penh. Most of the waste is made up of food and organic waste and plastic. In addition, there is also some paper, wood, glass and other materials, like metal, rubber and leather, textiles and ceramic and stones. Even though food and organic waste make up the vast majority of generated waste, recycling is not yet common practice in Cambodia. If waste would be properly separated and not all thrown together, a lot of waste could be recycled much better and used for compost.

Organic waste could be brought to compost plants, recyclables to recycling plants and only the rest would end up in a landfill. This would also make the landfills more secure, since organic waste often develops toxic gases and reactions and can lead to fires breaking out in the landfill¹⁴. In addition, today Phnom Penh does not only face the issue of dealing with urban solid waste but also with other waste streams such as hazardous waste, e-waste, industrial waste and medical waste, which are also increasing. This leads to new challenges for collection and proper disposal of waste¹⁵.

Challenge Two: Responsibilities and Mindsets

The waste management cycle consists of several steps; waste generation, collection, treatment and disposal. Within this cycle there are three main actors involved: 1) Waste Generators, 2) Waste Companies; and 3) Local Authorities. Local authorities bear the responsibility to ensure the provision of waste management services. In Cambodia the most well-known waste management service is CINTRI. They offer collection services and have a big fleet of trucks and smaller carts to collect urban solid waste. Citizens pay a fee to CINTRI to ensure that garbage gets collected.

Waste generated by source in Phnom Penh

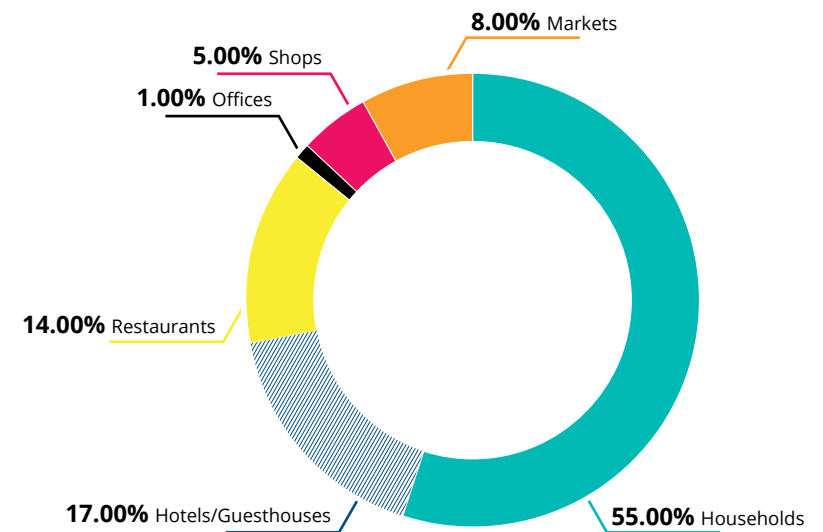


Figure 2: Waste generated by source in Phnom Penh (based on Keng 2015)

¹⁴ Jacob Goldberg, Yangon's two-week landfill fire raises burning questions for authorities. The Guardian, May 17, 2018, retrieved from: <https://www.theguardian.com/cities/2018/may/17/yangon-two-week-landfill-fire-raises-burning-questions-for-authorities-myanmar>, last accessed November 22, 2018.

¹⁵ Singh; Premakumara, Yagasa and Onogawa, 2018, 4.

However, due to the poor economic conditions of many Cambodian citizens there is a general unwillingness to pay for waste collection services and a lack of awareness about the importance of a sustainable, functioning waste management system. Many people do not understand the importance of proper waste collection and disposal and still throw their trash haphazardly around collections points or burn their trash on the street¹⁶.

The pressing need for more efficient and sustainable waste management in Cambodia is obvious. The problem of dealing with waste management is not one that only Cambodia is facing. Fortunately, there is already a lot of progress being made – in Cambodia and elsewhere – and looking towards other examples and cases can help to find new solutions. One of these solutions is the approach to incorporate digital tools and technologies into the sector of waste management.

Digital innovation in the waste management and recycling sector

The phrase digital transformation is being used all around us today and for very good reasons. When we talk about digital transformation what we mean is the transformation of existing businesses, communication strategies, information and even machines and vehicles into things that are connected via information and communication technologies¹⁷.

This can include collecting, storing and sharing data online rather than on paper, calling and messaging by using the internet or using robotics and sensors in machines. The general aim of digital transformation is to make processes easier, more sustainable

and more efficient by introducing digital tools into the process. In a business sense digital transformation includes changing the way businesses interact with clients, making more decisions based on data analytics and information and using innovation to transform businesses¹⁸.

While digital transformation has been occurring in many obvious areas already, such as communication or storing information digitally, digital transformation and innovation can also be applied to many sectors that don't seem obvious at first. One of them is the sector of waste management. Even though at first one might not see a connection between waste and digital tools, there are many new innovations and business ideas that utilize digitalization. Utilizing data, cloud based systems, sensors and GPS tracking are innovative ways of introducing the digital transformation to the waste management sector.

Smart Bins

One good example of how new innovations from technology are applied to waste management is the development of so-called smart bins. Smart Bins are bins that have sensors installed inside of them. Depending on the sensor technology, the bin can indicate what kind of garbage is inside and measure how full it is. This information is then transmitted to the owner of the bin. In several cases, the information can also be transmitted to the collection trucks. That way collection trucks will only empty trash bins that actually need emptying and can optimize their collection route according to the information of the smart bins. This makes collection more efficient because the collection trucks no longer waste time going to bins that are empty. Smart Bins can be used for several clients. People who generate household waste can

install the sensors in their own bins to monitor the waste intake and the content. Smart Bins can transmit information to collection services to optimise their routes and smart bins can be used in public recycling facilities, e.g. in the Czech Republic and Slovakia, where people can use an app called *Sensoneo*¹⁹ to see which public recycling facilities still have capacities to accept garbage and which ones are filled up. This works well for recycling paper, glass and plastic. Another innovative use for smart bins is for restaurants and hotels which generate high numbers of waste. Using Smart Bins they can optimize their shopping to reduce waste generation.

Smart Bin Cambodia for example is a young start-up that has developed Cambodia's first smart bin. While their smart bin is still a prototype as of now, so far, their smart bin can be used to recognize different waste types like plastic bottles, cans and drinking cups. When a customer throws trash into the wrong recycling bin, e.g. a plastic bottle into the container for cans, the bin lights up and lets the customer know that he or she has made a mistake. Customers also earn points for every recycled item which they can redeem with partners. This adds a powerful incentive for people to start recycling and use the smart bins.

Online Solutions to buy and sell waste

Today platform economies are popping up everywhere. Rather than going to actual shops to do the shopping more and more people use digital platforms to buy and sell goods. Once again, waste is no exception. It is important to understand that trash is more than trash, it is a commodity.

With platforms like *BioTradin*²⁰, a British platform to buy and sell recyclable waste users can forego the middleman and just sell their waste directly, which saves transaction costs.



A landfill in Battambang, Cambodia

Bio Trading is an online marketplace for organic resources. Buyers and sellers trade with materials like wood waste, compost and soil. Everyone can be a buyer, and everyone can sell their organic resources, no matter whether you are an individual, a large scale farmer or a restaurant owner. Therefore, the market also becomes much more easily accessible. A platform economy like *BioTrading* adds more transparency when buying organic waste and cuts out the middleman. British company, *Veolia*²¹, still gets shares from the sales and also earns money from transporting the waste between seller and buyer, however seller and buyer now have a much more direct relationship to each other. An online market place like this also helps to find other consumers of waste, rather than just throwing wood and compost away without reusing it.

These platforms can also help to relieve recycle plants and landfills, in making sure

¹⁶ Ibid., 11.

¹⁷ <https://www.i-scoop.eu/digital-transformation/>, last accessed November 20, 2018.

¹⁸ Ibid.

¹⁹ Sensoneo, <https://sensoneo.com/product/citizen-app/>, last accessed November 19, 2018.

²⁰ BioTrading, <https://www.biotrading.co.uk/>, last accessed November 19, 2018

²¹ Veolia, <https://www.veolia.co.uk/>, last accessed November 22, 2018.

that the waste of one person might be useful to another. *E-Kabadi*²² and *The Kabadiwala*²³ are as well examples showing how trash can be sold online while using existing industries. The Indian start-ups use the structure of Kabadiwalas, the word referring to an informal waste collector, to help match customers with informal waste collectors and sell their own trash. In a similar approach like Smart Bin Cambodia, when using either of the two companies customers get points they can later redeem when settling gas and electricity bills or buying new credit for their phones.

This way there is an incentive for the customer to sell their trash and at the same time local workers are incorporated into a new business model, meaning they don't necessarily lose their jobs. Similar approaches could be possible in Cambodia, where there are many informal waste collectors to be incorporated into new waste management systems.

Another example is the American start-up *Rubicon Global*²⁴. They connect small enterprises with independent waste collection services and fleets. They offer solutions for SMEs, local government authorities and enterprises with several locations and can alert waste collection services as soon as their trash is actually full, optimizing the waste collection. In line with digitalisation they have developed several tools to analyse waste collection, collect data and information on waste collection services to improve their customer services and the routes of the fleets.

²² E-Kabadi, <https://www.e-kabadi.com/>, last accessed November 19, 2018.

²³ The Kabadiwala, <https://www.thekabadiwala.com/>, last accessed 19 November 2018.

²⁴ Rubicon Global, <https://www.rubiconglobal.com/>, last accessed 19 November 2018.

GPS Tracking for Waste Collection Fleets

Another way digitalisation can improve waste management is the feature of GPS Tracking. Many ridesharing and ride hailing apps already show the user where the needed vehicle is currently located, and they can follow the vehicle in real time. This also works in the Cambodian case with the app *Stops Near Me*²⁵, which a lot of Cambodians use to find out where the next bus stop is and where the next bus currently is. The same features are offered by apps like *Grab* or *PassApp*, where clients can see which vehicle is closest to them. Why not try a similar approach with waste collection trucks? Many companies already monitor their trucks with GPS tracking. However, what would improve for the clients would be to share the location of the trucks with them. Clients could potentially use an app that sends them a notification when a waste collection truck is coming closer or where they can just check the trucks location themselves. This way customers would know exactly when to take out their trash and they would not miss the garbage collection. In addition, this could also lead to trash not lying outside for too long, being exposed to the intense heat and or rain for hours. Tracking the routes that waste collection trucks take with GPS and collecting this data can also help to improve routes, factor in traffic better and therefore save time and become more efficient and improve transparency.

Open Data and its benefits

Data becomes the new parallel currency of many businesses and is essential for strategic decision making. Data provides extensive potential for cutting costs and improving processes. Optimization of routes, knowing

²⁵ Um Chanraksa, *Stops Near Me App Helps You Find a Bus in Phnom Penh*, Khmer Times, 22 December 2017, <https://www.khmertimeskh.com/5097084/stops-near-app-helps-find-bus-phnom-penh/>, last accessed November 19, 2018.

when a smart bin is full and what exactly is inside of it all has one common denominator — data. The relevance of collected data should not be underestimated. It can help municipalities in understanding their citizens' behaviour better and show certain issues and problems that might be faced by waste collection companies and citizens. For waste management companies, data helps to streamline their work and makes it more efficient. Through smart bins that monitor the waste intake, collection routes can be optimized. Collection trucks can avoid driving to collect a bin only to find out it is nearly empty and instead adjust their route to collect bins that actually need emptying. Citizens' access to data means more transparency and more awareness. They can see exactly how much waste they have generated, and prizes can be matched according to that. Therefore, they will pay for what they produce rather than have the feeling that they might be charged money without getting any service or that they might be charged too much for the waste they generate.

Apps

One major advancement of digitalisation is the fact that a lot of people now have access to smartphones and cheap internet, especially in bigger cities where the issues of municipal solid waste is becoming more and more of a problem. With smartphones mobile apps have emerged. Mobile Apps (applications) are being developed for all sorts of areas. You can shop online; you can track your bus, use social media, listen to music or play games all with the help of apps. The waste management sector has not been left out of app development. There are several ways in which apps can help regarding waste management. First, apps can be used to improve customer relation management. Waste management companies can use them to inform customers about pick-up times and clients can leave reviews in the

app, making the communication between company and client much easier.

Second, apps can be used to collect data on how much waste is generated. This is helpful for every actor involved in waste generation: the public, waste management companies and local authorities and the government. Together they can reduce waste generation – for instance by plastic bans - and to improve waste management. Third, they can help optimizing the routes of pick-up trucks and help to manage locations of trash bins. Customers can inform themselves about whether public bins are at capacity and monitor their own waste consumption. Fourth, awareness can be raised through apps. Apps like *Waste Atlas* collect information about waste globally and let users browse the app to find out information on municipal solid waste generation, collection coverages, recycling rates and waste generation per capita for different countries. Not every country is covered by *Waste Atlas* just yet, but users also have the chance to submit data. Apps can also be mobile games and could be utilized in education from a young age, that way children and teenagers learn about waste generation and can understand how important waste reduction is from an early age. Governments themselves can also support the development of apps and make data public, added transparency can help to improve trust in government services. Additionally, if local authorities are easily reachable and accessible through mobile application this can also add to improve their relationship with the citizens.

What is next for Cambodia?

Digitalization helps us rethink current business models and integrate innovation into existing business strategies. Using digital tools, we can create new value chains towards a circular economy and can reorganize the system of waste management. In the Cambodian context this calls for several steps:

1. Raising Awareness – the Cambodian society needs to learn more about the current state of waste management, understand how vital it is to reduce consumption and recycle materials. Apps, websites and social media campaigns targeted at a variety of people can be used to raise awareness about this pressing issue.
2. Stronger cooperation – digitalisation and shorter ways of communication, can also help to connect different stakeholders and actors, who otherwise might not have found each other. A strengthening of cooperation between local municipalities, start-ups and already established waste management business is needed.

3. Utilizing digital transformation – digital tools and technologies can be incorporated into the waste management sector. Introducing smart bins, GPS tracked collection trucks and online platforms to buy and sell waste would all be very helpful in transforming the waste management sector.

Waste management is not limited to one type of actor or one type of industry. It concerns everyone. Innovation starts where people start thinking differently and leadership provides them with opportunities to do so. Essential to digitalisation is that it is based on universal technologies – meaning that these technologies can be applied across sectors. All it needs are people thinking outside of the box, experimenting and combining old and new ways. Therefore, just some advantages of digitalisation include the power to create new value chains, create more transparency and enhance participation and accessibility. Now is the time to seize the potential of digitalisation for waste management.





DIGITAL INSIGHTS

Women in Cambodia's Digital Economy: Key Challenges and Opportunities

Socheata Touch¹

¹ Co-founder, Innovative Technologies for Education, Tourism, and development
Contract manger, regional project of Fair Finance Asia,
President chapter: Woomentum community
Active member, Cambodia Women Entrepreneurs Association
Active member, Asia Pacific MSMEs Trade Coalition, Singapore

*How do Cambodian women participate in the economy?
What challenges are women facing in the digital economy?
What opportunities can Cambodian women benefit from?*

Abstract

Many businesses in Cambodia have been transacting daily and are featured in the media, including businesses in the following areas: transportation, banking, construction, real estate, health care, and insurance, online shopping for clothes, food, grocery, and hotel booking. Digital transformation plays significant roles in boosting those businesses. It changes the traditional business models, consumption patterns, old school working styles, governance of organizations and it refers to the concept of “going paperless, cashless, and mobile working”. For instance, consumers can pay electricity and water bills via e-banking services and passengers can book buses and buy their clothes and food online. Those businesses in fintech are immensely contributing to Cambodian Economic growth². To increase competitiveness of the economy in the ASEAN community, government is planning to transform the country into a digital economy by 2023 in which digital tools and technologies will enhance people lives, said H.E Kan Channmeta³, Secretary of State at the Ministry of Posts and Telecommunications.

² Janelle Retka, “Cambodia’s finance minister: Fintech may play critical role in supporting financial inclusion”, Southeast Asia Globe’s Banking Special, August 16, 2018, <http://sea-globe.com/cambodias-finance-minister-fintech-may-play-critical-role-in-supporting-financial-inclusion/>

³ Manet Sum, “Cambodia to be a digital economy by 2023”, khmer times, March 07, 2018, <https://www.khmertimeskh.com/50112147/cambodia-to-be-a-digital-economy-by-2023/>

But what role do Cambodian women play in the digital era? Women represent 51 percent of the total population of Cambodia - 5.1 million are working age (15 to 64 years). Just over 60% of businesses in Cambodia are managed by women and some of them are in the informal economy⁴. However, their participation as equals to their male counterparts in social, political and economic life remains severely limited. This article will present the key challenges faced by women in the digital economy, including cultural and gender stereotypes, digital gender gaps in education, access to markets, access to finance, lack of women role models and networks. Entrepreneurship of women is increasingly important; this article will highlight a number of initiatives created for women and girls at the national, regional, and global levels to ensure women become true agents of socio-economic development. The paper concludes with a discussion on providing pragmatic solutions for women in building their entrepreneurship confidence in the digital era.

Women in Cambodia's Economy

Over the last twenty years, the private sector has economically transformed countries in the region⁵. The economic growth rate is expected to reach 7% in 2018 compared to 6.9% in 2017 and is mainly driven by garment export and tourism. Women are contributing to the growth by being involved and managing most businesses. Based on the National Institute of Statistics in 2015, 65% of all businesses in Cambodia⁶ are led by women and the nature of the business, however, is smaller in size and profit than businesses owned by men. Women are more likely to run their businesses in the retail trade and service industries and most of them are family businesses and in the informal

economy in terms of staffing, working capital, and location. Women in Cambodia take control of 61% of micro businesses, 18% of small businesses, 28% of medium businesses, and 13% of large businesses respectively. Women aged 15–64 years took comprised 49% of the total labor force with almost 4 million women in 2012 and this figure is expected to increase significantly. In the digital era, the trend of exchanged goods and services is made via e-commerce. The digital economy involves women every day as they are housewives who decide on and purchase products for themselves and families in relation to fashion, arts and crafts, food, accessories, ICT gadgets and books. Nevertheless, it is too soon to say that women-run SMEs can actively participate in and get benefits from the digital platforms in Cambodia. There should be a research study for this particular topic.

About 6.2 million Cambodians work in rural areas and 76% of the employed staff are women. Nearly 45% of all women are employed in businesses from their residential home. They are more likely to be self-

employed⁷. The typical picture of Cambodia's street businesses can be seen, when the women sit in their shops selling products and managing the household at the same time. Giving the fact of changes made by digital transformation, many believe that women have flexible ways of working to combine paid work with caring responsibilities. For instance, more women and girls are in online businesses where they are able to generate more income even though they are at home or at a work place. Two examples of this are Joonak Delivery company and Camsolutions company whose co-founders are young, talented Cambodian women. These women are using their tech innovations for serving their customers. Yet, there is no national study showing how women entrepreneurs increase their income due to the usage of innovative technologies. While there is an increased growth rate of tech-start-up businesses among young Cambodians, not many women and girls are involved in tech businesses. The gender gap in ICT skills and STEM education should also be taken into consideration⁸.

Talking about legal registration, while 6.6% of men's businesses are registered, only 1.7% of women's businesses obtain registration, meaning that women do not properly register at the ministry of commerce or its provincial departments. It is observed that women owned businesses are weavers of textiles, street vendors, restaurants and mobile food/beverage owners, clothes and footwear retailers, hairdressers, and farmers working in rural areas. They found that the registration is complicated and requires money under table to speed up the process of registration and taxation.

To encourage SMEs business registration, the ministry of commerce automatized bureaucratic procedures by introducing business online registration⁹ on January 4, 2016 and the Ministry of Finance and Economy enacted Sub-Decree No. 17 ("Sub-Decree 17")¹⁰ on 7 February 2017 to provide two years tax incentive to SMEs who voluntarily register at the tax department. On October 2, 2018, Prime Minister Hun Sen signed the new sub-decree on tax incentives (three to five years) for SMEs in six priority sectors – (1) agro-industry, (2) food production and processing, (3) manufacturers of products used in waste processing and tourism, (4) manufacturers of parts and equipment supplied to other manufacturers, (5) research and development of information technology – including innovative equipment-management services, (6) and enterprises developing SME commercial districts. Based on the above tax incentives and government trade facilitations, SMEs will increase their productivity to sell domestically and possibly export their products to other countries in the region. However, women SMEs tend to face disproportionately larger obstacles, including gender norms¹¹, trainings, access to credit, networks and market information from these mentioned policy frameworks compared to men. The government and relevant stakeholders should strategically discuss and support the whole value chain development process of women business and other related matters.

4 National Institute of Statistics, Ministry of Planning, "Cambodia Inter-censal Economic Survey 2014", September 2015, Page 7, <http://www.stat.go.jp/info/meetings/cambodia/pdf/c14ana02.pdf>

5 World Bank, "Cambodia is increasingly integrating with the region and has enjoyed a decade of macroeconomic stability and growth. However, its progress in meeting the Millennium Development Goals is uneven", September 27, 2018, <https://www.worldbank.org/en/country/cambodia/overview>

6 National Institute of Statistics, Ministry of Planning, "Cambodia Inter-censal Economic Survey 2014"

7 Asian Development Bank, "Promoting women's economic empowerment in Cambodia", 2015, <https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1445&context=intl>

8 The Sasakawa Peace Foundation and Dalberg Global Development Advisor, "Advancing Women's Empowerment: ICT SKILLS FOR GIRLS AND WOMEN IN SOUTHEAST ASIA", 2017, <https://www.dalberg.com/system/files/2017-07/ICT-Skills-for-Girls-in-Southeast-Asia.pdf>

9 B2B, "The New Online Registration System", June 27, 2016, <https://www.b2b-cambodia.com/articles/the-new-online-registration-system/>

10 <https://www.dfdl.com/resources/legal-and-tax-updates/cambodia-tax-update-new-tax-incentives-for-smes-voluntarily-registering-for-tax/>

11 According to European Institute for Gender Equality, Gender norms are ideas about how women and men should be and act. Internalized early in life, gender norms can establish a life cycle of gender socialisation and stereotyping.

Key challenges faced by women entrepreneurs

Cultural and gender stereotype

Cultural and gender norms are still the foremost challenges for women and girls to participate in the economy. Women are instructed to be submissive and maintain domestic roles such as taking care of children and family even though they have full time employment and/or operating their businesses. In the patriarchal structure of Cambodian society, perspectives on gender roles can have intense effects on the mobility of women and girls, women digital education, and access to information. According to the national survey of the ministry of planning¹², married women aged 18–64 years spend 3.5 hours per day more on unpaid domestic work than men regardless of their occupation, age, or rural / urban living environment.

This continuing influence of traditional social and cultural code so-called “*chbab srey*” remains a barrier and prevents women from starting or scaling up their businesses. “While doing businesses, women entrepreneurs are expected to fulfill household responsibilities. We work twice as hard as men and struggling to balance our business with our role as mothers and wives” said Dr. Eng Lykuong, President of the Cambodia Women Entrepreneurs Association (CWEA), a network group supporting women in business. When women entrepreneurs have commercial dialogues with primarily male executives, it can be unnerving. Male attitudes are sometimes competitive and aggressive. It can lead to harassment and women can become fearful and lose confidence in themselves¹³.

Moreover, some business discussions and negotiations as well as business socials and networking takes place during the evening time. Women generally must rush back home to do their household chores and therefore miss business opportunities at some points. Consequently, businessmen gain more advantages than his women counterparts because some business interactions take place without the presence of women. When children or relatives at home get sick, women take on more of the burden than men to take care of people because of their motherhood. Women sometimes must cancel and give up their business opportunities and most do not have time to conduct self- business learning and market research for their business expansion.

Gender gap in digital literacy, ICT and STEM skills

Looking at general education, the net enrollment rates of primary school for boys and girls are similar at 95.6% but girls and women are facing high drop-out school issues. Around 78% of the Cambodian population was literate in which 72% was women and only 67% of rural women were literate¹⁴. The gender gap in literacy restrains girl's and women's participation in and benefits from the country's economic development. It means that there is a lack of human capital particularly concerning knowledgeable and skilled women in the work force.

More interestingly, digitalization in the education sector is becoming an increasing interest from both the public and private sector. In the last few years, the Ministry of Education, Youth and Sport (MoEYS) has enacted educational reforms by improving the STEM curriculum and promoting tech

and entrepreneurship programs at state and private owned universities. In 2014 the Ministry of Posts, Telecoms and Communication established the National Institute of Posts, Telecoms & ICT to enhance the research and education in the field of STEM and entrepreneurship.

