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The **International Journal of Innovation in the Digital Economy (IJIDE)** focuses on the classical economic theory in the context of new technology, information, and innovation as the main resources. The main purpose of this journal is to provide the information that people require to understand the digital economy, the innovation process and their implications over the human life. Both quantitative and qualitative research papers are welcomed.

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# Digital Economy in Egypt: The Path to Achieve It

Mohamed Abo Bakr Abd Allah, Misr University for Science and Technology, 6th of October City, Egypt

## ABSTRACT

The evolutionary stages for each state are crucial to foresee its fate. After the 2011 revolution events, Egypt suffered from decline in all economic indicators. Nowadays, people live a new age of comprehensive economic reform. This article focuses on studying digital economy as one of the future economic aspects that helps achieving the sustainable development, and how to apply it in Egypt. It illustrates the global development in the digital economy; the current economic conditions in Egypt; the expected contributions of the digital economy to the Egyptian economy; the government efforts exerted towards building a digital economy; and the main elements supporting it.

## KEYWORDS

Digital Economy, Egyptian Economy, ICT Sector in Egypt, Sustainable Development in Egypt

## INTRODUCTION

The Egyptian economic system depended on the rentier economy for a long time. The government has argued economic policies based on support consumption of people more than the optimal levels for each class, so the consumer should depend on his level of income. Moreover, the government has subsidized foreign importations till the last couple of years in order to earn a political and social advantage. The state ought to focus on increasing productivity and supporting factors of production for domestic producers. When the state focuses on the scaling up of the GDP per capita, the income of an individual will be increased to be able to face the economic fluctuations, without large governmental intervention to support the low and middle-income levels.

Therefore, the state decided to change the previous conditions by economic reform plans in the Presidential era of Al-Sisi that began in 2014. The natural development of economy goes to the best of all aspects that reflect at SNA, so the economic philosophy aims to enhance and develop the economy by social capitalism. The digital economy is considered one of the best economies and a therapy for the weaknesses of the economic system which suffers from distortions in the economic structure. The digital economy is more feasible than traditional economies, and most developing and emerging countries will benefit from it.

The definition of the digital economy is not inclusive; it rather refers to an economy based on engaging the computing, digital technologies, and cyberspace inside the economic structure through digital platforms. Some researchers focused on e-commerce in their definition (Brahima, 2013), but also maybe the digital economy is not confined to an online trade or e-commerce only. Now the technological advancement is going so far ahead, so the digitization of the economic system is the effect of progress. As the Egyptian government has been applying for the economic reform program since 2015, the government has directed more focus on the infrastructure of ICT to suffice Egypt with the requirements of the digital economy. The government seeks to establish an integrated database

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for the Egyptian population to facilitate a lot of other economic issues. The digital economy depends more on Information and Communication Technologies (ICT) as well as industry advancement (Zimmermann, 2000). Egypt has digital activities like:

- E-commerce, (Souq.com, Jumia, etc.)
- Online banking
- Money transfer service by cellular phones
- Mobile taxi services, like Uber and Careem

These digital activities depend on online service request as the only digital part; however, the cash and plastic money are still dominating the payment methods. Actually, these activities are not sufficient to achieve the digital economy; and as Egypt is in the preparation stage for establishing the digital economy to achieve sustainable development, the government ought to catch up with the world digital advancement to achieve the required goal.

**THE DIGITAL ECONOMY ALL OVER THE WORLD****The ICT Infrastructure Worldwide***The Advancement of the Digital Economy is Linked Directly to Four Elements*

The development in Cyberspace. The global internet usage, one of the cyberspace divisions, is an important medium of exchanging the contents.

The development of software applications which facilitate and provide solutions to challenges, depending on the ICT sector.

The advancement in the hardware or the technological devices, such as:

- The computers or any other devices that include a computer
- Mobile phones
- Any device connected to the internet

The digital activities, such as:

1. E-commerce
2. Online banking
3. Any other activities using ICT to provide services or produce products

*The Development in Cyberspace*

Internet users have been in continuous increase over the last 10years and the growth rate of the available services is getting higher (see Table 1, 2).

*The Software's Applications Development*

The programmers have expanded to create many types of applications, so the software programmers increased their revenues to \$157.6 billion dollars in 2017 and they succeeded to increase the percentage of all global web pages served to mobile phones from 0.7% in 2009 to 50.3% in 2017(see Table 3).

*The Hardware and Technological Devices Development*

66% of the global population uses the mobile phone, 34% uses the social media and 22% uses e-commerce. These consumers spend 2 trillion USD and the average annual e-commerce revenue per user has reached 1189 USD in 2016 (Kemp, 2017). That means the big leap in the availability of

**Table 1. World internet usage and population statistics**

Year	No. of internet users (Million)	Individuals using the Internet (% of the population) 1
2005	1024	15.788%
2006	1147	17.581%
2007	1367	20.513%
2008	1547	23.067%
2009	1729	25.487%
2010	1991	28.854%
2011	2184	31.276%
2012	2424	34.341%
2013	2631	36.885%
2014	2880	39.939%
2015	3150	43.198%
2016	3385	45.91%
2017	3578	NA

Source: (Statista, 2017) 1.World Bank

**Table 2. World internet usage and population statistics on June 30, 2017**

World Regions	Population (2017 Est.)	Population % of World	Internet Users 30 June 2017	Penetration Rate (% Pop.)	Growth 2000-2017	Internet Users %
Africa	1,246,504,865	16.6%	388,376,491	31.2%	8,503.1%	10.0%
Asia	4,148,177,672	55.2%	1,938,075,631	46.7%	1,595.5%	49.7%
Europe	822,710,362	10.9%	659,634,487	80.2%	527.6%	17.0%
Latin America / Caribbean	647,604,645	8.6%	404,269,163	62.4%	2,137.4%	10.4%
Middle East	250,327,574	3.3%	146,972,123	58.7%	4,374.3%	3.8%
North America	363,224,006	4.8%	320,059,368	88.1%	196.1%	8.2%
Oceania / Australia	40,479,846	0.5%	28,180,356	69.6%	269.8%	0.7%
Total World	7,519,028,970	100.0%	3,885,567,619	51.7%	976.4%	100.0%

Source: (Internet world stats, 2018)

computers and smart devices and hence the capability to reach them. Therefore, the digital economy has absolutely grown up; by the year 2015, it has provided 204300 businesses, 118 billion GBP economic value and 1.3m employment (The Economist staff, 2016). Nowadays, people connect with information and with each other in any place, and with the world as a whole through the newest technologies that enable people to skip difficult problems. The big data and cloud computing assist us in sophisticated and complex decision making (Espinel, 2016). The mobile phones are also considered as one of the essential elements to build the digital economy as well as the mobile ecosystem and ratios in the global economy (see Table 4). For getting information about the kind of people who are using mobile and the type of service they get (see Table 5).

Table 3. Software's applications developments status

Year	Percentage of all global web pages served to mobile phones	Global enterprise application software revenue (Billion USD)
2009	0.7%	NA
2010	2.9%	NA
2011	6.1%	NA
2012	10.7%	NA
2013	16.2%	NA
2014	27.1%	115.1
2015	35.1%	120.4
2016	43.6%	149.9
2017	50.3%	157.6
2019*	NA	201

Source: (Statista, 2017) \*Forecasting

Table 4. The mobile phones contribution in the global GDP

Years	1) The mobile ecosystem alone generated of global GDP	2) Mobile industry contribution to global GDP	3) Employment (Direct jobs supported by mobile ecosystem)	Taxation *	Mobile operator revenues 2
2015	4.2%	\$3.1tn USD	17m jobs	\$430bn USD	\$1.1tn USD
2020	4.6%	\$3.7tn USD	20m jobs	\$513bn USD	\$1.2tn USD

Sources: (GSM Association, 2016-2017) \*Author's calculations.

Table 5. The penetration of mobile internet and smartphones

Year	Delivering digital inclusion to the still unconnected populations (Mobile internet penetration)	Delivering innovative new services and apps	Total consumer surplus generated by mobile technology (\$trillions)	Accelerating moves to smartphones
2015	44%	M2M connections	\$6.4tn USD 4 (4G) 12%, (3G) 51%, (2G) 47% and (1G) -11%	2.6bn smartphone
2020	60%	1bn connections	NA	5.8bn smartphone

Sources: (GSM Association, 2016-2017)

### The Digital Activities

Numbers show the prototype of consumption whether (iOS apple) app users or (Android) app users. There are many categories providing the economic activities rather than others like Finance, Business, Libraries & Demo, Art & Design, Education, Shopping and others (see Table 6).



Table 6. The consumers of the most popular mobile phones software applications until September 2017

Category of app	The ratio of (Android) app users	The ratio of Apple (iOS) app users
Tools	99.8%	NA
Communications	99.4%	NA
Video players & Edit	96.7%	85.65%
Travel & local	95.8%	28.12%
Social networking	95.2%	87.85%
Productivity	92%	46.08%
Music & Audio	88.1%	56.8%
Entertainment	84.5%	57.93%
Games	NA	81.64%
News & Magazines	81.2%	43.96%+
Books & Reference	70.8%	52.36%+
Lifestyle	65.9%	26.95%
Photography	61.4%	0.66%
Personalization	60%	NA
Business	43.4%	25%
Shopping	35.9%	20.92%
Weather	32.5%	7.57%
Sports	30.9%	12.72%
Education	27.5%	16.34%
Finance	24.9%	9.36%
Health & Fitness	23.3%	15.98%
Media & video	20.5%	NA
Maps & Navigation	17.9%	18.31%
Food & Drink	6.4%	9.85%
Medical	5.9%	2.64%
Comics	5.9%	NA
Music	6.4%	NA
Libraries & Demo+	5.3%	NA
Art & Design	3.8%	NA
House & home	3.5%	NA
Beauty	2.5%	NA
Auto & vehicles	2.2%	NA
Events	1.5%	NA
Dating	1.4%	NA
Transportation	1.2%	NA
Parenting	1.1%	NA

Source: statista, + Author calculations / NA: Not Available for this part according to source

### *The Best Countries Applying the Digital Economy*

These countries try hard to build a strong economy through the efficient use of information technology. I noted the top countries (see Table 7) which are also considered the top countries in Education too, approximately (Martin, 2017). Singapore tops at Table 8 and the latest OECD PISA global education survey (Organization for Economic Co-operation and Development, 2017 a). Indeed, the relationship between technological advancement and quality of education is a positive conditional relationship and therefore these countries top at digital evolution score.

### **The Currency of the Digital Economy**

The currency undergoes endless changes over time. The physical or tangible currency is in the process of vanishing from existence forever. In the digital economy, individuals use digital or virtual currency. The digital currency is divided into several aspects; first, the E-money like PayPal; second, the Cryptocurrencies, for instance, Bitcoin (BTC), Ethereum, Litecoin, Ripple, etc. (Coin market cap, 2018) that is used in the crypto trading.

What is the digital or virtual currency? It is a kind of electronic money or digital currency and digital presentation of value generated by designers and developers. The individuals can use it in digital trade, and also it is a tool of exchange and a unit of account and store of value. In reality, there are normally international differences between concepts (F. A. T., 2014); in this case, the differences are many due to the new concepts in the economic systems. Thus, the IMF has differentiated between any concepts (He, Habermeier, Leckow, Haksar, Almeida, Kashima, ... Yepes, 2016).

The digital currencies are out of the control of any central bank all over the world. These currencies move from one to another without intermediaries by the code. An individual sends the money to the receiving part of any transaction, and the wallet payment is the only place to save it. This wallet is located in any digital device like Google Wallet. The short age of BTC is a cause of BTC volatility (Bitcoin, 2018).

However, BTC is more famous than others. The visible changes between it and USD are considered as the economic phenomenon (see Figure 1).

### **The Payment Methods & Financial Technology Fintech**

The payment methods are developing rapidly inside the banking sector. This development involves banknote, plastic money, online banking. These technologies need the operator or customer to enter the data to benefit from the service. Near Field Communication (NFC) technology is the latest automatic technology in payment methods without human interaction, NFC allows customers to perform contactless transactions through a simple and safe two-way interaction process with electronic NFC compatible devices and customer's device to finish transactions. The customer's device sends information to NFC compatible devices like account number at the bank and the consumer's ID. According to (The Near Field Communication (NFC)-Forum, 2018)

“NFC technology enables simple and safe two-way interactions between electronic devices, allowing consumers to perform contactless transactions, access digital content, and connect electronic devices with a single touch. NFC complements many popular consumer-level wireless technologies, by utilizing the key elements in existing standards for contactless card technology (ISO/IEC 14443 A&B and JIS-X 6319-4). NFC can be compatible with existing contactless card infrastructure and it enables a consumer to utilize one device across different systems”.

The governments seek to limit the cash payment spreading to avoid cash risks; therefore, the countries want to convert into cashless societies through many ways as plastic money and digital currency with new payment methods.

**Table 7. The top ten countries harnessing information technology**

Networked readiness index 2016	Global rank
Singapore	1
Finland	2
Sweden	3
Norway	4
The United States	5
The Netherlands	6
Switzerland	7
The United Kingdom	8
Luxembourg	9
Japan	10

Source: Espinel, V. A. (2016), This article is part of the Annual Meeting of the Global Future Councils -World Economic Forum, 10Nov 2016, Retrieved March 7, 2018, from <https://www.weforum.org/agenda/2016/11/the-digital-economy-what-is-it-and-how-will-it-transform-our-lives/>

**Table 8. The top fifteen countries of digital evolution Index 2017 score**

COUNTRY	RANK	SCORE
Norway	1	3.79
Sweden	2	3.79
Switzerland	3	3.74
Denmark	4	3.72
Finland	5	3.72
Singapore	6	3.69
South Korea	7	3.68
UK	8	3.67
Hong Kong*	9	3.66
USA	10	3.61
Australia	11	3.55
Canada	12	3.55
The Netherlands	13	3.55
New Zealand	14	3.54
Japan	15	3.52

Source: Chakravorti, B. and Chaturvedi, R. S., DIGITAL PLANET 2017, The Fletcher School, Tufts University, July 2017, p.21., Retrieved March 7, 2018, from [https://sites.tufts.edu/digitalplanet/files/2017/05/Digital\\_Planet\\_2017\\_FINAL.pdf](https://sites.tufts.edu/digitalplanet/files/2017/05/Digital_Planet_2017_FINAL.pdf)

## The Internationally Successful Countries in Digital Transformation

### *The Swedish Experiment as an Advanced Economy*

The Swedish economy is considered to be one of the best successful examples in the digitalization of economic systems, and is also ranked as the highest living standard among other states (Organization for Economic Co-operation and Development, 2017 b). Sweden has an incredible CIT sector with

**Figure 1. BTC to USD Source: Trading view, Retrieved March 23, 2018, from the World Wide Web: <https://www.tradingview.com/x/LWe919pK/>**



advanced technological infrastructure. Sweden occupies the 3rd rank at The Digital Economy and Society Index (DESI) 2017 ranking (European Commission, 2017), and the 2nd with the same score as Norway, which ranks the 1st, at The Digital Evolution Index 2017 score (Chakravorti, Chaturvedi, & Troein, 2017). Moreover, Sweden is counted to be the 1st country globally that owns national digital currency (e-Krona) (Svriges Riksbank, 2017). Sweden's Central Bank (RIKS BANK) has begun the currency changing process by Kolla pengarna rather than banknote (Sweden's central bank, 2018), and RIKS BANK also canceled on 31 Aug 2017 the 1, 2 and 5-krona coins, the 20, 50, 100, 500 and 1,000 krona banknotes which will be invalid on 30 June 2018 (Sweden's central bank, 2018).

The Swedish experiment, therefore, can be followed as a guide and thus contribute to help the developing countries face their problems concerning the economic systems.

### *The Kenyan Experiment as an Emerging Economy*

Kenya has an advanced ICT sector ranking the 52nd in The Digital Evolution Index 2017 score (Chakravorti, & Chaturvedi, 2017). The digital financial inclusion that started in 2007 till now has progressed notably. Data prove that there have been 43,329,434 internet users by penetration rate 89.4% in the year 2017 (Communications Authority of Kenya [CA], 2017), and 41 million mobile users by penetration rate 90.4% in September 2017. The Kenyan market depends on the M-PESA in payment money methods instead of cash method. In March 2007, there were 307 agents and 0.020992 million mobile money accounts (Central Bank of Kenya, 2018). Then these numbers increased in November 2017 to reach 176986 agents and 36.3906 million mobile money accounts with change over 360% from 2007 to 2017 (CA, 2017).

