



Digital Inclusion Index: A Measurement of ICT Advancements in Bahrain & GCC

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Abstract: This paper deals with digital inclusion trends in Bahrain and GCC. Four digital inclusion variables were used for studying the digital inclusion in Bahrain. The same set of variables was used for all the GCC countries including Bahrain to rank them according to the Digital Inclusion Index. The digital inclusion trends show that mobile subscriptions and mobile internet users are the most popular amongst the variables. The digital inclusion index shows that the UAE is on top, followed by Bahrain. The correlational analysis shows that there is a significant association between the digital inclusion indicators and economic indicators. To conclude, the study observed that Bahrain is doing far better than the other GCC countries with regard to digital inclusion from the access point of view except the UAE. The study also suggested certain measures to improve digital inclusion in Bahrain.

KEYWORDS: DIGITAL INCLUSION, DIGITAL INCLUSION INDEX, CORRELATIONAL ANALYSIS.

INTRODUCTION:

In the present day world, the communication and technological services are very important and must be accessible and affordable to all so as to achieve a sustainable economic development. This has been realized by countries all over the world acknowledged.

REVIEW OF LITERATURE:

Researchers have made an extensive literature survey to develop a theoretical base in conducting this study.

The Swinburne Institute for Social Research (2015) has developed the digital inclusion index which measures the digital inclusion level of the population as a whole and also monitors this over time. The construction of this index and results thereof were transparent. [3]

According to Jalaluddin Abdul Malek et.al (2012), the techno-fear among the samples was removed by technology. They also found that there was a moderate level use of the applications in the device and internet access among the samples. [4]

Peter Walton et.al (2013), are of the view that the path of economic development is influenced by increased support from digital technologies as a part of day-to-day life. They also have opined that digital inclusion is progressively becoming one of the major challenges of social justice and is vital to educational achievement; employment participation; economic development; health and wellbeing and social inclusion. [5].

Anderson, B and Speed, E, (2009) discuss the concept of social and digital exclusion and suggest that a focus on the digital mediation of social processes may provide more purchase for public service providers. This focus leads to the consideration of the way in which digital services might support a range of health-related factors which are both directly and indirectly linked to specific health outcomes. [6]

In the words of Ronedo F & et.al, despite the evolution in deployed infrastructure and in the way that people access information, there still are those who are socially excluded and have no access to information due to their geographic location (e.g., riverside/countryside communities) [7]



Peter Walton Tegan Kop, David Spriggs and Brendan Fitzgerald, (2013) are of the opinion that in the present day world, Digital inclusion (and equality) is increasingly becoming one of the major social justice challenges. They also emphasize digital inclusion for the reason that it is vital to employment participation, economic development, educational achievement, social and civic inclusion, health and wellbeing. [8]

Don Perlgut (2011) concludes in his research that digital exclusion will rival all other social and economic determinants. He is also of the view that digital inclusion cannot be separated from economic and social inclusion, and will become a major factor in assisting (or losing) social and economic justice. [9]

Casacuberta, David (2007) has identified the five most promising strategies in terms of establishing best practice in the use of e-learning for social and digital inclusion, such as that combining teaching ICT with other non-digital knowledge is equally important to social inclusion, communication to the target groups, establishing peer to peer teaching systems, creating informal environments and using teachers similar to the students themselves, especially in cases of e-learning focused towards women. [10]

According to Radcliffe, Daniel and Voorhies, Rodger (2012), digital financial inclusion would look like and present a growing body of evidence which suggests that connecting poor people to a digital financial system will generate sizable welfare benefits. [11]

Reder, S. (2015) explored a digital inclusion pathway leading from digital access to digital literacy. The pathway consists of four observable stages in the data: Digital Access, Digital Taste, Digital Readiness, and Digital Literacy. [12]

STUDY OBJECTIVES:

1. The main objective is to study the access dimension of digital inclusion in Bahrain over a period of time.
2. To develop a digital inclusion index based on access dimension for GCC countries.
3. To study the correlation between the digital inclusion indicators and economic indicators.