Still, girls and women have a number of barriers preventing them from pursuing ICT and STEM skills. The Sasakawa Peace Foundation and Dalberg Global Development Advisors conducted a research study on

“Advancing Women's Empowerment: ICT skills for girls and women in Southeast Asia” in 2017¹⁵. The findings indicated women and girls in all countries including Cambodia encounter key main barriers as follows:

- > developing an interest in ICT because of gender bias on technologies,
- > acquiring ICT skills, and
- > entering the digital workforce

Barriers faced by girls and women that affect ICT and STEM skill adoption and employment

Barriers to developing interest in ICT

- > Gender biases stereotype technology as a male domain
- > Parents and teachers encourage girls less than boys in pursuing ICT skills education
- > Secondary school girls tend to exhibit lower interest and self-esteem in STEM subjects compared to other subjects
- > Few female role models in technology exist to drive girls' aspirations
- > Girls and women have lower access to ICT tools and connectivity than boys and men

Barriers to acquiring ICT skills

- > Girls and women have limited time to pursue ICT skill adoption because they are responsible for over 70% of domestic and care work
- > Girls and women have limited mobility, which restricts their access to in person ICT training
- > Families spend more on education for boys and men than on education for girls and women (including ICT training)
- > Girls and women face online harassment, which limits their online activities and opportunities to practice ICT skills
- > Trainings provide limited Gender-sensitive content and delivery, which hinders ICT skill adoption

Barriers to entering the workforce

- > Women perceive existing ICT jobs as unattractive because:
- > Women receive lower wages than men
- > Women gain fewer promotions than men
- > Women have weaker networks to leverage in their job search
- > Women face gender discrimination in hiring practices

¹² ILO & ADB, “Gender equality in the labor Market in Cambodia”, 2013, Government of Cambodia, Ministry of Planning (MOP). 2007b, <https://www.adb.org/sites/default/files/publication/31193/gender-equality-labor-market-cambodia.pdf>

¹³ Soksreinth Ten, “Cambodia's Women Entrepreneurs Aim to Scale Up”, October 07, 2018, <https://www.voanews.com/a/>

[cambodias-women-entrepreneurs-aim-to-scale-up/4603006.html](https://www.adb.org/sites/default/files/publication/4603006/cambodias-women-entrepreneurs-aim-to-scale-up/4603006.html)

¹⁴ National Institute of Statistics, Ministry of Planning, “Cambodia Inter-censal Economic Survey 2014”

¹⁵ The Sasakawa Peace Foundation and Dalberg Global Development Advisor, “Advancing Women's Empowerment: ICT SKILLS FOR GIRLS AND WOMEN IN SOUTHEAST ASIA”, 2017, https://www.spf.org/awif/wp-content/uploads/2018/05/Womens-Entrepreneurship-and-ICT-SE-Asia_2017_en-2.pdf

It is not surprising that there is gender bias at home and at schools where parents and teachers spend more time to teach boys than girls about STEM related subjects. Parents and girls themselves as a result do not see mathematics and science subjects as important or see that they can lead women/girls to have tech-career paths with high paid salaries in tech-businesses. Without financial and mathematic knowledge from their previous education, women SMEs have encountered many issues in growing their businesses. For instance, they are not able to manage their financial flow effectively or to transform their small family businesses to standard ones which can maintain talented employees and attract foreign investment sources.

Currently, there are not many businesswomen role models and tech-women in Cambodia as well as in the region. Thus, girls and young women entrepreneurs could not find strong and successful business women who can drive their interest and aspirations toward technology and entrepreneurship.

Gender and health issues

Despite the fact that the country's economy is growing significantly, the health of the population remains an issue in Cambodia where about 14% of women between 15 and 49 years of age were malnourished and about 70% of Cambodia's population do not have access to piped water particularly in rural areas. Talking about women's challenges in health, 45% of women were anemic and not many (only 69%) households were using salt with some iodine. The increased trend of unhealthy lifestyles has resulted in a sharp rise in incidence of heart diseases and cervical cancers for women and girls. In this regard, the absent rates of women in employment and making businesses is higher than men and women are spending more on their health care and well-being. Okhna Sear Rithy,

Chairman of World Bridge Group pointed out that women in Cambodian society face more health challenges like men due to poor eating habits and that is why they easily get sick.

Women, to some extent, have limited control over their reproductive rights and sexuality. Most Cambodian women are shy and will not openly talk about this with their husbands as this is still considered as a taboo subject. According to the MoWA 2009 Violence against Women Follow-up Survey¹⁶, when women are tired from work and/or businesses and are not in the mood, they are forced to have sex by their husbands. They are at risk of having HIV and other diseases transmitted from their husbands. Thus, women are far behind men in doing businesses when they have an illness.

Additionally, business opportunities can be taken away prior, during, and after pregnancy because women have more tension / stress and health risks. Health information of maternal mortality, health centers, and counselling centers/services are not yet widely accessible and affordable for women mostly in remote areas. Going to work and negotiating businesses are very tough when women have babies. Most workplaces in Cambodia do not have breastfeeding rooms. Women are faced to balance their life with business, domestic roles, and health care. Unlike men, women are multi-tasked persons and they need to have hundreds of hands to do household chores, take care of family and businesses, and ensure a healthy life for herself and family.

¹⁶ MoWA, "violence against women, 2009 follow up survey", 2009, http://www.mowa.gov.kh/inc/uploads/2016/12/Violence_Against_Women_2009_Follow-Up_Survey-Executive_Summary_Eng.pdf

Access to market

According to the Asian Development Bank, the majority of businesses are involved in agricultural value chains and services. Despite multiple economic interventions, Cambodian women SMEs have difficulties accessing information markets where they can possibly identify buyers in the market¹⁷. Many of them lack a deep understanding about markets within the country and across borders where women can establish win-win relationships with both suppliers and buyers. Some women business owners do not know if their business operations are truly profitable. For instance, women farmers plant cashew nuts and expect to sell at high exported prices. Many farmers start doing the same without having proper market suppliers and demand information. When it comes to harvesting time, the price may fall, forcing them to sell at lower prices which can lead to business loss. Unlike women, men have more advanced market knowledge and then they can make good business deals by using digital systems which men have greater command of.

Cambodia has a population of about 15 million people. In the digital environment, 34% of the population are Internet users, 16 % social media users, and 157 % owns mobile phones (on average, people own more than one phone). The market competition for customers is nowadays shifting to the online channel like E-commerce¹⁸. They utilize digital marketing and online bill notification to share product information to the market. The big data promises new production lines and management options for upgrading businesses. Women are 1.6 times more likely to lack skills as barriers to Internet use and for captivating market opportunities.

¹⁷ Asian Development Bank, "Promoting women's economic empowerment in Cambodia", 2015,

¹⁸ Brian Beck, "B2B Sales Channels are Changing – Act Now or Die", February 01, 2018, <https://www.digitaldoughnut.com/articles/2018/january/b2b-sales-channels-are-changing-act-now-or-die>

Asian market integration has brought some positive impacts to Cambodian Economy. However, enterprises run by women have greater challenges in accessing regional as well as global supply chains, contracting with large customers and suppliers abroad, and involving joint ventures foreign businesses¹⁹. In addition, women have difficulty to get access to business support services related to market needs. The support materials and resources are available online and most of them are in English.

Access to finance

Financial services are a key enabler for increasing consumption, mitigating business risks, and promoting SMEs. It is often acknowledged that there is a gender gap for women in financial inclusion and they are more economically excluded²⁰. According to the World Bank's 2014 Global Findex Database, lack of access to finance cannot allow women to fully engage in productive economic activities and cannot reduce burdens on women to be out of poverty²¹. In developing economies like Cambodia, women are 20% less likely than men to have a bank account and 17% less likely to borrow at formal financial institutions. At some points, women often lack access to loans and other financial services such as fin-tech (digital payment methods) and insurance. Based on the leading commercial bank ACLEDA report in 2013²², they had more women individual

¹⁹ Asian Development Bank, "integrating SMEs into global value chains: challenges & policy actions in Asia, 2015, <https://www.adb.org/sites/default/files/publication/175295/smes-global-value-chains.pdf>

²⁰ Rupal Kantaria, Chaitra Chandrasekhar, Mary Ellen Iskenderian Karen Miller, "women's financial inclusion: How to get a billion new customers", https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2016/june/WiFS/WiFS_2016_FINANCIALINCLUSION_Pages.pdf

²¹ World Bank, "Global Financial Development Report: Financial Inclusion", 2014, <https://openknowledge.worldbank.org/handle/10986/16238>

²² World Bank, "Global Financial Development Report: Financial Inclusion", 2014, <https://openknowledge.worldbank.org/handle/10986/16238>

borrowers which accounted for 53% of its total borrowers. However, women's loan size is smaller than men's. The above-mentioned issues result from the following points:

- › Low education and financial illiteracy: as mentioned in a previous part, most women and girls do not receive equal access to general and financial education from their schooling life. According to the Alliance for Financial Inclusion 2016, women, on average, are less financially literate and are not acquainted with banking and financial terminology²³. They do not have financial management skills and do not document or record their daily business transactions (book keeping) appropriately. As a result, it can lead to business bankruptcy or lack of liquidity for business expansion.
- › Property rights and control over assets: women are less likely to have ownership on the land or valuable assets that can be considered as collateral sources. Business women often face issues of not having qualified collateral to apply for bank loans. In some cases, when they can get bank loans, they cannot have much control over them even when taken out in their names. However, as borrowers they are responsible for loan repayment.
- › High interest rate and complex process of lending: According to Okhna Sreat Momsophear²⁴, vice president of the CWEA, the process for getting a loan is "complicated" and subject to high bank charges and steep interest rates compared to neighboring countries. The financial institutions don't care if you have a

business plan, they need your hard title of property, she said.

- › Biased attitude of banks: women sometimes face biased lending practices from banking officials who are mostly men. Undeniably, women have reported that financial service delivery can be patronizing toward them²⁵.
- › Lack of support from financial institutions on business coaching: women do not receive any business coaching on how to use bank loans effectively. In this regard, they may not trust banks or MFIs and prefer informal products from their village saving groups or unofficial money lenders due to their social connection, geography, and affordability.

Lack of women role models and networks

In this digital economy, taking risks and getting strong support are essential for entrepreneurial success. Robust social networks and connections inspire women entrepreneurs to take necessary steps to grow their businesses. Networks can provide them crucial market information, logistical support, linkages to suppliers, investors, financing, and technology. As the majority of high-level business is being dominated by men, women often do not have adequate access to networks because they are commonly limited by cultural norms. There is no surprise that 48 % of women founders lack available advisers and mentors. It is hard for women to flash their own paths into elite business networks as most business today still rings true with the philosophy that it's not what you know, it's about whom they know and who puts trust in you. Hence, women get less advantage in terms of obtaining business resources and

information to flourish²⁶.

To sum up, digitalization is likely to create a diversity of business opportunities and networks regionally and globally to entrepreneurs in both sexes. However, gender inequalities in education, culture norms, and health deter women from regional economic integration and trade. The disparity for women includes entrepreneurial skills, lack of established social networks, inadequate number of women role models, digital illiteracy, and financial restraints.

Improving women's role in Cambodia's digital economy

The technological revolution is rapidly shifting the ways people live and make businesses because digital transformation can connect economies around the world. ICTs can potentially enhance women's social, economic, and political participations if the aforementioned barriers can be overcome.

First, policy supporting Women SMEs and simplified procedures: Policy and national programs from the Royal Government of Cambodia to support more women in higher education and STEM occupations are required to pave the way for women participation in the digital economy. At the same time, digital education should be widely accessible, affordable, secure to foster women's digital literacy, facilitate online women entrepreneurship, and empower women through innovative digital finance tools and user-friendly platforms which can be set up for tech and non-tech women. As seen, the current programs of government, the establishment of National Institute of Post, Telecom and ICT is to promote higher

digital education in e-commerce, Telecoms & Networking, and computer science. According to Dr. Kan Channmeta, Secretary of State at the MPTs²⁷, a keystone of the ministry's efforts is entrepreneurship programs. The ministry should have women quotas for the transition phase. In cooperation with other ministries, academic institutions as well as the Young Entrepreneurs Association of Cambodia (YEAC) and the Cambodia women entrepreneur's association (CWEA), the ministry aims to promote entrepreneurship by teaching entrepreneurial skills at universities such as the National University of Management. The intention is to support aspiring entrepreneurs so they can understand the risks of starting a company, identify opportunities, assess challenges and learn to mitigate business risks.

MoEYS has a strategic plan for 2012-2018 to train teachers in mathematics, science and laboratory skills in order to strengthen STEM education at both the primary and secondary level and make teaching more attractive. With the endorsement from MoEYS, a Technovation project of USAID was established in 2014 that offers an open source, hands-on curriculum to develop an app prototype, business plan and video pitch in 12 weeks for girls aged between 10-18²⁸.

The ministry of Economy and Finance (MoEF) issued a policy dated 02nd October 2018 for the tax incentive scheme between 3-5 years for registered SMEs who are working on prioritized sectors. The question for women SMEs remains a challenge because most women SMEs are in the informal economy. How can women benefit from this incentive scheme? Another intervention is to simplify the business registration process and to

23 IFC, "research and literature review of challenges to women accessing digital financial services", 2016, <https://www.ifc.org/wps/wcm/connect/1872bbdf-de58-48b8-8158-7ee888081ff7/Research+and+Lit+Review+of+Challenges+to+Women+Accessing+DFS.pdf?MOD=AJPERES>

24 Soksreinth Ten, "Cambodia's Women Entrepreneurs Aim to Scale Up", October 07, 2018,

25 IFC, "Research and Literature Review of Challenges to Women Accessing Digital Financial Services", 2016,

26 Hina Shah, Punit Saurabh, "Women Entrepreneurs in Developing Nations: Growth and Replication Strategies and their impact on Poverty Alleviation", August 2015, https://timreview.ca/sites/default/files/article_PDF/ShahSaurabh_TIMReview_August2015.pdf

27 Khmer Times, "Digitalisation in Cambodian SMEs: Q&A with Kan Channmeta", June 4, 2018, <https://www.khmertimeskh.com/50496642/digitalisation-in-cambodian-smes-qa-with-kan-channmeta/>

28 More info can be found via this link: <https://www.development-innovations.org/technovation/>

encourage women SMEs to join the formal economy. Thus, they can obtain the benefits from the incentive schemes as well as other government initiatives. It is worth to note that the MoEF is calling for public-private partnerships in three pilot projects:

- › SME bank with an initial capital of \$100 million will be created to provide financing for SMEs with lower interest rates in order to ease financial challenges of SMEs²⁹. This will incentivize women SMEs to boost their businesses from lending loans with low interest rates from SME bank.
- › Skill development fund³⁰ is to build skilled workforces in five industries such as construction, manufacturing, ICT, electronics, and tourism.
- › Entrepreneurship promotion fund which has two main program activities- Capacity building component (entrepreneurship/management skills, promotion of entrepreneurial culture/attitude) and business support component (advisory and ICT solution, Networking).

The National Bank of Cambodia recently launched the financial literacy campaign with VISA by introducing the central bank's new digital application, available as "NBC-Edu" in app stores. Through the new digital education program, they hope to make young people more knowledgeable about how to properly use financial services, and to make them less vulnerable to risk, said Her Excellency Chea Serey³¹, the NBC director-general. She

added the bank is working with MoEYS and other development partners in designing a curriculum to teach students about savings, loans and financial management which is supposed to roll out in the 2019 academic year.

However, the implementation of the ministries' policies has not yet indicated the increase of women and girls' participation. To put it into a nutshell, the interventions of MoWA would engage more girls and women in STEM education and entrepreneurship. There should be joint-forces between all relevant ministries in promoting more women's participation.

Secondly, increased skill set and productions: besides the policy frameworks and initiatives from the government, the establishment of business associations and involvement of private sector are very critical to build business skills and knowledge of women SMEs. These are a few highlighted initiatives:

- › SMEs cluster development zone is being developed by World Bridge group company that is based on the German Industrial 4.0 model to help Cambodian SMEs produce high-value goods and connect them with the local supply chain. The primary objective is to create a sustainable and highly productive SME community. The SME cluster houses will have inter-linked business entities - manufacturers, ICT companies, R&D firms, and logistics agencies. The cluster will begin with the food and beverage sector because it is easy to source the agricultural raw materials in the coming year. As discussed in the section above, over 60% of SMEs are owned by women and most of them are in the food and agriculture sector. Thus, qualified SMEs, in particular those owned by women, will be selected to join the program and obtain skill enhancement and financial

support to upgrade their production and not only supply Cambodia but also export to other countries. This cluster concept has been successfully implemented in the Philippines and Thailand³².

- › CWEA was formed in 2011 with strong support from the minister of MoWA-Her Excellency Ing Kanthaphavi, Dr. Lili Sisombat- advisor of World Bank and H.E. Dr. Sok Siphana. Its vision is to help Cambodian women entrepreneurs to start, grow and sustain themselves in business, and succeed in their respectful industry. CWEA was started with 14 women founders and has increased members to 500 plus in 2018. They are generating jobs for approximately 15,000 workers for self-employed individuals such as farmers, weavers, agents, brokers, sub-contractors and company employed³³. Members are able to sharpen their business mindset and skills provided by the capacity building committee of association. CWEA has collected challenges faced by women entrepreneurs for policy advocacy and the impact of the economic development. Additionally, CWEA creates business network events for their members to have business connections and promote women business leadership in the ASEAN community as well as globally. With financial assistant from the US embassy, 12 women delegates joined the International Visitor Leadership Program in three states of the USA in September 2018³⁴. This is an example for exploring business support modalities for women and to connect Cambodian and American women entrepreneurs.

› WING was set up as the first mobile money business in the country in 2009. It won the Enterprise Challenge Fund from AusAid because it provided a strong technology base for WING to expand. WING sponsors radio awareness programs on financial management and on how to engage in community development. Of WING's roughly 5,000 agents, 65% are women. It brings businesses for women operating from home. Women agents are often getting business training and support from WING³⁵. They are in collaboration with Oxfam to promote a cashless method for women savings groups and provide financial literacy programs to rural women as well.

› SHE investment is a social enterprise that supports women with micro, small and growing businesses to scale, creating social and economic impacts for communities. They have five main programs for women SMEs- (1) incubator and accelerator program, (2) economic empowerment program, (3) business financing, (4) Leadership and management training, (5) and business network/events. All curriculums are delivered in the Khmer language, and tailored to Khmer women and culture. As of 2018, more than 200 women³⁶ have been trained by the SHE investment program on how to start a profitable business

› Woomentum community was initiated by Mouna Aouri Langendorf³⁷ who fled from the Arab Spring Revolution to Singapore

29 Kimsay Hor, "Hun Sen vows to launch new bank for SMEs", December 21, 2017, <https://www.phnompenhpost.com/business/hun-sen-vows-launch-new-bank-smes>

30 ADB, "Toward Adopting a Skills Development Fund for Cambodia", February 2018, <https://www.adb.org/sites/default/files/publication/401746/adb-brief-090-skills-development-fund-cambodia.pdf>

31 NBC, "an Implementation Plan for Embedding Financial Education within the National School Curriculum", September 27, 2017, https://www.nbc.org.kh/english/news_and_events/news_info.php?id=317

32 Phnom Penh Post, "SME cluster zones to empower farmers", October 05, 2018, <https://www.phnompenhpost.com/post-focus/sme-cluster-zones-empower-farmers>

33 CWEA, "about CWEA", 2018, http://www.cweacambodia.org/en/74/about-cwea?m_id=148

34 CWEA, "International Visitor Leadership Program (IVLP): Empowering Women Entrepreneurs", September 19, 2018, http://www.cweacambodia.org/en/events/181/international-visitor-leadership-program-ivlp-2018?m_id=0

35 Janelle Retka, "Gender inequality stifling Cambodian women in finance sector", August 09, 2018, <http://sea-globe.com/gender-inequality-stifling-cambodian-women-in-finance-sector/>

36 Sokhorrng Cheng, "SHE group trains over 200 local female entrepreneurs", September 14, 2018, <https://www.phnompenhpost.com/business/she-group-trains-over-200-local-female-entrepreneurs>

37 Michael Tegos, "A civil engineer's startup is building bridges for women entrepreneurs in Asia", August 05, 2015, <https://www.techinasia.com/woomomentum-crowdfunding-startup-profile>

in 2011. It is a platform for women to learn about the mechanics of building a business, solicit advice from mentors, get coaching, or raise funds. Woomentum is also a crowdfunding platform based in Asia. Currently, it has members from 33 countries. The woomentum community-cambodia chapter will be launched at the end of 2018. It will be led by Cambodian women and for Cambodian women.

- ASEAN SME Academy was launched by USAID and the US-ASEAN Business Council in 2014. The cornerstone of the Academy is to provide e-trainings for SMEs from Fortune 500 companies. In addition, the Academy incorporates training materials focused on SMEs from regional firms and international organizations. In 2016, The two-day training of Cambodian facilitators program³⁸ was held and aimed to produce capable individuals to provide further training to the SMEs within their own networks and promote further growth of SMEs in the country. As such, the Academy is an important tool for promoting entrepreneurship in ASEAN.

Third, E-commerce: According to H.E. Pan Sorasak³⁹, Minister of Commerce during the E-Commerce Week 2017 organized by UNCTAD in Geneva, a vibrant private sector is vital to develop new business ideas/models and break barriers, particularly in e-commerce. It is essential to ensure that dialogue happens and the private sector in Cambodia understands how ICT is shaping the way we are doing business. One of the key aspects of access to market strategy is to introduce the opportunities of e-commerce to women

SMEs. It helps women overcome poverty and mobility restrictions by reducing their physical presence in a shop, office or warehouse. Women are increasingly recognizing the potential of ICT to generate income⁴⁰. Online shopping and e-markets have been increasing significantly in recent years, since the Internet users in Cambodia have been growing rapidly, from 1.7m users in 2011 to 7.16m users in 2016⁴¹.

The trend of using e-platforms currently is known in food, logistics, fashion clothing, transportation, and other fintech. Money Mobile App is now popular, and it is an excellent business case showing housewives and women running small and medium enterprises from home. They can make online goods sales or home-based shops common, money transfer, and even use Visa cards to boost their retail ads on social media platforms throughout the country and abroad.

Fourth, Women entrepreneurship incubation from International initiatives: the international initiatives for women entrepreneur development programs will support efforts to address challenges faced by women SMEs in the developing world, including Cambodia. The approaches combine capacity building on business education, access to global markets with high quality mentoring and networking. Where appropriate, financial products (access to finance) are tailored to meet the needs of women entrepreneurs based on their country context. The organizations below have produced many combined approaches for women in developing countries:

- WeConnect International is a global

network that connects women-owned businesses to qualified buyers around the world. WeConnect International identifies, educates, registers, and certifies women's business enterprises based outside of the U.S. that are at least 51% owned, as well as managed and controlled by one or more women, and then connects them with multinational corporate buyers. Recently, WeConnect International signed an agreement with IFC⁴² to boost access to markets for women-owned small and medium enterprises in emerging markets with an emphasis on Asia, Sub-Saharan Africa, and Latin America. From this, Cambodian Women SMEs would of course gain benefits because it will have more US large corporate companies to source the products supplied by Cambodian women.

- The Overseas Private Investment Corporation (OPIC) is a self-sustaining U.S. Government agency that helps American businesses invest in emerging markets like Cambodia. OPIC provides financial products such as loans and guaranties, political risk insurance, and support for investment funds. OPIC together with Goldman Sachs 10,000 Women, IFC provided a 30 million loan to ACLEDA bank to support women owned businesses in Cambodia. It increases access to capital for up to 100,000 women entrepreneurs⁴³. The loan is used to provide women-owned start-ups with loans for working capital, expansion capital, and equipment in their production life cycle.

SheTrade was launched by the International Trade Centre (ITC) and seeks to connect three million women entrepreneurs to market by 2021. At SheTrades, women entrepreneurs can get free access to online courses, participate in face-to-face workshops, watch live webinars on a range of topics and better understand their markets by using ITC's tools. It has an e-market to trade women's products around the globe and has the SheTrades investment challenge for women entrepreneurs. During the annual SheTrades Global event 2018, four companies – Solution Oasis (Ghana), Brogibro Safaris and Event Management (Kenya), Annona (Kenya and USA), and Suntri Centre (Ukraine) were declared winners. This is a good example for Cambodian Women entrepreneurs to do crowd-funding for their start-up initiatives and business expansions in the coming years. From the SheTrade online platform, Cambodian women can open up their market to other countries by having their products available in e-market.

Cherie Blair Foundation for Women is focusing on developing women's micro, small and medium enterprises into growing and sustainable businesses, supporting the development of what is commonly referred to as the 'missing middle' of the economy. It works through three programs- (1) enterprise development, (2) mentoring women in business, (3) mobile technology program. They have provided a mentoring support program with CWEA by increasing business capacity of Cambodian women and connecting with experienced mentors around the globe.