## **THE CURRENT SITUATION IN EGYPT**

### **The Development of Macroeconomics**

The economic conditions are enhanced through an economic reform program that has begun in 2015 and received later the parliament approval in 2016. The program included financial reforms like left subsidies over the state budget. While the government is establishing a comprehensive social safety net after changing it to being as financial aid, IMF loan helped this program. According to Sustainable Development Strategy: Egypt 2030 Vision (Ministry of Planning and Follow-up and Administrative Reform, 2016), the Egyptian state peruses the top 30 economic systems globally in 2030. The government seeks to reach 2010 economic indicators before the 2011 revolution first, and then kickoff to run out the targets of Egypt Vision 2030 (See Table 9, Figure 2, 3, 4).

It was possible for the Egyptian economic situation before the 2011 revolution to be better than that. The national production was not local totally, because of the foreign components that have been included in the production process. Therefore, the domestic exportation wasn't purely national.

### **The Egyptian ICT Sector**

The ICT sector has grown; the technological progress has nearly reached everyone everywhere. To know some indicators about Egyptian consumers at ICT market (see Table 10, 11).

These indicators refer to the fact that consumers have a high tendency to use the technology services, so the telecom companies have begun to increase their investments more inside the ICT sector. The cultural aspect has played a role in increasing the consumption of anything new and facilitating more accessibility among people. The competitive advantages in the Egyptian market are many and encourage investors to enhance the quality of services. We can observe the investment flows in the ICT sector (see Table 12).

Thus, the ICT contributed by a good ratio to socioeconomics. Therefore, Ministry of Communication and Information Technology (MCIT) has argued many strategies that focused on the digital government that includes ICT for Education, ICT for Health, ICT for Government e-Content, Legislative Services and Green ICT (Ministry of Communication and Information Technology, 2018).

### **The Main Challenges to Accomplish MCIT's Plan**

Finishing advanced technological infrastructure that consists of establishing new tech-zones, strengthening each 1- the internet services in general, 2- mobile network coverage and 3- e-government services.

The human aspect that is operating the digital government, that is divided into many points:

1. The public employees with so rigid mentalities.
2. The weak performance in HR department functions.
3. Lack of contact between subordinates and their managers, to inform and understand the reasons behind the subordinates' actions.
4. Lack of technological expertise in the administrative system of the state.
5. The unemployment that will generate because of mechanizing jobs in the government.
6. Lack of collaboration, coordination and teamwork spirit among ministries. In spite of the efforts of the Ministry of ICT to join and link all governmental entities together, the process needs more acceleration.
7. Finishing integrated databases: the government has adopted the National Integrated Information System Project that is expected to end within 2018 and 2019 (Koigi, 2017).
8. The government needs to own an efficient Big Data system quickly.

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**Table 9. Main indicators of the performance of Egyptian economic sectors**

During	2017	2018
No. of population 3	96123849	96 592902
Population (% Growth Rate) 1	1.95	1.87
Real Sector:4	July/March 2016/17	In July/ Sept. 2017/2018
Real GDP (% Growth Rate) FY	3.8	5.2
GDP L.E	July/March 2016/17 1486.2 bn	NA
Life expectancy at birth, total (years)	71.66	NA
Unemployment rate %	11.98%	NA
Total Labor Force of Population	32231782	NA
Labor force, female (% of total labor force)	23.188%	NA
Gross savings (% of GDP)	NA	48.7
Financial Account (US\$ mn) FY	29147.5	NA
External sector: FY	16/17 4	17/18 1st Q 4
Trade Balance/GDP (%)FY	-15.1%	-4.0
Net FDI in Egypt (%GDP) FY	3.4%	NA
Service Balance/GDP (%)FY	NA	NA
Net transfers/GDP (%)FY	NA	NA
Current account balance (% of GDP)	-6.6%	-0.7
External debt: FY	16/17 4	17/18 1st Q 4
Total External Debt (bn USD)	79032.8	80831.9
External debt /GDP %	33.6%	36.2%
Short-term external debt/Total external debt	15.530%	14.9%
External debt service/Exports of goods and services (%)	18.8%	15.7%
Budget sector: FY	16/17	NA
Revenues/GDP (%)	Jul/Mar 12.3%	NA
Expenditure/GDP (%)	Jul/Mar 20.4%	NA
Total wages/Total public revenues (%)	Jul/Mar 43.43%	NA
Overall deficit (Surplus) /GDP (%)	8.0%	NA

Source: 1. World Bank. 2. (Central Bank of Egypt, 2009:2018) 3. (Central Agency for Public Mobilization and Statistics, 2017-2018) Note all numbers according to the current value for each year. NA: Not Available FY: Fiscal Year

9. The government should provide an open climate to start-up companies, by simplifying initial steps to establish their companies.
10. Business sophistication. The government should be supportive and encourage entrepreneurs and small companies to scale up and upgrade their companies by providing business incubators.
11. Cybersecurity is one of the most influential elements in the digital economy, to protect the government's systems.
12. The parliament and the government ought to work together to develop legislation to adapt to the new technologies.

Figure 2. Inflation in Egypt. Source: (Central Bank of Egypt, 2016, 2018)

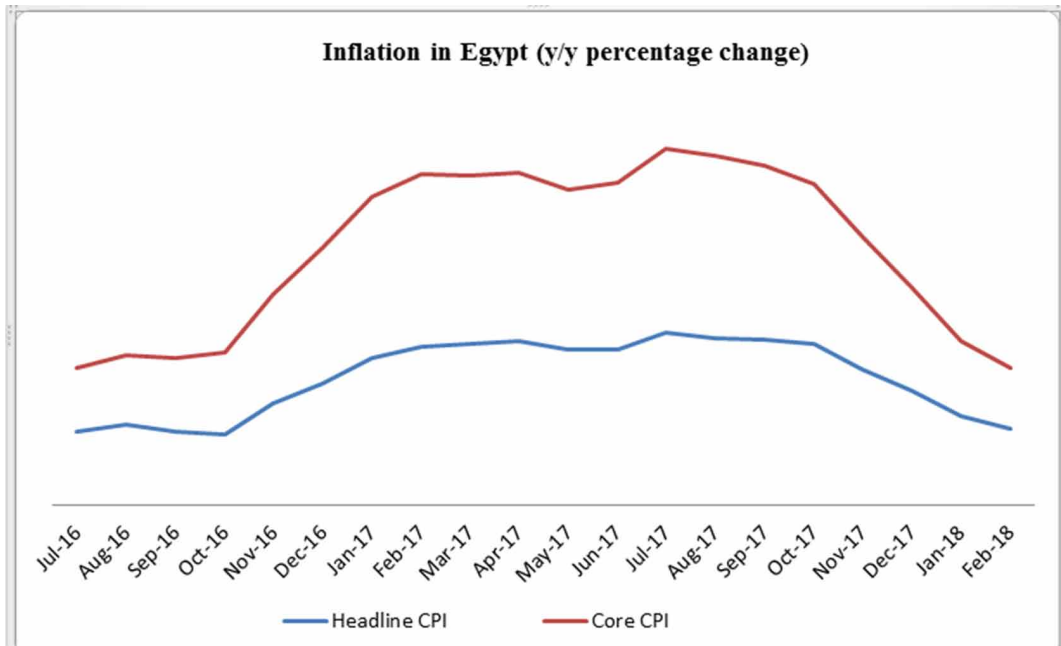
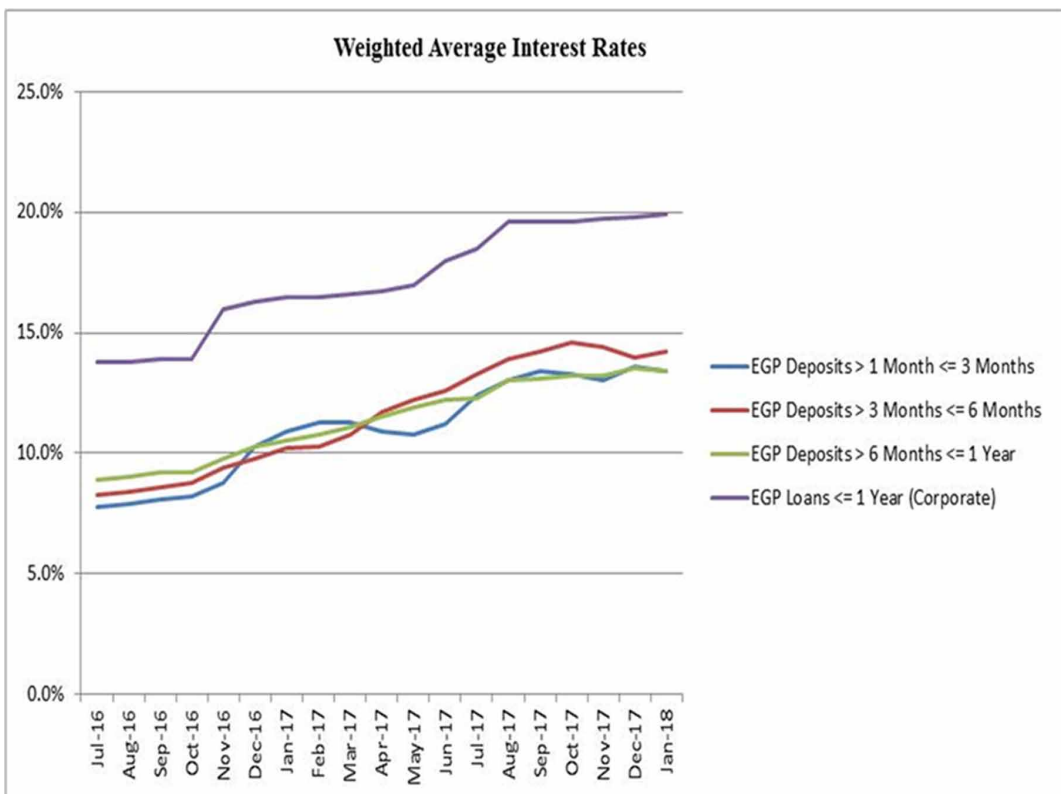
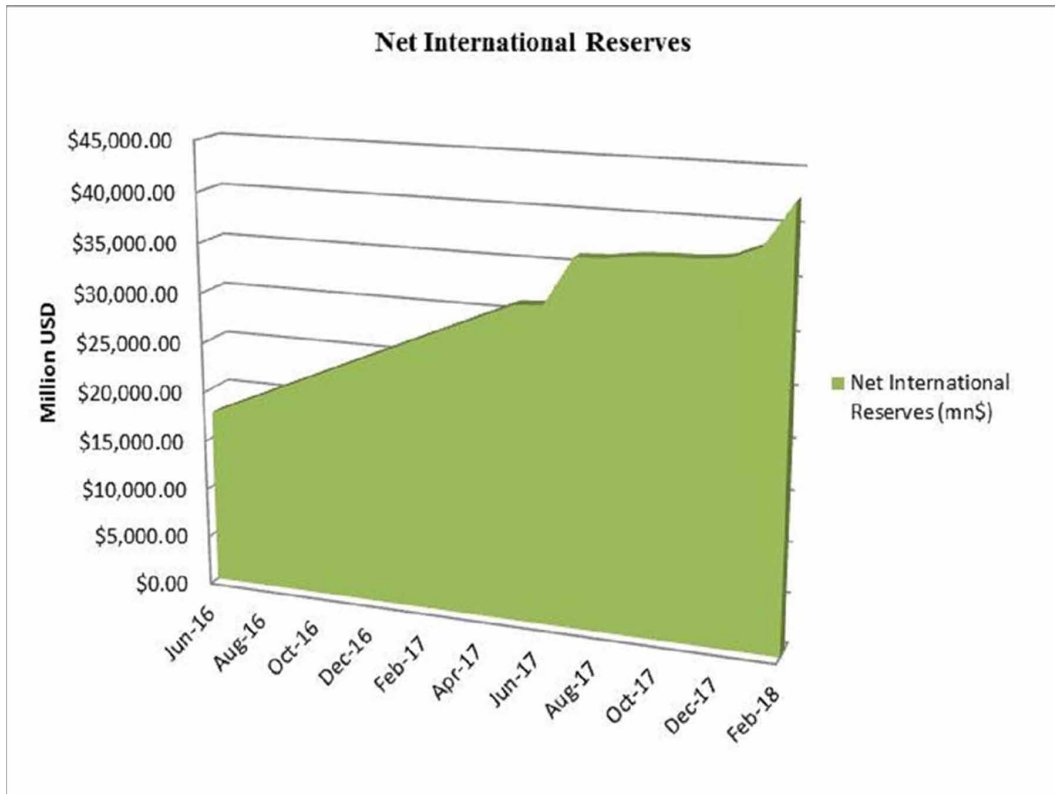


Figure 3. Weighted average interest rates. Source: (Central Bank of Egypt, 2016, 2018)



**Figure 4. Net international reserves. Source: (Central Bank of Egypt, 2016, 2018)**



The second element of digital citizenship: Internet Safety, ICT 4 Community Integration, and Social Responsibility & Community Services (Ministry of Communication and Information Technology, 2018). The obstacles facing the government are as follows:

1. Cultural and educational element for the people with the high rate of technological illiteracy.
2. The economic aspect.

**Table 10. The macroeconomic development plan**

Index	Egypt vision 2030 targets
Total Budget Deficit / GDP	2.28%
Public debt / GDP (Domestic +external)	75%
The real economic growth rate	12%
Population growth rate	NA
Unemployment rate	5%
Balance of payment (\$USD billion)	+1% of GDP
CPI Inflation rate	3:5%

Source: (Minister of Planning and Administrative Reform and Follow-up, 2015)



Table 11. The ICT penetration in Egypt

During	2011	March 2017	The monthly growth rate in March 2017	The annual growth rate in March 2017
Mobile subscription	83.43 million	99.91million	1.05%	4.89%
Mobile Penetration	102.76% of Pop. total	111.61% of Pop. total	1%	3.28%
USB Modem subscription	2.68 million	3.30 million	-0.71%	-6.20%
Mobile Internet subscription	10.49 million	30.45 million	20.19%	17.65%
Internet Penetration users	25.6% of Pop. total	37.8% of Pop. total	NA	NA
Internet Users	17.49 million	29.84 million	NA	NA
Fixed Lines Subscriptions	8.71 million	6.22 million	NA	NA
ADSL Subscription	NA	4.49 million	2.60%	12.08%
The proportion of Mobile Internet Users of Total Mobile Subscription	NA	30.84%	4.85%	3.31%

Sources: (Ministry of communications and information technology, 2017)

- Lack of contact among the government and people. There are not enough places to accommodate all, and the government representatives are not enough to explain for people. As considering rural areas, Ads is infeasible and enough.

Egypt occupies the 54th rank at digital evolution Index 2017 score (Chakravorti, Chaturvedi, & Troein, 2017), the 93th rank at Knowledge & Technology Outputs Index, the 97th at Creative Outputs Index, the 120th Business Sophistication Index, the 107th at Market sophistication Index and the 120th at Regulatory Environment Index. All these indications are sub-index Global Innovation Index (Dutta, Reynoso, Garanasvili, Saxena, Lanvin, Wunsch-Vincent, ... Guadagno, 2018).

The Egyptian state has put a long-term plan in ICT and all sectors related it, to get the tremendous improvement in the ICT sector (see Table 13). The Egyptian ICT sector is developing continuously, and all elements of the digital economy are competent to the vision of Egypt 2030 (see Table 14).

Table 12. ICT contribution to the economy

During	2011/2012 1	2016/2017
ICT GDP at Fixed Prices	42.5 billion EGP	15.75 billion EGP at 4th Q 2016 1
Annual Growth Rate of ICT GDP	2.5%	11.5% at first 9 months at 2016/2017 2
ICT Sector's Contribution to GDP	5.1%	2.3% at 4th Q 2016 1
The contribution of the ICT sector to the treasury	13.1 billion EGP in 2011	1.1 billion USD & 10 billion EGP 2
The contribution of the ICT sector to Real Growth Rates	NA	12.4% at the fiscal year 2015-2016 2

Sources: 1. (Ministry of communications and information technology Egypt, 2011:2017) 2. (Central Bank of Egypt, 2016) Note Author's calculation of information and communication sectors ratios together

**Table 13. The ICT sector contribution of GDP**

During (FY)	2011/12	2012/13	2013/14	2014/15	2015/16	July / Sept. 2016/17
Communications						
Growth Rate (%)*	5.2	4.9	5.6	5.7	8.4	9.9
The contribution of GDP (Million LE)	38670.1	40582.2	42859.8	48886.0	52890.3	14567.0
Information						
Growth Rate (%)*	4.1	3.4	3.7	3.7	4	17.1
The contribution of GDP (Million LE)	3052.0	3154.7	3271.4	7298.0	5950.9	2654.3

Source: (Central Bank of Egypt, 2010:2018) \* the growth rates according to GDP at factor cost.

