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INFORMATION AND COMMUNICATION TECHNOLOGY'S IMPACT ON SOCIO-ECONOMY[*]

BİLGİ VE İLETİŞİM TEKNOLOJİSİNİN SOSYO-EKONOMİ ÜZERİNDEKİ ETKİSİ

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Abstract: The study aims to analyze how ICT (Information and Communication Technology) factors affect on the economy and society. The study had analyzed how environmental, readiness and usage factors affect socio-economy. A panel data collected from 60 countries published in the Global Information Technology Reports from 2014 to 2016 periods are used in the study. Multivariate analysis of variance (Manova) method was applied in the analysis as the data has two continuous dependents (social & economy) variables. Study findings showed that the Manova model is significant statistically in all four different statistical tests. The study also found that all independent (environmental, readiness, and usage) variables are significant statistically at either 1%, 5%, or 10% level in both equations.

Key Words: *Information, Communication, Technology, Socio Economy, Panel Method*

JEL Codes: *L86, L96, A13, C33*

Öz: Bu çalışmanın amacı, bilgi ve iletişim teknolojisi faktörlerinin ekonomi ve toplumu nasıl etkilediğini incelemiştir. Çalışma *çevresel, hazır olma ve kullanım* faktörlerinin **sosyo-ekonomiyi** nasıl etkilediğini analiz etmiştir. Çalışmada 2014-2016 dönemlerinde Global Bilgi Teknolojileri Raporlarında yayınlanan 60 ülkeden toplanan panel verileri kullanılmıştır. Verilerin iki sürekli bağımlı (*sosyo and ekonomi*) değişkene sahip olması nedeniyle analizde çok değişkenli varyans analizi (manova) yöntemi uygulanmıştır. Çalışma bulguları, manova modelinin dört farklı istatistiksel testin tamamında istatistiksel olarak anlamlı olduğunu bulunmuştur. Çalışma ayrıca, tüm bağımsız (*çevresel, hazır olma ve kullanım)* değişkenlerin her iki denklemde de istatistiksel olarak anlamlı olduğunu ya % 1, % 5 veya % 10 düzeyinde bulmuştur.

Anahtar Kelimeler: *Bilgi, İletişim, Teknoloji, Sosyo Ekonomi, Panel Yöntemi*

JEL Kodları: *L86, L96, A13, C33*

INTRODUCTION

Information and Communication Technology, in short, "ICT" refers to the technologies which give access to online information through telecommunications. İt is also called İnformation Technology "IT". But İnformation and Communication Technology primarily focus on communication technology such as the internet, wireless networks, cell phones, and many other communication mediums. ICT became a major factor for facilitating the activities of both individual and business levels. For this reason, ICT in many ways had contributed to the well- being of the economy and society.

This great technology evolution had also affected business structures as well as business strategies. Since internet emerged it had created a lot of opportunities. For example, the internet had allowed businessmen to reach a wide customer population worldwide wide which increased their revenue. Due to the internet access, large customers from around the world can introduce your business and purchase your products. The internet also became an important alternative distribution channel for both goods and services (Maditrios, Chatzoudes, and Sarigiannidis, 2014: 300).

According to Jelassi and Enders (2004), e-business is defined as the use of electronic means to conduct business internally and externally. Internal e-business means the employees of the organization's interconnectivity with each other which improves and facilitates knowledge dissemination, sharing information, and support management reporting all these happens with the help of the internet. E-business activities also include supporting after the sales service activities, collaborating with business partners in researches to produce new products, or formulating new sale strategies and promotions.

Many people think that e-business and e-commerce are the same in one or synonymous or interchangeable. E-business definitions are broader and wider than e-commerce. E-business does not only mean just, buying, selling goods and services, it also means giving support services to customers after the sale, collaborating with the partners in the business to e-learning and electronic processing transactions. On the other hand, e-commerce refers to the process of buying, selling, transferring products or services and information through the internet or any other communication means. E-commerce had a great impact on the following stakeholders: customers, organizations, and society. E-commerce has a lot of advantages to these stakeholders which include, minimizing product and service costs, increasing efficiency, customization of the product or the service according to the customers' needs, and creating a globally virtual market place (Shahriari, Shahriari, and Gheiji, 2015).