Cartier women initiative awards are an international business plan competition created in 2006 by Cartier, INSEAD Business School, McKinsey & Company to

38 Galuh Wulan, "Training of Facilitators on the ASEAN SME Academy, 7 – 8 November 2016, Phnom Penh Cambodia", November 07, 2016, <http://www.asean-sme-academy.org/events/training-facilitators-asean-sme-academy-7-8-november-2016-phnom-penh-cambodia/>

39 UNCTAD, "Towards Inclusive E-Commerce", April 24, 2017, https://unctad.org/en/PublicationsLibrary/dt1stict2017d7_en.pdf

40 The Sasakawa Peace Foundation and Dalberg Global Development Advisor, "Advancing Women's Empowerment: ICT SKILLS FOR GIRLS AND WOMEN IN SOUTHEAST ASIA", 2017

41 Prasith Suon, "PROMOTING e-Commerce for MORE INCLUSIVE DEVELOPMENT IN CAMBODIA", October 30, 2017, <https://www.unescap.org/sites/default/files/3.%20Cambodia%20update%202017%2010%2030th,%20Inclusive%20eCommerce%20Sustainable%20Development%20in%20Cambodia.pdf>

42 Bhattiprolu B. Murti, "IFC, WEConnect International Partner to Boost Market Access for Women Entrepreneurs", November 20, 2018, <https://ifcextapps.ifc.org/IFCExt/Pressroom/IFCPressRoom.nsf/0/9ED E22978942CEA28525834B00533C02>

43 OPIC, "OPIC, Goldman Sachs 10,000 Women, IFC Sign Commitment with ACLEDA Bank Plc. to Support Women-owned SMEs in Cambodia", November 1, 2016, <https://www.opic.gov/press-releases/2016/opic-goldman-sachs-10000-women-ifc-sign-commitment-acledda-bank-plc-support-women-owned-smes-cambodia>

identify support and encourage projects led by women entrepreneurs. It has resources for entrepreneurs, a directory of women's networks & studies about entrepreneurship.

Conclusion

This paper has illustrated that women play a crucial role in Cambodia's economy, yet face several issues as entrepreneurs. Creating an environment for women and men in which both can thrive equally is an ambitious goal but relevant to achieve the country's sustainable development goals and economic growth. ICT and STEM innovations are critical drivers for social, economic and political transformation, and digitalization opens up new opportunities in many countries in the Southeast Asian region and across the world. Generally, the development of SME opportunities for women within digital agendas is not an over-night work. Women and girls encounter a range of challenges spanning from basic education, gender stereotypes, employment, and access to market and finance when they become entrepreneurs. The inclusion of an ICT agenda in policies for gender can bridge the gap of inequality between men and women. Thus, it is necessary for a convergence of efforts, resources and understandings from various public and private stakeholders involved in ICTs, entrepreneurship, innovative education, health and finance. A number of both national and international initiatives and support systems exist and can be tapped into in order to improve the current situation for women entrepreneurs in Cambodia, and to facilitate their success in the digital era.





DIGITAL INSIGHTS

Policy vs. Privacy and Data Protection Implications: A Case of Cambodia

Ngoun Somaly¹

Keywords – e-Commerce, Data Protection, Privacy, Cybersecurity, Directive 95/46/EC, GDPR, Self-Regulation, Government Regulation, TRUSTe, Data Security, OECD, CoE, ASEAN, Developing Nations, Cambodia.

¹ Researcher, Tallinn Law School, Tallinn University of Technology, Estonia; Research Fellow, Center for the Study of Humanitarian Law, Royal University of Law and Economics, Cambodia; Co-founder and Legal Consultant for startup at Lawtitude Tech OÜ, Estonia. Somaly holds Master in Law and Technology from Tallinn University of Technology in Estonia and Master in International Human Rights Law and a Bachelor of Law from Paññāsāstra University of Cambodia. She has provided legal advices and helped number of tech startups to establish in Estonia. She conducts extensive legal research and publications in the area of Cybersecurity law and e-Governance. She also represented Cambodia and Tallinn Law School in the framework of Export Academy at Estonian House of Commerce.

As long as you have a computer and connect it to a network, you are vulnerable to someone or something else accessing or corrupting your information.

Abstract

With an increase of channelization, e-commerce has become a primary sales channel for online retailers. The E-commerce industry has experienced revolutionary changes in the last decade, and is drastically driven by consumers. Virtual shops via apps now replace the traditional business transactions and the scope of selling products/services online has strikingly increased. The e-commerce activities keep increasing due to the expansion of the Internet and innovations of new technology and ICT tools. However, these are not widely used in Cambodia due to the limited capacity of electronic facilities and knowledge on how such transactions should be done. Countries' economies and individuals can advantage of the abundance of benefits from the rise of new commercial technologies, but at the same time these benefits have created opportunities for privacy violation and misuses of personal data. Different approaches for privacy and personal data protection are found in various countries due to the high level of identity theft and online fraud. Many developing countries are yet to enact any binding procedures in order to effectively respond to the above issues including Cambodia. Lack of trust in the system and without specific procedures to guarantee the safeguard of data privacy remain as crucial barriers to the growth of e-commerce in developing nations. There are two main approaches being used for privacy and data protection in e-commerce such as the Self-Regulation approach being practiced in the United States and Government Regulation, which is being implemented in the European Union.

This paper discusses the applications of these two different data protection standards and why the government regulation approach is applicable for better data protection in e-commerce for developing nations based on the evaluation of issues affecting data protection and practice in developing countries, using a case of Cambodia.

Introduction

Information and Communication Technologies (ICTs) and the trend toward digitalization are growing. Global expansion of digital media, networks, and ICTs has become a new powerful technological revolution in the history of humankind. Due to the rapid pace of technology development, great expansion of Internet access, and the increase in the use of ICTs by the private sector, businesses, communities, and governments around the world have become the major pieces of today's global economy and social development.² It has become an unexpectedly useful service serving as a kind of laboratory for research, governance, intergovernmental institutions, social and economical development, as well the ability to disseminate information across the globe.³ The Internet has become the most powerful tool for business and there are tons of ways to legitimately generate revenue online.

Digital development has become the backbone of the global economy through the invention of new methods to conduct business via electronics called e-Commerce. E-Commerce has been defined as “the sharing of business information, maintaining business relations, and the conducting business transactions by mean of telecommunication networks”.⁴ Different IT sectors collectively create the discipline of e-commerce which includes electronic messages, email and fax, sharing a corporate digital library, electronic document interchange utilizing EDI and electronic fund transfer. Electronic publishing to promote marketing, advertising, sales, and customer support are also in the category of e-Commerce.⁵ The above process can be done through the large amount of data collected for supporting e-Commerce activities. Since data has the potential to create higher value for businesses, the integrity and efficiency of commercial websites' data protection measures are widely doubted.⁶

Modern technology is an advantage for the betterment of human beings, yet it also creates concern in relation to security in cyberspace. It means that computer functions such as software programs and Internet

capabilities can be manipulated to conduct criminal activities in cyberspace. New types of crime generated via new technologies now provide greater opportunities for criminals to conduct criminal activities via computer systems and networks a cost an estimated one trillion U.S dollars of economic loss annually. Cybercrime is one of the most serious threats to economic and national security around the world. Highly confidential information is stolen and leaked causing significant legal and ethical concerns.⁷ The volume of data breaches, mostly consisting of hacking and malware, is at the highest level ever and it has also given opportunities for privacy violation and misuses of personal data. Therefore, different approaches for privacy and personal data protection are now found in numerous countries due to the high level of identity theft and online fraud.

The lack of proper frameworks and mechanisms to deal with the cybersecurity issue are the main challenges for securing cyberspace and data protection,⁸ particularly for developing and low-tech countries.⁹ There are two main approaches being used for privacy and data protection such as the *Self-Regulation* approach being practiced in the United States and *Government Regulation* being implemented in the European Union. We are going to discuss the application of the two different approaches above and see which particular approach is applicable for better data protection in e-commerce for developing nations based on the evaluation of issues affecting data protection and practice in developing countries by using Cambodia as a case study.

Data Protection Approaches

Data privacy is the aspect of information technology that deals with the ability of an organization or individual who has to determine what data in a computer system can be shared with third parties.¹⁰ Data plays an exceedingly important role for socio-economic development in the new technology innovation method of business conducted by means of telecommunication networks. Consumer or user privacy in e-Commerce involves the handling and protection of sensitive personal information that individuals provide in the course of everyday transactions. Since the Internet has evolved into a medium of commerce, the concern regarding consumer data privacy violation is increasing.¹¹ Two main approaches for privacy and data protection in e-commerce are being practiced differently in the United States, the European Union, Asia and other regions across the globe. The two different approaches are *Self-Regulation* and *Government Regulation*.

Self-regulation is an industry-led approach allowing industries to regulate privacy standards directly with their customers. This type of regulation does not have to be mandated or imposed by government. Self-regulation allows industries to develop and self-enforce rules commonly arrived at for the mutual benefit of its members.¹² The authority is given to industries to develop their own guidelines and to decide on the degree of information that will be collected and used to notify their compliance with privacy standards formulated by them. The self-regulation approach, which is the evolution of industry norm and voluntary compliance, is being

² Agnes Kaper, *The Fragmented Securitization of Cyber Threats*, Union, Tanel Kerikmäe (Ed.), *Regulating eTechnologies in the European*, (Switzerland, Springer, 2014), 157-159.

³ Althaf Marsoof, *Online Social Networking and the Right to Privacy: The Conflicting Rights of Privacy and Expression*, *International Journal of Law and Information Technology* 19 (2), (Oxford University Press, 2011), 111. <https://doi.org/10.1093/ijlit/eaq018>

⁴ Vladimir Zwass, *Electronic Commerce and Organizational Innovation: Aspects and Opportunities*, *International Journal of Electronic Commerce* 7 (3), (Taylor & Francis, 2003), 8. Available at: <http://www.jpedia.org/ijecnew/zwass-20031.pdf>

⁵ Ibid.

⁶ Bettina Berendt, et al., *Privacy in E-Commerce: Stated Preferences vs. Actual Behavior*, *Communication of the ACM* 48 (4), (Association for Computing Machinery, Association for Computing Machinery, 2005), 102.

⁷ Sean L. Harrington, *Professional Ethics in the Digital Forensics Expert: Ultimate Tag-Team or Disastrous Duo?*, *William Mitchell Law Review* 38 (1), (2011), 2. Available at: <http://open.mitchellhamline.edu/wmlr/vol38/iss1/8>

⁸ Hamid Jahankhani, A. Al-Nemrat, *Examination of Cyber-criminal Behavior*, *International Journal of Information Science and Management*, (2015), 41.

⁹ Micheal N. Schmitt, *The Law of Cyber Targeting*. (Tallinn Paper No.7, NATO CCDCOE, 2015), 1. Available at: https://ccdcoe.org/sites/default/files/multimedia/pdf/TP_07_2015.pdf

¹⁰ R.S.Khemani, D.M.Shapiro, *Glossary of Industrial Organisation Economics and Competition Law*, (OECD), 73. Available at: <http://www.oecd.org/regreform/sectors/2376087.pdf>

¹¹ Ibid.

¹² Ibid.

practiced in the United States.¹³ Such industry regulation is not a pure market model but can create rules, play a role in enforcement and also aid in adjudication, which lies between pure market and government, including trade associations and third-party certification.¹⁴ The United States does not adopt legal obligations regarding data privacy protection in e-Commerce for commercial websites or online service providers. In order to assure their consumers data privacy, U.S. companies establish third-party organizations such as TRUSTe and WebTrust.¹⁵

Government Regulation is defined as an imposition of rules by government, backed by the use of penalties that are intended specifically to modify the economic behavior of individuals and firms in the private sector. Regulatory authorities interfere with this process by setting minimum price levels, excess capacity, and it tends to persist in the industry. Various regulatory instruments exist regarding price setting, output, standard and ownership ceiling including disclosure of information etc.¹⁶ Government regulation regime is being strictly implemented in the European Union, especially regarding data privacy safeguards. Since the 1980s the non-binding privacy guideline of the Organization for Economic Cooperation and Development (OECD) and Council of Europe (CoE) Data Protection Convention have contributed a great deal to the development of the consistency of national data privacy laws. Many countries in Europe have established strict laws regarding data privacy safeguard based on Directive

95/46/EC issued by the European Council in 1995 for the protection of individuals in regard to the processing of personal data and movement of such data.¹⁷ Moreover, from 25 May 2018 another extensive regulation regarding personal data processing in EU, the General Data Protection Regulation (GDPR), sets out more extensive obligations on data controllers and processors, and provides strengthened protections for data subjects that came into force.¹⁸ Above instruments not only influence European data privacy, but it also influence data privacy standards outside Europe because businesses with European consumers (or users in the internet space) must also comply with them.

The Key Aspect of Data Entry in E-Commerce and Data Security

Advancement of today's technology allows more extensive data gathering and invasions of privacy. According to GDPR Article 4 (1), personal data means *"any information relating to an identified or identifiable natural person; an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person"*.¹⁹ Marketers can now record exactly what an individual consumer purchased, when, where, how much and how often. The increased need to gather consumer data is also due in part to consumers' desire for individualized attention

and personalized communication.²⁰ However, consumers are becoming increasingly concerned about the degree to which retailers, manufacturers, marketers and websites are monitoring their action. There are a number of questions being asked whether consumers are aware of the means by which retailers or marketers collect information about individual purchase behaviors and how their personal information is collected and used?²¹

Web users were asked to fill out questionnaires that were related to their privacy, addressing respondents' willingness to reveal certain types of private data, their general trust in privacy statements, the value of privacy, and their intended reaction to various privacy scenarios before shopping takes place. Customers were asked to sign the store's privacy statement, or even agree to the sale of their data to an anonymous project sponsor. Sometimes they were asked to leave other private information even with no reason or requirement to do so.²² According to a survey conducted by Bettina and Oliver, a group of customers were more concerned about revealing information related to their identity such name, email, or mailing address, while another group was more concern about disclosing information relevant to their interests, hobbies or health status.²³ However, the same research revealed that many web users are unable to act accordingly while they have strong opinions on privacy and their state of privacy references once they are in an online interaction environment. Users were usually willing to talk about themselves when they are in a rich interaction environment and they are willing to give away their information without any compelling to do so.²⁴

Web users usually rely on legal protection although it is widely known that laws and regulations have difficulty responding to the fast development in ICTs. Some companies include regulations related to the privacy rights and the protection into their companies' privacy statement. Some statements from European companies advised their clients about their privacy rights under the European Union Directive and Regulation. Directive 95/46/EC regulates the right to be informed about who processes the data, purpose of using such data, to inspect one's data, to enforce and amend when needed, and to refuse to consent to specific types of usage of such data.²⁵ Another concerning situation occurred when consumers received a privacy statement that advised them about their rights protected under certain regulation, but they did not receive information about how their data will be used, for what purpose, and who will process their personal data.

Application of Privacy and Data Protection Approaches

Extensive discussion about developing a regulatory framework for privacy began in the 1970s by OECD, the European Union, and the U.S. government. Five core privacy principles were discovered and guided through the discussion led by the OECD in 1980.²⁶ Notice/awareness was the first core principle; participants should receive notice of an entity's information practices before they disclose any personal information. Choice/consent was the second core principle, where the participants should be given options to the uses of any personal information collected from them, especially for secondary uses that are unrelated to the original transaction such as sale of information to third parties. The third principle was access/participation, which allow participants to have access to information

13 Karim Jermal, et al., *Enforced Standards Versus Evolution by General Acceptance: A Comparative Study of E-Commerce*, Journal of Accounting Research 43 (1), (2004), 74. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1475-679x.2004.00163.x>

14 Siona Listokin, *Industry Self-Regulation of Consumer Data Privacy and Security*, the Jonh Marshall Journal of Information Technology & Privacy Law 32 (1), (2015), 17. Available at: <https://repository.jmls.edu/cgi/viewcontent.cgi?article=1783&context=jitpl>

15 Ibid.

16 OECD glossary, 73.

17 Graham Greenleaf, The influence of European data privacy standards outside Europe: implication for global of Convention 108, Journal of International Data Privacy Law 2(2), (2012), 68. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1960299

18 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) Available at: <http://data.europa.eu/eli/reg/2016/679/2016-05-04>

19 Ibid., Art. 4 (1).

20 Timothy R. Graeff, Susan Harmon, Collecting and using personal data: consumers' awareness and concerns, Journal of Consumer Marketing, 19 (4), (2002), 303. Available at: <https://doi.org/10.1108/07363760210433627>

21 Ibid.

22 Berendt, *Privacy in E-Commerce*, 2-3.

23 Ibid., 4.

24 Ibid., 5.

25 Ibid

26 Jermal, *Enforced Standards Versus Evolution*, 77.

recorded about them and be able to modify any information deemed incorrect. Last but not least, integrity/security, which obligate collectors to take reasonable steps to ensure data integrity, convert it into anonymous form before using it for secondary purposes, and destroy untimely data. Finally, the fifth principle was enforcement/redress, where mechanism to enforce the privacy policies is required to have in place.²⁷

Privacy and Data Protection Practice in the European Union

Data privacy laws are aimed at safeguarding certain interests and individual rights. There are several core principles for the better protection of data privacy such as the principle of fair and lawful processing, principle of minimalism, principle of purpose limitation, principle of data quality, principle of data security and data subject influence.²⁸ Moreover, other principles have been adopted by OECD and apply to personal data in either public or private sectors, which should be protected by security safeguards against such risk as loss or unauthorized access, destruction, use or modification or disclosure of data²⁹ regardless whether those acts emanate from state authorities or from natural or legal person.³⁰ OECD issued an important guideline on privacy and data protection in 1980, although it does not form binding international law, it may seem highly influential and was used together with CoE Data Protection Convention 1981 as a template for the introduction of national legislation in many countries in Europe.³¹

In the European Union, the right to private life is found under Article 8 of the European Convention of Human Right (ECHR). The public authorities must act in accordance with it, and legislation passed by governments must comply with the ECHR.³² Article 8 of CoE Data Protect Convention guarantees the right to respect privacy and correspondence.³³ According to the European Court of Human Rights, private life includes the privacy of communication, which covers the security and privacy of mail, telephone, e-mail and other forms of communication including information derived from the monitoring of personal Internet usage.³⁴ Moreover, monitoring via technological means and the processing and use of data obtained without consent, systematic collection and storing of data by security services on particular individuals, even without the use of covert surveillance methods, thereby amounted to an interference if private life protected under Article 8.³⁵ Interference by law is permitted under section two, however it must be for necessity in a democratic society and proportionate to the legitimate aims pursued under this article.³⁶

The Convention on Cybercrime of the Council of Europe entered into force on 01 July 2004 and it is the only binding international instrument on Cybercrime. The Convention aims at harmonizing the domestic criminal substantive law elements of offences and connected provisions in the area of cyber-crime.³⁷ It is also provides for domestic

criminal procedural law powers necessary for the investigation and prosecution of such offences as well as other offences committed by means of a computer system or evidence in relation to which is in electronic form.³⁸ Last but not least, the Convention is setting up a fast and effective regime of international cooperation.³⁹

Specific European data protection law, such as the Data Protection Directive 95/46/EC which was replaced by the General Data Protection Regulation (GDPR) 2016/679, constitutes the primary framework regulating personal data processing in the EU.⁴⁰ The GDPR sets out more extensive obligations on data controllers and processors, and provides strengthened protections for data subjects. Although the GDPR is directly applicable as a law in all Member States, it allows for certain issues to be given further effect in national law.⁴¹ However, in some instances, depending on the nature and circumstances of the personal data processing, the type of personal data being processed, or when the data protection issue happened, the GDPR will not apply and instead another legal framework will apply. For example, if a data protection complaint or complaint related to an incident, which occurred before GDPR became applicable on 25 May 2018, then previous legal framework will apply. Under Article 1 of Directive 95/46/EC of the European Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the freedom of movement of such data provides protection to the fundamental right and

freedom of a person, and in particular their right to privacy with regard to the processing of personal data.⁴² According to Article 17 of Directive 95/46/EC, “member states shall provide that the controller must implement appropriate technical and organizational measures to protect personal data against accidental or unlawful destruction or accidental loss, alteration, unauthorized disclosure or access, in particular where the processing involves the transmission of data over a network, and against all other unlawful forms of processing to ensure a level of security appropriate of such measures”.⁴³

In addition to Directive 95/46/EC of 24 October 1995, Directive 2002/58/EC of 12 July 2002 also provides protection concerning the processing of personal data and the protection of privacy in the electronic communication sector and was amended by Directive 2009/136/EC of 25 November 2009. According to Article 1, equivalent levels of protection of fundamental rights and freedom regarding processing personal data in the electronic communication sectors shall be guaranteed by member states.⁴⁴ It is also provided under Article 4 that the service providers must take appropriate technical and organizational measures to safeguard the security of its services and shall ensure a level of security appropriate to the risk presented of data.⁴⁵ Member states have the obligation to ensure the confidentiality of communication and the related traffic data by means of a publication communications network and publicly available electronic communication service through national legislation. For the legitimate purpose of this directive, the member states shall prohibit listening, tapping, storage or other kinds of interception or surveillance of communications and the related traffic data by persons other

27 Ibid., 77-78

28 Lee Andrew Bygrave, *Data Privacy Law: An International Perspective*, (Oxford, Oxford University Press, 2014) 1-2.

29 OECD, *Recommendation of the Council concerning Guideline Governing the Protection of Privacy and Transborder Flows of Personal Data*, (OECD, 2013), 13-15. Available at: <https://www.oecd.org/sti/ieconomy/2013-oecd-privacy-guidelines.pdf>

30 UNHCR, *CCPR General Comment No. 16: Article 17 on Right to Privacy*, HRI/GEN/1/Rev.9 (1), (1988), para.1.

31 Cristina Blasi Casagran, *Global Data Protection in the Field of Law Enforcement*, (New York, Routledge, 2017), 227-229.

32 Lilian Edwards, Charlotte Waelde, *Law and the Internet*, 3rd (ed.), (U.S, Hart Publishing, 2009), 445.

33 CoE, Convention for the Protection of Individual with regard to Automatic Processing of Personal Data, ETS 108, 1981, Art.8.

34 EIKo 03.04.2011, 62617/00, *Copland vs. the United Kingdom*, § 41, 44.

35 EIKo 02.09.2010, 35623/05, *Uzun vs. Germany*, § 44-46.

36 Ibid., § 78.

37 CoE, Explanatory Report to the Convention on Cybercrime, ETS 185, 2001, § 16. Available at: <https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016800cce5b>

38 Ibid.

39 Ibid.

40 David Erdos, *Intermediary publishers and European data protection: Delimiting the ambit of responsibility for third-party rights through a synthetic interpretation of the EU acquis*, (International Journal of Law and Information Technology 26 (3), (2018), 190. Available at: <https://doi.org/10.1093/ijlit/eay007>

41 Regulation (EU) 2016/679 of the European Parliament and the of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

42 OJ L 281, 23.11.1995, Art.1.

43 Ibid., Art. 17.

44 OJ L 201, 31.07.2002, Art. 1.

45 Ibid., Art. 4.

than users.⁴⁶ Last but not least, Article 15 of the Directive 2002/58/EC allow member states to adopt legislation measures to restrict the scope of the rights and obligations regarding confidentiality of the communication, traffic data, presentation and restriction of calling and connected line identification, and location data, however such restrict must constitute a necessary, appropriate, and proportionate measure within democratic society to safeguard of national security.⁴⁷

Case C-131/12 Google Spain v. Gonzalez

Mr. Costeja Gonzalez, a Spanish national resident in Spain, filed a complaint against newspaper company La Vanguardia Ediciones SL, and against Google Spain and Google Inc. The complaint was against two web pages by La Vanguardia's newspaper with information about Mr. Gonzalez's proceeding for the recovery of social security debts which appeared in the search engine of the Google group.⁴⁸ He required La Vanguardia either to remove or alter his personal data or use certain tools made available by search engines in order to conceal the data. Second, he requested that Google Spain or Google Inc. be required to remove or conceal his personal data from the search results with the link to La Vanguardia as this issue had been resolved years ago and it was now entirely irrelevant.⁴⁹

The first complaint related to La Vanguardia was rejected because AEPD, the Spanish Data Protection Agency, found the publication was legally justified. However, there are questions concerning a complaint against Google Spain and Google Inc. According to AEPD, operators of search engines are subject to

data protection legislation and the court has the power to require the withdrawal of data and the prohibition of access to certain data. The grounds for withdrawal and prohibition can be made based on the fundamental right to data protection and the dignity of a person. But does the search engine operator have to remove the information that is justified by a statutory provision?⁵⁰ The Spanish court referred the case to the European Court of Justice (ECJ) seeking an explanation for three important issues. First, whether the EU's 1995 Data Protection Directive applied to search engines such as Google. Second, Whether EU laws apply to Google Spain when the Company's data processing server was in the United States. Third, whether an individual has the right to request that his or her personal data to be removed from accessibility via a search engine, the so-called "right to be forgotten".⁵¹

According to the ruling issued on 13 May 2014, the ECJ provided that even if the physical server of a company processing data is located outside of Europe, the EU rule applies to search engine operators if they have a branch or subsidiary in a member state which promotes the selling of advertising space offered by the search engine. Google is subject under the EU data protection rule as Google is a search engine operator that is controller of personal data. Therefore, EU data protection law and the right to be forgotten apply to Google. Last but not least, individuals have the right to ask search engines to remove personal data when that information is inaccurate, inadequate, irrelevant or excessive for the purposes of the data processing.⁵² Upon the ruling on case *Spain v. Gonzalez* issued in 13 May 2014, the ECJ found Google is subject under data protection

law as it is the company that runs a search engine service and the controller of data. The ECJ ordered Google to remove certain personal information from the search results, thereby creating the "right to be forgotten".⁵³ Moreover, the court decided that search engines must assess each individual's request for removal. In response to this ruling issue by the ECJ, Google received 431,399 requests from users seeking their data removed from the search engine. Finally, Google has removed 43% of the total requests.⁵⁴

Joint cases C-293/12 and C-594/12

The High Court of Ireland and Constitutional Court of Austria were asking the Court of Justice to examine the validity of the directive, in particular in the light of two fundamental rights under the Charter of Fundamental Rights of the EU in respect for private life and the fundamental right to the protection of personal data. The court provided that "even though the retention of data required by directive 2006/24 constitutes a particular serious interferences with those rights, it is not such as to adversely affect the essence of those rights, the directive does not permit the acquisition of knowledge of the content of the electronic communication as such."⁵⁵ Moreover, the competent national authorities to have possible access to those data shall genuinely satisfy an objective in general interest as required by Directive 2006/24. This means that the proportionality of the interference in those circumstances should exist to be appropriate for attaining the 'legitimate objective' and not exceed the limits of what is 'appropriate and necessary' in order

to achieve those objectives.⁵⁶ In the case, Directive 95/46 does not require any provision to be adopted, which imposes an obligation on the personal data protection and only 'processing operations carried out'.⁵⁷

In the same case the court also pointed out that, "option of specifying in greater detail of the Directive in to national legislation may pose specific risks to the rights and freedoms of data subjects, Directive 95/46 provides, as is evidenced from recital 54 in its preamble, the number of such operations should be very limited."⁵⁸ Investigating cybercrime and collecting of digital evidence need appropriate technical measures and proper legislation and policy that on par with international standard that could balance between fundamental rights and security in cyberspace.⁵⁹ As mentioned above, Data Protection Directive 95/46/EC is replaced by the GDPR 2016/679 on 25 May 2018. This regulation lays down rules to the protection of persons with regards to the processing of personal data and rules relating to free movement of personal data; protects fundamental rights and freedoms of natural persons and in particular their right to the protection of personal data; the free movement of personal data with the Union shall be neither restricted nor prohibited for reasons connected with the protection of natural persons with regard to the processing of personal data.⁶⁰

⁴⁶ Ibid., Art. 5.