## Providing Governmental Services Through the Internet

The government provides different online services for citizens or foreigners, for instance:

1. The official papers related to the identification and personal status issued by Civil Status Organization in (Ministry of Interior-Civil Status Organization, 2018), receiving the visa e-Visa whether tourism or regular visit, and extra services for tourists (Ministry of Interior, 2018).
2. The Investment regulations: An investor can establish his business at the Investor Service Center

Ministry of Investment & International Cooperation (Ministry of Investment and International Cooperation, 2018), and the investment map to provide the investor with all the information about the available opportunities (Ministry of Investment and International Cooperation, 2018). There is also a more specialized one for industrial activities through the industrial investment map by Ministry of Trade & Industry (Ministry of Trade & Industry, 2018).

## THE FINANCIAL INCLUSION

### Cash Problem in Egypt

The people's cash mentality is still existing. Many examples demonstrate that, for instance, when Egypt sold (the Suez Canal investment certificates), half of the funds 64 Billion EGP was coming from outside (Tasch, 2015). When CBE raised the interest rate, NBE and Banque Misr were entering a tremendous number. The Egyptian state kicked off some new policies and decisions such as the establishment of a national council of payment<sup>1</sup>. This council is responsible for:

- Reducing the usage of cash outside the banking system.
- Developing a national payment system.
- Seeking to expand financial inclusion and engage the greatest number of individuals and the informal sector in the banking system, decreasing the cost of funds transferring and rising tax revenues.
- Protecting users' rights to the systems and services of payment.
- Achieving a competitive payment service market, organizing and observing existing work entities.

Table 14. Egypt's status globally 2017:2030

During	2017 1	2020 goals	2030 goals
Global innovation index (rank)	105	85	60
Information & communication technologies (ICTs).	91	50	30
General infrastructure	100	100	60
Innovation efficiency ratio	0.6	0.85	1
High-technology exports as percentage of Egyptian Manufactured exports (%)	0.5%	3%	6%
Intangible assets	103	80	60
Investment	121	100	60
Legislative environment	92	100	60
Online creativity	97	60	30
Business environment	90	90	60
Credit facilities	111	100	60
Research & development (R&D)	54	40	30
Education	58	50	30
Tertiary education	103	90	60

Sources: (Minister of Planning and Administrative Reform and Follow-u, 2016). 1.(The Global innovation index, 2017)

It is a good move to eliminate cash society, but the government ought to take care and put limitations on the cash that will come from outside the banking system. This can be done through considering some points like:

- The Ministry of Finance should not approve any tariffs & taxes paid outside the banking system.
- The government should order all governmental entities and departments to stop taking any official financial dues, fees, etc. that exceed 1000EGP through cash payment.
- Paying all types of people's financial dues through the banking system.

The first decision of the council was issued on June 3, 2017: A one-year exemption for all citizens from all fees to open an account for mobile payment services. The second reduces all mobile payment service fees by 50% in 6 months (Central Bank of Egypt, 2017). There are telecom companies that have been providing this service for Egyptian consumers like Orange by Orange, Vodafone, and Etisalat.

The government seeks to get rid of cash economic system so the Ministry of Finance has stopped dealing with paper checks in the governmental entities since December 1, 2017, as a primary action to transforming into a cash less-society (Egyptian Ministry of Finance, 2017). The government exerts parallel efforts to build the cashless economic system; however, the cashless society is a middle stage and is considered as a preparation phase to the digital economy.

### The Financial Awareness

The individuals need to know the benefits of financial inclusion for all individuals from the poorest classes to the richest classes; therefore, CBE has been making many events to encourage the individuals to enter into the banking system and other financial services like assurance, etc. 9 million Egyptians are subscribed in exchange of money through mobile phones (Egypt Today staff, 2017). Actually, the financial awareness has increased over the last 7 years; the economic indicators reflected that clearly especially in dealing with the banking system (See Table 9, 15, 16, 17, 18 and also Figure 2, 3, 4).

Table 15. Financial inclusion

Indicator	Numbers	Percentage
Adult Egyptians who they have right to elect, have accounts in banks and post offices 1	17794105 approximately*	32% of total voters
Egyptians have accounts in banks of the total population those who can2	NA	34%
The mobile phone transactions 3	9 million subscribers and accounts	9.615% of the population
Informal sector of economy 4	NA	40% of GDP

Source: 1. Governor of the central bank of Egypt press comments, Edited by Ahmed Yaqub, 7th Day website, 12 September 2017, Egypt, (In Arabic) Retrieved March 7, 2018, from <http://www.youm7.com/> \*No. = (32%\* Adult Egyptians who they have right to elect in 2015 according to the supreme committee for elections 55,606,578) 2. Governor of the central bank of Egypt press comments, Edited by Middle East News Agency, 14 September 2017, Egypt, (In Arabic) Retrieved March 7, 2018, from <http://www.nile.eg/%D8%A7%D9%84%D8%B1%D8%A6%D9%8A%D8%B3-%D8%A7%D9%84%D8%B3%D9%8A%D8%B3%D9%8A-%D9%8A%D9%81%D8%AA%D8%AA%D8%AD-%D8%A7%D9%84%D9%8A%D9%88%D9%85-%D8%A7%D9%84%D9%85%D8%A4%D8%AA%D9%85%D8%B1-%D8%A7%D9%84%D8%AF> 3. Governor of the central bank of Egypt press comments, Edited by Mohamed Seddik, Al-Ahram, 15 September 2017, Egypt, (In Arabic) Retrieved March 7, 2018, from <http://www.ahram.org.eg/NewsPrint/613492.aspx> Ratio= (9mn / Total no. of pop. On Monday 25 September 2017 08:16 AM 93595616)\*100 4. Minister of Planning and Follow-up and Administrative Reform press comments, Edited by Mohamed Seddik, Al-Ahram, 15 September 2017, Egypt, (In Arabic) Retrieved March 7, 2018, from <http://www.ahram.org.eg/NewsQ/613490.aspx>

Indeed, the economic decisions taken on the 3rd of November 2016 have aimed to facilitate the banking system in his path to financial inclusion and the individuals became more understanding to its importance. The results of these decisions were reflected directly on the economic performance (See Table 16, 17, 18). However, the degree of intensity for cashless society includes the digital economy as the strongest degree. The individuals need to know the financial inclusion benefits, and the financial inclusion involves all people, so CBE holds many events to encourage people to enter the banking system.

## THE DIGITAL ECONOMY APPLICATION IN EGYPT

### The Necessity of the Digital Economy in Egypt

The digital economy will depend primarily on the SNA for enhancement. There are many advantages for the digital economic system, for example:

#### The Economic Aspect

The advantages can be divided into three parts:

##### Fiscal Aspect

The digitalized economic system will provide a reduced budget deficit and public debt with their debt interests through:

##### *Reducing the Government Expenditure*

All governmental spent money will be in the banking system only, that will lead to transparency for all official accounts in banks, and the ministerial level of management will be able to control the budgets.

##### *Reducing the Governmental Subsidies*

If the government knows who deserves it, the government will definitely fund subsidies with lower rates for all types of subsidies like energy, food, housing, exportation, etc.

##### *Increasing Taxation Revenues*

Escaping taxation will decrease and more numbers of informal economic systems will be involved.

Table 16. The monetary indicators

During End of	2012 June	2013 June	2014 June	2015 Jun	2016 June	2017 June	2017 Aug
M2 / GDP (%)	65.35	69.67	71.20	72.24	77.30	84.10	73.75
M2 / GDP (%) excluding the effect of a change in exchange rate *						73.91	65.65
Foreign currency deposits/ Total deposits (%)	20.66	21.25	18.95	17.86	18.53	27.78	25.77
Foreign currency deposits/ Total deposits (%) excluding the effect of a change in exchange rate*						15.89	14.87
Income velocity of money (GDP/ M2)	1.53	1.44	1.40	1.38	1.29	1.19	1.36
Income velocity of money (GDP/ M2) excluding the effect of a change in exchange rate*						1.35	1.52
Money multiplier (M2 / M0)	4.15	4.08	4.16	3.63	4.38	5.05	5.12
Money multiplier (M2 / M0) excluding the effect of a change in exchange rate *						4.44	4.56
Deposits except for CBE							
1) Government Deposits	118616	126987	178846	252152	362060	524428	529402
2) Non-Government Deposits	908070	1063832	1254882	1488006	1761009	2517727	2594985
In Local Currency of 2)	718217	835422	1014712	1219985	1433387	1815641	1923164
In Foreign Currencies of 2)	189853	228410	240170	268021	327622	702086	671821

Source: (Central Bank of Egypt, 2010:2018) \* As a result of the decision of liberalizing the exchange rate dated 3 November 2016

### *Digital Debt Clock*

That will be responsible for recording any occurring transactions and hold comparisons between the values of total debts with the main macroeconomic indicators, like the US National Debt clock (US National Debt clock, 2018). The Egyptian debt clock will help economic decision-makers to select the best alternative.

### **Monetary Aspect**

It will help Central Bank of Egypt to access more people until it can achieve its goals through the following procedures:

#### *Financial Inclusion*

It will inevitably involve the informal economy because all the society will deal with noncash methods or digital currency like e-EGP inside the banking system. Furthermore, CBE will allow the necessary funds to be available to people to include them in the banking system and achieve wider extension.

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**Table17. Bank credit for customers (Except CBE)**

End of	2011 June	2012 June	2013 June	2014 June	2015 June	2016 June	2017 June	2017 Nov.
Total Credit Facilities, of which:	474139	506736	549120	587852	717999	942727	1426457	1441200
Non-Government	434337	473147	513340	587852	717999	942727	1071734	1083259
Balances in Local Currency	309573	349560	376479	406499	468502	572348	724503	750847
Non-profit local organizations	2818	2928	3289	2803	3169	3493	4876	5148
Foreign organizations in Egypt	89	76	191	61	388	421	439	797
External sector	1090	907	637	322	366	313	853	834
Balances in Foreign Currencies	124764	123587	136861	140551	183076	196639	347231	332412
Non-profit local organizations	11	45	145	148	264	240	52	9
Foreign organizations in Egypt	623	55	184	16	200	335	311	319

Source: (Central Bank of Egypt, 2010:2018)

***The Cost of the Banknote***

The cost to produce a banknote is more than E-EGP currency.

**The Improvement of Economic Indications**

The digital economic system will improve the GDP inputs and achieve sustainable development through:

**Domestic Production**

The industry is the most crucial factor of development. The ICT sector will integrate with other industries to begin the 4th industrial revolution (Schwab, 2018). That kind of industrial revolution will move Egypt to the level of the top industrial countries.

**Investment**

Investment will increase to a higher level because the Internal rate of return (IRR) in Egypt is high and guaranteed through the market condition which is considered as one of the emerging markets for investment. Egypt ranks as the 20th country at Emerging Markets Logistics Index 2017 (Agility, 2018), and one of the best-emerging markets Index 2017 (Modern Index Strategy Indexes, 2018).

**Trade Balance**

Egypt will be one of the top exporters of ICT products and other products globally.

Table 18. The bank loans for customers (Except CBE)

End of	2011 June	2012 June	2013 June	2014 June	2015 June	2016 June	2017 June	2017 Nov.
Total lending, of which:	471288	503218	544893	584066	713661	937126	1418421	1431904
Non- Government	431486	469629	509113	543264	647240	763386	1063698	1073963
Balances in Local Currency	308126	347232	373668	403508	464637	567038	716856	741970
Non-profit local organizations	2818	2928	3289	2803	3169	3493	4876	5148
Foreign organizations in Egypt	89	76	191	61	388	421	439	797
External sector	1031	846	584	322	366	313	853	834
Balances in Foreign Currencies	123360	122397	135445	139756	182603	196348	346842	331993
Non-profit local organizations	11	45	145	148	264	240	52	9
Foreign organizations in Egypt	620	53	183	14	200	335	310	313

Source: (Central Bank of Egypt, 2010:2018)

### The governance, Transparency, and Integrity

The digital economy does not need the human factor a lot. Therefore, the mistakes will limit instantly and create a stable governance system. This aims at the following:

- Reducing governmental corruption: It consists of two parts. The first one is the financial corruption which exists with the cash payment method that allows anyone to commit an illegal act. The second is nonfinancial corruption. The document-based system in any government gives way for corrupted individuals to recurrently break laws.
- Accountability: The digitalization of governmental entities will allow making deals and transactions visible; therefore, no one will act illegally.
- Governmental governance for businesses sector companies: The digital economy is one of the best ways to run and handle companies without selling anything. By converting to it, efficient companies can generate profits.

### The Security Aspect

In the digital economy, banknote money will be invalid and replaced by E-money like e-EGP. That will help to reduce crimes especially theft of cash money.

### THE DISADVANTAGES OF THE DIGITAL ECONOMY AND WAYS OF ADAPTATION

There are three aspects that can turn into a mess if not well protected and controlled:

## **The Cybersecurity**

The cybercrime, hacktivism, and cyber espionage have been expanding recently until they reached accessibility to sensitive systems like infrastructures, any smart device, and essential services in several countries all over the world. For example, cyberattacks have posing a threat to the world. These attacks happened in many countries.

One of the massive cyberattacks took place in March 2017 in 90 countries globally, and caused panic in these countries. For instance, countries that have received these attacks were India, Argentina, Russia, Ecuador, USA, Turkey, Taiwan, United Kingdom, Mexico and Indonesia. The major attacked countries like Russia, Singapore, Netherlands, USA, Italy, United Kingdom, China, Germany and Portugal included hackers.

The total attacks globally on July 22, 2017 were 6,629,145 attacks (Check Point Software Technologies LTD, 2018). These indications helped us to realize the value of threats. Egypt established the supreme council for cybersecurity on December 15, 2014<sup>2</sup>, and the Egyptian Prime Minister decided to implement the recommendations of the council on May 2, 2017<sup>3</sup>. It has been a great step to improve the implementation on the real ground. Egypt ranks the 2nd among the Arab States and the 14th at (GCI) Global Cybersecurity Index 2017 score (Brahima., 2017). These indicators refer to the stability of the cybersecurity situation, but the threats are increasing swiftly. Although Egypt has been able to face the new challenges, we can still do the best.

## **The Solution**

We should establish a cybersecurity strategy and include it in the vision of Egypt 2030 to face the coming threats through:

1. Putting the national cybersecurity concept in the education system.
2. Establishing intuition to increase the level of awareness on the internet.
3. Co-operating and coordinating with cybersecurity companies.
4. Setting up and using the latest technology in cybersecurity programs.
5. Increasing cybersecurity in tertiary education.
6. Establishing an IT business incubator for cyber security applications.
7. Enactment of new legislation on cybersecurity.

## **Social Equity**

As for the unemployment that will generate from digitalization for all entities in Egypt, the government ought to find out other alternatives to face the resistance of labor.

## **The Solution**

The world protects labors rights, not jobs. With the passage of time and because of technological progress, some jobs vanish; therefore, the government should move to find out the appropriate solutions.

We can avoid risks by the following procedures:

1. Putting a strategy of retraining programs for job losers.
2. Putting a strategy to replace the human element by technological devices and services.
3. Putting a strategy of review for job losers.
4. Enactment of necessary legislation to protect labors' rights.

## **Cultural and Moral Aspect**

The people need to understand the necessity of the ethical aspect of technology usage.



## The Solution

1. The state should help grow awareness for the best usage of new technologies.
2. Enactment of legislation to put restrictions on evil usage of unethical acts.

## IMPORTANT ELEMENTS SUPPORTING THE DIGITAL ECONOMY

The main factors shaping the principal basis of sustainable development and the digital economy:

### The 4th Industrial Revolution (Industry 4.0)

The history of industrial revolutions: The 1st industrial revolution occurred in the 18th century. It developed the production method to machines, the efficiency of water power, new industrial manufacturing and iron production processes (Hackett, 1992; White, 2009). The 2nd industrial revolution took place in the 19th century and it was characterized by mass production and electrical energy. The 3rd industrial revolution occurred in the 20th century and was characterized by IT and electronics (Baweja, Donovan, Haefele, Siddiqi, & Smiles, 2016).

Lastly, the Industry 4.0 is based on many elements. One of them is Cyber-Physical Systems (CPS) (Oks, Fritzsche and Möslein, 2017). These systems are the results of cyberspace and real-world integration (Bloem, van Doorn, Duivesteyn, Excoffier, Maas, & van Ommeren, 2014).

Egypt ought to achieve massive industrial mutations with their comparative and competitive advantages. Egypt should jump onto the 4th industrial revolution without completing the 3rd revolution. We should start from where the world ended. Nowadays, the Industry 4.0 reached new technologies like autonomous vehicles, 3D printing, the Blockchain<sup>4</sup>, biotechnology, etc. (Bloem, van Doorn, Duivesteyn, Excoffier, Maas, & van Ommeren, 2014).