HYPOTHESES OF THE STUDY:

The study was carried out with the following null hypotheses:

- Bahrain leads the digital inclusion index among GCC countries.
- There is no significant relationship between economic indicators and digital inclusion indicators in Bahrain.

RESEARCH METHODOLOGY:

The research approach for this study is basically deductive as the researchers have chosen to achieve the research objectives through testing hypotheses. The research design to be adopted is conclusive as the research aims to provide final and conclusive answers to the research question. The study purely relies on secondary data which were extracted from World Development Indicators, The World Bank, updated date: 03/01/2017.

In general the digital inclusion is measured with an index called 'Digital Inclusion Index' using the four dimensions which are; Access, Affordability, Key Online Activities and Digital Literacy. However, for the present study the researchers have used only one dimension of the digital inclusion, i.e. access. The following are the variables which are used for measuring access dimension of the digital inclusion, which are mainly related to access dimension:

- Mobile cellular subscriptions (per 100 people)
- Fixed telephone subscriptions (per 100 people)
- Fixed broadband subscriptions (per 100 people)
- Internet users (per 100 people)

In constructing the current Digital Inclusion Index (DII) the researchers have not adopted a three-dimensional approach like Human Development Index by UNDP, rather one dimensional approach was used in the study.

Digital Inclusion Index Formula:

The Digital Inclusion index¹ is calculated with the following formula:

$$Vi = \frac{Ai - mi}{Mi - mi}$$

Vi = Index of a Variable

Ai = Actual value of variable i

mi = lower limit on the value of variable i

Mi = upper limit on the value of variable i

¹UNDP, Human Development Reports, Calculating the Indices, <http://hdr.undp.org/en/content/calculating-indices>.



ANALYSIS & DISCUSSION:

The analysis and discussion is divided into three parts;

- Digital Inclusion in Bahrain – Access Dimension
- Digital Inclusion Index - GCC Countries
- Correlation analysis between Digital Inclusion Indicators and Economic Indicators.

Digital Inclusion in Bahrain:

The digital inclusion in Bahrain is measured with access dimension using four different variables as shown in Chart 1.

Among the four variables, the mobile cellular subscription per 100 people is the most popular in Bahrain. This is evident from Table-1 which shows that the average mobile subscriptions during 2001-2015 are 114.13, which is far ahead of the next best, i.e. internet users per 100 (50.53). From Chart-1, one could infer that it has increased by 4 times during the study period, i.e. from 42.87 in 2001 to 185.26 in 2015. This shows that the mobile subscriptions are still the most popular in Bahrain when compared to internet users, fixed telephone users and fixed broadband users.

TABLE 1: AVERAGE DIGITAL INCLUSION DURING 2001-2015

Digital Inclusion Variables	Average (2001-2015)
Mobile cellular subscriptions (per 100 people)	114.13
Internet users (per 100 people)	50.53
Fixed telephone subscriptions (per 100 people)	21.60
Fixed broadband subscriptions (per 100 people)	10.47

The internet users per 100 people is the next best digital inclusion variable as shown in Chart-1. It has increased from 15.04 in 2001 to 93.48 in 2015. This means that the internet users have increased by 6 times during the study period. As shown in Table-1, the average internet users per 100 people during the study period was 50.53. An increase in internet users is the directly related to the digital literacy. It is understood that a country with more internet users can achieve digital literacy that is one of the aims of millennium development goals of the World Bank.

According to Chart-1, the fixed telephone subscription per 100 people is the only variable which has decreased during the study period. There were

24.88 fixed telephone connections in 2001 and it dropped to 20.52 during 2015. Table-1 depicts shows that the average fixed telephone connections per 100 people during 2001-2015 was 21.60 per 100 people. The reduction in fixed telephone subscription is a world-wide phenomenon as internet based communications have developed, such as WhatsApp, Viber, Facebook messenger, etc.