⁴⁷ Ibid., Art. 15. See also OJ L 105, 13.04.2006, Preamble, Recital 4.

⁴⁸ EKO 13. 05. 2014, C-131/12, *Google Spain v. Gonzalez*, p.6. <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62012CJ0131&from=ET>

⁴⁹ Ibid.

⁵⁰ Ibid.

⁵¹ European Commission, Factsheet on the "Right to be forgotten Ruling" (C-131/12), p.1. http://ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf. See also EKO 13. 05. 2014. C-131/12. *Spain v. Gonzalez*. p.7-9.

⁵² Ibid.

⁵³ Simon Wechsler, *The Right to Remember: The European Convention on Human Rights and the Right to be Forgotten*, J.L. & Soc. Probs, (2015-2016) 2. Available at: <http://www.columbia.edu/cu/jlsp/pdf/Dec2015/Wechsler.pdf>

⁵⁴ Transparency Report, European Privacy Requests for search removals, (2016). Available at: <https://www.google.com/transparencyreport/removals/europeprivacy/>

⁵⁵ EIKO 08.04.2014, Joined cases C-293/12 and C-594/12, para 39.

⁵⁶ Ibid., para 44-46. See also case C-343/09, *Afton Chemical*, C-581/10 and C-343/09 Nelson.

⁵⁷ EIKO 09.11.2010, Joined cases C-92/09, *Volker und Markus Schecke GbR* and C-93/09, *Hartmut Eifert*, § 99.

⁵⁸ Ibid., para 105.

⁵⁹ Agnes Kasper, Eneli Laurits, *Challenges in Collecting Digital Evidence: A Legal Perspective*, Tanel Kerikmäe, Addi Rull, (Eds.) *The Future of Law and eTechnologies*, (Springer, 2016), 201.

⁶⁰ GDPR, Art.1

GDPR Ruling

Only five days after the GDPR became applicable, German Regional Court (Landgericht) Bonn, issued a ruling on the practical application of the GDPR regarding the issue of public availability of ICANN 'WHOIS data' (which means publishing certain personal and contact data of those who run and maintain any particular website), and this probably made the court's ruling the first GDPR court decision worldwide.⁶¹ The court was called upon to rule in an interim injunction proceeding about the data minimization principle set forth in article 5 (1) lit. c) GDPR. ICANN sought to obligate EPAG to comply with the ICANN "Registrar Accreditation Agreement", which requires registrars to collect administrative (Admin-C) and technical (Technical-C) contact information for a new domain name registration ("WHOIS data"). The court ruled that ICANN could not show credibly that the collection of Admin-C and Technical-C was necessary pursuant to Article 5 (1) lit c) GDPR and therefore that EPAG is not obligated to collect such data.⁶² Personal data may only be collected for specified, explicit and legitimate purposes and shall be adequate, relevant and limited to what is necessary to collect the Admin-C and Technical-C, therefore an obligation to comply with the requirements of the Registrar Accreditation Agreement exists as long as such agreement is in accordance with above article.⁶³

Another case was brought to the court in Finland under GDPR and the Personal Privacy Protection Laws. Finland's Supreme Court ordered Google to remove from its search engine the personal data, including all

connected URL links, of a convicted murderer.⁶⁴ Finland's Data Protection Ombudsman (DPO) took the case against Google to the Supreme Court after the company refused a formal written petition to have the man's personal information removed from the search engine. Google argued its rights under freedom of speech law, though Google had unsuccessfully tried to have the DPO's "right to be forgotten". The Supreme Court determined that the man's right to privacy was not diminished by his crime, therefore the court ruled that the removal of the convicted felon's data from Google's search engine did not infringe on the public's right to information in this specific case.⁶⁵

Privacy and Data Protection Practice in the United States

In the United States, legislation concerning data privacy has been enacted in a sectorial manner, which means that each law or compliance regulation has been created in response to the needs of a particular industry or section of the population. The United States is home to some of the most advanced and largest technology and data companies in the world. In 2017, there was a disastrous breach at Equifax, Yahoo's admissions that billions of its email accounts were compromised, Deep Root Analytics' accidental leak of personal details of nearly two hundred million U.S. voters, and Uber's attempts to conceal a breach that affected fifty-seven million accounts.⁶⁶ While the majority of the world now draws attention to the new European GDPR, the United States did not pass any specific data privacy law. There are various Federal statutory laws concerning

rights to privacy in the United States such as the criminal code, the civil code, evidentiary law, family law, property law, contract law, etc. However, the United States is lacking in a comprehensive federal law that regulates the collection and use of personal information.⁶⁷

The United States is followed the novel of its Constitution, not only is freedom of speech guaranteed, but the free flow of information is also protected. It allows the direct marketing industry in the United States to maintain the right to a free flow of information and allows it to compile any kind of information concerning anyone while average U.S. citizens are not aware of the kind of information about them that is being stored, compiled and transferred without restrictions and without notification.⁶⁸ The Federal Trade Commission (FTC) has adopted the broadest role in which the industries have authority to create their private policy and usually create misinterpretation concerning the purpose of personal data collection and assurances of data security. U.S. privacy law typically allows businesses to use personal information for different purposes, including marketing, without the data subject's consent since a sector-base system leaves industry unregulated.⁶⁹ They argued once a person discloses information while registering or transacting at a site, there are no legal constraints on what can be done

with that personal information as long as no fraudulent actions are involved. There is no requirement about what data are being collected about them, and that consumers be provided with an option to give or deny their consent to secondary uses of the data gathered.⁷⁰

The FTC also tries to push e-commerce websites to privacy practices. In order to assure their consumers data privacy, U.S. companies should establish third-party organizations such as TRUSTe and WebTrust. TRUSTe was established in 1996 as a non-profit organization to promote better privacy and data practice in the U.S. Many websites in the U.S. voluntarily display a TRUSTe Web seal to signal their compliance with the privacy standards formulated by TRUSTe.⁷¹ Since industry-led practices have not sufficiently addressed regulators' concerns, the FTC issued guidelines and best practice for self-regulation of consumer privacy in 2009 and 2012. It has informed several industry-led initiatives covering the use of digital information that seek to foster innovation while protecting data privacy and data security for their consumer. In May 2014, the FTC also called for additional guideline for "data brokers" to protect consumer privacy.⁷²

⁶¹ DLA Piper, *Germany: First Court Decision on GDPR*, 06 June 2018. Available at: <https://blogs.dlapiper.com/privacymatters/germany-first-court-decision-on-gdpr/>

⁶² Ibid.

⁶³ Ibid.

⁶⁴ Gerard O' Dwyer, *Google Loses GDPR Case in Nordic Legal Precedent*, Global Finance Magazine, 01 October 2018. Available at: <https://www.gfmag.com/magazine/october-2018/google-loses-gdpr-case-nordic-legal-precedent>

⁶⁵ Ibid.

⁶⁶ Nuala O'Connor, *Reforming the U.S. Approach to Data Protection and Privacy*, Council on Foreign Relations, 30 January 2018. Available at: <https://www.cfr.org/report/reforming-us-approach-data-protection>

⁶⁷ Graham Greenleaf, *The Influence of European data privacy standards outside Europe*, 70.

⁶⁸ Jennifer L. Kraus, *On the Regulation of Personal Data Flows in Europe and the United States*, Colum. Bus. L. Rev. 59, (1993), 60-61.

⁶⁹ Ibid., p.70-71.

⁷⁰ Jermal, *Enforced Standards Versus Evolution by General Acceptance*, 79.

⁷¹ Ibid.

⁷² Siona, *Industry Self-Regulation*, 16.

Policy vs. Privacy and Data Protection Implications in Cambodia

Issues Affecting Privacy and Data Protection in Cambodia

Cambodia is known as the home for the largest population of adolescents / millennials in the region, with 68% of the total population under 30-years old and active online.⁷³ According to Telecommunication Regulator Cambodia, the total number of Internet users has reached twelve million as of June 2018 with a total population of about sixteen million.⁷⁴ E-commerce activities in Cambodia have also increased in the last few years due to the large number of Cambodian young people who are active online. The expansion of network coverage in Cambodia brings a lot of business opportunities for young entrepreneurs as well as contributes to economic growth in the country, yet Internet security and data protection issues remain as the main concern for the Internet community in Cambodia, and particularly for e-Commerce. Below are five main factors affecting privacy and data protection practice for e-Commerce in Cambodia.

1. Lack of awareness and digital illiteracy
2. Lack of professionalism and ethical concern
3. Lack of technical expert
4. Political and economic priorities
5. Inadequate of relevant regulation and proper government enforcement

Cambodia has had significant achievements in the past few years in the field of legal and

policy framework, institutional framework, awareness and coverage and service for ICTs development. As a result, the Royal Government of Cambodia adopted the ICT Master Plan 2020 in 2014 in line with the ASEAN ICT Master Plan 2020 and ITU Connect 2020 Agenda. The Law on Telecommunications was also adopted in 2015 for regulating the telecommunications industry, role of MPTC and Telecommunication Regulator of Cambodia (TRC) and foundation and principles for establishing regulation on numbering plan, licensing regime, spectrum, etc. RGC also adopted the Telecom/ICT Development Policy 2020 in April 2016. There are some other laws and policies that are being drafted and include: draft law on Cybercrime, draft law on e-Commerce, and draft of Spectrum regulation.

Cambodia has been drafting the e-Commerce law to facilitate and regulate online business operations for investors and customers.⁷⁵ However, until now relevant documents still pending include cybercrime law. At the same time specific electronic transaction law and data protection dose not exist in Cambodia. In order to keep pace with social and economic development in the ASEAN integration, harmonization of law is extremely important. The progress toward harmonization has been the strongest in the area of electronic transaction law and cybercrime law. For the time being, 9 out of 10 member states in ASEAN now have electronic transaction legislation in place. Cambodia has not yet passed electronic transaction legislation; however, a draft law has been developed. Cambodia and the Lao People's Democratic Republic do not have cybercrime laws, while the other 8 members enacted this legislation.⁷⁶ According

to the review on the status of e-Commerce law harmonization in ASEAN, Cambodia demonstrates the slowest legislation process.

Privacy and Data Protection Implications in Cambodia

Industry advocates believe that regulation fail to keep pace with the fast growth of information technology, therefore self-regulation offer better solutions and are capable to cope with fast changes in an industries revolution like e-commerce. Self-regulation through trade associations and certification programs can adapt more quickly and appropriately to innovation than government regulation when there is proper management of this approach. Self-regulation can provide a market solution to information asymmetries between firms and consumers by differentiating companies' data privacy and security performance. Individual firms can use industry standards to increase consumer trust without stifling the creating of new products or shifting away from a free, advertising revenue-based business model.⁷⁷ Europeans move faster regarding the adoption of data protection legislation, while advocates of the direct marketing industry do not believe that the U.S. should pass direct marketing legislation because they believe that Europeans adopt legislation in order to eliminate U.S. business from their competitors list. They argued that individuals should be able to receive information, use it and transfer to others and the protection of personal privacy must be balanced against such transfers since the emergence of high-technological data compilation and transfer capabilities, country regulation cannot adequately protect individual interests by regulated direct marketing.⁷⁸

With similar issues affecting privacy and data protection in Cambodia, Tiwalade and Ray

believe that developing states in Africa such as Nigeria are better to practice self-regulation. Nigeria has not yet enacted any specific law regarding privacy and data protection. The government has drafted guidelines for data protection and cybersecurity practice, but there is yet to be any legislation while 73% of the Nigerian population believes that Nigeria's legislation and parliamentary body is opaque corrupt.⁷⁹ They believe that Web seals like TRUSTe is easy to access and create awareness about data misuse and show how to forward complaints to the right authority, while government regulation does not have an easy accessible system to provide customer dispute resolution. Moreover, due to the political situation and the change in political history in Nigeria, people will be reluctant to embrace transparency or even if transparency was achieved it might not be trusted. Due to the country's economic situation, traditions, unawareness of data privacy issues, and ineffectiveness of the legislation enforcement, a government regulation approach is not suitable for implementation in Nigeria.⁸⁰

Although some states prefer to establish self-regulatory measures rather than have governmental interference via legislation, the protection of privacy in this case should prevail over industry preference. The approach that needs to be taken to ensure personal privacy and to work towards an intercontinental solution to the problems of personal data protection requires the government to pass legislation.⁸¹ Data protection law is likely to expand larger to Latin America, Africa, and Asia. Some other countries such as those in the Middle East and Central Asia are starting to enact Data Protection laws and establish a Data Protection Authority (DPA). Malaysia,

⁷³ Cheang Sokha, *Presentation on ICT Development in Cambodia*, CICC Forum, Tokyo, December 2015. Available at: http://www.cicc.or.jp/japanese/kouenkai/pdf_ppt/pastfile/h27/151013-2kh.pdf

⁷⁴ Sok Chan, *Internet users rise as network coverage expands*, Khmer Times. Available at: <https://www.khmertimeskh.com/50514827/internet-users-rise-as-network-coverage-expands/>

⁷⁵ Tian Shoahui, *Cambodia drafts E-commerce as online sale grow*, Xinhua 06.11.2016. Available at: http://news.xinhuanet.com/english/2016-11/06/c_135809717.htm

⁷⁶ UNCTA, *Review of e-commerce legislation harmonization in the Association of Southeast Asian Nations*, (UNCTA, 2013), 5. Available at: http://unctad.org/en/publicationslibrary/dtlstict2013d1_en.pdf

⁷⁷ Siona, *Industry Self-Regulation*, 16.

⁷⁸ Kraus, *On the Regulation of Personal Data Flows in Europe*, 79.

⁷⁹ Tiwalade Adelola, et al., *Privacy and Data Protection in E-commerce: The Effectiveness of a Government Regulation Approach in Developing nation using Nigeria as a case*, (ICITST, 2014), 235.

⁸⁰ Ibid., 237-238.

⁸¹ Kraus, *On the Regulation of Personal Data Flows in Europe*, 78-79.

Singapore, Philippines, Mexico, Peru, Japan and Taiwan have enacted extensive data privacy laws with OECD and EU-influenced while the establishment of DPA is in progress.⁸² Cambodia should adopt legislation to protect citizens against direct marketers that exploit their personal data, and allow Cambodian direct markets to continue to effectively compete on both local and international levels.

ASEAN was established in August 1967 in Bangkok, Thailand. The primary purpose of the ASEAN was to accelerate the economic growth, social progress and culture and development in the region.⁸³ Cambodia became the last member of ASEAN in 1999 and party to the “Bangkok Declaration”⁸⁴. ASEAN established the ASEAN Intergovernmental Commission on Human Rights to promote human rights in 2009. The Commission drafted the ASEAN Declaration of Human Rights, which was unanimously adopted by all member states in November 2012. The Declaration provides a provision to guarantee all the civil and political rights granted under UDHR in order to fit the international human rights standard to all ASEAN member states.⁸⁵ Article 21 of the ASEAN Declaration on Human Rights provides that “every person has the right to be free from arbitrary interference with his or her privacy, family, home or correspondence including personal data, or to attack upon that person’s honor and reputation. Every person has the right to the protection of the law against such interference or attacks.”⁸⁶ We can see the intents of this article clearly that the right of

individuals be guaranteed in line with UDHR, however, there is no specific guideline for the implementation of this instrument. As a result, ASEAN cannot reach its legitimate purposes of the convention among member states.

In addition to the above article, Article 5 of the 2000 e-ASEAN Framework Agreement signed at 4th ASEAN International Summit provides that member states shall adopt electronic commerce regulatory and legislation frameworks that create trust and confidence for consumers and facilitate the transformation of business toward the development of e-ASEAN. It further provides that member states shall expeditiously put in place national laws and policies relating to electronic commerce transactions based on international norms and take measures to promote personal data protection and consumer privacy.⁸⁷ Another fundamental right, particularly data protection and privacy, were found in the ASEAN Agreement for establishing e-ASEAN. However, 17 years after signing this agreement, Cambodia has shown its slowness since many regulations concerning the field are still in the drafting process including cybercrime law and e-Commerce while the other nine member states already enacted those laws.

In order to keep pace with the swift development of technology and other advanced economies, the Cambodian government should consider the establishment of a single comprehensive data protection legal framework. The law itself should be effective enough to resolve the conflict in the concerning area and fix the inconsistency between the existing legislation and dispute resolution mechanism. It should also cover all stakeholders since data protection is the fundamental element of corporate social responsibility in a digital age and an essential compliance function for

any organization that collects, uses, or shares consumers’ privacy and sensitive information. According to Article 19, individuals should not have an unqualified right to control the accessibility of information about them, unless it is private, defamatory and not justified by law.⁸⁸ Since privacy and data protection can be interfered with by ICTs in the digital age, the use of fines as a mechanism against corporate entities that aid in distribution of prohibited materials and against parties those create a private tort action is required.⁸⁹

Cambodia should also consider establishing a mechanism that has independent authority to monitor the enforcement and take action with disputes that arise in such a complex system. In addition, the Cambodian government should take another step to strengthen the Telecom/ICT development foundation by providing trustworthy and clear legal and regulatory frameworks, further developing Telecom/ICT infrastructure, bringing digital divide and enhancing the level of ICT literacy.⁹⁰ Last but not least, there should be an enhancement of ICT security and development of the ICT industry by raising awareness about data security to all level stakeholders. Also there can be methods to organize and encourage the implementation of cybersecurity techniques, prepare national technical standards on cybersecurity and capacity building provided to enforcement agencies to take into account. Finally, the working team has to pay more attention to sustainability and safeguards of all government and e-Commerce website from cyber attack, diversify Telecom/ICT industry and identify critical information infrastructure.⁹¹ Through high legal standard

protection, the rights to get access to their personal information to make corrections and to receive notification when their data will be used for another purpose will be granted. It will also create rights protected by the law to promote the protection of personal data and enable citizens to receive remedies when such rights have been violated, especially for developing countries like Cambodia.

Conclusion

Technology has had a swift development during the last decade, which allows people across the globe to get connected and exercise a number of rights. It provides the fast flow of information, data sharing, freedom of expression, storing of information and makes other impossible things that people never imagined possible. The connection between one’s personal life and technology has also increased the number of moments recorded for posterity in the digital age. Development in the field of network provides us ideal opportunities in broad scope, but privacy seems to be less protected and harder to control. Revealing of private data could constitute illegal activities and those activities can be the act of creating fake profiles for commercial exploitation, defamation, and blackmail including phishing attacks activity etc. In order to verge upon this modern era, legislators must look for possible ways to ensure privacy is well protected. Currently, two major approaches are being practiced to ensure privacy and data protection standards. The first protection approach is *Self-Regulation* being practiced in the United States and the second approach is *Government Regulation* being implemented in the European Union.

European directive and regulation stipulated strict data protection with five core principles that it must be processed fairly and lawfully and only collected for a specified, explicit, and legitimate purpose. The use of personal data

⁸² Greenleaf, *The influence of European data privacy standards outside Europe*, 69.

⁸³ About ASEAN. Available at: <http://asean.org/asean/about-asean/history/>

⁸⁴ ASEAN Declaration is the founding document of Association of Southeast Asian Nation of 08.08.1967, hereby refer to “Bangkok Declaration”. Available at: <http://asean.org/the-asean-declaration-bangkok-declaration-bangkok-8-august-1967/>

⁸⁵ ASEAN Declaration on Human Rights, 09.11.2012. Available at: aichr.org/?dl_name=ASEAN-Human-Rights-Declaration.pdf

⁸⁶ Ibid., Art. 21.

⁸⁷ 2000 e-ASEAN Framework Agreement, 24.11.2000. Available at: <https://cil.nus.edu.sg/rp/pdf/2000%20e-ASEAN%20Framework%20Agreement-pdf.pdf>

⁸⁸ 2000 e-ASEAN, 15.