Today there are the Industry 4.0 and the technologies of sub-digital economy, for instance: Big data (BD) (Akred, 2014) and Artificial intelligence (AI). Four approaches were discussed to define AI, the most important of which are about the abilities of systems to think and act rationally or like human beings (Russell, & Norvig, 2009). Thus, AI provides creative solutions of life problems for each field, one of which is industry as a whole. The international trend in the industry is going to the automation of everything in the industry. The industrial automation has more special abilities than humans, such as:

1. Lessening the fixed cost on the medium and long run.
2. Increasing the efficiency of production and improving rates performance.
3. Increasing the safety aspect.

Therefore, depending on machine is becoming one of the main elements that subbed the digital economy, so the Machine Learning (ML)<sup>5</sup> is one of the things that help machines enhance and develop their performance in doing tasks. Many companies use the (ML) in their services and AI as well (Brynjolfsson, & McAfee, A., 2017).

The link between machines to machines is represented through the Internet of Things (IoT), or between men to devices through the Internet of Smart Thing (IosT) (Grebow, 2017). IoT has many applications in our life, one of which is utilizing it in Industry 4.0 (Zawra, Mansour, Eldin, & Messiha, 2017). The Industrial Internet of Things (IIoT) represents the integration among other technologies like BD, computers and cloud computing systems, until escalating up the efficiency and performance of machines (Wanyama, 2018). The IIOT appeared in the 1970s as Computer-Integrated Manufacturing (CIM) in an attempt to create a network of things. It is applied in an attempt to create a network of things (Jeschke, Brecher, Meisen, Özdemir, & Eschert, 2017).

## **Small and Medium Sized Enterprises (SMEs) and (e-SMEs)**

These kinds of companies have many advantages for the economic systems and societies as a whole. The SMEs seek to satisfy people's needs and desires because of the simple steps to end anything and the good accessibility to consumers. The contribution of SMEs is remarkable on the economic growth, job creation and employment (International Labour Office, 2015).

The SMEs boost the economic activities, especially in developing countries. The combination between ICT & SMEs is feasible for the Egyptian economy. The new shape of SMEs is (e-SMEs), which has spread all over the world. It includes many companies in the start-up stage like Amazon, Uber, and so on.

## **Knowledge Economy and Cognitive Economy**

The Egyptian economy is primarily based on natural resources or physical and materialistic elements. The knowledge economy is based on knowledge-incentive through a focus on technical information, scientific advancement and new technologies (Walter, Powell, & Snellman, 2004), and therefore the intellectual tools come first before natural resources. The economy-based knowledge is harmonious with the digital economy; the both are emphasizing on innovation, creativity, entrepreneurship, advanced technologies and scientific approaches, so the two types of economies are integrated and harmonious. The new economy presented a new concept "Knowledge capital" and role with small businesses (Carayannis, 2013, pp. 1178-1180).

The cognitive economy is a new field of cognitive science, and is considered as the interdisciplinary science that emerges from two main sciences: economics and psychology. It includes a combination of economics, information theory, management theory and cognitive science. Its role will be in assisting decision makers to realize, understand and analyze more the consumers' mentalities and perceptual processes until they can be transferred into usable processed data (Ogiela, 2014). In Egypt, we need it to avoid most problems.

## **Co-financing**

The Cooperative financing is one of the best solutions to avoid regulations' complexity and break risks as possible in the SMEs and startups. It consists of two financiers or more to finance SMEs and entrepreneurship companies. Egypt needs to boost the cooperative financing by amending the laws and adjusting regulations of the banking system to agree with co-financing. The e-SMEs need it to skip financial obstacles and concentrate on increasing the productivity. The European Union (EU) has made many co-financing programs for SMEs (Santander Group, 2014). Co-financing will help Egypt to move from the developing countries indexes to those of the developed ones. It also agrees with the vision of Egypt 2030 to achieve sustainable development. The government implements mega projects in several fields, so co-financing provides many types of support, and has many advantages like consultation services, quality control, expertise and other aspects especially with international institutions. One of the best examples for organizations adopting the co-financing system is Asian Development Bank (ADB) which has a lot of experiences in co-financing scale. The bank contributed to reducing poverty in Asia during the last years (Asian Development Bank, 2018).

## **CONCLUSION**

The Egyptian economy has passed through a significant transformation period. Therefore, the path of change to the best way is possible. The state seeks to change the body of the economic system to diversification activities compatible with the most recent scientific findings.

The old philosophy of the state has supported the poor sector's mentality or reliability on the government with the goodwill to decrease the pressures on them, through subsidies of everything for people by wrong strategies.

The paper displays the necessity to concentrate on increasing the income of each citizen or GDP per capita. The digital economy is the only way to reach the economic sustainability and increasing income.

The paper shows the perceptual aspect of Egyptian people that should understand and realize the digital economic system, and become aware that hard work and income increase are the only way to a better life. As satisfaction and happiness are measurements of success in any state, so we should work together government and people to achieve that.

The paper concludes by the recommendation that the government must accelerate the digitalization process of the state, until the government becomes able to achieve the digital economy and to be one of the top 30 economies in 2030.

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- <sup>2</sup> Cabinet. (2014). Establishing the supreme council for cybersecurity. Decision of the Prime Minister Prime (No. 2259 of 2014). Cairo, Egypt: Official Gazette, Egyptian Chronicle.
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- <sup>4</sup> According to Seebacher & Ronny Schüritz (2017, May), “A blockchain is a distributed database, which is shared among and agreed upon a peer-to-peer network. It consists of a linked sequence of blocks, holding timestamped transactions that are secured by public-key cryptography and verified by the network community. Once an element is appended to the blockchain, it cannot be altered, turning a blockchain into an immutable record of past activity...” (p. 14)
- <sup>5</sup> According to Qiu, Qihui Wu, Guoru Ding, Yuhua Xu & Shuo Feng (2016), “Machine leaning is a field of research that formally focuses on the theory, performance, and properties of Learning systems and algorithms. It is a highly interdisciplinary field building upon ideas from many different kinds of fields such as artificial intelligence, optimization theory, information theory, statistics, cognitive science, optimal control, and many other disciplines of science, engineering, and mathematics...” (p. 2)

*Mohamed Abo Bakr Abd Allah Abd Elaliem, Senior Student, Faculty of Economics, Business And Information System, Economics Major, Misr University For Science And Technology, Arab Republic of Egypt. He is a freelance researcher in Multidisciplinary science. He is writing these research papers in economics & politics to illustrate his philosophy.*

# The Adoption and Development of Airbnb Services in Norway: A Regional Perspective

Abbas Strommen-Bakhtiar, Graduate School of Business, Nord University, Bodø, Norway  
Evgueni Vinogradov, Nordland Research Institute, Bodø, Norway

## ABSTRACT

Collaborative consumption facilitated by peer-to-peer platforms has witnessed a rapid expansion in the areas of hospitality and tourism. However, it is very unevenly distributed across countries, regions, cities and neighborhoods. The aim of this article is to investigate why collaborative consumption takes off early and continues flourishing in some regions, while remaining almost non-existent in other regions. The extant literature provides some insights into the effect of demand-side factors on sharing economy. However, this literature largely neglects the role of supply. Informed by the innovation adaption literature, the present study seeks to address this gap. The analysis reveals that regions with a) well-developed tourism industry, b) relatively large number of available properties, and c) situated near the main tourist attractions, tend to have relatively large supply of Airbnb listings and relatively many Airbnb tourists. An early adoption of Airbnb services is also associated with availability of properties to rent out.

## KEYWORDS

Airbnb, Collaborative Consumption, Income, Infrastructure, Sharing Economy, Tourism

## 1. INTRODUCTION

Today, tourism with its 3.3% growth, is one of the fastest growing industries in the world (WTTC, 2017). It contributes \$7.6 trillion dollars to the world's Gross Domestic Product (GDP) and employs 292 million people (WTTC, 2017). Tourism with a growth rate of 3.3% has become the second fastest growing industry after Information and communication industry which recorded a 4.4% growth in 2017 (WTTC, 2017). And this growth has not been confined to the traditional tourism destinations such as Greece, Spain, Thailand, or Kenya. Scandinavian countries also have seen some growth in Tourism. Travel & Tourism plays an important role in the Norwegian Economy. The total contribution of Travel & Tourism to the Norwegian GDP was NOK 284.4 bn in 2016 (9.1% of GDP and was expected to grow by 0.2% to NOK 285,1 bn in 2017 (World Travel & Tourism Council, 2017). "In 2016, the total contribution of "Travel & Tourism generated 176,000 jobs (6,6% of total employment). This is expected to fall by 3.15 in 2017 and rise by 1.4% p.a. to 197000 jobs (7% of total employment) in 2027". (p. 1)

But despite its tremendous growth, the Tourism industry has lacked that innovative energy that has been present in other industries (Camisón & Monfort-Mir, 2012; Miles, 2008). Yet, despite the lack of this energy, it has not been immune to innovations coming from other industries. For example, innovations in other areas such as Information and Communication Industry (ICT) along with novel business models are impacting the Tourism industry in an unprecedented way.

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One of the main disruptive innovations has been the advent of the platform Business Model (PBM). Platforms create value by facilitating exchanges between producers and consumers, using the Information and Communication Technologies (ICTs). Platforms have become successful because they bring consumers and producers together at very low costs, provide reputation system to facilitate trust and finally use the network effect to rapidly increase the size of the market.

Airbnb is one of the companies that uses the platform business model. Its chosen industry, the short-term letting industry such as hotels, motels, and even normal housing letting companies have come under pressure from the Airbnb and the like.

In the recent years Airbnb has emerged as one of the most successful platform-based letting companies. In a few short years it has expanded to 191 countries and 81,000 cities. At the writing of this paper, Airbnb, with 5,000,000 listings has the largest number of rooms to let on its books surpassing Marriot Hotel with its 1,158,107 rooms (Airbnb, 2016).

Airbnb's expansion has of course not been evenly distributed across the map. Some places have more Airbnb presence than others. Statistics show that all traditional tourist attraction places such as Florence, Venice, Paris, London, etc., show sizable Airbnb presence. The appearance of Airbnb in these places is not surprising since tourists are already coming to these locations and Airbnb can take advantages of price differentials (with hotels and motels) to capture some of the market.

However, what is not quite clear is why Airbnb spread to regions that have not been traditional tourist destination places? What explains the spread of Airbnb to areas that have never been tourist destinations? Is the simple presence of Airbnb, brings tourism to these regions or is there something else, and Airbnb just moves in after the tourists?

These are some of the questions that this paper will try to answer. Norway is the country under examination.

## 2. LITERATURE REVIEW

Since its inception in 2008, Airbnb has shown a great ability to grow not only nationally but also internationally. This tremendous growth has caused concerns in national governments about taxation and regulations; local governments about the availability of affordable rental accommodations for the local population; and the hotel industry which sees a major threat to its very existence.

National governments primarily see the expansion of the platform-based rental companies such as Airbnb, HomeAway, etc., as a national regulation and taxation problem. To this end they have relied primarily on the existing laws. For example, in Norway, the government has not changed any of its tax laws, and it is not likely to do radical changes in the short run (Norges Finansdepartementet, 2017).

### 2.1. Airbnb & Local Authorities

Regardless of the regulations enacted, enforcement falls on the local governments, something that requires resources. As Leshinsky and Chatz (2018, p. 9) point out: "Enforcement requires resources, and these are limited at the municipal level. Taxpayer funds may be better spent on traditional land use and planning breaches e.g., illegal use or building permit breaches. Practical economics may suggest that there is no point in allocating scarce city funds for Short Term Rental (STR) enforcement. STR regulation may in fact have been hastened by cities. Understandably in times of affordable housing shortages, municipalities have been looking for strategies to keep rental properties on the long-term market."

Still, local governments, especially city councils in major tourist destinations have taken steps to limit the short-term rental expansion, and in some cases even are trying to reverse the trend.

For example, in May 2016, Berlin city council started limiting Airbnb and similar platforms activities to arrest the tremendous rent prices which in 5 years (2009 to 2014) had risen by 56% (France-Presse, 2016). Other cities have followed a similar path. For example, the local authorities in London and Amsterdam (Woolf, 2016a) forced Airbnb to take on the responsibility of policing

limits on the number of days per year a full unit can be let through its system, making it the first short-term rental company to cut such a deal (Woolf, 2016b). Another example is provided by the Japanese government which in 2016 introduced laws to restrict the minimum stay to one week and the size of the rooms (Wakatsuki, 2016).

Oskam and Boswijk (2016, p. 22) in certain cases see some harm in restrictions and come with the following warning: “Attempts to ban the phenomenon mean a disincentive to innovation and protect oligopolistic markets; more receptive policies may have the desired results if tourism grows moderately but in booming destinations they may lead to a harmful commercialization.”

## 2.2. Airbnb & Hotels

The third major concern has come from the hotel industry that is concerned with the serious threat posed by Airbnb and the like to its very existence in its current form. Authors such as Guttentag and Smith (2017), Zervas, Proserpio, and Byers (2014), Strømme-Bakhtiar and Vinogradov (2018), and others, to a large degree, have addressed this issue. The threat to hotel industry is real and is increasing.

Already some studies such the one by Zervas, Proserpio, and Byers (2017) was showing the negative affect of Airbnb on hotel revenues. Their study estimated that a 1% increase in Airbnb listings in Texas resulted in a 0.05% decrease in quarterly hotel revenues, an estimate compounded by Airbnb’s rapid growth. However, another study by David Neeser (2015) about the impact of Airbnb on the hotel industry in Norway, Finland, and Sweden, found that “Airbnb did not significantly affect hotel’s revenue per available room in average, but did contribute to a reduction in the average price of a room where Airbnb entered the most.” (p.11)

Strømme-Bakhtiar and Vingaradov (2018) also looked at the effects of Airbnb on hotels in Norway but came-up with a slightly different conclusion than Neeser (2015). Bakhtiar and Vingaradov’s findings showed that hotels in some “regions” of Norway where Airbnb is flourishing have more guests than the regions with less Airbnb activity. In addition, the study showed that Airbnb had a positive effect on the hotel market in Norway. This was partially contributed to general increase in the number of tourists and to the fact that some Airbnb guests would use hotels and Airbnb intermittently, moving from one to another depending on the rout travelled.

This move from hotels to Airbnb and vice versa, can partly be explained by the study done by Guttentag and Smith (2017), where he mentions that two-thirds of Airbnb guests use Airbnb as a lower end hotel/motel substitute.

## 2.3. Spatial Distribution

The rapid expansion of Airbnb in a relatively short span of time gave rise to three immediate concerns, namely the Airbnb’s effects on taxation, housing and hotel industry, leaving the question of why and how of spatial distribution for later time. The first question of course was the intra city distribution. Why Airbnb tend to cluster around the centers of the towns and cities?

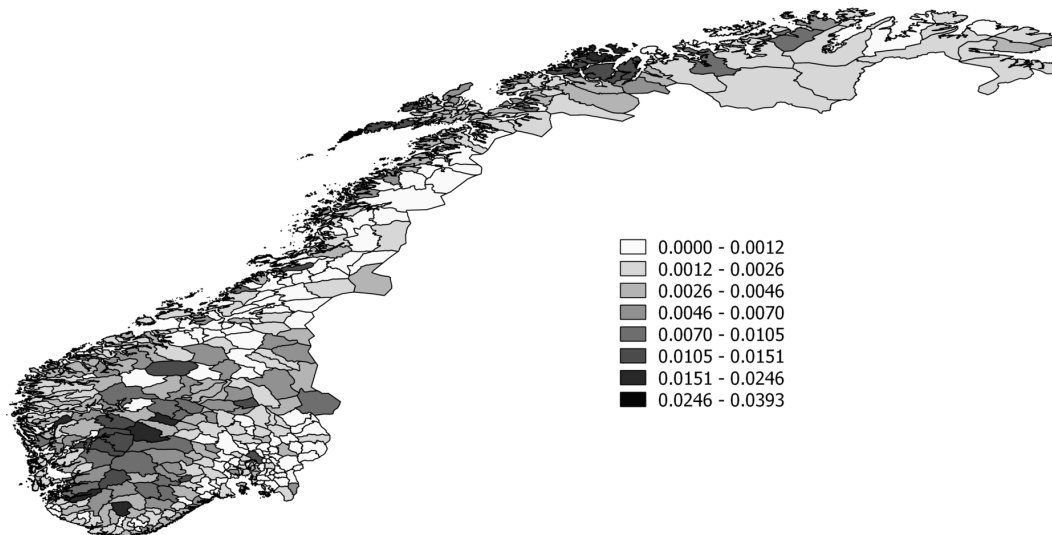
Gutierrez et al., (2016) studied the uneven distribution of Airbnb in Barcelona, Spain. Their study revealed a clear center-periphery pattern, where most of the listings tended to be concentrated in the city center extending to central residential districts that are not covered by hotels.