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As shown in the Chart-1, fixed broadband subscriptions (per 100 people) have shown tremendous growth during the study period. In 2001, there were only 0.17 fixed broadband connections for every 100 people, whereas it has reached 18.61 fixed broadband connections in 2015. This means that there is an increase of more than 125 times during the study period. The average fixed broadband subscription (Table-1) during the study period was 10.47 per 100 people.

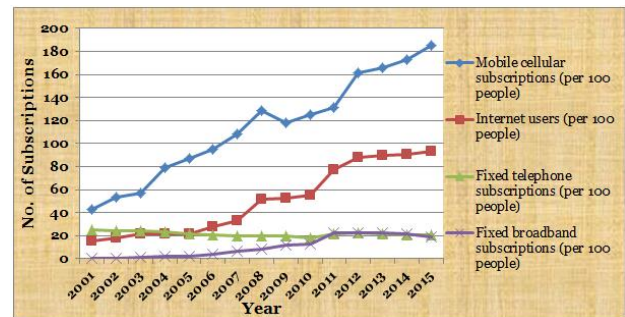


CHART 1: DIGITAL INCLUSION TRENDS IN BAHRAIN

Source: WDI, The World Bank, Updated Date: 03/01/2017

Digital Inclusion Index - GCC Countries:

As mentioned in the methodology, the digital inclusion index is calculated using the four variables of access dimension. The index was developed for all the six GCC countries, i.e. Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE. The Digital Inclusion Index values ranges between 0 and 1. A country with the digital inclusion index score of '1' is considered to have achieved the highest digital inclusion. The country with digital inclusion index score of '0' is considered to have a lowest digital inclusion or no digital inclusion.

Table 2 depicts the composite digital inclusion index for the study period, i.e. 2001 – 2015. Based on the average digital inclusion index for the study period, the countries were ranked.



TABLE 2: DIGITAL INCLUSION INDEX – GCC COUNTRIES

Countries	Average	Rank
UAE	0.850	1
Bahrain	0.697	2
Kuwait	0.531	3
Qatar	0.515	4
Saudi Arabia	0.265	5
Oman	0.095	6

From Table 2 one could infer that the UAE is ranked first with an average digital inclusion index of 0.850 among the GCC countries. This means that UAE has achieved 85.0% digital inclusion during the study period. The second position is achieved by Bahrain with an average digital inclusion index of 0.697, i.e. achieved 69.7% digital inclusion. The third position is for Qatar with an average digital inclusion index of 0.551, i.e. digital inclusion achievement is only 55.1% in the country. This is not convincing as Qatar is one of the richest country with high per-capita income. The table also depicts that the average digital inclusion index of Kuwait and Saudi Arabia are 0.498 and 0.271 respectively. Oman is the country which has the least digital inclusion during the study period. The average digital inclusion index is just 0.096, which means that it has achieved only 9.6% digital inclusion.

The purpose of the digital inclusion index is to show the present position of the country with regard to digital inclusion and to show the gap in digital inclusion. Thus the above analysis shows that all the countries need to fill the gap to achieve 100% digital inclusion, however the UAE's gap is very narrow, whereas Oman's gap is huge.

Hypothesis Testing:

H0: Bahrain does not lead with regard to digital inclusion index among GCC countries.

H1: Bahrain leads with regard to digital inclusion index among GCC countries.

From the average digital inclusion index shown in Table 2, the researchers have found that the null hypothesis 'Bahrain does not lead with regard to digital inclusion index among GCC countries' is accepted. This is because of the fact that the UAE is leading with regard to the average digital inclusion index during the study period and Bahrain follows.

Correlation analysis between Digital Inclusion Indicators and Economic Indicators:

The digital inclusion is an indicator of development for any country and it needs to be correlated with the economic indicators. In this regard, an attempt had been made by the researchers to correlate the digital inclusion indicators and the economic indicators.

This section of the study deals with the correlation analysis between the digital inclusion indicators and the economic indicators. The digital inclusion indicators are the same as used for digital inclusion index. The economic indicators include; GDP at Market Prices, GDP Per-capita, Gross Domestic Savings, Total Population, Population Density.