According to the 2016 E-commerce Foundation's Global Business to Customer's (B2C) e-commerce turnover report, 1.4 out of the 7.3 billion of the world population had purchased goods and/or services through the internet at least once in 2015. The total amount of money they had spent is $2,272.7 billion online which makes the spending average per e-shopper is about $1,582. The Asia-pacific region became the highest and strongest region of the business to customer e-commerce in the world in 2015. Business to Customer (B2C) e-commerce turnover is around $1,056.8 billion. Asian-pacific region had ranked ahead to its competitors like North America and Europe in which their B2C e-commerce turnover is around $664.0

billion and $505.1 billion respectively. On the other hand, Latin America, Middle East, and North Africa (MENA) were scored the lowest business to customer (B2C) e-commerce in comparison to the above three regions and their B2C e-commerce turnover in 2015 was $33.0 billion and $25.8 billion respectively.

Table 1. E-commerce Turnover Throughout Global Regions, 2014-2015

Regions	2014	2015	Growth
World	$1,895.3bn	$2,272.7bn	+19.9%
Asia-pacific	$822.8bn	$1,056.8bn	+28.4%
North America	$572.5bn	$644.0bn	+12.5%
Europe	$446.0bn	$505.1bn	+13.3%
Latin America	$25.8bn	$33.0bn	+28.0%
MENA	$21.7bn	$25.8bn	+18.6%

Source: E-commerce Foundation, National Associations and other sources, 2016

On the other hand, the United Nations Conference on Trade and Development (UNCTAD) estimated that global e-commerce sales comprising Business to Business (B2B) and Business to Consumer (B2C) transactions amounted to $16.1 trillion in 2013. Information technology revolution, internet connectivity, sophisticated policies that minimize business barriers, and supportive regulatory & legal environment in many countries had contributed to e-commerce growth (Aladdın and Valdimir, 2016).

Literature Review

Here are some previous researches conducted by different people in different areas which relate to the topic of "how İnformation and Communication Technology (ICT) impacts on socio-economy". Rajiv, Kartik, and Paul (2013) found that by making ICT available to the citizens, governments are able to increase the level of well-being in that country which reduces the level of stress and suicide rates in the country. According to the results from research conducted by the Commission on Science and Technology for Development (2010) found that ICT impacts the economy, society, and environment positively as a whole. On the other hand, ICT can also cause negative to society and on the environment.

Sabu and Shaijumon (2014) research the role of ICT in the fishing sector and they found that with the help of GPS, Sonra, Fish remote sensing, Wireless set, Computer and Mobile phones can make a significant impact on the fishers productivity, cost efficiency, safety and security of the fishers. All the fishermen had benefited by the use and training of ICT was able to increase productivity and income. Another study conducted by Rami, Mansoor, and Smutka (2016) in which they have examined how ICT, Population Growth, Gross Capital Formation, Openness, and Inflation factors affect economic growth. The data used in the research was collected from 18 selected Arab countries between 1995 to 2013 periods.

They found that ICT has a positive impact on the selected Arab countries' economic growth, except for the inflation variable, all other variables affect positively on the economic growth. A study entitled, "the role of information and communication technology (ICT) in enhancing local economic development and poverty reduction" which examined ICT role in enhancing the local economy had reaffirmed that, ICT is a cross-cutting, an enabler for growth and development which creates a maximum benefit to the society as well as alleviating poverty in the community (Kundishora, Phil and Fzie, 2017).

Research conducted by the JRC European Commission (2007) in Andalucia, Spain and it is aim was to contribute to the IPTS (İnstitute for Prospective Technological Studies) mission to provide customer-driven support to EU policy-making process by providing research-based analysis of questions related to ICT diffusion, knowledge, and innovation in EU regions. The research found that "ICT can be seen as a lever for long-term productivity growth". Their results also showed that the regional dimension of ICT contribution to productivity growth is worth considering as substantial differences may arise which will influence the long-term convergence of those EU regions lagging behind.

Soon (2011) had conducted research about, "The Role and Impact of ICT on Economy Growth". This research had investigated and discussed the use of ICT and its contributions to economic growth. Empirical results were produced using prediction analysis, therefor the research had concluded says that ICT impacts the economy positively. The research also gives advises to the countries that want to enhance their economic growth must adopt policies that facilitate ICT investments. Research conducted by Banco Bilbao Vizcaya Argentaria-BBVA (2021) about the importance of ICT in developing and emerging countries from a demand-side perspective found that a cell phone and internet access are gaining importance and value among the basic needs of the individuals. In comparison to the older people, youngsters consider ICT related needs are more basic for them.