Another study of spatial distribution of Airbnb by Dudas, et al. (2017) in Budapest pointed to Airbnb listings clustering in the center of Budapest or close to the touristic areas.

Yet, another study by Dudas et al. (2017) of New York also came to the same conclusion, but with a few interesting additions. Their findings showed that “Airbnb accommodations and the number of reviews are concentrated in those parts of the city that have a young population, a significant number of housing units, and a high number of points of interest.” (p. 147).

So far, most of these studies have focused on the intra-city expansion pattern of the Airbnb. Closer look at the distribution of Airbnb listings across the country (Norway) reveals striking differences between the municipalities (Figure 1).

Figure 1. The distribution of Airbnb listings across the country of Norway



Few if any try to determine factors that bring Airbnb to outlying regions. For example, Margaryan and Fredman (2017), studying geographical distribution of nature-based tourism operations/businesses in Sweden, showed that density of these businesses is related to the presence of natural and human made amenities. There are of course many other factors, which can be divided into two categories of demand and supply.

**On the demand side**, we can look at tourism, business activity in the regions, etc. Since on the city level Airbnb listings tend to gravitate to the touristic areas (Dudas, et al., 2017), we expect that Norwegian regions characterized by established tourism industry and close proximity to major tourist attractions will have relatively many Airbnb listings. It may also be suggested that such regions will adopt Airbnb relatively early because the presence of large number of tourists may inspire local home-owners to try Airbnb. Here we should note that the latest report from Airbnb (The Local, 2017) reveals that Norwegians constitute the largest group of Airbnb clients in Norway, meaning that although foreign tourists are important Norwegians constitute a major client base. The demand-side factors are reflected in the following hypothesis:

H1. Tourism is positively associated with early adoption and penetration of sharing on the rental market.

**On the supply side**, we have the factors that make it attractive for owners to enter the Airbnb rental market. The act of entering short-term rental market through Airbnb is arguably an entrepreneurial act. Based on motivation theory (Vroom, 1964; Landy & Becker, 1987), entrepreneurship literature has a long tradition of dividing motivations into “pull” and “push” categories (for example, Gilard, B and Levine, P., 1986). The “pull” factors reflect the voluntary profit-seeking behavior of the home-owners not caused by immediate need for additional income. Some people may look for additional income from the underutilized properties or may be motivated to share their properties by altruistic thoughts about effective use of resources, sustainability (Hamari, Sjöklint, & Ukkonen, 2016), welcoming foreign guests or need for additional social contacts. While measuring the recent intrinsic motives is beyond the scope of this study, the second hypothesis is based on the suggestion that the presence of underutilized properties pulls the owners towards sharing:

H2. Number of dwellings per capita is positively associated with early adoption and penetration of sharing on the rental market.

The “push” factors can be related primary to the urgent need for supplementary income. Low household income may, for example, push people to rent out parts of their properties or the whole residence moving to cheaper and less attractive parts of their city/town. While people with high net worth have some accumulated resources allowing them to compensate for temporary income reduction/loss, those with low net worth may in some cases be pushed to use Airbnb as flexible and easy-to-reach source of short-run additional income. On the other hand, it is possible to argue that relatively high income and net worth are often associated with larger real estate properties increasing opportunities for renting out. Moreover, people that manage to sustain high level of income leading to large net worth may be expected to be relatively good in identifying and exploiting alternative sources of income. With both lines of argumentation being equally conceivable, the following hypothesis was formulated:

H3. Net worth and household income are positively associated with early adoption and penetration of sharing on the rental market.

The mediating factor which is needed to connect demand with supply is the infrastructure. Proper infrastructure is one of the main essential necessities in tourism industry (Andrades & Dimanche, 2017; Gier, Christie, & Amolo, 2017). The following two hypotheses refer to transportation and ICT as the most relevant parts of infrastructure:

H4. Physical accessibility is positively associated with early adoption and penetration of sharing on the rental market.

H5. Advanced ICT infrastructure is positively associated with early adoption and penetration of sharing on the rental market.

### **3. METHOD**

In this study correlations between variables and linear regressions are used to test the hypotheses.

Data from several sources have been used to check the hypotheses. Data on all Airbnb listings in Norway for period 2014 – 2016 has been acquired from Airdna.co. This dataset based on net-scraping contains geolocated data so that the researchers could aggregate data on municipality level. Three dependent variables calculated from this dataset are used in this study: number of Airbnb listings in a municipality per capita, number of Airbnb reservation days in a municipality per capita and early adoption.

On the demand side, the number of firms related to the tourism industry was used as a proxy for tourism activity in a municipality. These data have been retrieved from the official registers. Municipalities in Norway are relatively small and some of the most visited nature attractions are located outside the municipalities where major transportation hubs and largest hotels are located. Thus, official statistics based on hotel reports may be less than perfect for measuring tourism activity on the municipality level. On the other hand, geolocated pictures posted on Instagram may be a good indicator for where the real destinations for tourists are located. In this paper, distance from the geometric centre of a municipality to the nearest of 39 most instagrammed places in Norway is used as one of the indicators for the demand for accommodation.

Based on the literature review, it was suggested that both availability of properties to be rented out and need for additional income may be associated with supply of potential Airbnb listings. Thus,

Table 1. Operationalization of variables

Variables	Description
<b>Dependent variables:</b>	
Airbnb listings per capita	Number of Airbnb listings in a municipality per capita
Airbnb reservation days per capita	Number of Airbnb listings in a municipality per capita
Early adoption	Scale from 0 to 3 where: 0 means no Airbnb listings in 2016, 1 means no Airbnb listings prior to 2016, 2 means no Airbnb listings prior to 2015, 3 means some Airbnb listings already in 2014.
<b>Independent Variables:</b>	
Tourism firms per capita	Number of firms related in the tourism industry, including travel agencies, guiding services, tour operator reservation services and related activities. Accommodation, food, car rentals and transport are not included.
Distance to the most instagrammed places	Distance in a direct line from the geometric centre of a municipality to the nearest of 39 most instagrammed places in Norway (km).
Net worth	Share of households in a municipality with net worth over NOK 250 000 (%).
Income	Average household income in a municipality (NOK).
Dwellings per capita	Number of dwellings in a municipality per capita.
ICT development	Number of private broadband contracts per 100 households in a municipality.
Distance to airports	Distance in a direct line from the geometric centre of a municipality to the nearest public airport (km).

data on the average net worth, household income and number of dwellings per capita for 2016 have been acquired from Statistics Norway (official bureau of statistics in Norway).

In this study, two variables are related to infrastructure. The number of private broadband contracts per 100 households is used as an indicator of which municipalities are most active in using ICT. Distance in a direct line from the geometric centre of a municipality to the nearest public airport has been calculated to reflect physical accessibility. The operationalization of variables is summarized in Table 1.

#### 4. ANALYSIS

Descriptive statistics for the variables are presented in Table 2. While some of the municipalities in Norway had no Airbnb listings, the largest number of listings per capita (0,0393) was observed in Flagstad, that is a small and remote municipality on the Lofoten islands in the Northern Norway. The number of Airbnb reservations per capita is also unevenly distributed varying from 0 to 1,42. While some of the municipalities adopted Airbnb already prior to 2014, some others joined the trend only recently. Due to historical reasons and complicated geographical topology of the country, large differences in distribution of tourism firms was observed. Relatively large distances between main tourism destinations separated with vast mountain areas and fjords was reflected in relatively large average distances between municipalities and the nearest most instagrammed places (mean 56,5 km, max 209,5 km). Standards of living vary widely across Norway. Mean share of households in a municipality with net worth over 250 000 NOK was 32,4% varying between 51,1% in the North and 83,4% in the South. Annual household income in some areas is almost twice as high as in the areas with minimal income (located mostly in Northern Norway). The number of dwellings per capita is also twice as high in northern provinces compared to South and Vest regions.

Table 2. Descriptive statistics (before transformations)

	Airbnb listings per capita	Airbnb reservations per capita	Early adoption	Tourism firms per capita	Distance to the most Instagrammed places (km)	Net worth	Annual household income (NOK)	Dwellings per capita	ICT development	Distance to airports
Minimum	0,0000	0,00	0,00	0,00	1,5	51,1	376 000	0,38	34,2	1,5
Maximum	0,0393	1,42	3,00	0,02	209,5	83,4	647 000	0,74	216,7	110,7
Mean	0,0035	0,069	1,15	0,0027	56,5	32,4	492 626	0,5113	79,9	33,6
Std.Div.	0,0044	0,119	0,62	0,0025	40,8	4,9	51 593	0,07233	15,2	19,9

Number of private broadband contracts per 100 households varies between 34,2 and 216,7 revealing the huge differences between the municipalities. Finally, some of the municipalities are situated up to 110 km from the nearest airport, making then rather difficult to reach, especially considering the dominant mountain terrain.

To address minor indications of the presence of multicollinearity in the dataset, Ln- and sqrt-transformations have been applied to some variables (see notes for Table 3).

The initial look at the correlations between variables indicates that the number of Airbnb listings and number of Airbnb reservations per capita are closely related to each other. However, these dependent variables are not correlated to early adoption of Airbnb.

The number of Airbnb listings and number of Airbnb reservations per capita are positively correlated with number of tourism firms, dwellings per capita and ICT development in a municipality. There are also probable relationships that differ between these two dependent variables: the distance from the municipality centre to the nearest most instagrammed place is negatively correlated with Airbnb reservation days while no significant correlation between this variable and number of Airbnb listings has been found. Number of Airbnb listings was negatively correlated with income, while

Table 3. Correlation matrix

	Airbnb listings per capita	Airbnb reservations per capita	Early adoption	Tourism firms per capita	Distance to the most Instagrammed places	Net worth	Income	Dwellings per capita	ICT development	Distance to airports
Airbnb listings per capita <sup>1</sup>	1	,786**	-,08	,478**	,024	,032	-,125*	,415**	,244**	,136*
Airbnb reservation days per capita <sup>1</sup>	,786**	1	,085	,318**	-,202**	-,078	,039	,167**	,224**	-,037
Early adoption	-,08	0,085	1	-,181**	-,336**	-,304**	,386**	-,411**	,195**	-,169**
Tourism firms per capita <sup>1</sup>	,478**	,318**	-,181**	1	,268**	,251**	-,388**	,568**	,039	,251**
Distance to the most Instagrammed places <sup>2</sup>	,024	-,202**	-,336**	,268**	1	,434**	-,418**	,524**	-,227**	,142**
Net worth	,032	-,078	-,304**	,251**	,434**	1	-,545**	,415**	-,274**	,125*
Income	-,125*	,039	,386**	-,388**	-,418**	-,545**	1	-,720**	,284**	-,255**
Dwellings per capita <sup>1</sup>	,415**	,167**	-,411**	,568**	,524**	,415**	-,720**	1	-,138**	,357**
ICT development	,244**	,224**	,195**	,039	-,227**	-,274**	,284**	-,138**	1	-,068
Distance to airports	,136*	-,037	-,167**	,251**	,142**	,125*	-,255**	,357**	-,068	1

\* Correlation is significant at the 0.05 level (2-tailed). \*\* Correlation is significant at the 0.01 level (2-tailed).

<sup>1</sup>Ln transformed. <sup>2</sup>Sqrt transformed.

no significant correlation between income and Airbnb reservation days has been indicated. Early Airbnb adoption was negatively correlated with number of tourism firms, distance to the most instagrammed places, net worth, dwellings per capita, and distance to airports. Early adoption was positively correlated with income and ICT development.

The results of three linear regressions with different dependent variables analyses are presented in Table 4.

Number of Airbnb listings and Airbnb reservations per capita are significantly related to the number of tourism companies and distance to the most instagrammed places partly supporting H1 when considering association between demand from tourists and Airbnb penetration. However, higher demand from tourists does not lead to earlier adoption of Airbnb services at the municipality level.

Number of dwelling per capita is significantly positively associated with penetration of Airbnb as measured by the first two dependent variables. The beta coefficients for dwellings per capita are highest in the model indicating that supply of properties that can be used for short-time renting is a stronger predictor of Airbnb penetration than demand for Airbnb services. Thus, H2 is partly supported. Contrary to the expectations, number of dwellings per capita is significantly *negatively* associated with early adoption of Airbnb services.

Net worth was not associated with any of the depending variables while both number of Airbnb listings and Airbnb reservations per capita are significantly positively associated with income (H3 partly supported).

Physical accessibility measured as distance to the nearest airport was negatively associated only with Airbnb reservations per capita. Finally, advanced ICT infrastructure is important for both number of Airbnb listings and Airbnb reservations per capita.

## 5. CONCLUSION

The aim of this paper was to contribute to understanding of why sharing economy is growing earlier and quicker in some regions than in others. Airbnb in Norway was used as a case. The analysis reveals that both demand as supply factors as well as infrastructure are important predictors of regional differences in Airbnb penetration.

Higher number of tourists and proximity to popular tourism destination create demand for short time renting leading to both increased number of Airbnb listings and higher number of reservations per capita.

In addition to the demand, the relevant supply of properties is crucial. Supply of Airbnb listings may be influenced by push and pull

factors. On the pull side, the analysis suggests that presence of properties available for renting out increases chances that the owners will look for alternative or untraditional markets to rent their property out. In the data presented in this paper, the availability of properties is the much stronger predictor of Airbnb penetrations than demand from tourists.

On the push side, the data does not indicate that the need for additional income in low-income municipalities stimulates people to use sharing as a potential source of additional income. On contrary, higher per capita income is strongly associated with renting out via Airbnb. Probably, high-income households are more likely to have spaces to share than relatively low-income households. However, the absence of relationships between net worth and Airbnb does not support this proposition.

Both physical infrastructure and, specially, ICT development on the regional level seem to stimulate sharing economy as exemplified by Airbnb.

Among all the demand, supply and infrastructure-related factors, only availability of properties to let is associated with early adoption of Airbnb. It is probable that the demand from tourists stays mostly unnoticed by ordinary home-owners if they do not look actively for what to do with their unoccupied properties. The people with excess properties are probably the earliest adopters of sharing economy, while others follow them when they observe that tourists may provide income for the households not involved in traditional tourism business.

**Table 4. Linear regression results (Coefficients in the table are standardized Beta)**

	Dependent variable:		
	Airbnb listings per capita <sup>1</sup>	Airbnb reservations per capita <sup>1</sup>	Early adoption
Tourism firms per capita <sup>1</sup>	,304**	,286**	,075
Distance to the most Instagrammed places <sup>2</sup>	-,205**	-,367**	-,129
Net worth	-,018	-,006	-,112
Income	,243**	,222*	,116
Dwellings per capita <sup>1</sup>	,575**	,441**	-,251*
ICT development	,186**	,128*	,066
Distance to airports	-,047	-,152*	-,035
R Square	,386	,245	,247
Ajusted R Square	,373	,229	,231
R Square Change	,386	,245	,247
F Change	29,601**	15,724**	15,914***

\* Correlation is significant at the 0.01 level (2-tailed).

\*\* Correlation is significant at the 0.001 level (2-tailed).

<sup>1</sup>Ln transformed.<sup>2</sup>Sqrt transformed.

## 5.1. Implications

These findings may have some implications for practitioners. Traditionally, the areas with rapidly growing demand from tourists reacted (often with a considerable time lag) by building additional hotels and public infrastructure. Online peer-to-peer platforms allow private actors to accommodate a considerable number of tourists with little or no control from the public or regional authorities. Taking into account peer-to-peer platforms may be useful for planners and policymakers for two reasons. First, it may help to create modern and dynamic tourism industry where it was previously underdeveloped. Second, rapidly growing demand for accommodation for tourists is linked to mainly uncontrolled growth in number of properties rented out through online platforms that in some locations causes troubles associated with increased pressure on permanent dwellers, long-term tenants and local infrastructure.

Our results cast doubt on the proposition that those who suffer economically often use peer-to-peer renting as a source of additional income. While relatively high-income households use their access properties to get additional rent, the ability of online renting platforms to be used as an instrument in welfare policy is limited.

Finally, when the purpose of regional policy is to encourage tourism in the peer-to-peer accommodation sector, investing into ICT and transport infrastructure is a good choice.

## 5.2. Limitations

Some of the limitations of this study call for further research. While some differences on the regional level have been addressed here, more individual level studies are needed in order to understand the relationships between sharing and tourism. The results of this study may probably be generalized to other sharing services on the short-term rental market but, more research on interaction of supply and demand for sharing in other sectors is required. On the methodological part, linear regressions provide just preliminary insight into the relationships between phenomena discussed in this paper.



Since individuals are the key decision makers in the peer-to-peer economy, an agent-based modelling can contribute to further understanding of how individual actors' uncoordinated decisions lead to appearing of new economic and social structures.