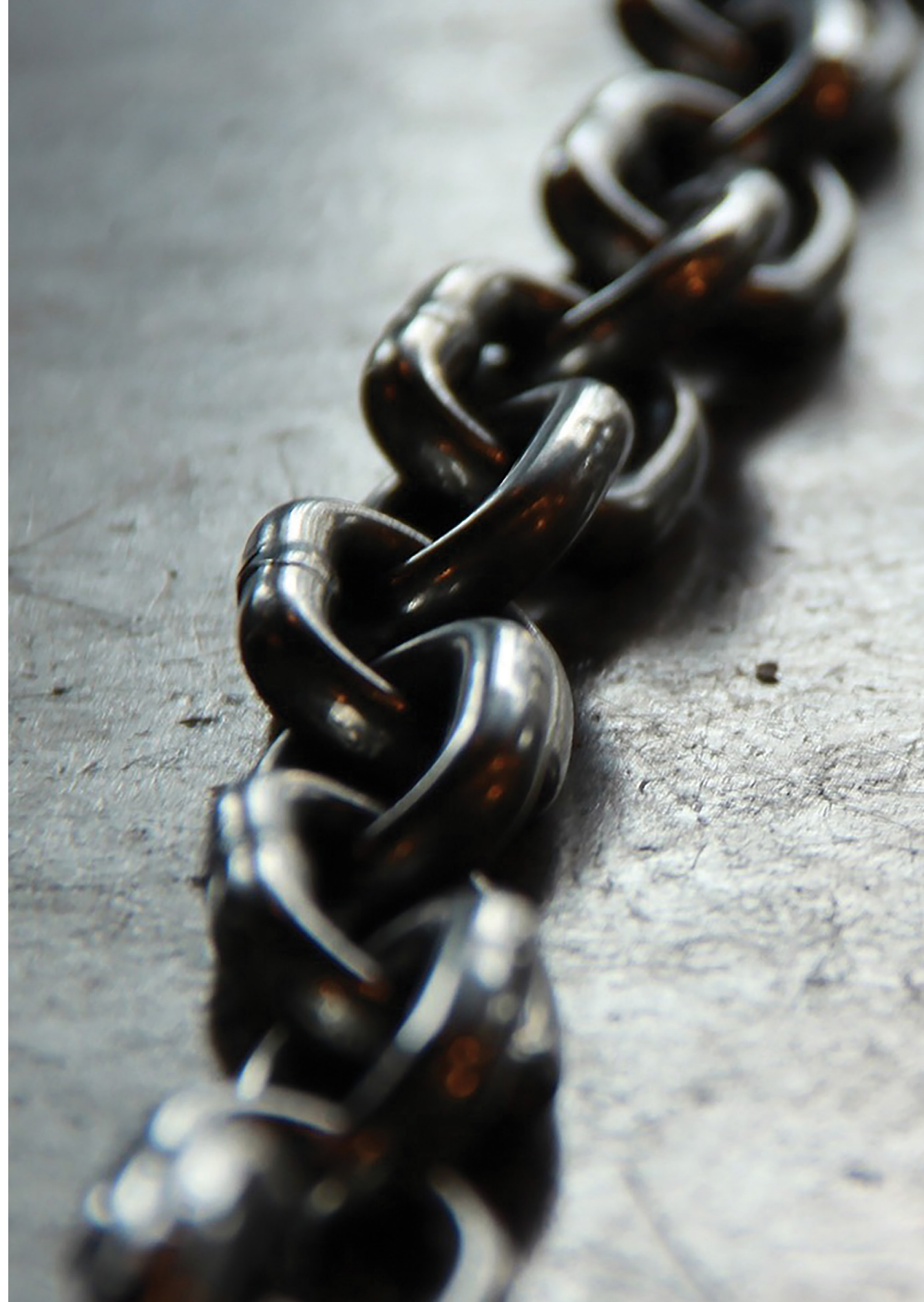
⁸⁹ Robert, Bolton, *The Right to Be Forgotten: Forced Amnesia in a Technological Age*, 31 J. Marshall J. Info. Tech. & Privacy L., (2014), 1. http://heinonline.org/HOL/Page?handle=hein.journals/jmjila31&div=9&start_page=132&collection=journals&set_as_cursor=40&men_tab=srchresults

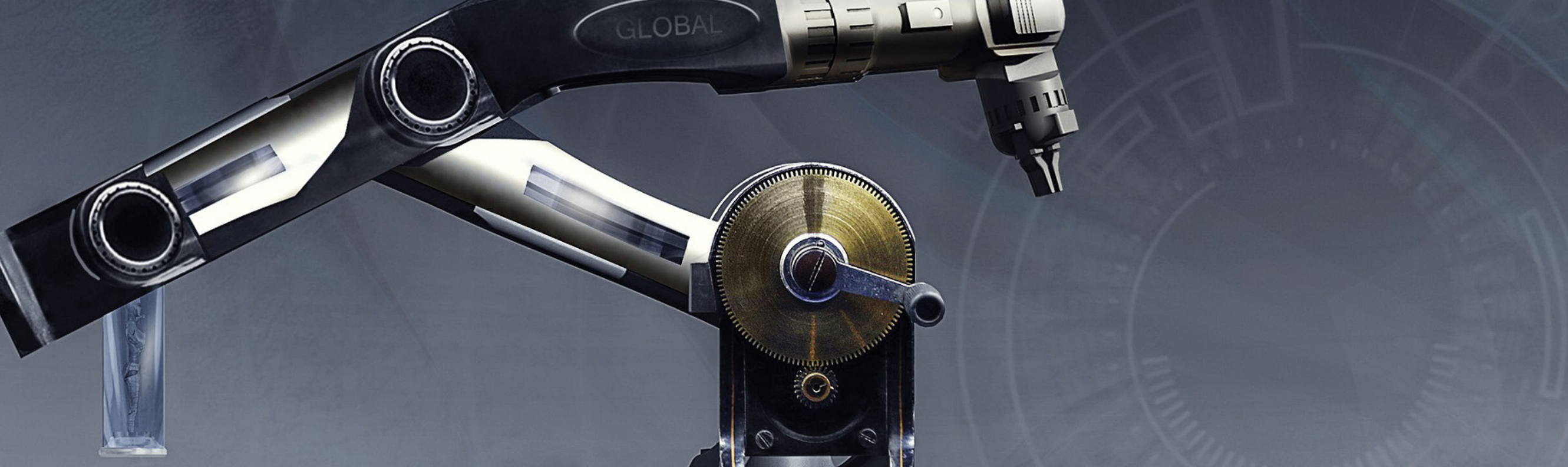
⁹⁰ RGC, Telecom/ICT Development Policy 2020, (2016), 20. Available at: <http://www.mptc.gov.kh/site/detail/546>.

⁹¹ Ibid.

for any other secondary purposes beyond the original purpose is strictly prohibited. Moreover, data collected cannot be kept any longer than needed to serve the stated purpose, and it can only be collected if the person has given his or her consent. Directives and regulations adopted by the Council of Europe are binding; member states are obligated to adopt those principles into their national law in order to guarantee strict enforcement and equal standard protection among member states in the European Union. In addition to this, it also requires each member state to establish an independent government body to monitor the development, implementation, and enforcement of national data protection law, while the United States has implemented a different standard of protection, and up to now it has not regulated any particular law to cover most e-Commerce Websites.

Cambodia's lack of adequate and comprehensive strategies, policies and regulation frameworks, constrain the effective oversight of this sector. If compared to other nations in the region, Cambodia and Lao are the slowest in terms of the establishment a legal framework concerning the ICT sector including electronic transaction and data protection law. While we are enjoying abundant benefits from digital age, we also seem to be victims of personal data breach. Privacy becomes easy to break and receives low protection in this modern era. The high legal protection standard should be created in Cambodia to protect both investors and consumers from data exploitation. This specific area of law should contain the five core principles mentioned in section 4 above and follow the practical experience being practiced in the European Union. Moreover, a mechanism to have oversight in this sector should be established in order to guarantee the safeguard of data practices in e-Commerce in Cambodia.





DIGITAL INSIGHTS

Cambodian SMEs in the 4th Industrial Revolution: Government Policies and Opportunities

Lydet Pidor¹

*Keyword: Small and Medium Enterprises (SMEs),
government policy, digital economy, innovative business*

*Why should more SMEs go digital?
What gov't policy and support does Cambodia have?
What SMEs should do to grab this opportunity?*

Abstract

Over the past decade, the world has entered a new phase called the 4th Industrial Revolution powered by many ICT innovations such as Artificial Intelligence (A.I.), Big Data and Augmented Reality, and a vast number of startups and forward-thinking companies globally have embraced it to improve or transform their business models. Cambodia, where small and medium enterprises make up a sizable part of the economy, is a market with high potential to draw value from those innovations. Micro-SMEs and SMEs employment represents about 72% of the total workforce which is 2,571,543 million people with 515,630 being establishments², legally registered and non-registered, in Cambodia. The country's government is looking to facilitate and tap into the opportunities they present through a number of regulatory and policy initiatives aimed at SMEs and tech-driven companies such as the Rectangular Strategy Phase IV, which will be outlined in this article. The latter part of this article will also address the questions of what else is needed in Cambodia and what role SMEs play collectively in helping the country go digital.

¹ BSc Economics Graduate, Royal University of Law and Economics (RULE)

² General Department of SME&H, Ministry of Industry and Handicraft (MIH), 2018

many others. Similarly, massive open online course (MOOC) platforms like edX also provide a variety of subjects related to innovation such as Human Centered Design (HCD) and product innovation design.

Global context overview

Digital technologies have evolved rapidly with great impact on everyday life, from the way we communicate to how we work and share the economy where activity will be improved via big data or information analytic. In 2016, the digital economy worldwide was worth USD 11.5 trillion, or 15.5% of the global GDP. The digital economy grows 2.5 times higher than the global economy while Return on Investment (ROI) of digital investment is 6.7 times higher than non-digital investment.

It is projected that 24.3% of the global economy is digital, digital economy will be worth USD 23 trillion and an average worker extra income equivalent to USD 500 by 2025.⁶

“Every corporation will become an information-driven company.” according to Timothy Chou, an author and lecturer in cloud computing at Stanford University.⁷

Although the digital economy has been defined in different ways and keeps evolving over time during the Fourth Industrial Revolution, it could be described, as any activity that is facilitated by electronic means in order to drive the exchange of goods or services.

Digital innovation spillover has noticeably accelerated across industries in recent years, especially to wherever electricity and an internet connection are available, although people may experience internet speeds differently based on the type of network and data transmission there are. As illustrated in

Introduction

To begin with, I would like start with the definitions of several terminologies to establish a common understanding for later discussion in this paper:

- > **Digitalization** is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.³
- > **Digitization:** The conversion of text, pictures, or sound into a digital form that can be processed by a computer.⁴
- > **Innovation:** Invention + Exploitation. In other words, Innovation is composed of two parts: first, the generation of an idea or invention and second, the conversion of that invention into a business or other useful application.⁵ Innovation could also be elaborated as the embodiment, combination or synthesis of knowledge in original, relevant valued new products, process or services.

Presently, the World Wide Web, widely known as www, offers numerous resources and technology solutions to help businesses manage their operations digitally without requiring a computer science or advance technology background. Examples include *WorkflowMax*, which is a job management software; a customer relationship management system named “Salesforce”; and an online accounting tool for SMEs named “Banhji” and

figure 1 that electricity and internet broadband play a foundation role to bridge people to new innovative business like Netflix or social media like Facebook.

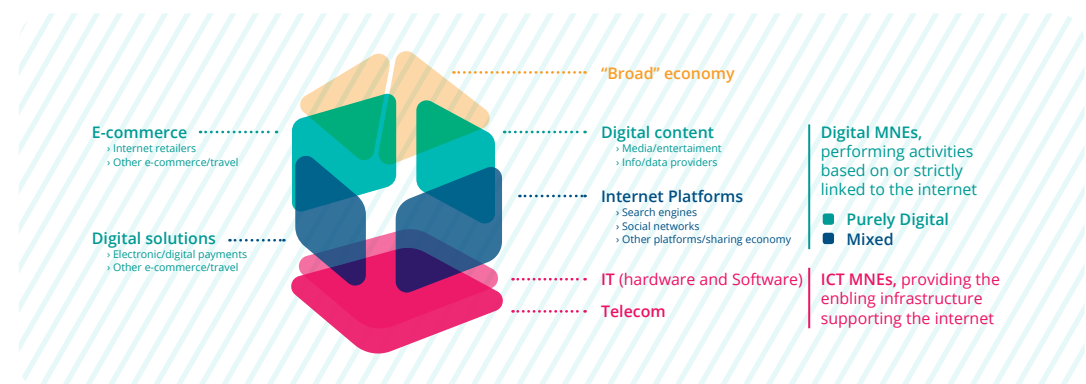
Figure 1: Asia's Highway's Information

	Fixed broadband		Mobile broadband		Bandwidth capacity (Kbps per user)	3G Network coverages (% of population)	Number of Internet exchange points (IXP) per 1,000 inhabitant
	Average upload speed (Mbps)	Average download speed (Mbps)	Average upload speed (Mbps)	Average download speed (Mbps)			
Cambodia	10	8	5	8	18	70.00	13
Indonesia	4	7	4	8	7	60.00	16
Malaysia	6	10	4	8	34	92.00	33
Myanmar	10	6	1	3	4	79.30	n.a.
Philippines	3	5	3	6	37	78.00	30
Singapore	96	97	22	38	737	100.00	903
Thailand	5	18	9	18	65	97.00	45
Vietnam	18	16	2	5	24	64.00	11
China	10	32	12	22	7	57.00	4
India	6	7	2	6	6	75.00	5
World Average	10	16	5	10	62	75.70	96

Source: Lurong CHEN, ERIA-DP-2017-11. The Raw data from EIU (2017).

Figure 2 shows a UNCTAD framework for mapping the digital economy, telecom is the main of the framework in terms of infrastructure development.

Figure 2: UNCTAD framework for mapping the digital economy.



Source: UNCTAD, 2018

3 Gartner IT Glossary

4 Dictionaries 2018

5 Review 2003

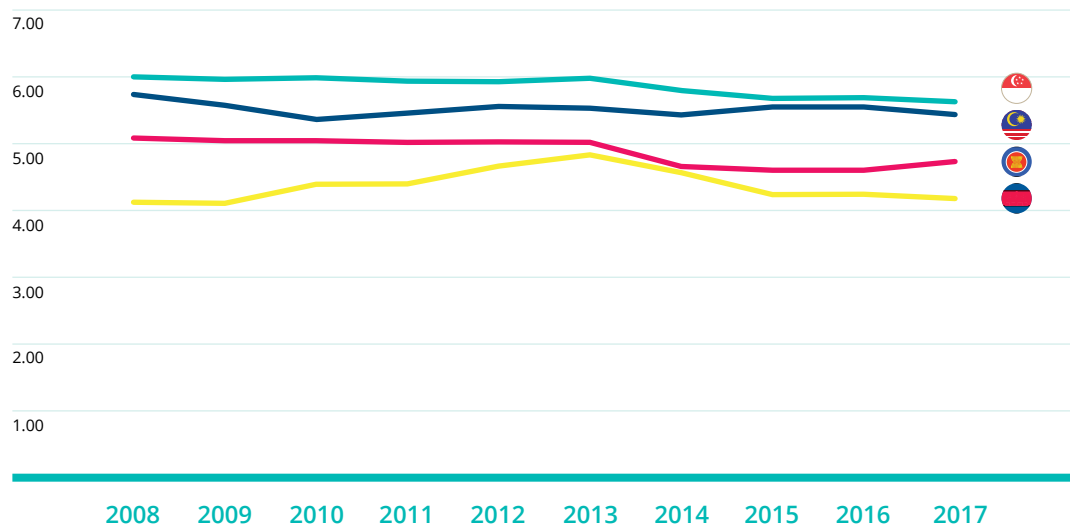
6 Digital Spillover by HUAWEI and OXFORD ECONOMICS, 2017

7 William Xu 2017

Cambodia's Digital Economy

Cambodia is, compared to neighboring countries in the region like Vietnam and Thailand, still at a nascent stage of the new economy in terms of digital adoption by business and government. Firms have not significantly invested in digital technology, which in some way reflects limited competitive pressure and poor investment climate in the country.

Figure 3: Firm-Level Technology Adoption in Cambodia 2007-2017.



Source: WEF (2017), Executive Opinion Survey 2016.

*Survey question, "In your country, to what extent do businesses adopt the latest technologies? [1 = not at all; 7 = to a great extent]"

There are only about 22% of firms with a website or homepage in 2015, and about 24% in 2017 which not increased significantly in Cambodia.⁸ Furthermore, digital payment platforms that hold great potential for the digital economy have also remarkably emerged in recent years. Nevertheless there are still about 78% of the population unbanked while less than 15% participate in mobile banking and only 3% own a credit card under minimal capital flow restriction.

Besides, digital adoption by the government is below average which new platforms have been introduced, but digital functionality is still limited. Cambodia's government received a relatively low score in digital adoption index which most of the reason relate to the full functionality of technology system integration. The Cambodia bandwidth capacity is 18 Kbps per user; in comparison, the world average is 62 Kbps per user.⁹

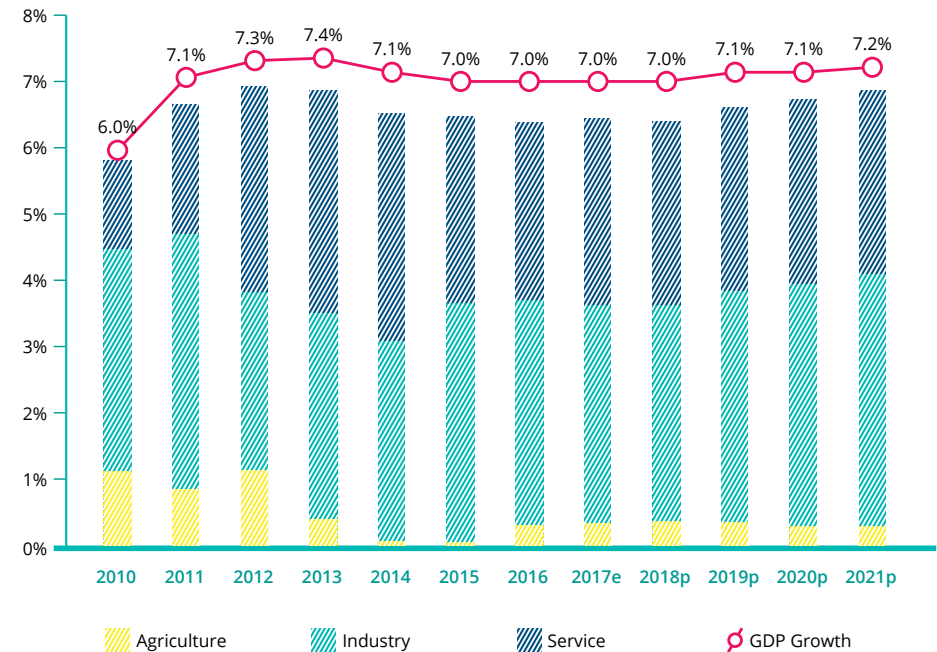
⁹ E-COMMERCE DEVELOPMENT - ITS CURRENT STATUS IN CAMBODIA Report 2018 by SOK Bovy

⁸ World Development Report 2016, Digital Dividends.

Cambodian Economy Overview

It has been noticed for almost a decade that Cambodia's economy grew around 7% from 2011 to 2018 while it is projected to remain robust and grow by 7.1% in 2019. The major sectors that drive the economic growth are Construction, Garment, Retail and Tourism. Besides, if we look at GDP-per capital increase from 1,215 USD in 2015¹⁰ to 1,563 USD in 2017¹¹ we notice that the middle-income families have increased which leads to more demand in the market in general.¹²

Figure 4: Contribution of Cambodia economy growth by sectors.



Source: National Institute of Statistic (2010 – 2016), Ministry of Economy and Finance (2017 – 2021)

Cambodian Micro-SMEs (MSMEs) and SMEs have contributed to about 58% to Cambodia's GDP with four main sectors contribution which is 25% in Agriculture, 29% in Manufacturing, 43% in Trade and 5% in service. Notwithstanding, Cambodia defines SMEs differently by Ministry of Industry and Handicraft, and General Department of Taxation as demonstrated in figure 6.

Additionally, there are only about 32% of Cambodia's SMEs that use Fiber Optic for internet connection. Also, the majority of cloud service usage is in Education, Hospitality including Tourism and Airlines, and Service like banking, insurance, and micro-finance institutions. Not surprisingly, there are still a lot of enterprises not aware of cloud services, 56% out of 153 respondents (enterprise) in Cambodia interviewed.¹³ Although people may see this as a problem

¹⁰ A year that Cambodia becomes a lower-middle income country.

¹¹ National Institute of Statistic (2010 – 2016), Ministry of Economy and Finance (2017 – 2021)

¹² There is also a similar view on this from Ms. ANN Sothida, Director of CBRE Cambodia, when she had an interview with a local media, The Phnom Penh Post.

¹³ Internet and Cloud Opportunities in Cambodia report 2017 by HUAWAI

of SMEs in the fourth industrial revolution for keeping up with new technology solution, this could be an underlying market opportunity for technology and internet service providers in terms of total available market.

With a huge young population advantage, 53% of the population is under 25 years old and 23% of them live in urban areas, Cambodia's tech entrepreneurship ecosystem has advanced into a vibrant and dynamic space, and the notion of being an entrepreneur has also remarkably improved over the past three years.¹⁴ Also, entrepreneurship has been fundamentally classified in two types which are SMEs Entrepreneurship¹⁵, and Innovation Driven Enterprise¹⁶.

Benefits for SMEs to go digital

According to a market research study in 2018, there are three main factors that were calculated to potentially increase in GDP when more SMEs adopt technology solutions:

1. Productivity improvements in offline sectors enabled by digital adoption, such as productivity improvements in the manufacturing sector from adoption of Industry 4.0.
2. Expansion of digital markets enabled by

Figure 5: SMEs definition in Cambodia.

Type of Enterprise	Ministry of Industry and Handicraft		GDT
	No. of Employee	Investment Capital (USD)	Turnover (USD)
Micro	<10	<50K	<62,500
Small	10-15	50K-250K	62,500-175K
Medium	51-100	250K-500K	175K-1 M
Large	>100	>500K	>1 M

Source: Compiled by author, data from the MoEF, 2018.

digital integration, such as access to new markets through e-commerce or financial inclusion through digital financial services.

3. Growth of enabling sectors that lay the foundation for digital integration, such as growth in ICT or logistics sectors that will support digital integration.¹⁷

Besides, SMEs themselves could also use consumer data to improve their new product development, communication, establishment of competitive advantage for sales promotion, and etc.

There is a research study that also identified the benefits of ICT¹⁸ for SMEs that they can leverage inherent strengths to incorporate ICT-enabled practices. The size of small businesses enables them to be more adaptable and responsive to changing conditions than larger companies and to further benefit from the speed and flexibility that the electronic environment offers.¹⁹

The identified opportunities²⁰ as inter-firm

17 ADVANCING TOWARDS ASEAN DIGITAL INTEGRATION report by Bain & Company, 2018
 18 ICT = Information and Communication Technology
 19 Arbore & Ordanini, 2006
 20 Wattanapruttipaisan (2002-03)

linkages for enhanced collective efficiency, technological and innovation capabilities, and hence competitiveness, subcontracting and outsourcing relationships, which cover processing and manufacturing activities and services of high value-addition.²¹

Benefits	Costs
<ul style="list-style-type: none"> > Leveraging inherent strength (size); > Improved communication, establishing competitive advantage, marketing and sales promotion, and improved information search, cost cutting; > 24-hour service; > Improved customer service; > Improved procurement procedures and staff recruitment; > Supplier management; > Inter-firm linkages, value addition to services, manufacturing 	<ul style="list-style-type: none"> > Hardware and software development; > Maintenance or IT support services; > Content development; > Staff training.

Factors determining adoption, and Barriers of ICT in SMEs

Small and medium enterprises (SMEs) could leverage ICT and e-commerce to compete or link with large firms. There are many factors of ICTs within SMEs. There are three major factors that have been identified in a research study which are benefit, organizational readiness to e-commerce and pressure from external factors.²²

Research also shows that it is crucial to align the business processes with digital strategy to successfully launch online trading by SMEs.²³

21 Bergeron, et al 1998; Lawrence & Chau, 1998; Poon & Swatman, 1995; Cragg, 1998

22 Chau (2001) Mehrtnes ET al.2001

23 Bergeron, et al 1998; Lawrence & Chau, 1998; Poon & Swatman, 1995; Cragg, 1998

Factors determining of ICT adoption in SMEs	Barriers of ICT adoption in SMEs
1. CEO's innovativeness, perceptions	1. Perception of low benefit
2. Organisational competencies (vision, value, technical ability and control)	2. Finance
3. Vision, value, technical ability and control	3. High cost internet, lack of skill and knowledge of IT, poor infrastructure
4. Compatibility, perceived usefulness, external pressure, perceived ease of use, and organizational readiness	4. Lack of customized ICT products for SMEs
5. Strategic value of information technologies (IT)	5. Small size
6. Productivity, profitability, and consumer surplus	6. Inability to realize the cost and time benefits of e-business
7. Time of adoption	7. Lack of research in the area
8. Operational support and transactions processing	8. Non-attainment of expected benefits
9. Customer pressure	9. Lack of strategic focus
10. Role of intermediaries	10. Mistrust of IT industry
11. Appropriate business model development	11. Classification as Internal barriers (within organization) and external barriers (outside organizations)
12. Size and other characteristics of SMEs	12. Competition with the larger firms
13. Government assistance	
14. Technology innovation	

In regard to a survey result from a small group discussion with SME representatives and related associations by the Ministry of Economy and Finance shows that a rapid survey was conducted during a small group consultation with the private sector on SMEs Supporting Measures by Deputy Director of Department of Macroeconomic and Fiscal Policy, Ministry of Economy and Finance in January 2018, and four challenges were raised which were (1) Access to Finance, (2) Access to Market Information, (3) Tax compliance and (4) Level of Playing Field. The result was not much different to a survey finding by the International Finance Corporation (IFC)²⁴ about the obstacles of doing business in different size enterprises worldwide. It turned out that the same four problems were present as well.

Cambodian gov't initiatives toward this movement

Rectangular Strategy-Phase IV²⁵

With the intention to promote more economic activity and diversification in the new stage of development, the Royal Government of Cambodia has identified four priority areas for her Rectangular Strategy Phase IV (RS4) where human resource development is the first priority, and economic diversification (including digital economy and fourth industrial revolution) is second and followed by the private sector and market development as the third while the fourth one is Inclusive and sustainable development

(RS4 – Part 1)

- › *Rectangle 2 - Economic Diversification:* (1) Improving logistics system and enhancing transport, energy and digital connectivity;

(2) Developing key and new sources economic growth; (3) Readiness for digital economy and industrial revolution 4.0; and (4) Promoting financial and banking sector development.

- › *Rectangle 3 – Promoting of private sector development and employment:* (1) Job market development; (2) Promotion of SMEs and entrepreneurship; (3) Public-Private Partnership; and (4) Enhanced competitiveness.

[...] During its sixth mandate, the RGC will focus on the following priorities:

1. Finalizing the preparation of the “**SMEs Development Policy**” and promoting subsequently its effective implementation.
2. Strengthening the supporting mechanism to facilitate registration, service coordination, widely and timely dissemination of market information, dissemination and mainstreaming new technologies in an effort to open up markets for Cambodian products.
3. Establishing a “**SMEs Bank**” to provide financing to SMEs and promoting also the development and implementation of other financing arrangements/options including the Collective Investment Scheme.
4. Establishing a “**National Entrepreneurship Fund**” and an “**Entrepreneurship Development Center**” in collaboration with the private sector with the aim of promoting entrepreneurship and efficiency in business.

[...] ²⁶

- › *Rectangle 4 – Inclusive and sustainable development:* (1) Promotion of agricultural and rural development; (3) Strengthening management and urbanization; and (4) Ensuring environmental sustainability and readiness for climate change.