TABLE 3: CORRELATION ANALYSIS BETWEEN DIGITAL INCLUSION INDICATORS AND ECONOMIC INDICATORS IN BAHRAIN

Economic Indicators		Fixed Broad Band	Fixed Telephone	Internet Users	Mobile Subscription	Secured Internet Servers
GDP at Market Prices	Pearson Correlation	.942**	-.572*	.957**	.999**	.933**
	Sig. (2-tailed)	.000	.033	.000	.000	.000
	N	14	14	14	14	14
GDP Percapita	Pearson Correlation	.841**	-.636*	.864**	.964**	.849**
	Sig. (2-tailed)	.000	.015	.000	.000	.000
	N	14	14	14	14	14
Gross Domestic Savings	Pearson Correlation	.863**	-.677**	.875**	.951**	.829**
	Sig. (2-tailed)	.000	.008	.000	.000	.000
	N	14	14	14	14	14
Total Population	Pearson Correlation	.951**	-.599*	.954**	.965**	.921**
	Sig. (2-tailed)	.000	.023	.000	.000	.000
	N	14	14	14	14	14
Population Density	Pearson Correlation	.952**	-.599*	.954**	.962**	.921**
	Sig. (2-tailed)	.000	.024	.000	.000	.000
	N	14	14	14	14	14

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

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

Source: Researchers' own calculation through SPSS software based on WDI.

The results of the correlation analysis are depicted in Table-3 above. The correlation analysis is made between economic indicators and the digital inclusion indicators. At the overall level, there is significant association between the digital inclusion indicators and economic indicators. It is also understood that there is a high positive correlation between all the economic indicators and the mobile subscriptions. The similar significant relationship can be seen for other digital inclusion indicators with the economic indicators. However, there is a negative correlation between the economic indicators and the fixed telephone. This gives us an understanding that when the country is economically developed the fixed telephone connections are reduced.

Hypothesis Testing:

H0: There is no significant association between digital inclusion indicators and economic indicators in Bahrain.

H1: There is significant association between digital inclusion indicators and economic indicators in Bahrain.



From the above analysis, the researchers have found that the null hypothesis 'There is no significant association between digital inclusion indicators and economic indicators in Bahrain' is rejected. This means that there is a significant relationship between the digital inclusion indicators and the economic indicators.

IMPORTANCE:

- One of the important social justice challenges faced by the policy makers and communities worldwide is 'Digital Inclusion'.
- In this research paper an Index number is constructed by which digital inclusion in GCC countries, especially Bahrain can be measured. Through this index continuous monitoring of the progress can also be achieved.
- It will provide critical visions to inform more effective programs, policies and products to ensure that all Bahrainis can get online and enjoy the benefits that connection can bring.

LIMITATIONS:

- The present study has used only one dimension of the digital inclusion, i.e. access.
- High dependency on secondary sources of information is considered as a weakness of this study. However, the data is from an authentic source, (i.e. from) the World Bank.

CONCLUSION:

The study shows that Bahrain is doing far better than the other GCC countries with regard to digital inclusion from the access point of view except UAE. However, the government of Bahrain must still work productively on the following measures to achieve complete digital inclusion across the island:

- Low-cost broadband: Though the broadband access in Bahrain is significant, still the average cost the broadband services is quite high. Thus, the government, can initiate measures for the provision of low-cost broadband across the island, which will speed up the process of digital inclusion in a big way.
- Digital literacy training: There are still significant portions of the people who feel that internet is not useful or relevant to them. In this regard, the government with the support of the social and voluntary organizations and individuals initiate training programs for such targeted population who don't realize the importance of internet. This will increase the digital literacy among the people which will automatically increase the digital inclusion in the country.

- Free Wi-Fi Hotspots: This is another important measure to be taken for speeding up the digital inclusion achievement. In Bahrain, only Bahrain International Airport and the public transport system (BUS) is offering free Wi-Fi Hotspots to the passengers. The provision of free Wi-Fi Hotspots must be increased across the length and breadth of the country so as to increase the digital inclusion.

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