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# Digital Sharing Economy

Vardan Mkrttchian, HHH University, North Ryde, Australia

Yulia Vertakova, Southwest State University, Kursk, Russia

## ABSTRACT

The modernization of traditional manufacturing industries and service industries, organization of trading and purchasing procedures, related financial and logistics operations, changes in consumption patterns in the presence of thorough penetration of information technologies and digitalization of economic processes creates the basis for forming new markets and new conditions of their operation. One of the effects of global technological changes and digitalization of consumer experience was the development of a new form of trade and property relations – a share economy. Reorientation of consumer behavior from purchasing to sharing, exclusion of intermediaries from a “client – contractor” chain, strengthening the role of online reputation and self-regulation of the community to ensure the quality of services revolutionize a business model in many areas. Digital share economies will evolve and transform over the next few years. In this regard, it becomes important to study the essence, principles of functioning, and development of new business models.

## KEYWORDS

Digital Economy, Digitalization, Management, Modern Business Models, New Reality, Share Economy, Sharing Recourses

## INTRODUCTION

The modern economy is postindustrial, and it is often called a new, innovative, knowledge-based economy, economy of competencies, and economy of networking. It should be noted that these definitions, on the one hand, have different meanings, and, on the other hand, characterize the same period of economic activity. Recently, the concept of digital economy has emerged in the economic theory and practice of a number of countries. This is due to the fact that the beginning of the XXI century has brought the development of digital technologies on the basis of the information revolution and globalization of the economy. Information in the society and business processes has become a major resource. In the hands of humans, it is transformed into knowledge, and socio-economic relations are increasingly transferred to the network space.

Digital economy operates at three levels - markets and industries, platforms and technologies, environment (Bershadsky et al., 2017). At the first level, suppliers and consumers interact, at the second level; competencies are formed for the development of markets and sectors of the economy. The third level is the environment that creates conditions for the development of platforms and technologies. Technological tools and management models are necessary for its successful operation and development. They will participate in all three levels, create “cross-cutting” technologies to operate in the global market and develop infrastructure for the digital economy (Mkrttchian et al., 2016).

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## **BACKGROUND**

Currently, digital economy is included in the list of main directions of strategic development of Russia and many foreign countries. At the governmental level, the aim of creating conditions for deep system digitalization of life and economic order in Russia is outlined (Vertakova et al., 2016). The development of digital economy can influence the internal and external business environment, its behavior models, but today it is still difficult to implement such models in practice. In any case, the technology itself which makes it possible to build digital control models, has not yet reached the required level of maturity and continues to develop (Plotnikov et al., 2017).

The combination of conditions and factors of information globalization has led to the formation of new economic realities, commonly called “digital economy”, the formation intensity of which is different for individual countries. Big data and digital technologies lead to high-speed decision-making, communication with buyers or suppliers and control, both on the demand side and on the supply side (Vertakova and Plotnikov, 2016). The economy has gradually moved away from the traditional model of centralized organizations, where large operators, often being dominant, are responsible for providing services to a group of passive consumers.

Until now, scientists and practitioners have not formed a consensus on the essence of the digital share economy: some consider it an effective platform for transactions within a network that unites equal participants, while others see it as a source of corruption and shadow cash flows, and other negative events that hinder economic growth. Despite this, none of the economists will deny that share economy has great prospects and it already has a significant impact on global economic processes.

The aim of the present study is to substantiate the essence, peculiarities and features of digital share economy, as well as to determine the directions of its development in Russia. The study was carried out based on materials describing the development of this concept both in the whole world and its spread in the Russian economy.

## **MAIN FOCUS OF THE ARTICLE**

### **Issues, Controversies, Problems**

Interest in the study of share economy is only increasing with the development of digitalization processes. The fact is that many economists call its spread in the world as one of the intense features of digital economy. The basis of share economy is collaborative consumption. In the scientific world, it is believed that the term was introduced in 1978 after the publication of the article by American scientists Marcus Felson and Joe L. Spaeth in the journal *American Behavioral Scientist* (Felson and Spaeth, 1978).

The concept of share economy was first introduced into practice by Professor of Law, Lawrence Lessig at Stanford University in 2008 when he described how many Internet users save significantly by organizing a group in the network and ante up to buy things with a very large discount (Owyang and Jeremiah, 2015). And by 2010 there had been a rapid rise of Internet services for the exchange of services and things between individuals so that the phenomenon of sharing was spoken about everywhere: the American magazine *Time* called the collaborative consumption one of the ten ideas that would change the world (Vidas-Bubanja and Bubanja, 2016).

The works of the following scientists have made a special contribution to the study of the theory of share economy and its role in the modern ecosystem: Don Tapscott (1999), Stephany (2015). The research papers of such scientists and professional communities as the Boston Consulting Group (2010), International Bank for Reconstruction and Development (2016) are devoted to studying the information society, the formation of new technological methods, e-business models, the introduction of digital technologies and digital economy development.

According to the practicing scientist Matofska (2016), it is the strengthening of global communication accessibility that promoted the emergence of new economic relations on the principles of collaborative consumption.

In their study on consumer economics base on the principles of data sharing, General partner of Kleiner Perkins Caufield & Byers, Executive Vice-President Mike Abbott and Chief Executive Officer of AIG commercial insurance department, Rob Shimek believe that secure data sharing will drive the new digital economy: “If the world of the Internet of things is the beginning of a new industrial revolution, then the secure sharing of large amounts of data will be a prerequisite for its implementation” (2017).

At the same time, the concept of share economy remains debatable from the point of view of practical expediency. So, according to Arun Sundararajan, Professor of Stern School of Business in New York University: “...it is necessary to invent a new economic discipline to know exactly the impact of share economy...” The biggest question for Professor – whether all this creates a new industry or displaces existing enterprises? (2016).

Other critics have collected voluminous data representing an alternative view on share economy. A particularly valuable source is an Inside Airbnb Murray Cox report, which is widely used in many media outlets to inform about the risks of the new paradigm (2016).

Threats and weaknesses of Uber, Airbnb business and share economy they promote are revealed in the T. Slee book “What’s Yours is Mine: Against the Sharing Economy” (2015).

The problems of digital share economy model development do not remain without attention on the part of the European economists.

For example, a researcher at Bruegel (Belgium) Georgios Petropoulos notes that in order to enhance the capabilities of the new business model, it is advisable to adopt an agreement on a single interpretation of the category “share economy” and the classification of participants in this ecosystem in all countries of the European Union (2017).

The staff of analytical services at PricewaterhouseCoopers predicts that financial, housing, transportation services will be prospective transactions in the main areas of share economy in Europe. They will provide business development (2018).

Thus, the problems of digital share economy model development are global and this is confirmed by the research of scientists – economists of different continents and countries.

At the same time, the problems of share economy development and digitalization are mainly considered as a whole, without studying their interaction and mutual influence.

## **Solutions and Recommendations**

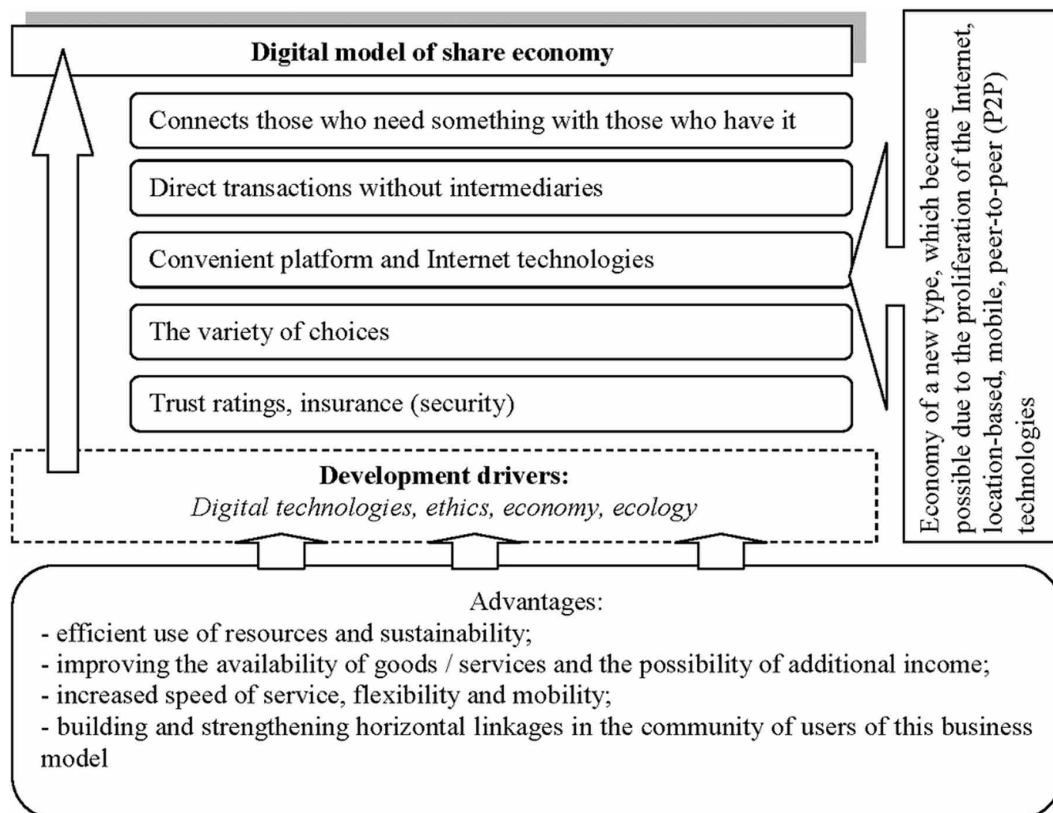
Today civilization is moving towards a new model of increasingly decentralized organizations, where large operators are responsible for aggregating the resources of many people to provide services to a much more active group of consumers (Polyanin et al., 2017). This shift marks the emergence of a new generation of “dematerialized” organizations that do not require physical offices, assets, and even employees.

The features of share economy in the era of digitalization processes development are shown in Figure 1.

According to the author, the principles of business operation under the conditions of digital share economy (DSE) are:

- DSE companies develop their own system of quality control of services based on horizontal relationships and trust of users (user reviews, rating system);
- DSE companies make it possible to rationally use resources or exchange them, reducing the load on the environment;
- DSE users receive additional earnings – about 25% of the annual income of a family;

Figure 1. Features of the shared economy (made up by the authors)



- users whose main income is generated by DSE are self-employed or micro-entrepreneurs, thus contributing to the development of the economy;
- DSE companies allow citizens around the world to come together to share resources (even small DSE companies can be global);
- it is in the interests of DSE companies to improve the rules for the members of their communities, ensuring that users comply with all legal requirements (this applies to all aspects of activities: from informing service providers about the mandatory procurement of permits to control of services quality being provided).

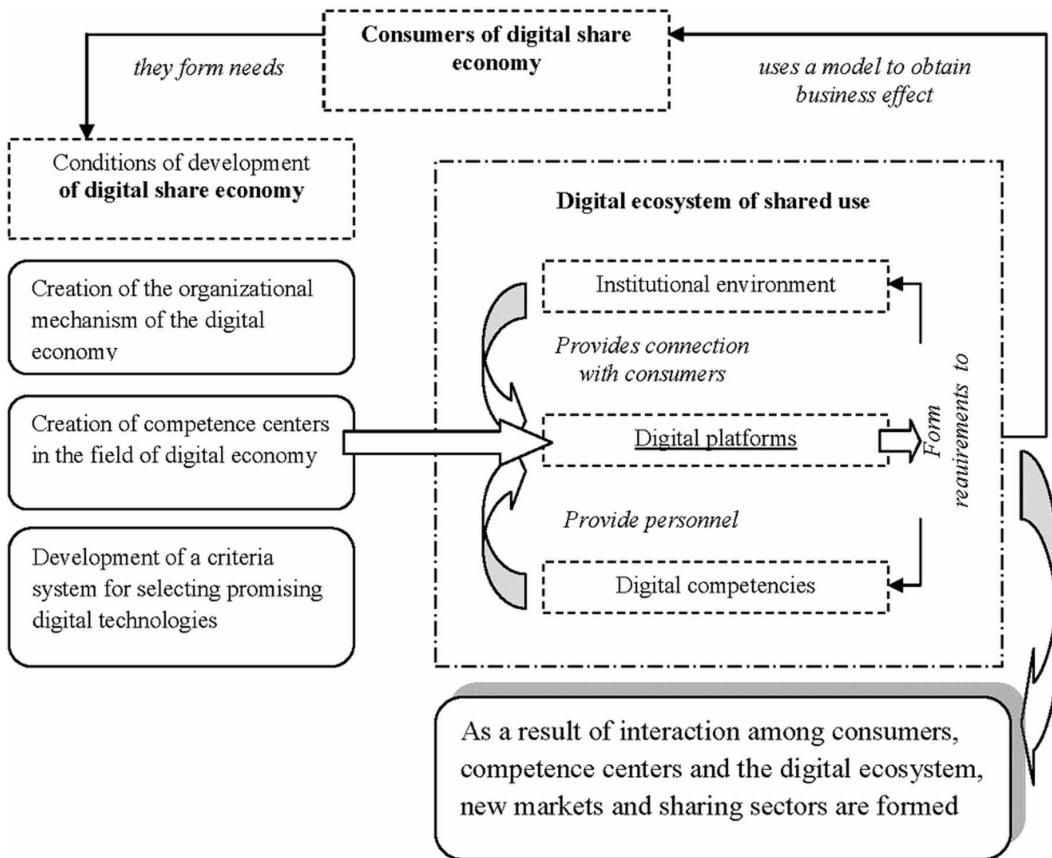
The problem with this model is that, in most cases, the value produced by the group is not shared equally among all those who contributed to its production; profits are captured by large intermediaries that operate the platforms. New digital technologies in business are designed to eliminate this imbalance. The concept of operation of the digital ecosystem of shared use is shown in Figure 2.

A digital platform is a tool that allows you to find the desired effect and create a chain of cooperation for it, or find the right resource and set it to a known effect, and make it in the form of a real business.

The characteristic features of modern digital platforms are:

- Mass introduction of information and communication technologies in all spheres of life
- Escalation of the size and complexity of the platforms
- Complexity of development and assembly environment

Figure 2. Concept of operation of the digital ecosystem of shared use (made up by the authors)



- Widespread use of parallel and distributed computing
- Cloud computing, mass implementation of mobile platforms, the Internet of things (lack of locally isolated systems).

The operational structure of a share economy digital platform is shown in Figure 3.

The most developing directions of digital platforms in share economy are:

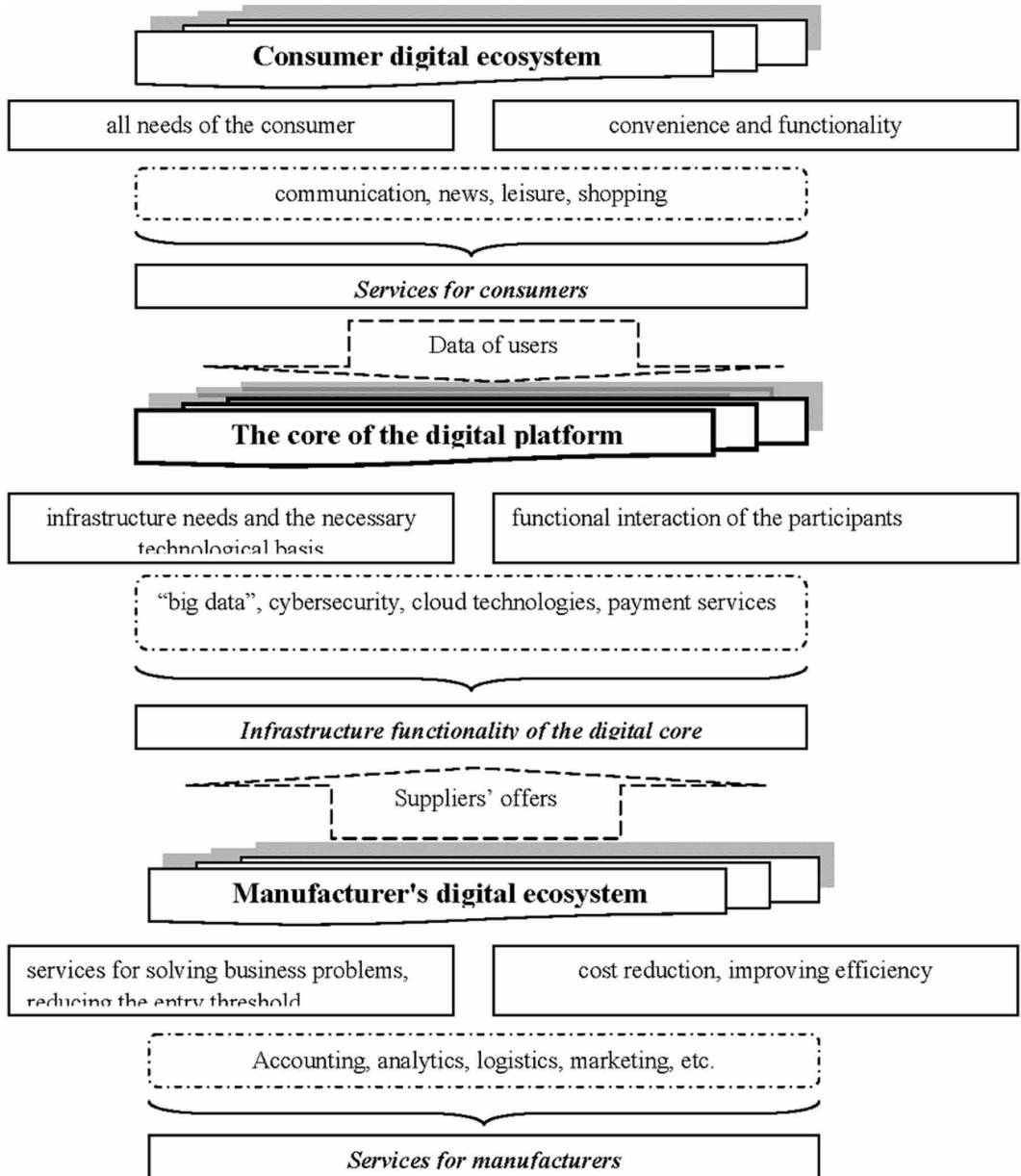
- open educational projects
- Rent / infrastructure leasing
- Open / virtual laboratories
- Social scientist networks
- Data platforms
- Crowd funding platforms
- Open corporations / hackathons
- Digital services

The short review of certain platforms functionality in digital share economy is on the figure 4 (Kuladzi et al., 2017) and (Lytneva et al., 2017).