One of the areas that ICT had impacted most is the education sector. It participated and facilitated the progress of education, industrialization, socio-economic development, and modernizations of the country (Ashok and Tony, 2012). Today's students have more chance to access and reach knowledge easily and quickly than their predecessors 30 years ago. ICT importance was also realized in this Covid 19 pandemic period where people's gathering was prohibited due to the infectious spread of the pandemic. All most all the schools and universities in most countries are digitilized and students continue their studies through the internet.

Data and Methodology

A panel data taken from 60 countries in the Global Information Technology Reports from 2014 to 2016 periods were used in the study. The table below shows a list of the countries from which the data has been collected.

Table 2. List of the Sample Countries Participated in the Study

No.	Country Name	No.	Country Name	No.	Country Name
1	Singapor	21	Albania	41	Kenya
2	Finland	22	Algeria	42	Rwanda
3	Sweden	23	Bosnia &Herzeg	43	Gambia
4	Netherlands	24	Argentina	44	Bangaladesh
5	Norway	25	Azerbaijan	45	Cambodia
6	Switzerland	26	Bostwana	46	Uganda
7	United States	27	Brazil	47	Nepal
8	United Kingdom	28	Bulgaria	48	Tanzania
9	Luxembourg	29	China	49	Mali
10	Japan	30	Colombia	50	Mozambique
11	Canada	31	Jordan	51	Ethiopia
12	Korea Rep.	32	Malaysia	52	Malawi
13	Germany	33	Turkey	53	Madagascar
14	Hong Kong	34	South Africa	54	Haiti
15	Denmark	35	Khazakhastan	55	Burundi
16	Australia	36	Namibia	56	Guinea
17	New Zealand	37	Iran	57	Chad
18	Iceland	38	Panama	58	Zambia
19	Austria	39	Lebonan	59	Zimbabwe
20	France	40	Mexico	60	Benin

The aim of this study is to analyze the İnformation and Communication Technology (ICT) factors mentioned in the Global Information Technology Report and how these factors affect the economy and society. Many countries in this world especially the developed countries had transformed their economies and the well-being of their society after they had introduced Information and Communication Technology (ICT) into their real life. For this reason, it is worth to be studied and make research on ICT's socio-economical impact. To understand ICT's main factors that contribute to the economy and to the well-being of the society, to what magnitude these factors contribute, and in which directions they affect the dependent variables in the equations. Figure 1 below presents the conceptual framework of the study.
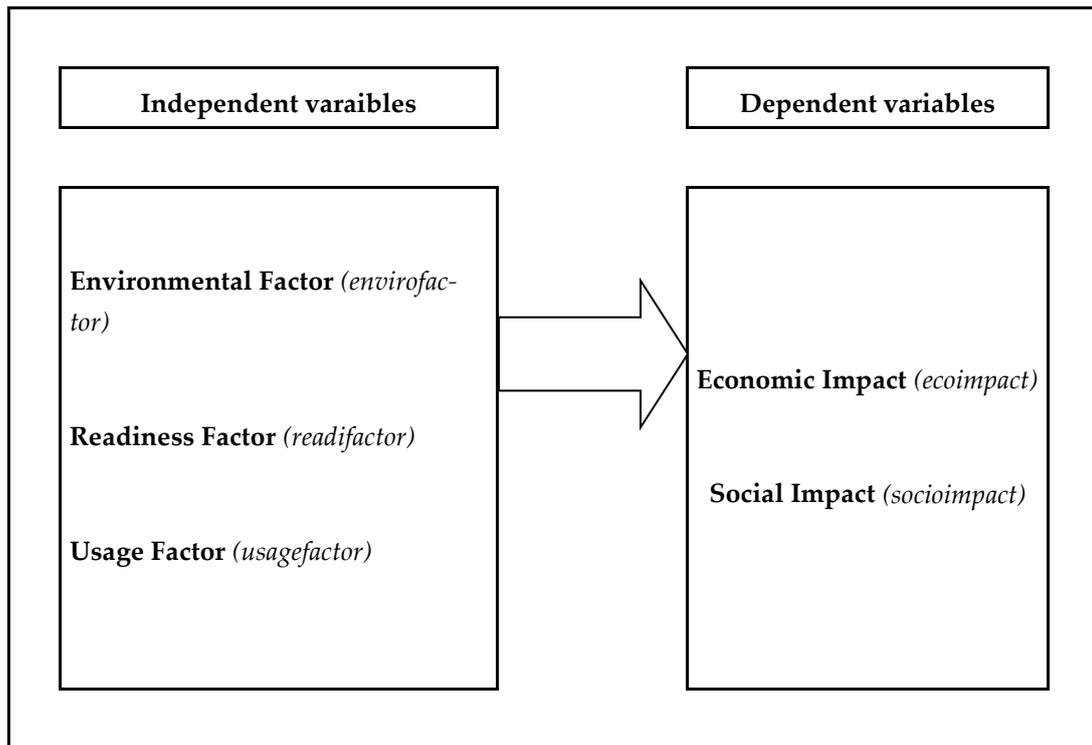
Figure 1. *Conceptuel Frame Work of the Manova Regression Analysis Model*