²⁴ Mirjam Schiffer 2001

²⁵ Rectangular Strategy for Growth, Employment, Equity, and Efficiency: Building the Foundation Toward Realizing Cambodia Vision 2050 Phase IV of the Sixth Legislation of the National Assembly announced by September 2018.

²⁶ Find out further point in “Rectangular Strategy 4”, page 49 – 51.

Within this, it could be said that the government has tried to produce a supporting package to spur private sector development by accelerating market demand creation through the Entrepreneurship Promotion Center and National Entrepreneurship fund creation, and supply generation through SMEs Bank with additional cross-cutting support from the policy level such as SMEs Development Policy and other parts of pillars in its RS4.

Supporting programs

The following are the objective and priority sectors of three examples of the government-funded programs through the Ministry of Economy and Finance.

SMEs Bank that will be designed to support the government policy by increasing access of affordable finance for SMEs and stimulating inclusive economic growth. The bank aims to support some priority sectors such as manufacturing, service firms supporting manufacturing, post-farm gate agri-business and food processing, innovative Start-up, tourism (particularly services), wholesaler and retailer.²⁷

Entrepreneurship Promotion Center aims to support potential SMEs & innovative start-ups, plus to promote entrepreneurial culture. The center is expected to be launched in 2019.²⁸The priority sectors of the center's program are: agro-processing, manufacturing, tourism and innovative startup.

Skill Development Fund (SDF) is designed to stimulate private participation and simulate SDF permanent structure in order to establish

²⁷ A presentation on SME Bank & Entrepreneurship Promotion Fund during a national workshop on "Role of MSMEs in Achieving SDGs in Cambodia" organized by the Ministry of Industry and Handicraft at Sokha Phnom Penh hotel, 4th October 2018.

²⁸ Small group discuss about Entrepreneurship Promotion Fund's programs lead by deputy director of Macroeconomic and Fiscal Policy at the Ministry of Economy and Finance, 5 October 2018.

a trusted financing platform. Currently, the fund is being implemented. The fund focuses on five priority sectors such as construction, manufacturing, ICT sector, electrical/electronics, and tourism where private company that is in one of these sectors could apply for cost-sharing of their staff training that could either be skill upgrade or pre-employment.²⁹

Supporting regulations

Sub degree on:

- › Capacity Building and Research & Development Fund (CRBRD).³⁰

It is designed to promote human resource development, research and innovation development of ICT in Cambodia, as well as encourage the creation of new ICT businesses through the Innovation Center at the campus of the National Institute of Posts, Telecoms, & ICT, also known as NIPTICT.

- › Digital Signature.³¹
The sub degree seeks to promote and manage the use of digital signature in a secure way and efficient way in Cambodia.
- › Tax Incentives for Small and Medium-Sized Enterprise in Priority Sectors.³²

²⁹ Consultation Meeting on Skill Development Fund with enterprises and schools organized by the Ministry of Economy and Finance, 8 June 2018.

³⁰ Sub degree on Definition and Mechanisms for Implementing Telecommunication Services Universal Service Obligations, 21 July 2017. Link to download the document (Khmer): http://www.mptc.gov.kh/files/2017/09/934/20170724_sub_decree_no_112_on_randd_stamp.pdf

³¹ Sub degree on Digital Signature, 29 December 2017. Link to download the document (Khmer): http://www.mptc.gov.kh/files/2018/02/1102/20180104_sub_decree_246_digital_signature_stamp.pdf

³² Sub degree on Tax Incentives for Small and Medium-Sized Enterprise in Priority Sectors, 2 October 2018. Link to download the document (English): <https://www.scribd.com/document/393102925/Sub-Decree-on-SME-Tax-Incentives-2018-Unofficial-English-translation>

The objective of this incentive is to promote the development of SMEs, and create jobs and increase domestic production capacity. *The priority sectors for the incentive include* agriculture or Agro-processing, food production and processing, manufacturing of goods for domestic consumption for the tourism sector, manufacturing of final goods, parts or components, to support other manufacturing, research and development of information technology including the supply of innovative information management services, and enterprises in the SME clusters, and enterprises that develop those clusters.

ICT Policy and Regulatory Development

The government promulgated the Law on Telecommunications³³ which stated that starting from 2017; all telecommunication operators in Cambodia have to contribute a percentage of their annual gross revenue for:

- › *2% for Universal Service Obligations (USO):*
 1. Encourage the construction and development of telecommunications networks;
 2. Promote the provision of basic telecommunications services, value added services and emergency services more broadly into rural and remote areas;
 3. Reduce the digital divide for the social and economic development.
- › *1% for R&D:* Establish and administer the capacity building, research and development fund.

³³ The Royal Kram of Cambodia's Law on Telecommunications promulgation on 17 December 2015.

The Policy on Telecom/ICT Development 2020 that was released on April 11, 2016³⁴ focuses on three main areas with some details as follows:

1. **Strengthening the Foundation of Telecom/ICT Development** that includes policy and legal framework; telecom/ICT infrastructure development, bridging digital divide, and human resource development and R&D. For example, to increase 100% of mobile penetration, 100% of broadband coverage in urban area and 80% in rural area.
2. **Strengthening ICT Security and Developing Industry** that included strengthening ICT Security; and developing the ICT Industry by improve human resources in the ICT sector, and ICT literacy rate in the government, sub-national government, and high school graduate.
3. **Promoting ICT Usage:** Developing and Promoting the use of e-Government application; promoting e-commerce; and promoting the use of ICT for disaster relief and environmental protection such as to have more telecom or ICT company register, up to 65%, bring all government bodies to online through websites, and more.

³⁴ A presentation of Dr. KAN Channmeta during a conference on "The Future of E-economy in Cambodia" on 4th November 2018 - organized by Konrad-Adenauer-Stiftung Cambodia.

Conclusion

As several government support mechanisms have been set in place, it is also crucial for the target beneficiaries to do their part in order to benefit from these as much as possible. More importantly, when it comes to the implementation of the supporting mechanisms it is imperative that the relevant agencies and private actors have the same picture of what the regulations and policies are designed for.

There is no doubt that Cambodia has taken another step forward to enhance innovation and digital transformation in SMEs during a period of change when smart technology and innovative startups have been increasingly designed to address human as well as business problems in a much better way than ever before.

This does not mean that all SMEs must go digital, but SMEs themselves should figure out how much they should innovate, whether to adopt available technology solutions areas such as customer relationship management (CRM), HR management, digital advertisement, e-payment and so on. This means that SMEs don't need to use all of these technologies, but they could either test new tech ad hoc or do a small survey or informal interview with their customers and do a quick analysis about consumer's behavior toward their digital participation as well as preferences.

After this, SMEs should be able to have a better idea of which technology solutions would help them provide a better service or products to their customers. Moreover, this would not only help SMEs to better engage with their clients, but may enable them to expand into new potential markets across the country and the greater Southeast Asian region as well.



DIGITAL INSIGHTS

Digital Transformation in SMEs: Understanding the Challenges of German SMEs

Robert Hör¹

¹ Mr Robert Hör is currently program manager for digitalization at Konrad-Adenauer-Stiftung Cambodia. He is a political scientist by training and is in charge of several research projects and dialog formats between Cambodian, regional and German experts. His current research focus lies on the implementation of digitalization projects within SMEs and organizational development. Having always been fascinated by the socio-political impact and potential of new technologies and what they could mean for enterprises, he started studying the online M.Sc. program digital transformation and management. His major fields of study are digital strategy development, political economy and business informatics.



Introduction

From the craftsman next door, to the mechanical engineering enterprise in the region, to the hip start-up: the implementation of digitalization projects has become a major concern for small and medium sized enterprises (SMEs) around the world. The starting point for carrying out digitalization projects are basic strategic considerations that are geared by external environmental changes and the internal potential to improve processes, better organize the enterprise structure and reach new markets. Both the strategic adaptation to digitalization and the implementation of digitalization projects promise significant increases of profitability, revenue and productivity.²

However, many enterprises face a number of typical challenges internally when going digital, which stem from the mutual interrelation with environmental changes, such as changing customer behavior and new competitors due to globalization. German SMEs in particular deal with these transformative challenges since the lion share of the SMEs evolved in the pre-digital era.³ Even if there is no one-size-fits-all solution, there are developments outlining the direction of German SMEs based on their own cultural peculiarities, sector and historical evolution.

So how do German SMEs realign themselves strategically to environmental changes caused by digitalization? And what kinds of digitalization projects have been carried out? And also, what can Cambodian SMEs learn from the German evidence? The following article explores these two questions and shows that despite all stereotypes toward the German SMEs — like that they are patriarchal, risk-averse and long fuse — the German SMEs have recognized the potential and taken up the topic of digitalization.

Digitalization in this article will be understood as,

the use of connected and digital information and communication systems, both internally on the organization level (internal digitalization), as well as in relation to existing and potential customers, suppliers, authorities or other relevant organizations and individuals (external digitalization).⁴

However, before diving into the research questions, a short portrait of the German SME sector is drawn to better understand its peculiarities.

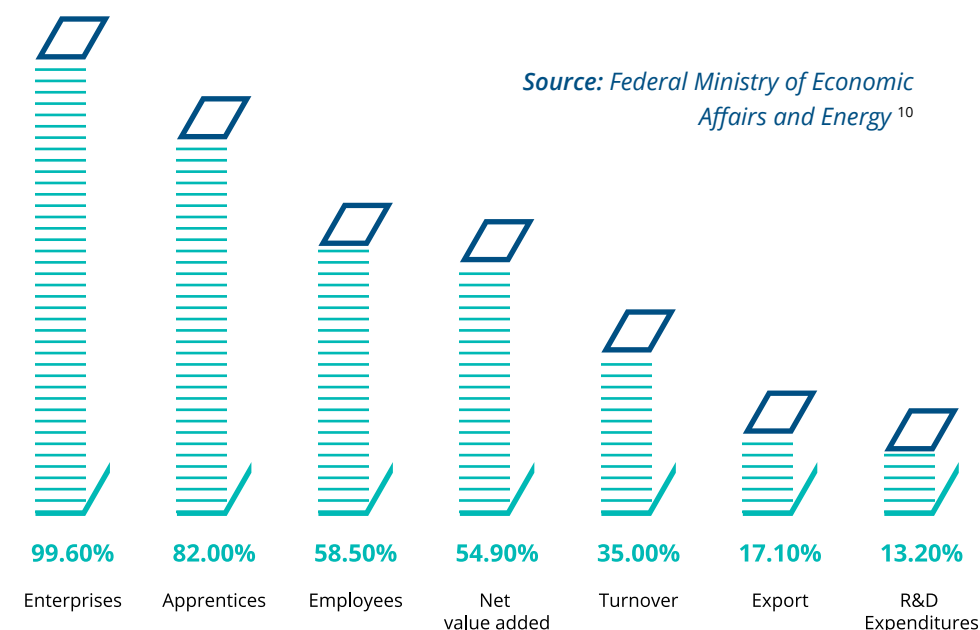
The German SMEs: Guarantors of Prosperity and Growth

The importance of the German SME sector is reflected on the one hand in quantitative economic indicators and on the other hand in qualitative characteristics (e.g. family-owned, financing attitudes). Having a closer look at the quantitative figures, it is clear that SMEs are the dominant business organization with 99, 6% of German enterprises classified as SMEs. However, there are several definitions,

which describe what SMEs actually are⁵. The definitions used by research institutes are varied, which makes comparing the data difficult. Bearing this challenge in mind, one can still draw conclusions. For the purpose of this article, the official ministerial definition of the German Mittelstand⁶ will be used.

According to the Federal Statistical Office⁷, there were approximately 2 million micro enterprises in Germany, which means up to 9 employees and up to a 2 Million Euro turnover, 395 thousand small enterprises, per definition no micro, up to 49 employees and up to 10 Million Euro turnover and 72 thousand middle sized

enterprises, up to 249 employees and up to 50 Million turnover⁸. The figures show that the German SME sector is dominated by micro and small enterprises: 81% of SMEs have less than 5 employees. In contrast, the share of SMEs with more than 50 employees is 1.9%.⁹ The size of SMEs is relevant to better understand the way projects are implemented and how resources are allocated. Consequently, this has an influence on the work identity of staff and leaders, communication and action realization. The graphic also shows that the SME sector is the main in-enterprise instructor and that SMEs employ 58, 50% of the total German workforce.



² Westerman et al (2014): Leading Digital: Turning Technology into Business Transformation. p5.

³ A study conducted by Commerzbank shows that 70% of the German SMEs are older than 21 years. Assuming the breakthrough of digitalization in the late 1990s, this share existed in a pre-digital era. Distribution of German SMEs by age in 2016: <https://de.statista.com/statistik/daten/studie/719354/umfrage/verteilung-der-unternehmen-des-deutschen-SMEss-nach-alter/> (29.10.18).

⁴ IUBH: Digitalisierung im Mittelstand 2018. Under: https://www.iubh-dualesstudium.de/wp-content/uploads/sites/13/2018/06/Studie_Digitalisierung-im-Mittelstand_2018.pdf (23.11.2018), p 1.

⁵ Institute für Mittelstandsforschung: <https://www.ifm-bonn.org/definitionen/kmu-definition-des-ifm-bonn/> (21.11.2018).

⁶ Mittelstand is the German name for SMEs.

⁷ The definition of SMEs varies. For example, the definition of the Federal Statistical Office contrasts with the definition of the EU Commission. This defined ...

⁸ Federal Office of Statistics (2016): Number of companies in Germany by company size. <https://de.statista.com/statistik/daten/studie/731859/umfrage/unternehmen-in-deutschland-nach-unternehmensgroesse/> (23.10.18).

⁹ KfW SME Panel 2017. Germany's SMEs continue to break records - sectoral transformation poses new challenges. [https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-SMEsspanel/PDF-Dateien-SMEsspanel-\(EN\)/KfW-SMEsspanel-2017_EN.pdf](https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-KfW-SMEsspanel/PDF-Dateien-SMEsspanel-(EN)/KfW-SMEsspanel-2017_EN.pdf) (23.10.2018).

¹⁰ Federal Ministry of Economic Affairs and Energy: Wirtschaftsmotor Mittelstand Zahlen und Fakten zu den deutschen KMU. Under: https://www.bmwi.de/Redaktion/DE/Publikationen/Mittelstand/wirtschaftsmotor-mittelstand-zahlen-und-fakten-zu-den-deutschen-kmu.pdf?__blob=publicationFile&v=32 (23.11.2018), p2.

Besides the quantitative figures, which underline the macroeconomic relevance of SMEs in Germany, the German SME sector is also globally recognized for its innovation capabilities, in particular regarding service, product and process innovation.¹¹ This international reputation is also reflected in the current global competitiveness report of the World Economic Forum, where Germany outperformed the United States of America and Switzerland in the innovation category.¹² The report also mentions that SMEs are a significant driver of innovation and states that five dimensions, namely interaction and diversity, research and development, commercialization, administrative requirements and entrepreneurial culture, are framing the innovation ecosystem performance.¹³ Three of them are entrepreneurial culture, interaction and diversity and research and development. They can be found in a complex research body, e.g. family firm research, resource based view, transaction based view or industrial based view, analyzing the characteristics of SMEs in Germany to learn more about the nature of German SMEs business performance. The bottom line is that SMEs have limited resources due to size, but still drive innovation. De Massis et al developed a framework to learn more about the management of SMEs in Germany and indicate six key traits: niche focus and customer collaboration, globalization strategy, preference for self-financing, superior employee relations and community embeddedness.¹⁴

German SMEs are largely run by families¹⁵, 95% of all SMEs are family businesses and 85% of them are owner-managed¹⁶. The romantic picture of the family owner, who greets everyone in the production and educates the apprentices in person, fits reality. In most cases, German SMEs offer enhanced training, high involvement of employees in decision making and flat hierarchies. Data suggests that Germany has unusually high employment stability and is one of the countries with the lowest employee turnover. This indicates high employee satisfaction and high identification with the job. This is linked to the fact that SMEs think long-term and across generations. At the core of their business strategy is the longevity of the organization, which influences strategic decisions about investment and change management. One could think of German SMEs as marathon runners instead of sprinters, which is also reflected in the term "patient capital". Following this logic, SMEs pursue a continual improvement process and product innovation process.¹⁷

Another trait of German SMEs is their focus on niche markets. Thus, SMEs develop highly focused strategies concentrating on one specific product or service. This allows enterprises to build up expertise and unique capabilities¹⁸. The tinkers and craftsmen of Germany's SME sector orchestrate resources highly efficiently and effectively; they streamline financial resources and export worldwide. In many sectors, like hospital equipment or special hoists, German SMEs are global champions and market leaders. The laser-like niche focus leads to specific product portfolios and a strong export-orientation.

The reason is simple, when you produce one specific product the demand will be exhausted in a market with the size of Germany.

The financing of investment and innovation also shows that SMEs operate independently and are self-financed. Capital often comes from the family, thus ensuring control and less interference of external stakeholders. For instance, private equity is eleven times higher in Silicon Valley than in German SMEs.¹⁹ The enterprises are also very strongly rooted in the region and integrated into the social communities. They develop close networks with independent research institutes, such as the Fraunhofer Society, which supports numerous projects and provides research-oriented support.²⁰

All in all, it can be said that German SMEs not only contribute to macroeconomic parameters, but go far beyond. They are culturally embedded and have developed their own ways of doing business. Short term economic interests often give way to cross-generational and long term thinking. The willingness to take risks and finance projects by themselves instead of taking money from external stakeholders is also evidence of an evolutionary management approach. Their remarkable expertise in niche products combined with excellent customer relations is one of the main drivers of innovation and sustainability. The management approach of SMEs is of a transformative character. Decisions are thought through and take a while, and then are implemented in many small steps with less risk.

Overview of Digitalization Projects

At the center of the digital transformation of SMEs is the question of what kind of projects are implemented to climb up the levels of digitalization. According to Saam et al, there is still potential for SMEs to go from digitalization level 1 (stationary internet, enterprise resource planning, Wiki, homepage, social media), over through the second level (mobile internet, applications for communication and information, cloud computing, data analysis), to the third level (new business models, apps, industry 4.0). What is essential here is the operational level, where digitalization becomes reality. This sphere is directly linked to the strategic reflections of the top management and might change the organizational structures, contribute to product and enterprise development and thus the general performance of SMEs. In this regard, digitalization projects can vary from content, e.g. R&D, product development, process development, but also in financial size as well as the scope of projects. Eventually it is about how much money is invested in what kind of projects.

In general, digitalization projects can be classified in two categories:

¹¹ De Massis et al (2017). Perspective. Innovation with limited Resources: Management Lessons from the German SMEs. In The Authors Journal of Product Innovation Management. Page 6ff.

¹² Global competitiveness report : <https://www.weforum.org/agenda/2018/10/germany-is-the-worlds-most-innovative-economy/> (21.11.2018).

¹³ Ibid

¹⁴ Ibid

¹⁵ De Massis et al (2017). Perspective. Innovation with limited Resources: Management Lessons from the German SMEs. In The Authors Journal of Product Innovation Management. Page 6ff.

¹⁶ Bundesverband mittelständische Wirtschaft Unternehmerverband e.V. (2018): Der Mittelstand als Garant für Wohlstand und Fortschritt: <https://www.bvmw.de/themen/SMEs/zahlen-fakte> (23.11.2018).

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Bottscher (2013): Making a difference. German SMEs and their financing Environment. Deutsche Bank DB Research.

²⁰ Bottscher (2013). P5.

Technological projects	Capability projects
<ul style="list-style-type: none"> > Procurement of new or improved hardware > Programming or introduction of new software > Introduction of IT security concepts or applications > Fundamental change of the website or functions > IT connection between business departments and business processes > New IT-forms, e.g. cloud computing 	<ul style="list-style-type: none"> > IT training for staff, at least one day > Use of IT consulting > Reorganization of workflows to integrate digital workflows > Development of a new marketing or sales concept via Internet

Based on Saam et al

On average, SMEs spend EUR 18,000 on digitalizing their business.²¹ There are also big differences in investments considering the size of SMEs. SMEs with less than five employees spend just under EUR 8,000, whereas SMEs with more than 50 employees invest nearly EUR 150,000. The leading sector is manufacturing, where SMEs invest an average of EU 75,000 in digitalization. To put this into context, data shows that all German SMEs together invested almost EUR 14 billion. This pales by comparison to the EUR 32, 2 billion in innovation and EUR 169 billion in machinery, buildings, equipment or similar items. As a result, the larger enterprises, the more they invest in digitalization and the higher the probability that they become or already are digital pioneers. Due to their size, projects are often more complex and comprise more diverse applications.²² The figures show that SMEs decently invest in digitalization, which correlates with the previously described tendency to self-finance and long term thinking. Traditional and long

term investments in machineries are still dominating.

The majority of digitalization projects conducted by SMEs can be allocated to technological projects. According to the IUBH study, 82.9% invested in new software, 73.3% in the automation of business processes and 61% in new IT hardware.²³ In addition, Saam et al also found that enterprises with more than 50 employees in particular conducted digitalization projects between 2013 and 2015.²⁴ The data also shows that young enterprises, which means no older than 10 years, set different priorities and focus more on digitalization projects. In conclusion, most of the SMEs invest in digitalization projects regardless of their size. The focus clearly lies on new software and new IT hardware related to technological projects and training as well as consultation related to capability projects. A cluster analysis also shows that digital masters invest more in the connectivity of business processes and sectors. In general, these digital masters invest significantly more in both

project areas.²⁵

Bearing in mind that most of the SMEs are family-owned and at the same time owner-led, it is not a big surprise that most of the projects are initiated by the boss. The development of digitalization projects is mostly managed by the top management (IUBH: 87.1%) with involvement of the executive level II (IUBH 76.2%), but low involvement of the executive level III (IUBH 31.7%). In contrast, the executive level II (IUBH 86.1%) and III (IUBH 52.4%) are crucial when it comes to the implementation of digitalization projects and also the staff (IUBH 55.4%) gets much more involved. Additionally, 30.7% hire consult external consultants to develop and conduct digitalization projects. This illustrates that the development, or in other words, the ideation process, is highly dependent on the owners and their willingness, awareness and access to information.

*Strategy entails designing business models (and redesigning them as contingencies occur) to allow the organization to reach its goals.*²⁶

As one main goal of German SMEs is to secure the long term development of its business — as we have seen across generations — it is paramount that the strategy considers the volatility, uncertainty, complexity and ambiguity caused and influenced by digitalization.²⁷ The design of strategies as a consequence channels investment and the development of new dynamics within the company, such as new forms of internal and external cooperation mechanisms, the investment in staff, new technologies and their interaction with customers. Eventually digital transformation starts with fantasy and novel

ideas, which fashion the innovation capacity of the enterprise.²⁸

Nevertheless, at the strategic level, these ambitions also create internal key challenges. This is already one part of the strategy challenge, knowing the potential of new technologies for optimizing business processes. This challenge and three other challenges can be summed up in the POST analogue principle. This framework enables a fast orientation and analytical approach. It takes a look at four dimensions: the personnel, the organization, the strategy development and new technologies. To set up tactics and define actions to overcome the challenges decides how fast the organization can reap the potentials of digitalization.

The POST-Analogue Principle: Challenges for German SMEs

Against this background, it can be said that German SMEs are transforming step by step in a gradual change approach. The opposite would be a radical change or leap frogging. Most of them stem from a pre-digital era with cross generational teams. Hierarchies are flat investments made based on a long term mindset. Digitalization projects are of decent size, in particular in the majority of micro sized enterprises. At the same time there is potential, which can be easier seized when knowing the challenges. That is why four main internal challenges are described next.

²⁸ Müller- Stewens / Lechner 2016, 150ff

²¹ KFW Research: Digitalization in German SMEs: state of implementation and investment. p3.

²² KFW Research. P4.

²³ IUBH. P 20.

²⁴ Saam et al. p40.

²⁵ Ibid.

²⁶ DaSilva, Carlos/ Trkman, Peter (2014): Business model – what it is and what it is not. p384.

²⁷ VUCA concept

Dimension	Internal challenge for SMEs	Potential for SMEs	
		Internal	External
Personnel to go digital	Heterogeneous employee structures with regard to age, education, lack of IT skills	Dynamic capabilities and continual innovation and quality process because of long term commitment, close consultation with staff, integrative change management	external consultancy, e.g. supported by the federal government of Germany
Organization to enable new dynamics	Traditional grown organizations, all and true mentality, silo mentality	Use of flat hierarchies to enable creative and inclusive innovation processes, agile and lean management culture	New cooperation with research institutes, SME associations
Strategy for going digital	Awareness of digitalization benefits, risk averse, investment behavior	New markets, better business models, long term investments through agile management	Consultancy supported by the government, competence centers and platforms
Technique to be more efficient	Traditional grown IT landscapes linked to previous investment	Improved value chains, better customer relations, new markets for niche products, better service	Consultancy supported by the government, competence centers and platforms

Own graphic.

Personnel – Capability Development

Media created the image of Silicon Valley tech enterprises, where young and hip geeks are sitting on bean bags programming the next global breakthrough app. Google, Facebook and Co are attracting employees worldwide, in particular digital natives.²⁹ They have grown up with digital technologies and are equipped with tech skills. But the reality in German SMEs looks quite different. The employee structures are heterogeneous with regard to age and education. As already mentioned above, Germany has unusually high employment stability and is one of the countries with the lowest employee turnover.