Effects of digital model in share economy are:



Figure 3. Operational structure of the digital platform of share economy (made up by the author)

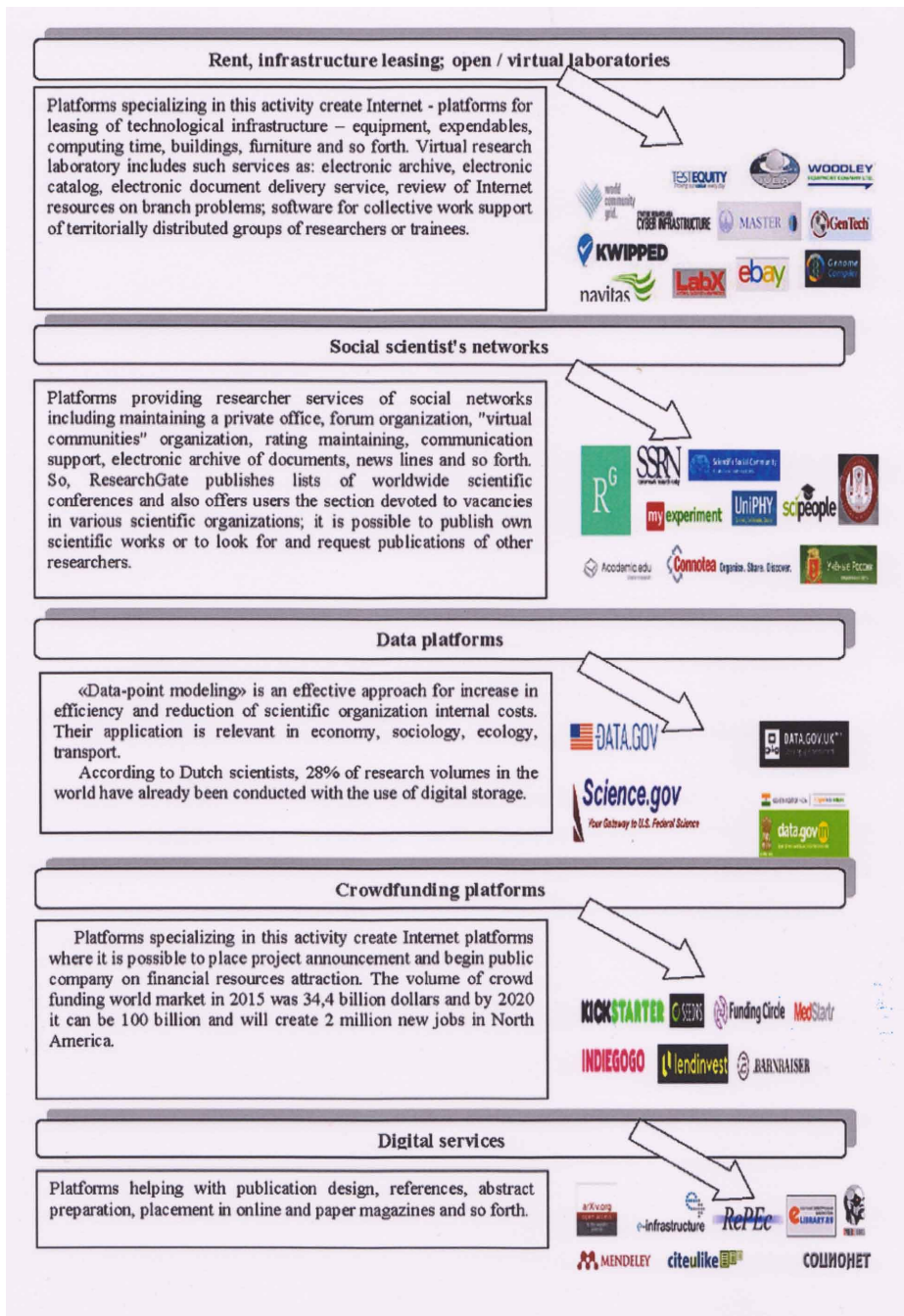


- Reorientation of consumer behavior from acquisition to sharing
- Intermediaries exception from a chain “client performer”
- strengthening of online reputation role and self-regulation of community for ensuring service quality

Digital share economy grows exponentially.

Exponential mathematical model of share economy primary growth as follows:

Figure 4. Review of certain platforms functionality in digital share economy



$$V_t = V_0 k_t \tag{1}$$

where  $V_t$  – expected volume of share economy for the reporting period;

$V_0$  –initial volume of share economy use, i.e. functioning result of primary digital platforms in share economy;

$k_t$  –number of digital platforms in final volume of share economy.

$$DT = \frac{t \log_n}{\log \left( \frac{V_t}{V_0} \right)} \quad (2)$$

where DT –increase period in volumes of digital share economy;

t – Time between the first and subsequent measurements (in years);

$V_0$  – economy volume at primary measurement;

$V_t$  – economy volume at subsequent measurement.

Thus, basic mathematical model of exponential growth of primary digital share economy is:

$$V_t = V_0 \exp r t \quad (3)$$

where  $V_t$  – expected volume of share use for the reporting period;

$V_0$  - initial volume of share economy;

r – Exponential growth coefficient;

t – Time between the first and subsequent measurements (in years).

So, if in 2014 the world volume of digital share economy was 14 billion dollars. According to Forbes it will be 335 billion dollars by 2025.

In 2016 according to the European Commission the volume of economy transactions only in Europe was about 28 billion euros.

In Germany within 4.0 Industry Program there was a replacement of 600 thousand jobs into 1 million jobs in digital economy in 2015 (World Development Report, 2016).

In Italy development of share economy has just begun. Research of Pavian university made by Luciano Canov and Stefanie Milyavakka shows that turnover of shared goods in Italy is 3,5 billion euros. By 2025 it will increase to 14 billion euros and even can exceed 25 billion euros. This prospect defines circular economy as the main driving force for future development of Italian economy (Polyanin et al., 2017).

Now 44% of USA consumers are familiar with share economy and 19% of consumers participate in these economic processes. And according to analysts' forecasts these figures will continue to grow (Abbott and Shimek, 2017). About 6 million USA residents are independently employed people working through digital platforms (Abbott and Shimek, 2017).

In China instead of the term "share economy" the term "general access economy" is used. In China this phenomenon has gained distribution because 86% of consumers use mobile payments. China advances other countries on this indicator. Even in rural areas mobile payments are used by 31,7% of population (Petropoulos, 2017).

In particular, trade turnover of this economy sector was 499 bln. dollars 2016. It increased more than twice in comparison with the previous year. In 2017 branch market was 680 bln. dollars. New digital services gave 5,85 million new jobs. More than 50 million people are employed. It is about

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**Table 1. Contribution of digital economy of joint use to GDP of the certain countries of the world (World Development Report, 2016), (PricewaterhouseCoopers, 2018) and (Vidas-Bubanja and Bubanja, 2016)**

Country	GDP in current prices in 2016, bln \$	Contribution of digital share economy to GDP, %
The USA	18,56	5,4
China	11,39	6,9
Russia	1,27	5,7

5,5% of country working population. About 600 million people are participants of the market. This is practically every second Chinese.

In 2018, according to China State information center, volume of share economy in China exceeds 230 bln. dollars. This is 1,67% of country GDP. At the same time nearly 45% of world volume is share economy. China hopes that by 2020 share economy will be 10% of GDP and by 2025 – 20% (Petropoulos, 2017).

According to Forbes volume of Russian share economy market was 230 billion rubles in 2017. According to RAEC and PBN Hill+Knowlton Strategies indicator has grown by 20 percent in comparison with 2016 and in short term segment development will accelerate. With the existing annual growth Russia needs less than one and a half year to have 300 billion rubles as volume of this market.

The main reason for rapid growth of this economy model is connected with the fact that Russia was concentrated on development of similar services later than abroad. In spite of all factors Moscow became one of the last European cities where car sharing has appeared (Polyanin et al., 2017).

Thus, digital share economy is dynamically developing social and economic models. It makes a serious contribution to development of national and regional economies.

According to PAEK and OC&C contribution of digital share economy to countries' GDP in current prices in 2016 was 3,8% (Lytneva et al., 2017) and (Slee, 2015) (Table 1).

One of breakthrough trends of share economy development is industrial Internet. According to analysts' forecasts the number of machines' operators reduced (40%) in 2015. Machines are operated by artificial intelligence and interact with each other through 5G networks. Production control will be exercised by highly qualified specialists by means of smart glasses and smart. Machines' breakage will be reduced for 50% and idle time for 60% (Kuladzhi et al., 2017). The current state of industrial Internet is described in Figure 5.

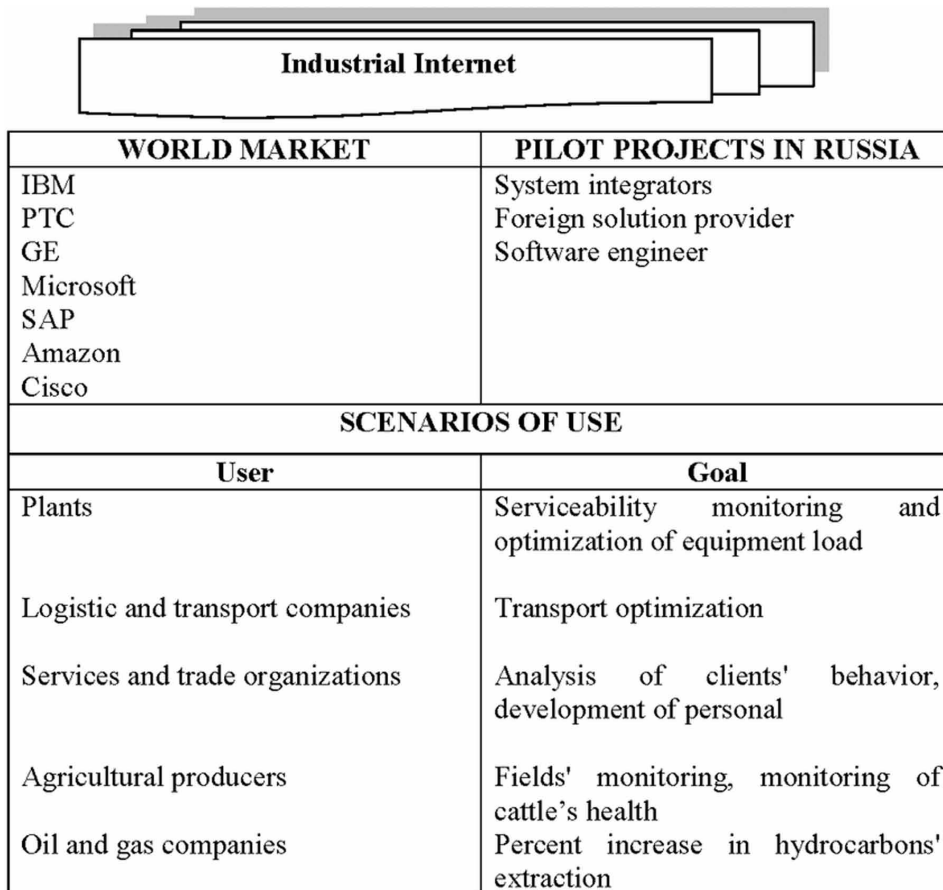
At the same time, there are factors interfering development of digital share economy model:

- Lack of legal methodological support which have to be observed at model realization
- Difficulties of collective opinion use of all parties involving into digital ecosystem, due to the lack of the best practice
- Difficulties in infrastructure control and management
- Lack of reliable and effective technology solutions (Kuladzhi et al., 2017)

Thus, digital technologies allowing providing share economy functioning continue their development.

In conditions of digital share economy, data become a form of capital. Formation, accumulation and use of such capital demand close cooperation of all participants involved into economic processes. However economic advantages have those states and economic entities which have not only access to data but also effective technologies of their processing. High-quality economy growth is possible with the technologies allowing estimating precisely current state of markets and branches. It is also

Figure 5. Industrial Internet in share economy



possible to carry out effective forecasting of their development and react quickly to changes in an environment of national and world markets.

The main principles of management are:

- Data acquisition in real time
- Economic processes management based on automated analysis of large amount of data
- High speed of decision-making, rules change in real time - instant response to changes and environment interactivity
- Orientation to the specific user, life situations of clients as business process (user becomes closer thanks to mobile devices and the Internet)
- Digital ecosystem is as synergy center of all participants
- Thus, not only technologies, but also new management models of data and technology allowing carrying out rapid response and modeling of future calls and problems are important factors of success in share digital economy.

In this regard, it is necessary: firstly, to build new global economic model of "digital share economy"; secondly, to support digital business models which are effective now; thirdly to think not only about ideal steady business - models but also about organization of "digital transformation" of present economic agents; fourthly, heads of economic entities have to think constantly about

competitiveness of digital business and have direct responsibility for that. Then “changes” (and organizational and administrative mechanisms) will become their main priority.

Digital share economy washes away traditional borders between economy and everyday life. In this regard, public authorities need to develop such policy which provides economy growth and helps people to live and earn as they want. Joint consumption influences economy even if it doesn't influence GDP growth. The result of this is personal wellbeing and also the need for natural resources decreases. However, it increases the risks connected with social protection and social security and also with corporate taxation. Therefore, a government needs to make so that joint consumption became favorable.

At a stage of digital share economy development under lack of sufficient practice for expediency assessment of separate restrictive measures introduction, restrictive regulation is capable to control new technological generation of economy development. And this respectively leads to lag Russia from leading world economies in the field of modernization of traditional production branches, service branches and also modernization of management procedures.

## **FUTURE RESEARCH DIRECTIONS**

In this regard it is necessary to adhere to non-prohibitive legal regulation in this sphere. Legal regulation of digital economy has to be aimed, first of all, at providing necessary conditions for its development, including support of innovative development and contribute introduction and development of digital technologies.

## **CONCLUSION**

It is proved that new model of consumer economy in conditions of data sharing; the world operated by sensors and connected devices in conditions of digitalization open global opportunities. Interaction processes establishing digitalization of participants allow business structures to unite potential opportunities, harmonize technological interests and reduce risk level and as a result, promotes increase in level of their innovative activity. The results also promote creation of perspective base for further development of economy branches:

1. The concept entity of “joint consuming” is not new. However, with the advent of digital technologies, pro-active use of virtual environment for social and economic relations is possible.
2. Digital model of share economy is capable to change ecosystem radically to which we got used. It is possible to do at first by certain sectors conversion and finally by means of all global economic market transformation.
3. It is defined that digital share economy is new social and economic model influencing consumption of goods and services in a revolutionary way. Ecosystem allows uniting people and companies online in community for the purpose of resources sharing or exchanging.
4. Digital platforms create self-regulating and self-governed share economy. Computer programs control this economy. Transactions are carried out by means of self-actualized digital contracts. Such type of decentralized management reduces inefficient operations and increase safety and stability level of economic system.
5. Digital share economy carries out freely operations on own conditions. It offers prospects for innovative intermediary service development in future. Such services could allow the third party approve or decline transaction in case of disagreements between other parties that demands further development of standard, legal and methodological support.