Models

Ecoimpact = α_i + β_i (envirofactor) + β_i (readifactor) + β_i (usagefactor) + e_1 (1)

Socioimpact = α_i + β_i (envirofactor) + β_i (readifactor) + β_i (usagefactor) + e_2 (2)

The conceptual framework presented in figure 1 consists of three independent variables and two dependent variables. The three independent variables are also called drivers because they establish and determine the conditions of the dependent variables (INSEAD, 2014). These three independent variables are divided into 8 pillars or components as you can see below:

Environmental factor: This factor measures how a country's policy and regulations are in favor of ICT implementation, the emergence of entrepreneurship, and support of innovation. When a country's policies and the judiciary are ready to support business competition, innovation, entrepreneurship and protects property rights & investments, especially private investments then such environment is called ICT friendly environment. Under these conditions or constraints, ICT can better contribute to the well-being of the country's economy and society.

Hypothesis ≠ 1

H0: The environmental factor does not affect the dependent variables

H1: The environmental factor does affect the dependent variables

Readiness factor: This factor measures the degrees to which the society is ready to use the ICT. The readiness factor has 3 subindexes: The first subindex is, the structure and diğital content subindex factor such as mobile network coverage, secure internet savers, international internet bandwidth, and electric production at the same time the accessibility of the diğital content. The second subindex is the affordability subindex factor is also a very important variable that affects the readiness factor and everyone must consider it deeply.

The affordability subindex factor considers the cost of accessing ICT, either through the mobile telephone or fixed broadband internet, as well as the level of competition of the internet and Telephone sectors which also contributes to the ICT readiness factor. The third subindex factor is the skill subindex factor which measures the society's effective usage ability of the ICT. The knowledge and skills needed for the effective use of ICT can be acquired through education from educational institutions, so increasing the literacy and knowledge of ICT can be increased by the effective use of ICT technologies.

Hypothesis ≠ 2

H0: The readiness factor does not affect the dependent variables

H1: The readiness factor does affect the dependent variables

Usage factor is a combination of 3 subfactors which are **(1) the individual usage (2) the business usage (3) the government usage.** Usage factors assess these three sub-components of the ICT: the individual usage level, the business usage level, and the government usage level. Usage factor gauges ICT penetration and diffusion at the individual level using indicators such as number of mobile subscriptions, number of individuals using the internet, number of households available for the personal computer (PC), and number of households with internet access.

On the other hand, at the business usage level, usage factor measures to what extent firms integrated ICT into their business. It also measures ICT's training available to the business innovations. But at the government usage level, the usage factors assess how the government puts policies in favor of the ICT implementation and determinant of carrying friendly policies towards ICT competitiveness, innovations in a way ICT can contribute to the well-being of the economy and society.

Hypothesis ≠ 3

H0: The usage factor does not affect the dependent variables

H1: The usage factor does affect the dependent variables

Impact factor: This factor measures ICT's broad effect on the economy and society. "ICT affects the economy positively, it increases in size and productivity of the ICT sector and an associated growth in the industries that provide inputs to ICT production" (UNCTAD, 2010). ICT is one of the very important factors which contributes to economic growth. ICT's investment & infrastructures can boost the overall capital of the country, therefore, as the investment of the country increases so too the economy also grows bigger. With the help of ICT, Companies are able to produce more at the same time reducing the

cost.

Adopting ICT into their businesses, they are able to perform low-cost transactions which in turn increases their profits. There is no doubt that ICT can affect economic growth positively. On the other hand, the social impact factor measures, how ICT contributes to the well-being of society. Making ICT available to the citizens, governments are able to increase the level of well-being of their society which lowers the level of stress and suicide rate in the country (Rajiv, Kartik, and Paul, 2013). As we know ICT impacts the environment, education system, energy consumption efficiency, health progress, knowledge sharing, and society's communication ways. We will also test the homogeneity and equality of the covariance between groups, so we will run Box's M test to verify whether the null hypothesis or the alternative hypothesis is true.