This indicates high employee satisfaction and high job identification. Staff is often highly professionalized in what they do. On the one side this has positive effects on innovation potential, but on the other hand more training has to be offered and streamlined to prepare the existing staff for digitalization projects and related change management.

Assuming the environment becomes more volatile, this also demands more flexibility and willingness to learn from the employee side. The data from chapter one showed that German SMEs have excellent employee-employer relations and that there is high commitment. In contrast, Saam et al showed that there is a lack of IT skills of IT staff but also IT skills of normal employees.³⁰ This means, that investment in IT capability projects is

needed. In particular, digital champions can be role models to show that investments pay off. At the same time this is linked to externalities like the education system and thus includes a political sphere. Awareness which leads to action can be supported by external action plans of the federal government and other actors like business associations.

Besides the skills itself, it is also relevant to develop concepts to improve workflows. For instance, several project management tools are available online and the use of generic enterprise resource planning applications can optimize resource allocation and communication. Today they do not only cover material planning and production functions like in the 1980s. They also integrate customer relationship management and extended

supply chain functions.³¹ Consequently, ERPs can cover business modules from manufacturing, human resource, sales to inventory and financing. The information in the systems is coming from trained employees, who adapted to digital communication as a result of digitalization projects. ERPs are executed by all departments and managed cross department wise. Function by function will be added in line with the IT architecture and data management strategy.

In conclusion, personnel are elementary when projects are implemented. The willingness of employees to change is one of the main reasons why change management in enterprise fails. At the same time, they are a major source for project ideas within their

²⁹ Prensky, Marc (2001): Digital Natives, Digital Immigrants. Under : <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf> (23.11.2018), p2.

³⁰ Saam et al, p4.

³¹ Weclapp gmbh (2018) : <https://www.weclapp.com/en/> (23.11.2018).

specific area. In close consultation between management and employers strategies can be designed together based on the existing factual skill sets and technical awareness.

Organizational - Impacts of Digitalization

Three different approaches are emerging when it comes to organizing digitalization:

1. The direct approach: Certain areas of the value chain initiate projects, for example the marketing, production and controlling departments. Here, it is crucial to work across departments and levels.
2. The Start-up within its own enterprise approach: A unit is formed, e.g. in a SME a person is assigned to think free of existing structures about innovative forms. This organizational approach creates an autonomous learning environment that allows mistakes – a sandbox for experiments. However, this approach needs flat hierarchies, a low degree of pro forma and a high degree of expert knowledge.
3. Parallel Business: Another option is to start a new business model besides the existing one from scratch, which needs goal-oriented resources.

In all three cases it is up to management to decide which approach is chosen and the implementation of digitalization projects leads at least for the time of the project to some form of organizational instability. Firstly, project staff is involved, which means that there is a power shift and change in the organization. Secondly, the output of digitalization projects might be that the entire organization has to adapt hierarchies, define new job descriptions and cooperation with partners. For example, a retail company

decides to move from a catalogue business model to an online shop. As a result, neither in-house nor outsource printing is needed. At the same time, online banking tools have to be applied, new information architecture established and staff trained on how to upload products and manage after sale services. But also the marketing would undergo deep changes and use business intelligence and customer relations tools to better address advertising. This would be a radical change from the analogue business model to a new digital business model.

An organizational change like that has to be carefully planned and all aspects of the business have to be rethought. It fits into approach three and the old business models would run simultaneously during the transition phase. Here the correlation with the other three challenges becomes visible. First, the strategic decision is made and investments done in a domain, website design and sophisticated backend. Simultaneously, staff has to be trained and old habits unlearned. And of course, beforehand several pilots and experiments analyzed. In most sectors and in particular for German SMEs, this kind of radical change is rather the exemption. The previous chapters clearly showed that in German SMEs the organizational transformation takes place in line with evolutionary traditions, which means one small project after another in different departments. Nothing is rushed and everything thought through. Most of the SMEs pursue clear goals in line with economic, social, and internal habits.³²

Another potential of using digitalization to reinvent organization structures is to outsource parts of the business, parts like accounting or hardware from the IT department, but also to standardize products and services. Both together enable enterprises

³² Schneck, Ottmar (2014): Encyclopedia of Business Administration. p688.

to easier cooperate more easily and organize themselves in modules. An economy based on ICT builds by comparison to an industrial economy on network effects instead of scale effects³³. For instance, B2B online shops change digital trade and online payment processes³⁴. Due to decreasing transaction costs more and more activities get outsourced. This leads to more connected economies and at the end complex value added ecosystems instead of traditional pipeline models. Cases in point are various online platforms, where products can be sold and services offered. They form one pillar of a digital economy and are based on a triangular structure. Users must first conclude a contract with the platform provider before they can conclude contracts with other users.³⁵ In conclusion, the internal implementation of digitalization projects challenges exiting structures; levels of hierarchy and at the same times enable more efficient value chains by outsourcing and the usage of networks. All in one, the change is one main challenge for staff, partners and management.

Strategy Development Challenges of transforming SMEs

Before projects start and investments are made, a vision has to be defined and new goals set. The strategy is where the digitalization journey starts and defines the direction. New technologies are growing exponentially and prices drop from year to year. For instance, as robot production has increased, the price has halved over the last 30 years and will continue because production has shifted to lower cost regions like China. New B2B products are popping up every year. What was useful last year is no longer useful 18 months later.

³³ Shapiro, Carl/Varian R. Hal (1999): Information Rules: A Strategic Guide to the Network Economy. p173.

³⁴ Mittelstand Digital (2018): p18.

³⁵ European Parliament (2017): Online Platforms: How to adapt regulatory framework to the digital age? Under: www.europarl.europa.eu/studies (23.11.2018).

Most of the SMEs invest in new and improved software and hardware components. Rather less interesting for SMEs is the investment in new IT forms, like cloud computing and big data. Nevertheless, the main reason for SMEs to opt for a digitalization strategy is the opportunity presented by the ability of new technologies.³⁶ Or in other words, mobile apps, robotics, additive manufacturing, wearables and Internet of Things set a seed in the head of managers. The exponential growth and availability of technologies to lower prices is adding to the creativity.³⁷ The application scope ranges from first level applications like websites and ERP functions to connected information and communication application with external service providers.³⁸

This sounds easy in theory, but it assumes that information about technology availability and individual application potential are clear. German SMEs are often highly specialized and focused on niche products. Consequently, new applications must be individualized and adapted to the existing structure. System landscapes and IT architectures have emerged that are tailored to their service delivery. The effects must be clear and in best case explored in a safe environment beforehand. Before the procurement of new technologies, attention has to be drawn to new technologies.³⁹

The opposite is a visionary leader who decides top down and leads by charisma. Furthermore, most of the German SMEs stem from a pre digital era which means that their branding, customer base, employers, finance and existing business model has to be considered in designing new strategies. The potentials of new technologies have to be carefully explored and checked against alternatives before the planning can start. Factors in

³⁶ Mittelstand Digital (2017). p9.

³⁷ Ibid. p31.

³⁸ Saam et al (2016). p16.

³⁹ Westerman et al (2014). p46.

management decision are, implications for enterprise development, product development, process optimization, staff and organization development. The main reasons for project failures are psychological aspects. So management is not just about looking at numbers and deciding what is next. It is also about leadership and clear communication of a vision and well-managed change. The IUBH study shows that unclear communication is one of the main barriers. Another aspect is the target-oriented communication of the need and use of digital projects. This is linked to an avoidance tendency of employees. If staff feels overwhelmed they might develop an attitude of resistance and hinder the success of projects. To avoid this situation, unrealistic planning should be avoided, the top management should support, relate and reframe the narratives of change. The permanent repetition of why we are changing and where the enterprise is going is important to keep staff motivated. The size of SMEs and flat hierarchies in Germany allow close communication and feedback.

Technology – The technology-company match

A best case example for the optimization of work processes is the SME MUNSCH. The company manufactures plastic chemical pumps. In the past, a drawing was made and the machinery was programmed individually. It was a routine task and there had always been minor errors. In cooperation with the Mittelstand 4.0 competence center, they directly interlinked the configuration program with the machine. The CNC programming is now completely automated.⁴⁰ As a result, the intermediate step of programming is avoided because the data flows directly to the machine. Less time and less steps is the consequence. New technologies also change the characteristics of goods and differ from

analogue goods:

*Digital goods is a general phrase used to describe any goods that are stored, delivered and used in its electronic format. Digital goods are shipped electronically to the consumer through email or download from the Internet.*⁴¹

Furthermore, digital goods are based on binary data and can be disseminated, developed and applied via information systems and information and communication technologies. There are three main characteristics which differentiate digital goods from material goods. The first, digital goods cannot be destroyed or are not subject to wear and tear. While a car loses worth over time, the quality of digital goods stays the same. Nevertheless, software, web site templates etc. are subject to market forces and get regularly updated. The second characteristic is that digital goods can be easily changed. A case in point is games as a service which means that computer games get permanently updated and extended. Thirdly, digital goods can be replicated on a low cost basis. This is one reason why companies highly invest in copy protection. The characteristics also offer a new dimension of digital services, like online platforms or cloud computing.

In this regard, new technologies enable new products and services as well as a change of the value creation and general business orientation of SMEs. For instance, the design of furniture can be outsourced to the customer thanks online configurations, which can be used with mobile devices. A carpenter SME in Germany took this step and now the data goes from the prosumer directly to the tablets of workers in the workshop.⁴² All customer and production data are now digitized and the new customers reached through ICTs.

Conclusion

German SMEs are aware of the potential of digitalization and are implementing projects of all sizes. The way they conduct projects is highly linked to general German SME traits, such as being family owned, self-financed, long term thinking. Nothing is rushed and everything is thought through before investment is made. The change follows an evolutionary approach instead of radical top-down changes decided top down. One advantage of German SMEs is the close relation to their staff and other partners. This enables a SME to lead change in line with staff needs and with external expertise. Nevertheless, finding skilled labor with IT skills remains one big challenge. Here SMEs could invest more in staff and make use of competence centers and external expertise. Another challenge is also to rethink business models and reap the potential of value added networks across sectors. We have already seen that ICT trends and new technologies are the main driver of strategic decision making. But that investment remains low by comparison to other investment forms. Nevertheless, the lion share has a digitalization strategy, which will shape the future development of German SMEs.

What does all this mean for Cambodia? Micro-SMEs and SMEs employment represents about 72% of the total workforce in Cambodia, which are 2,571,543 million people with 515,630

of enterprises.⁴³ Here we are talking about legally registered and non-registered MSMEs contributing to the wealth of the society. At the same time most of them lack awareness about the potential of digitalization and the willingness to invest and prepare for the digital economy. Even if we cannot compare the situation of MSMEs in Cambodia to SMEs in Germany, we can transfer the analytical framework, because the better we understand the environment and internal challenges of MSMEs, the better policy-makers, associations and other actors can tailor support programs and establish linkages to start-ups and experts. The approach of this paper was to look into the general peculiarities of SMEs in Germany based on qualitative and quantitative aspects. The same can be done for Cambodia to grasp their way of doing business. Then we build the bridge to the conduct of digitalization projects and the way they are linked to the general peculiarities. Finally, we discussed the four challenge dimensions. The same challenges can also be observed in Cambodia and in other countries. There is a lack of highly needed skills, organizational and strategic innovation willingness and applied technologies. However, further research should be done, looking much closer into the four dimensions to realign the policies and actions.

⁴³ eral Department of SME&H, Ministry of Industry and Handicraft (MIH), 2018

⁴¹ Webopedia: Digital goods: https://www.webopedia.com/TERM/D/digital_goods.html (23.11.2018).

⁴² Mittelstand Digital. p6.

⁴⁰ Mittelstand Digital. p8.

DIGITAL INSIGHTS

China's Techno-Utilitarian Experiments with Artificial Intelligence

Dev Lewis¹

¹ Dev Lewis is a Yenching Scholar at Peking University and a Research Associate at Digital Asia Hub. His research focus is on the intersection between technology, society, and politics, in China and India. He previously held roles at Infosys China, an IT services and consulting MNC, and Gateway House, a foreign policy think tank. He has a degree in International Relations from Roger Williams University, and studied Mandarin at East China Normal University and Zhengzhou University.



Introduction

Any article talking about China's journey with Artificial Intelligence (AI) has to begin with the board game Go. More specifically, the face-off between Lee Sedol, winner of 18 world titles and widely considered to be the greatest player of the past decade, and Google's DeepMind-AI-powered Alpha Go. In a now landmark match, Alpha Go didn't just trounce Lee Sedol 4-1, it displayed uniquely inventive tactical abilities, in a match that was watched by over 200 million people worldwide². Go, a highly strategic game with more than 2,500 years of history in China and the East Asia region, has served as an essential game for intellectuals and thinkers in Chinese bureaucracy for centuries and plays a central role in military and strategic planning in China today. DeepMind's victory over Lee Sedol and then later over Chinese champion Ke Jie captured the minds of people all over the world, especially East Asia. In China it lit the ignition of the Chinese combustion engine that has since stayed in 6th gear, driving an ambition to first catch up to and then surpass all others as the world's leading AI power.

AI development is regularly framed as an arms race, which, although misleading because it ignores the significance of cross-border exchanges of talent and investment, does convey the very real sense of competition between countries to lead in this domain. There is a very real historical geopolitical dimension to this, as the Chinese Communist Party (CCP) believes it has been kept at arm's length by Western countries from

access to the latest technology. Weaning off dependence on Western-built technology is as much a political and security imperative as it is an economic one. For China, AI is seen as a strategic technology that will help it achieve its core national economic, social, political, and military objectives, which will see the country transition to a developed, prosperous economy with the Party at the helm³. This was outlined as such when the State Council of China — the premier policy body — issued the "Next Generation AI Development Plan" in July 2017, which unambiguously called for China to become the number one global source of AI innovation by 2030.

The document notes China's recognition that ever since the first industrial revolution it has consistently played catch-up to the West, particularly the US, lagging behind in patents, talent, and scientific research. In AI, China wants to make the leapfrog to be a trailblazer. In the context of AI this means: breakthroughs in fundamental research, building a commercial ecosystem, cultivating and attracting the best talent, and setting global standards and norms. Prior to this plan, Chinese companies such as Baidu and Alibaba had already placed their bets on AI, while previous government plans had made references to AI.

This State Council plan sought to develop a "whole-of-nation-approach,"⁴ creating an incentive structure for all stakeholders — entrepreneurs, students, scientists, investors, policy makers, and government bodies — to leverage China's strengths, better understand the technology and craft appropriate legal frameworks, grow the talent pool of AI engineers, and develop indigenous innovation

³ "Translation: Chinese Government Outlines AI Ambitions through 2020," New America, accessed 1 September 2018, <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-chinese-government-outlines-ai-ambitions-through-2020/>.

⁴ Kania, Elsa, "China's Artificial Intelligence Revolution," The Diplomat, 27 July 2017, accessed 31 October 2018, <https://thediplomat.com/2017/07/chinas-artificial-intelligence-revolution/>.

that will enable this leapfrog. Fast forward to nearly two years, how big is China's AI industry in commercial terms?

According to the Tsinghua University Technology Policy and Research Institute's China AI Report (《中国人工智能发展报告》) the size of China's AI industry in 2017 is estimated to be RMB 23 billion (Euro 2.9 billion)⁵. But it is very difficult to accurately make such assessments because AI itself is a catch-all term for a number of different technologies and appliances⁶, not to mention the difficulties in accessing data. An illustration of the disparity: the Tsinghua AI report counts 1,011 AI companies in China, while the Beijing Municipal Commission of Economy and Information Technology in its White Paper "Beijing AI Industry Development White Paper" (《北京人工智能产业发展白皮书》) counts 4,000 AI companies, with Beijing alone home to 1,070. It is reasonable to settle on a number closer to the former, as efforts by the China Money Network⁷ and think tank Yiyou⁸ counted 1,122 companies and 922 companies respectively. For context, the number of AI companies globally is estimated to be anywhere between 3,465 to 4,925⁹.

Given these numbers it is not surprising to see that China makes up a significant share of global funding in AI. China received 60% of global investments in AI between 2013

and 2018, according to the Tsinghua report, while a CB Insights report attributes 48% of worldwide AI investments in 2017¹⁰ to China. That a lot of the investment took place in the past two years is reflected in the fact that 81% of the companies are between angel, seed, and Series A rounds, as per the China Money Network report cited above. According to the Tsinghua report the growth in the AI industry is expected to peak at 75% in 2018 and eventually decline to 40% by 2020¹¹. For context: The State Council is aiming for China's "core AI industry" to reach RMB 10 trillion (Euro 1.2 trillion), the amount the sector needs to grow 25 times between 2018 and 2030¹².

Finally, any talk of investment in technology in China has to mention Baidu, Alibaba, and Tencent, collectively referred to as BAT. None of them are strictly AI companies as defined above, but they are key architects driving research and development (R&D) and mergers and acquisitions and are of course, the owners of data. They have collectively invested in over 35 AI companies in China and abroad, including the majority of the well-known AI unicorns mentioned later. Yet, increasingly so, public capital is dominant, most notably through Government Guidance Funds (GGF) (政府引导基金), which will be touched upon in more detail in the next section, and which are responsible for funding 21 out of the top 50 Chinese AI companies¹³.

⁵ 清华大学正式发布《中国人工智能发展报告2018》，Tsinghua University Technology Policy Research Centre, "China AI Development Report 2018," http://www.sohu.com/a/241293549_680938, accessed July 2018.

⁶ According to the 3-year AI implementation plan issued by the National Development and Reform Council (NDRC), AI is: basic research in fields such as deep learning, the development of basic software and hardware such as chips and sensors, and applied research in areas like computer vision and cybersecurity.

⁷ Using the definition "private companies with a core focus on AI technology".

⁸ "Artificial Intelligence Research in China 2018," 亿欧_产业创新服务平台 Iyiou, August 2018, accessed 15 October 2018, <https://www.iyiou.com/intelligence/reportPreviewH5?id=87240&&did=574>.

⁹ "China AI Top 50," China Money Network, 19 September 2018, accessed 15 October 2018, <https://www.chinamoneynetwork.com/china-ai-top-50-2018>.

¹⁰ "AI 100: The Artificial Intelligence Startups Redefining Industries," CB Insights Research, 18 September 2018, accessed 24 September 2018, <https://www.cbinsights.com/research/artificial-intelligence-top-startups/>.

¹¹ 清华大学正式发布《中国人工智能发展报告2018》，Tsinghua University Technology Policy Research Centre, "China AI Development Report 2018," http://www.sohu.com/a/241293549_680938, accessed July 2018.

¹² Ibid.

¹³ Ibid.

² "Innovations of AlphaGo," DeepMind, accessed 31 August 2018, <https://deepmind.com/blog/innovations-alphaGo/>.

What Do We Mean When We Say AI?

Computer Vision, Natural Language Processing, and Voice Recognition are among the most important core machine learning-based technologies that have seen significant breakthroughs in application worldwide and this is the case in China as well. Facial recognition makes up 35% of all AI applications in China¹⁴ and it is in this area that some of China's most well-known, and globally controversial, AI unicorns, such as SenseTime 商湯科技^{15,16}, Megvi Face++¹⁷, and Yitu 依图^{18,19} have emerged. Natural Language Processing (NLP) and Voice Recognition make up 31% and 258% of AI applications in China. Provincial-level and city-level government bodies are also important clients as they too seek to digitise or risk being outshone by a neighbouring district or province in areas ranging from better urban management to improving the quality and access of government services. The most controversial area is, of course, the use of these technologies to bolster security, which is resulting in heightened state surveillance. Examples include Yitu's technology being added to CCTV cameras across Shanghai to

aid law enforcement²⁰; SenseTime, which is now moving towards working more closely with the security apparatus in Xinjiang; and experiments with the use of big data collection and algorithmic policing that may take place within the arches of the Social Credit System, which is seeking to improve people's accountability in the face of the law. This reflects the dual-use edge of these technologies and China is at the forefront of applying AI in its law enforcement apparatus, unobstructed by significant legal obstacles or strong privacy protection concerns at the moment.

The Chinese private sector is responsible for China's technology sector success, especially for developing commercially successful applications around payments and e-commerce. However, the extent of the influence of the State, which can be read interchangeably with the CCP, on the future path of technology is on the rise. A flurry of laws and regulations on domestic Internet governance, coupled with the lofty State ambitions around AI, outlined above, have emboldened the strong nexus between the State and all stakeholders in the industry.

Ecosystem Building with Chinese Characteristics

The Chinese technological ecosystem is distinctive in a number of ways, but the role and influence of the Chinese government arguably sets it apart. It is able to develop and implement visions with the same control as the lead conductor of a complicated orchestra. Lee Kaifu notes in his new book *AI Superpowers: US and China*²¹ that in China the government sets the tone by putting AI at the front and centre of the agenda, which subsequently energises

²⁰ "Yitu Profile," Bloomberg, accessed 15 September 2018, <https://www.bloomberg.com/profiles/companies/1510312D:CH-shanghai-yitu-internet-technology-co-ltd>.

²¹ *AI Superpowers* by Lee Kaifu, Chairman and CEO of Sinovation Ventures

and drives the entire ecosystem, including local governments, entrepreneurs, students, and universities alike.

The Central government has issued a number of plans and strategy documents (See Table 1 for a list of all Central-level plans related to AI that have acted as a call to action for provincial-level governments. At least 15 of China's 31 provinces have issued AI development plans of their own). On the surface, these plans are very much in line with the Chinese tradition of Leninist central planning. Rogier Creemers, an authority on Chinese techno-legal issues, described the Next Generation AI plan as "Santa's list of desiderata and objectives, but with little insight into how these should be achieved other than by throwing money at the problem"²². One clue is the audience it is meant for, i.e., not people sitting in India or Germany, but party and government officials at all levels of the central and provincial governments. Matt Sheehan of Macropolo explains: "The hope is that if local officials cough up a sufficient number of these gifts—factories adopting smart robots, new research centers pursuing natural language processing, autonomous agricultural drone demonstration projects—they will eventually add up to the plan's headline goal: global leadership in AI"²³.

One phenomenon that captures this approach is the government-backed fund of funds known as GGFs first mentioned above. At the end of 2016 there were estimated to be over 1,000 of these funds, set up largely at the provincial and city level, aiming to raise subsidiary funds with an aggregate fundraising total of

²² Creemers, Rogier, "China's Plan to 'Lead' in AI: Purpose, Prospects, and Problems," *New America*, accessed 15 September 2018, <https://www.newamerica.org/cybersecurity-initiative/blog/chinas-plan-lead-ai-purpose-prospects-and-problems/>.

²³ Sheehan, Matthew, "How China's Massive AI Plan Actually Works," *MacroPolo*, 13 February 2018, accessed 15 September 2018, <https://macropolo.org/chinas-massive-ai-plan-actually-works/>.

RMB 5.3 trillion (Euro 671 billion)²⁴. While not aimed exclusively at spurring innovation in technology, a large number of these funds are aimed at areas such as big data, high-tech manufacturing, chipsets, etc²⁵. However, there is very little evidence or any publicly available impact assessments on whether these GGFs are an efficient use of State capital and are able to spur innovation, or whether this public capital is simply crowding out private investors rather than creating an additional effect. China has been attempting to build up a commercially viable indigenous semiconductor industry for many decades, a sector notorious for its extremely high market-entry barriers and high-risk capital investment, and some of the largest GGFs are especially prominent here, such as Guangdong Integrated Circuit Industrial Investment Fund, Shanghai Integrated Circuits Industry Investment Fund (RMB 50 billion/Euro 633 million), and China State-Owned Assets Venture Investment Fund (RMB 200 billion/Euro 2.5 billion), which is an investor in Cambricon, a unicorn chipset manufacturer. Time will tell as to how successful these State-led efforts are at growing the ecosystem and spurring innovation. So far, no GGF has made a successful exit.

In November 2018 the Ministry of Industry and Information Technology (MIIT) announced an open call for applications via a website <http://www.aibest.org.cn> for companies from across the country, with the goal to select a maximum of five companies from 17 distinct technical areas to "break bottlenecks in AI development, set up industry benchmarks, cultivate an innovation development army, and accelerate national AI industry development, and deepen integration with

²⁴ "China's \$798B Government Funds Redraw Investment Landscape, Here Are The Largest Funds You Must Know," *China Money Network*, 31 October 2017, accessed 1 November 2018, <https://www.chinamoneynetwork.com/2017/10/31/chinas-798b-government-funds-redraw-investment-landscape-largest-funds-must-know>.

²⁵ *Ibid.*

the real economy"²⁶. This effectively creates a national team of AI champions, presumably alongside the Baidu, Alibaba, Tencent, iFLYTEK and SenseTime, handpicked by the Ministry of Science and Technology to develop open innovation platforms in four areas²⁷.