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*Vardan Mkrttchian received his Doctor of Sciences (Engineering) in Control Systems from Lomonosov Moscow State University (former USSR). Dr. Vardan Mkrttchian taught for undergraduate and graduate student's courses of control system, information sciences and technology, at the Astrakhan State University (Russian Federation), where he was the Professor of the Information Systems (www.aspu.ru) six years. Now he is full professor in CAD department of Penza State University (www.pnzgu.ru). He is currently chief executive of HHH University, Australia and team leader of the international academics (www.hhhuniversity.com). He also serves as executive director of the HHH Technology Incorporation. Professor Vardan Mkrttchian has authored over 400 refereed publications. He is the author of over twenty books published of IGI Global, included ten books indexed of SCOPUS in IT, Control System, Digital Economy, and Education Technology. He is also has authored more than 200 articles published in various conference proceedings and journals.*

*Yulia Vertakova Professor, D.Sc.(Economy) is Head of Department of regional economics and management of Southwest State University, Russian Federation. She is the leading scientist of digital economy, industry development 4.0, indicative governance of sustainable development of regional economy, cluster initiatives in the region, structural transformation industrial complex regulation in terms of digitalization of economy, green economy, scaling business models, business planning, innovative management, strategic management, socio-economic systems, indicative planning, regional economics, socio-economic forecasting, proactive management, reengineering of business processes.*

# **New Empirical Data Findings for Student Experiences of E-Learning analytics Recommender Systems and their Impact on System Adoption**

Hadeel Alharbi, University of New England, Armidale, Australia

Kamaljeet Sandhu, University of New England, Armidale, Australia

## **ABSTRACT**

This article examines Saudi Arabian students' experiences of using an e-learning analytics recommender system during their study and the extent to which their experiences were predictors of their adoption and post-adoption of the system. A sample of 353 students from various universities in Saudi Arabia completed a survey questionnaire for data collection. Results showed that user experience is a significant predictors of student adoption and post-adoption of an e-learning recommender system. Based on these findings, this study concluded that universities must support students to develop their awareness of, and skills in using an e-learning recommender system to support students' long-term acceptance and use of the system.

## **KEYWORDS**

Adoption, Elearning Analytics Recommender System, TAM, Universities

## **1. INTRODUCTION**

E-learning refers to the use of electronic information, multimedia, and communication technologies (ICT) in education. It is mostly inclusive of all education technology types related to training, learning, and teaching. The generally acknowledged advantages of e-learning include: the provision of flexible and convenient learning pathways, geographical reach, cost effectiveness in course delivery, and more effective management of learning spaces (Al-Gahtani, 2016). Within the suite of e-learning technologies is the e-learning analytics recommender systems (ERS). Broadly categorised as a collaborative, content-based, or hybrid system, an ERS primarily helps students who lack adequate personal experience or competency to evaluate and make better choices from the potentially overwhelming number of alternative items (Okechi and Kepeghom, 2013). This done by first predicting and then responding to the user's areas of interest. Despite the rapid growth in the Saudi ICT market, adoption of ICT applications such as e-learning solutions remains limited (Alenezi et al., 2012; Al-Gahtani, 2016). As such, Saudi Arabia is regarded as a late adopter of e-learning technologies. Therefore, this study explores the user experience factors impacting the adoption of ERS by university students in Saudi Arabia. Understanding these factors is crucial to learning activities that aim foster the adoption of such technologies in Saudi Arabia the wider Arab region. Data analysis showed that students' perception regarding the usefulness of the e-learning recommender system was a key determinant of system acceptance as it was seen as an educational tool to reduce task times and improve

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academic performance. The primary drivers for students to perceive the usefulness of the e-learning recommender system were the anticipated benefits of the system to access educational materials, the ability of the system to improve their academic performance, effectiveness, productivity and ability of the system to enable them to accomplish their educational tasks quickly. Data also showed that the perception that the e-learning recommender system was easy to use contributed to the use of the system. In other words, the easier the system was to use, the more likely the students would accept it. Perceived ease of use was measured in terms of system flexibility, system ease of use in terms of learning and understanding, and the ease of skills assessment of its users.

## 2. METHODOLOGY

Qualtrics survey software was used to develop a web-based survey divided into two sections. The first section captured the respondents' profiles (i.e. demographics data) using multiple-choice questions. The second section included close-ended scale questions using a five-point Likert scale with end points of "strongly agree" and "strongly disagree" to measure the independent and dependent variables related to the research model.

The web-based questionnaire was distributed via email to 1000 students and was accessible to students from 5 February 2016 to 15 May 2016. Participation was completely voluntary. In addition, 550 questionnaires were randomly distributed by the researcher and three professional survey collectors recruited to distribute and collect the survey data from different locations. Of the 406 returned surveys, 53 were excluded from analysis either because the students indicated that they had not used an ERS or due to missing response items. The remaining 353 surveys were included in the analysis.

## 3. RESULTS

### 3.1. Sample Characteristics

Descriptive statistics showed 82.4% of the respondents were females and 17.6% were males. Most respondents (85.6%) were aged between 18 and 23 years, and most (81.3%) perceived their level of experience in using computers as intermediate. The majority of respondents (68.8%) indicated they used the Internet more than once a day, and 47.9% of respondents used computer-assisted instruction as their e-learning educational technology, compared to 41.6% who used e-learning systems, and 10.5% who used the World Wide Web as their educational technology (see Table 1 for full details of the sample characteristics).

### 3.2. Students' Experience with e-Learning Recommender System

User experience data is important to IS/IT research to inform decision making around the system design and to strengthen the development process (Djamasb et al., 2016). The user experience is also important for understanding continuous usage as a determinant of IT success (Deng et al., 2010). User experience in this study was measured using a seven-item scale:

1. Students' skills
2. Finding information on the ERS
3. Knowing how to use the ERS
4. Finding the ERS
5. Navigation within the ERS
6. Having enough awareness when interacting with the ERS
7. Confidence when using the ERS

**Table 1. Participant demographic and computer use details**

Measure	Item	Frequency	Percentage
Gender	Female	291	82.4%
	Male	62	17.6%
Age	18-23 years	302	85.6%
	24-29 years	44	12.5%
	30-35 years	7	1.9%
Computer Use Experience	Beginner	27	7.7%
	Intermediate	287	81.3%
	Advanced	39	11.0%
Internet Usage Frequency	Once a week	6	1.7%
	Once a month	17	4.8%
	Once a day	87	24.7%
	More than once a day	243	68.8%
Educational Technology Used for Learning	E-learning	147	41.6%
	Computer-assisted instruction	169	47.9%
	Word Wide Web	37	10.5%

### 3.2.1. Students' Skills

Previous studies have shown a significant relationship between experience and user acceptance and post-adoption IT usage (Castaneda et al., 2007; Davis et al., 1989; Deng et al., 2010; Hsu and Lu, 2004). In this study, most Saudi students (75.8%) answered 'strongly agree' or 'agree' that they had become skilful in using the ERS (see Table 2 for all descriptive statistics). Significantly fewer participants (11.9%) indicated they 'strongly disagree' or 'disagree' with the proposition (see Table 2 for all descriptive statistics).

### 3.22.. Loccating Information on the e-Learning Recommender System

Previous literature suggested that the user's ability to use new technologies to find relevant information will speed up its adoption and diffusion (Genius et al., 2006; Pavlou and Fygenson, 2006). Most participants (74.2%) in this study reported they 'strongly agree' or 'agree' that they can find relevant information about the ERS (see Table 3). This is compared to 12.7% of respondents who reported that they 'strongly disagree' or 'disagree' with the proposition (see Table 3 for all descriptive statistics).

### 3.2.3. Knowledge of How to Use the e-Learning Analytics Recommender System

A significant prerequisite for performing a behaviour is often possession of the necessary knowledge and skills to undertake the behaviour (Pavlou and Fygenson, 2006). In this study, most Saudi students (71.6%) indicated 'strongly agree' or 'agree' to the proposition that they had become skilful in using the ERS (see Table 4). This is compared to only 12.4% of students indicated 'strongly disagree' or 'disagree' in response to the statement (see Table 4 for all descriptive statistics).

### 3.2.4 Finding the e-Learning Analytics Recommender System

Identifying the location of appropriate services and hyperlinks can be an important factor in achieving a satisfying online experience (Lee, 2009). Almost three-quarters of the participants In this study

**Table 2. Students' skills in e-learning analytics recommender system use**

UE1					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	1.4	1.4	1.4
	Disagree	37	10.5	10.5	11.9
	Not sure	43	12.2	12.2	24.1
	Agree	191	54.1	54.1	78.2
	Strongly Agree	77	21.8	21.8	100.0
	Total	353	100.0	100.0	

**Table 3. Locating information on the e-learning analytics recommender system**

UE2					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	39	11.0	11.0	12.7
	Not sure	46	13.0	13.0	25.8
	Agree	186	52.7	52.7	78.5
	Strongly Agree	76	21.5	21.5	100.0
	Total	353	100.0	100.0	

**Table 4. Knowledge of how to use the e-learning analytics recommender system**

UE3					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	1.4	1.4	1.4
	Disagree	39	11.0	11.0	12.5
	Not sure	54	15.3	15.3	27.8
	Agree	168	47.6	47.6	75.4
	Strongly Agree	87	24.6	24.6	100.0
	Total	353	100.0	100.0	

(73.9%) indicated 'strongly agree' or 'agree' that it was is easy for them to locate the ERS as the system is clearly found in the university homepage (see Table 5 for all descriptive statistics. Conversely, 10.2% of the participants indicated 'strongly disagree' or 'disagree' in response to the statement.

### 3.2.5. Navigation of the e-Learning Analytics Recommender System

The design and layout of a website and the extent to which they contribute to a problem-free user navigation are important predictors of IT/IS adoption (Lee, 2009). The right navigation design will save users both time and efforts and support them to minimise performance errors leading to better adoption rates (Hasan, 2016; Ganguly et al., 2009). The data analysis results show 72.5% of

**Table 5. Finding the e-learning analytics recommender system**

UE4					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	30	8.5	8.5	10.2
	Not sure	56	15.9	15.9	26.1
	Agree	184	52.1	52.1	78.2
	Strongly Agree	77	21.8	21.8	100.0
	Total	353	100.0	100.0	

participants reported that they ‘strongly agree’ or ‘agree’ with the statement that they found the ERS easy to navigate. Conversely, 11.6% of respondents indicated ‘strongly disagree’ or ‘disagree’ in response to the statement (see Table 6 for all descriptive statistics).

### 3.2.6. Students' Awareness when Interacting with the e-Learning Analytics Recommender System

When using an online system, users must divide their attention between the task to be performed and the surrounding environment. Distraction as a construct has been widely examined in the literature on human-computer interaction for its impact on user performance of a primary task. Previous studies have demonstrated that environmental distractions can negatively impact the user's ability to process information and use the technology efficiently, and subsequently diminish their overall performance experience and behavioural intention to use the technology (Coursaris et al., 2012). In this study, 13.3% of participants responded with ‘strongly disagree’ or ‘disagree’ to the proposition that they were less aware about other things around them when interacting with the ERS (see Table 7). Conversely, most students (75.1%) indicated ‘strongly agree’ or ‘agree’ with the proposition.

### 3.2.7. Students' Confidence in e-Learning Recommender System Use

In relation to e-learning, user confidence is considered a technological efficacy and is typically described as his/her ability to complete an educational task using the e-learning system (Sawang et al., 2013). As such, user confidence in e-learning system use is identified as a predictor of both usage behaviour (Güllü et al., 2016; Cheon et al., 2012) and of continued use of the system (Mohammadyari and Singh, 2015). It emerged in our data analysis that most students (78.8%) indicated ‘strongly agree’

**Table 6. Navigation of the e-learning recommender system**

UE5					
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	35	9.9	9.9	11.6
	Not sure	56	15.9	15.9	27.5
	Agree	165	46.7	46.7	74.2
	Strongly Agree	91	25.8	25.8	100.0
	Total	353	100.0	100.0	

Table 7. Students' awareness when interacting with the e-learning analytics recommender system

UE6					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.3	.3	.3
	Disagree	46	13.0	13.0	13.3
	Not sure	41	11.6	11.6	24.9
	Agree	194	55.0	55.0	79.9
	Strongly Agree	71	20.1	20.1	100.0
	Total	353	100.0	100.0	

or 'agree' to the statement that when they were successfully using the ERS for one educational task, they felt confident to use it for other educational tasks (see Table 8 for all descriptive statistics). In comparison, only 12.4% of the respondents indicated 'strongly disagree' or disagreed with this statement. This finding suggests that students were keen to use the ERSs for more than one educational task and their usage behaviour grows with increased experience and confidence.

### 3.3. Students' Continued use of the e-Learning Analytics Recommender System

User expectations and the evolution of their perceptions of the technology over time are important considerations when determining continued use or post-adoption behaviours (Dağhan and Akkoyunlu, 2016; Karahanna et al., 1999). Indeed, repeat users; that is, post-adopters can better evaluate the attributes of a technological system based on their broader experience with the system (Chiu et al., 2014). While the initial acceptance of an e-learning system is a significant first step toward achieving e-learning success, long-term success still requires continued usage (Dağhan and Akkoyunlu, 2016; Lee, 2010). Hence, understanding the factors affecting users' intention to continue using e-learning is very noteworthy for a successful implementation of ERSs as it will assist vendors and developers to provide better services for learners and teachers. In this study, continued use of the recommender system was measured via the items: 1) the intention to continually use recommender system in the future.

Table 8. Students' confidence in e-learning analytics recommender system use

UE7					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	.8	.8	.8
	Disagree	41	11.6	11.6	12.5
	Not sure	30	8.5	8.5	21.0
	Agree	196	55.5	55.5	76.5
	Strongly Agree	83	23.5	23.5	100.0
	Total	353	100.0	100.0	

### 3.3.1. *The Intention to Continually use the e-Learning Recommender System in the Future*

Our study showed that 74.8% of students indicated ‘strongly agree’ or ‘agree’ when asked if they intended to continue using the ERS. In contrast, 5.9% of students indicated ‘strongly disagree’ or ‘disagree’ for this item (see Table 9 for all descriptive statistics).

## 4. DISCUSSION

The findings to emerge from the data analysis suggest that university students’ experiences of using an ERS plays an important role in predicting their acceptance, use and continued use of the system. Overall, our descriptive statistics showed that students’ skills, awareness when interacting with the system, confidence levels, and ability to navigate and locate information on the ERS were significant determinates of students’ acceptance and continued use of the of ERS. This is consistent with extant literature which demonstrates that user experience plays a significant role in elucidating e-learning adoption (Al-alak and Alnawas, 2011). Users who are skillfully in operating computers, the Internet, and e-learning systems, are more likely to have a positive attitude towards e-learning system use (Lee et al., 2013; Purnomo and Lee, 2013).

Given that significantly more participants indicated they had become skilful in using the ERS (see Table 2), students’ skills and experience clearly play an important role in predicting students’ acceptance and continued usage of ERS. When this result is considered in relation to the result showing most participants found it easy to locate the ERS at the university (see Table 5), it is important for universities to provide students – newly enrolled students, particularly – with information on how to optimise their access and use of the ERS. University students increasingly represent diverse technological demographics and thus present with many and diverse learning needs and preferences (Kim and Forsythe, 2010). Therefore, universities must ensure students can properly navigate the system to meet their learning needs and to inspire continued use.

In addition, the finding in this study that most students thought that the ERS layout design was easy to navigate and that they could access information and services on the system without difficult has importantly implications for the integration of ERSs in university classrooms. The finding that student distraction can be an issue suggests that universities must increase the awareness of students about the possible distractions and external interruptions that might impact their attention and focus while interacting with the ERS (Cheon et al., 2010).

**Table 9. Intention to continue using the e-learning analytics recommender system**

		CU1			
		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Strongly Disagree	6	1.7	1.7	1.7
	Disagree	15	4.2	4.2	5.9
	Not sure	68	19.3	19.3	25.2
	Agree	152	43.1	43.1	68.3
	Strongly Agree	112	31.7	31.7	100.0
	Total	353	100.0	100.0	



## **5. CONCLUSION**

This study found that user experience can significantly impact students' adoption and post-adoption of ERSs. If the students are skilful, able to locate information, know how to navigate between different sections of the ERS, have adequate awareness about the system, and are confident when using the system then they will more likely accept and use the ERS.

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*Hadeel Alharbi is a PhD candidate at the University of New England.*

*Sandhu's teachings and research expertise is in information systems adoption, management accounting and corporate governance adoption, and e-learning acceptance at universities.*

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