Hypothesis ≠ 4

H_0: The observed covariance matrices of the dependent variables are equal across groups.

H_1: The observed covariance matrices of the dependent variables are not equal across groups.

Empirical Results

As you can see from the descriptive summary in table 3 below, the data seems well balanced and it consists of 180 observations. If we compare the means of the variables are approximately the same, except ecoimpact variable which has a 3.705556 means score. On the other hand, if we glance in the Standard deviation column, we also found that four out of the five variables have approximately the same standard deviations except for the envirofactor variable which has 0.9708827 of standard deviation score and it is the lowest standard deviation in the list.

Table 3. Descriptive summary statistics of the analysis

Variables	Obs	Mean	Std. Dev	Minimum	Maximum
ecoimpact	180	3.705556	1.226783	2	6
socioimpact	180	4.155556	1.267656	2	6
envirofactor	180	4.261111	0.970882	2	6
readifactor	180	4.594444	1.364749	2	6
usagefactor	180	4.127778	1.268574	2	6

Table 4 presents variable correlations and as you can see the correlation between variables is somehow high and all of them are positively correlated. For example, the correlation between usagefactor and ecoimpact is 0.9217, while envirofactor and readifactor correlations with the ecoimpact are 0.8248 and 0.8092 respectively.

Table 4. Correlations between ecoimpact factor and independent variables

Variables	Ecoimpact	Envirofactor	Readifactor	Usagefactor
Ecoimpact	1.0000			
Envirofactor	0.8248	1.0000		
Readifactor	0.8092	0.7255	1.0000	
Usagefactor	0.9217	0.8482	0.8497	1.0000

According to the results presented in table 5, correlations between socioimpact which is a dependent variable, and other independent variables, the usage factor again has the highest correlation which is 0.8873 with the socioimpact factor whereby the envirofactor and readifactor have correlations of 0.8202 and 0.80502 respectively with the socioimpact factor.

Table 5. Correlations between socioimpact factor and independent variables

Variables	socioimpact	envirofactor	readifactor	usagefactor
socioimpact	1.0000			
envirofactor	0.8202	1.0000		
readifactor	0.8052	0.7255	1.0000	
usagefactor	0.8873	0.8482	0.8497	1.0000

According to the hypothesis 1 test results in figure 2; F (2, 176) = 9.59 (P = 0.0001), the environmental factor is statistically significant at 1% level. Therefore, we reject the null hypothesis and accept the alternative hypothesis which says, the environmental factor does affect the dependent variables.

Test of the environmental factor

(1) [ecoimpact] envirofactor   = 0

(2) [socioimpact] envirofactor   = 0

     F (2,   176)   = 9.59

     Prob >   F   = 0.0001

Figur 2 . Test of the hypothesis ≠ 1

If we look to the hypothesis 2 test results in figure 3; F (2, 176) = 4.85 (P = 0.0089), the readiness factor is statistically significant at 1% level. Therefore, we reject the null hypothesis and accept the alternative hypothesis which is the readiness factor does affect the dependent variables.

Test of the readiness factor

(1) [ecoimpact] readifactor   = 0

(2) [socioimpact] readifactor   = 0

     F (2,   176)   = 4.85

     Prob >   F   = 0.0089

Figur 3. Test of the hypothesis ≠ 2

If we also look to hypothesis 3 test results in figure 4; F (2, 176) = 63.03 (P = 0.0000), the usage factor is statistically significant at 1% level. Therefore, we reject the null hypothesis and accept the alternative hypothesis which is *the usage factor does affect the dependent variables*.

Test of the usage factor	
(1) [ecoimpact] usagefactor = 0	
(2) [socioimpact] usagefactor = 0	
F (2, 176) = 63.03	
Prob > F = 0.0000	

Figur 4 . *Test of the hypothesis ≠ 3*

We have executed Box's M test to verify the fourth hypothesis and table 6 shows the hypothesis 4 test results. The significance value is greater than 5%, suggesting that, the vector of the dependent variables (ecoimpact and socioimpact) follow a multivariate normal distribution and the variance-covariance matrices are equal across groups. For this reason, we reject the alternative hypothesis and accept the null hypothesis which says, *the observed covariance matrices of the dependent variables are equal across groups.*

Table 6. Box's M Test Results

Box's M	12,468
F	0,617
df1	18
df2	2495,323
Sig.	0,889

To understand ICT's main factors that contribute to the economy and well-being of society, we have conducted this research. According to the Manova test results presented in table 7, we have seen that this model is statistically significant. All the four different test statistics in the model are significant statistically.