Yet, if this top-down approach to building the ecosystem may lean more towards waste rather than innovation and efficiency, or stifle market competition, China's approach towards adopting technology, which Kaifu Lee classifies as techno-utilitarian, may serve to give China a competitive advantage compared to Western countries in developing AI. This is already visible with the speed with which the government has moved to adopt AI in government services as outlined above. This can also be extended to Chinese consumers, who are known to be quick adopters of new technologies, for instance, digital payments or bike sharing, with concerns about privacy a much lower priority. Can this lead to a first mover advantage in AI?

It is illustrative to home in on specific industries or domains. Autonomous driving is a case in point. The first company to go to market may not be the one that is the first to develop the technology but the one that operates in a country that is the first to develop a nation-wide regulatory framework that allows autonomous vehicles to legally drive on the road. An interesting example here is the New Xiongan District being built in Hebei province, 80 miles outside Beijing. Among many novel features, the Chinese government, in partnership with Baidu, builder of Apollo, an open source platform for autonomous vehicles, used by BMW and

Bosch, plans to build a road system designed for autonomous vehicles²⁸. Another important area which requires not just technology but a strong private-public partnership is urban governance. For instance, Alibaba Cloud's City Brain, currently being tested in cities such as Hangzhou and Suzhou, is among the global leading platforms enabling the creation of Smart Cities through the collection of data and realtime insights.²⁹

Ultimately this brings the discussion to the fundamental questions of how societies approach AI and the values it wants to build into the technology, which are informed more by the socio-political DNA of a culture than by the technology itself.

Governance and Privacy: Ideas and Approaches

Discussions about ethics, societal impact, future of work, and governing algorithms are increasingly becoming a part of the global AI discourse. These are difficult futuristic questions with no easy answer and China is not different in this case. And just as in most countries, the Chinese people too are most concerned about job losses and societal risks. At the recently held World AI Conference in Shanghai, President Xi Jinping raised the need to "develop laws, safety, employment, ethics, and governance of AI from all aspects" and noted that this would "require deep cooperation with all countries"³⁰. Jeffrey Ding, a researcher at the Future Humanity Institute in Oxford, notes that, the world needs to shift its attention from whether China is having these discussions to what the substance of the discussions are.

In China, questions about ethics, unlike in most democracies, are not framed around the individual but instead the collective. In an interview with this author, Rogier Creemers explains: "China does not share those concerns [of the West] because its 'OS' [operating software] is not built on the State as the facilitator of the individual good, which lies at the heart of the liberal democratic idea of the State and citizenship....So the question about algorithms in China is very likely not going to be about whether they violate anyone's specific individual rights or not, but rather, whether or not they contribute to the solution of the identified socio-economic problems. This is where the question of fairness might get a look in: not from an identity or class-based perspective, but more from a classically Leninist approach."³¹

China too is looking both inwards and also outwards for values and a philosophical framework to approach AI. Professor He Huaihong, a professor of Chinese philosophy at Peking University, has argued that China needs to rebuild its social ethics based on Confucian values in the face of rapid changes and developments in Chinese society³². Baidu became the first Chinese company to join the Partnership on AI while other companies are increasing their efforts to engage with leading American and European research institutes.

The issue of data protection and the need to balance it with the needs of data-hungry Machine Learning systems is also a fundamental pain point. China has long been a thriving ground for data theft, enabled by lax data protection standards and a population (and government) still unaware

or unable to stem the tide. The Cybersecurity Law (2017), which is now more than a year in implementation, places strict restrictions on the flow of cross-border data as well as sets higher data protection standards, the effect of which is already being seen with violating companies being flagged. China's main standards body also passed the Personal Information Security Specification (not a binding law), said to have been modelled on the European Union's General Data Protection Regulation (GDPR)³³, which raises the bar for Chinese companies to protect their users' data, given over, over rising concerns about misappropriation of personal information by the private sector. The law also seeks to create a framework for managing data with the rise of smart cities and big data systems.

How to balance the need to innovate with the need to protect personal data? A commentary published by the *People's Daily* captured the dilemma as such: "The updating and iteration of technology is an important force pushing forward societal progress, and people should not 'give up eating for fear of choking' because of privacy issues, but the development of artificial intelligence also cannot come at the cost of sacrificing privacy"³⁴.

26 MIIT. 新一代人工智能产业创新重点任务揭榜工作方案 Work plan for key projects for the development of next generation of AI". 11 november, 2018, accessed 27 November 2018, <http://www.miit.gov.cn/n1146295/n1652858/n1653018/c6492065/content.html>

27 SenseTime Becomes the "National Open Innovation Platform for Next-Generation Artificial Intelligence on Intelligent Vision 9 September, 2018, accessed 27 november <https://www.sensetime.com/news/719.html>

28 USA, LLC Baidu, "Baidu and Xiongan New Area Sign Strategic Agreement to Develop Smart City," GlobeNewswire News Room, 20 December 2017, accessed 25 September 2018, <https://globenewswire.com/news-release/2017/12/20/1267217/0/en/Baidu-and-Xiongan-New-Area-Sign-Strategic-Agreement-to-Develop-Smart-City.html>

29 <https://www.alibabacloud.com/et/city>

30 The Paper, "习近平致2018世界人工智能大会的贺信 (Xi Jinping Address at WAIC)," https://m.thepaper.cn/newsDetail_forward_2448320, 20 September.

31 Lewis, Dev, "Dev Lewis," Digital Asia Hub, 14 August 2017, accessed 15 September 2018, <https://www.digitalasiahub.org/2017/08/14/interview-with-dr-rogier-creemers-ai-social-credit-algorithmic-governance-cybersecurity-vpns-cross-border-dataflows/>.

32 Ding, Jeffrey, "How China Seeks to Govern AI – GlobalChallengesFnd – Medium," Medium, 5 September 2018, Accessed September 15, 2018. <https://medium.com/@ChallengesFnd/how-china-seeks-to-govern-ai-baf1c0cd1a54>.

33 "China's Emerging Data Privacy System and GDPR," China's Emerging Data Privacy System and GDPR | Center for Strategic and International Studies, 23 October 2018, accessed 1 November 2018, <https://www.csis.org/analysis/chinas-emerging-data-privacy-system-and-gdpr>.

34 Caiyinghao, 蔡映洁, People's Daily, 27 August 2017, accessed 15 September 2018, <http://opinion.people.com.cn/n1/2017/0823/c1003-29487792.html>

Conclusion

In just a short span of time, China has begun to channel a significant amount of capital to seed the building of a commercial ecosystem and to spur the adoption of AI in several industries, including government services. This has seen China dominate recent global investment in AI as well as contribute to the second-most number of AI companies across the world, with this trend looking to continue into the next few years as a number of Chinese unicorn companies grow and mature. The number of AI patents filed by China is rising fast³⁵, as are academic papers published by Chinese researchers. However, as China's own AI plan, which looks more than a decade to 2030, suggests, the "AI race" is more a marathon than a sprint, with several fundamental issues that will need to be addressed, as much in the realm of politics as in the laboratory.

There are two critical winds of change in international relations. First is the unmistakable convergence between technology and politics. Technology companies and their platforms are impacting elections and national discourses, the scale and real-world impact of cybersecurity attacks continues to rise, and governments are moving to create laws and frameworks to set governance standards that reframe how people use technology. China is a major actor in each one of these areas. This is intertwined with the second critical trend—China's rise as the second largest economy and challenger to the United States-led order. The geopolitical shifts and political decisions made by countries and societies will shape the future technology leadership.

This issue is already flaring up as 5G technology edges closer to commercialisation. Chinese companies Huawei and ZTE have emerged

as leaders in developing the technology; yet, they are facing resistance in many important countries, with Australia recently banning Huawei from participating in the bidding of its national 5G networks, and the US unambiguously urging its allies to do the same³⁶. The opaque relationship Chinese companies have with the State has been a long-standing national security concern for many countries, further amplified an uptick in CCP branches set up within technology companies³⁷, or new laws such as the Cybersecurity Law (2017), which requires Chinese companies to share data and open up source codes under the pretext of national security. At this moment Germany has set up a cybersecurity lab to exclusively review Huawei's source code before it is given the green light to bid in Germany's 5G network infrastructure build-out. The outcome of this process will have a significant say on whether Chinese telecommunication companies are able to build 5G networks in major developed countries. Which leads to the next question: Can Chinese technology companies truly become global giants without truly being global or catering to developed countries?

The domination of Chinese companies is still mostly felt only within China's borders. With the exception of Southeast Asia, Chinese internet companies have a negligible global presence compared to their American counterparts. Many have begun going global, but like their counterparts in energy and infrastructure, are focused on catering to emerging markets. Chinese AI companies will struggle to match American giants like Google, Facebook, and Amazon, without access to data from around the world. This brings the discussion back to China's competitive advantages and innovative capabilities.

Can China make breakthroughs in fundamental research, whether in AI or technologies such as Quantum computing? China is spending large amounts on research and development, including in Quantum computing, but there are few quantitative assessments that suggest that this funding is significantly pushing the innovation needle forward. Despite becoming one of the world's leading filers of patents, both domestically and internationally, evidence suggests that a large percentage of these patents are not leading to commercial use and are not renewed. Research ecosystems and university systems in Western Europe and the US are still the benchmark for research and attract the world's best talents.

All these questions reflect the complexity around assessing AI and indicators of its success. China's size, economic power, and ambition suggest that it has the important characteristics to be a very important power in the AI realm. China may come to lead

in several industries, as it does now for example in mobile payments, but it may not necessarily result in Chinese companies taking this technology to the rest of the world. Any deterministic claims of global dominance are off the mark and still too early, with many future flash points around technology, politics and economics that may affect this. As are claims about the kind of society that China wants to build for itself using AI. The Chinese society is still relatively new to digitisation and has only just begun negotiating its relationship with technology. This will be a product of China's domestic political system and economic realities and therefore unlikely to look like the West. Yet there will be lessons and models from China's approach that will be valuable for ecosystems around the world and it is important that these differences do not prevent an open exchange of ideas and discourses and that China is allowed to play its role in the global decision making on the future of AI.

This Article was first published in "Digital Asia", an edition of "Panorama - Insights into European and Asian Affairs" by KAS Regional Programme Political Dialogue Asia.

³⁵ Huang, Echo, "China Has Shot Far Ahead of the US on Deep-learning Patents," Quartz, 2 March 2018, accessed 25 September 2018, <https://qz.com/1217798/china-has-shot-far-ahead-of-the-us-on-ai-patents/>.

³⁶ Wall Street Journal. Washington asks allies to drop Huawei. Accessed 27 November <https://www.wsj.com/articles/washington-asks-allies-to-drop-huawei-1542965105?tesla=y>

³⁷ Chen Qin Ching, People's Daily. Technology companies strengthen CPC committee role in management, development. 21 November 2018, accessed 27 November, 2018 <http://www.globaltimes.cn/content/1128433.shtml>

Policy	Agency	Content	Year
Make in China 2025	China State Council	Push forward Smart Manufacturing	May 2015
Guiding Opinions concerning Vigorously Moving Forward the "Internet Plus" Plan	China State Council	AI as one of Internet Plus' 10 Key Points	July 2015
Outline of the 13th Five-Year Plan for the National Economic and Social Development of the People's Republic of China	China State Council	Includes AI in the Outline	March 2016
"Internet Plus" and AI: 3 Year Implementation Plan	National Development and Reform Council (NDRC)	Pushing for development of AI applications	May 2016
13th Five-year Plan for Scientific and Technological Innovation	China State Council	Development of AI-based methods driven by big data	July 2016
Government Work Report (2017)	China State Council	AI enters into the government work report for the first time	March 2017
New Generation Artificial Intelligence Development Plan	China State Council	Three-phase plan for China to become the world's leading AI innovation centre by 2030	July 2017
3-Year New Generation Artificial Intelligence Development Implementation Plan	Ministry of Information Industry and Technology (MIIT)	Action plan for integrating AI into the real economy	December 2017

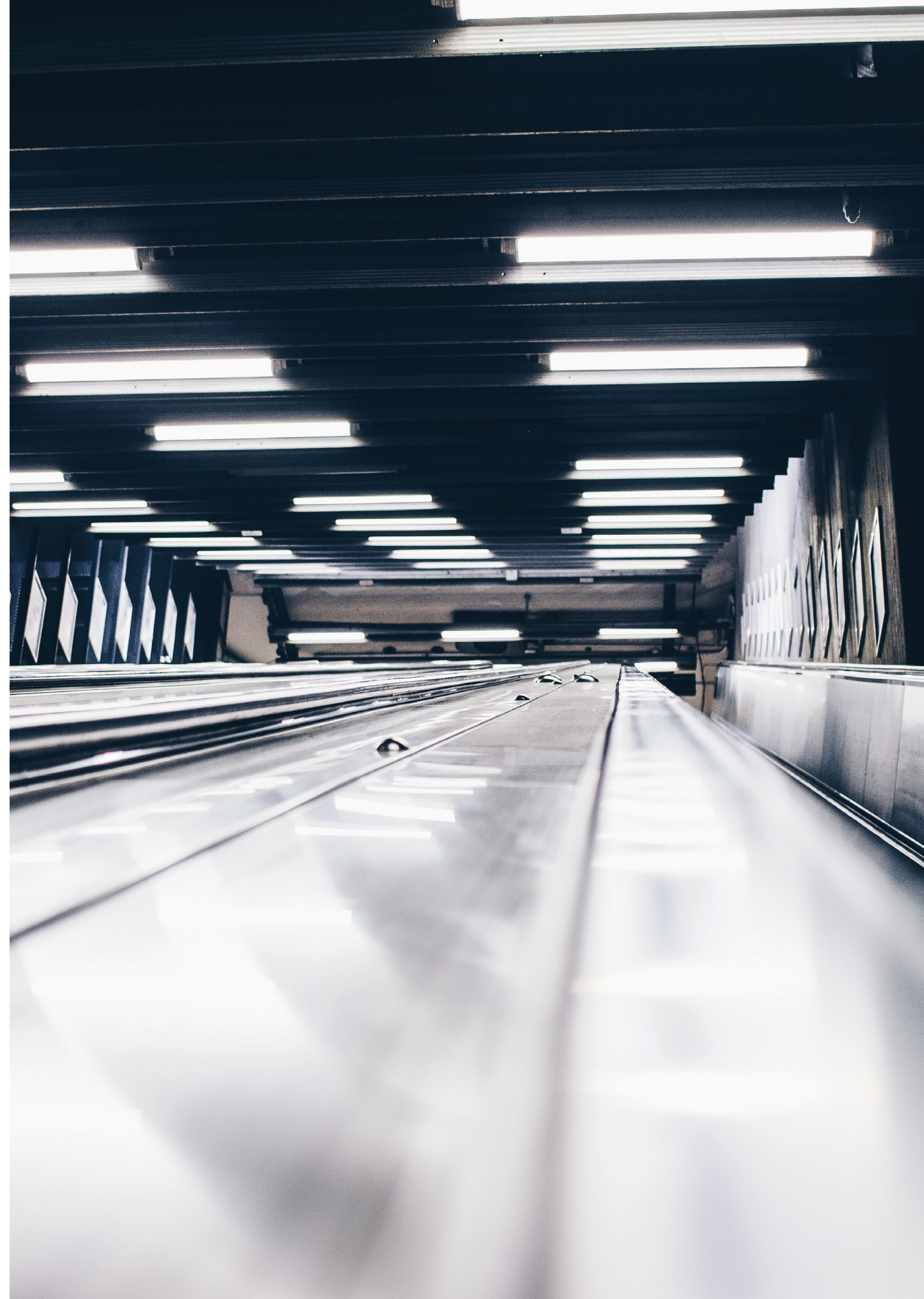
Source: 北京人工智能产业发展白皮书 *Beijing AI Development White Paper*, Beijing Municipal Government, http://www.sohu.com/a/238841203_473283, accessed June 2018.

DIGITAL INSIGHTS

Content Popularity on Social Media Platforms: How Business Models and User Preferences Meet

Dr. Pablo Porten-Cheé¹

¹ Dr. Pablo Porten-Cheé leads a multi-disciplinary research team at the Weizenbaum Institute in Berlin, Germany, that studies emergent citizenship norms under conditions of digitalization and consequential effects on political participation, opinion expression, and user interventions in disrupted online discussions (i.e., hate-speech, incivility, and fake news). These studies base on a multi-methods approach on the individual-level encompassing guided interviews, focus groups, representative panel surveys, and experimental designs. He received his doctoral degree in Communication Science from the Heinrich Heine University Düsseldorf, Germany, with a doctoral dissertation on the factors of online and offline media-stimulated interpersonal communication. Pablo Porten-Cheé has published peer-reviewed journal articles on political media effects under conditions of an expanding online media content and its use (spiral of silence processes, social fragmentation, and the role of popularity cues, as for example, Facebook-Likes). Content popularity on social media platforms: How business models and user preferences meet



Introduction

As spaces where mass and individual communication coalesce, social media are in the very core of communication research's distinctive interests. They call for attention in this field because of their high prevalence in terms of use² and characteristics like the faster and incidental flow of information³ to otherwise inattentive audiences. Consequently, social media may, in this and other ways, even promote political participation⁴.

But although social media are oftentimes discussed as having a pivotal role archetypically presenting both the pros and cons sides of the impact of digitalization on our societies, social media are not public goods, are not a part of the public infrastructure. Social media instead are economic products, often termed as platforms, offered by corporations. These corporations, including *Facebook*, *Twitter*, *Youtube*, follow market logics of how to develop, and how to sell their platforms. Their business models do not rely on subscriptions or fees, but build on placing paid advertisements instead. While this business model is not different to that of the legacy media, as for example television or the press, social media corporations do know more about their audiences than mass media corporations do, to be more precise, they know more about their users on two aspects:

individual usage and content popularity. In this essay, I will argue how the second aspect appeals to the user preferences, that are shaped by receiving standardized popularity cues by the platforms. Finally, I will discuss the political implications of this fit.

User behavior and content popularity

As spaces where mass and individual communication meet, platforms are the new ecosystems where information is produced, received, shared, and debated. Even without using a profile on platforms like Youtube, *user behavior* on the platform is tracked which includes page impressions, length of page visit, mouse position, and all textual inputs in forms of comments or chats. Public debates around the *Cambridge Analytica Data Scandal*⁵ showed that platforms not only collect user data systematically, but also sell these to third parties. Platforms apply their user data to constantly learn about their users and, from an economical stance, predict their consumer behavior based on the items, groups, fan sites they visibly show interest in.

The second layer of user information platforms are interested to collect data on falls under the notion of content popularity. *Content popularity* refers to all kind of user reactions on third-party or user-generated content on platforms, including news items, user posts, or comments. Content popularity relies on aggregated representations of relevance or endorsement of content by the audience in terms what is defined as popularity cues⁶.

Knowledge on content popularity by the platforms is applied straightforward: The more likes, shares, or comments a post, news item, or comment receives, the more prominent this content appears in a newsfeed⁷. This logic of content selection is not arbitrary at all, it follows a *popularity paradigm*⁸. Falling under this perspective, the popularity paradigm implies that popular content attracts more audience than unpopular one and thus, placing advertisements next to popular content can potentially reach and address a wider audience, and even more important, a wider consumer market.

Content popularity and the users

Users could, naively coined, however simply ignore the so called affordances (i.e. liking, sharing, commenting, etc.) offered by the platforms and merely use the platforms to receive content and connect with each other. However, research shows that individuals use exactly these affordances to navigate and communicate with their fellow peers in social media environments. Further, empirical findings indicate that receiving numbers of likes and other popularity cues promote the selection of content shown in the news feeds as well as the time of exposure⁹.

Popularity cues that define the popularity of the content on social media are thus not only part of the infrastructure of social media but also an inherent instrument of their business model that serve to attract users and provoke

user engagement. Popularity cues, further, address a regime that also resonates pretty well with the audiences' needs. Some studies stress that users tend to share more content when seeing their peers (through numbers of shares) doing so¹⁰ possibly because they perceive a sense of influence with their contributions¹¹. Psychological and communication research explains the susceptibility to popularity cues with the varying individual likelihood of elaborating content and the fear of social isolation¹². First, users that are particularly low involved in the topics depicted in the content they receive are assumed to be more prone for cues that allow them to get easier entry points to the content than the content themselves. Such entry points can be such popularity cues that provide a first idea to which degree the content is endorsed or how relevant it is. Second, popularity cues may be mistaken as indicating what many others think or believe¹³, or even what the public opinion on political topics looks like. Especially users who fear to be isolated from society are most likely to be particularly prone to monitor their environment for public opinion cues, as for example via popularity cues. Following this logic, 1000 likes next to an article supporting tax increase for social welfare could be misread as public opinion being supportive for such policy measures. First research backs the

2 Newman, N., Fletcher, R., Kalogeropoulos, A., Levy, D. A. L., & Nielsen, R. K. (2017). *Reuters Institute Digital News Report 2017*.

3 Gil de Zúñiga, H., Weeks, B., & Ardèvol-Abreu, A. (2017). Effects of the News-Finds-Me Perception in Communication: Social Media Use Implications for News Seeking and Learning About Politics. *Journal of Computer-Mediated Communication*, 22(3), 105–123.

4 Ohme, J. (2018). Updating citizenship? The effects of digital media use on citizenship understanding and political participation. *Information, Communication & Society*, 1–26.

5 Rosenberg, M. (2018). How Trump Consultants Exploited the Facebook Data of Millions. *New York Times*. Retrieved from <https://www.nytimes.com/2018/03/17/us/politics/cambridge-analytica-trump-campaign.html>

6 Knobloch-Westerwick, S., Sharma, N., Hansen, D. L., & Alter, S. (2005). Impact of popularity indications on readers' selective exposure to online news. *Journal of Broadcasting and Electronic Media*, 49(3), 296–313. And: Porten-Cheé, P., Haßler, J., Jost, P., Eilders, C., & Maurer, M. (2018). Popularity cues in online Media: Theoretical and methodological perspectives in political communication research. *Studies in Communication and Media*, 7(2), 210–230.

7 Bucher, T. (2012). Want to be on the top? Algorithmic power and the threat of invisibility on Facebook. *New Media & Society*, 14(7), 1164–1180.

8 Webster, J. G., & Ksiazek, T. B. (2012). The dynamics of audience fragmentation: Public attention in an age of digital media. *Journal of Communication*, 62(1), 39–56.

9 Messing, S., & Westwood, S. J. (2014). Selective exposure in the age of Social Media: Endorsements trump partisan source affiliation when selecting news online. *Communication Research*, 41(8), 1042–1063. And: Winter, S., & Krämer, N. C. (2014). A question of credibility - Effects of source cues and recommendations on information selection on news sites and blogs. *Communications*, 39(4), 435–456.

10 Burke, M., Marlow, C., & Lento, T. (2010). Social network activity and social well-being. *Proceedings of the 28th international conference on Human factors in computing systems - CHI '10* (p. 1909). New York, New York, USA: ACM Press.

11 Oeldorf-Hirsch, A., & Sundar, S. S. (2015). Posting, commenting, and tagging: Effects of sharing news stories on Facebook. *Computers in Human Behavior*, 44, 240–249.

12 Noelle-Neumann, E. (1974). The spiral of silence - A theory of public opinion. *Journal of communication*, 24(2), 43–51. And: Petty, R. E., & Cacioppo, J. T. (1986). *Communication and Persuasion. Central and Peripheral Routes to Attitude Change*. New York: Springer.

13 Neubaum, G., & Krämer, N. C. (2017). Monitoring the opinion of the crowd: Psychological mechanisms underlying public opinion perceptions on social media. *Media Psychology*, 20(3), 502–531. Routledge.

idea that popularity cues affect public opinion perception¹⁴, pointing out that the effects on personal opinions are actually even stronger¹⁵.

Conclusion

The constant reception of popularity cues may promote users to develop an idea of social media logics and develop a pressure to conform to these because these logics resonate well with the need to connect¹⁶, which in turn is technologically cultivated by the platforms¹⁷. What this means for public opinion is not clear at this stage and needs theoretical advancement and empirical inquiry. But what we know by now is that the susceptibility, reception, and use of the platforms' affordances by the users most likely reinforce the social media cooperations to further invest in their user data monitoring that already allows to depict how their users may be read and addressed as consumers and *curate* their content reception led by popularity cues that allows to increase their potential reach for paid advertisements.

- 14 Porten-Che , P., & Eilders, C. (2018). The effects of likes on public opinion perception and personal opinion. Manuscript under review.
- 15 Jin, S. V., Phua, J., & Lee, K. M. (2015). Telling stories about breastfeeding through Facebook: The impact of user-generated content (UGC) on pro-breastfeeding attitudes. *Computers in Human Behavior*, 46, 6-17. And: Walther, J. B., Jang, J., & Hanna Edwards, A. A. (2016). Evaluating health advice in a Web 2.0 environment: The impact of multiple user-generated factors on HIV advice perceptions. *Health Communication*.
- 16 Klinger, U., & Svensson, J. (2015). The emergence of network media logic in political communication: A theoretical approach. *New Media & Society*, 17(8), 1241-1257.
- 17 Dijck, J. van. (2013). *The culture of connectivity : a critical history of social media*. Oxford: Oxford University Press.