Following tests are the four test statistics; Wilks' Lambda (W) statistic, Pillaia's trace (P) statistic, Lawley-Hoteling trace (L) statistic, and Roy's largest root (R) statistic. All the variables in the Manova model's significance test table were found to be significant statistically. The four different test statistics and their P-value (Prob > F) results are: W=0,1019, P=0,000; P=0,9146, P=0,0000; L= 8,6516, P= 0,0000; R= 8,6328, P= 0,0000 respectively. The P-values of the four different test statistics are $P < 0,01$, therefore the null hypothesis (H_0: The Manova model is not significant statistically) has been rejected and accepted the alternative hypothesis (H_a: The Manova model is significant statistically).

Table 7. Multivariate analysis of variance (manova) model test results

Number of Obs=180	W=Wilks' lambda	L=Lawley - Hotelling trace
	P= Pillai's trace	R= Roy's largest root

Source	Statistic		df	F(df1 df2) = F			Prob > F	
Model	W	0.1019	3	6.0	350.0	124.41	0.0000	e
	P	0.9146		6.0	352.0	49.44	0.0000	a
	L	8.6516		6.0	348.0	250.90	0.0000	a
	R	8.6328		6.0	176.0	506.46	0.0000	u
Residual	176							
envirofactor	W	0.9017	1	2.0	175.0	9.54	0.0001	e
	P	0.0983		2.0	175.0	9.54	0.0001	e
	L	0.1090		2.0	175.0	9.54	0.0001	e
	R	0.1090		2.0	175.0	9.54	0.0001	e
readifactor	W	0.9477	1	2.0	175.0	4.83	0.0091	e
	P	0.0523		2.0	175.0	4.83	0.0091	e
	L	0.0552		2.0	175.0	4.83	0.0091	e
	R	0.0552		2.0	175.0	4.83	0.0091	e
usagefactor	W	0.5827	1	2.0	175.0	62.67	0.0000	e
	P	0.4173		2.0	175.0	62.67	0.0000	e
	L	0.7162		2.0	175.0	62.67	0.0000	e
	R	0.7162		2.0	175.0	62.67	0.0000	e
Residual	176							
Total	179							

E = exact,   a = approximate,   u = upper bound on F

After we found the model and independent variables which explains to the dependent variables were significant statistically as shown in table 8, we are able to continue interpretation to the rest of the regression and construct equation models. Let's construct a separate regression equation model for each dependent variable with its significant test and p-values. The sample size (Obs=180), the predicted parameters numbers (Parms), the root mean square error of the equation (RMSE), and R^2 value (R-sq). The first equation of the first dependent variable (ecoimpact) is R^2 = 0,8585, F = 355.8825 (P = 0.0000) and the second equation of the second dependent variable (socioimpact) is R^2= 0,8127, F = 254.4869 (P = 0.0000). As table 8 presents, each equation's p-value is less than 1% (p < 0.01) therefore both equations are significant statistically.

Table 8. The predicted manova regression results

Equation	Obs	Parms	RMSE	R-square	F	P
ecoimpact	180	4	0.4654207	0.8585	355.8825	0.0000
socioimpact	180	4	0.5533357	0.8127	254.4869	0.0000

	Coefficients	Std. Error	t	P>ItI	[95% Conf. Interval]	
ecoimpact						
envirofactor	0.1914628	0.067654	2.83	0.005	0.0579461	0.3249796
readifactor	0.0816312	0.048353	1.69	0.093	-0.0137951	0.1770576
usagefactor	0.692471	0.067592	10.24	0.000	0.5590758	0.8258662
Constant	-0.3437054	0.164004	-2.10	0.038	-0.667372	-0.0200389
socioimpact						
envirofactor	0.3103897	0.080433	3.86	0.000	0.1516525	0.4691272
readifactor	0.1674203	0.057487	2.91	0.004	0.0539685	0.2808721
usagefactor	0.5321602	0.080359	6.62	0.000	0.3735674	0.6907529
Constant	-0.1328918	0.194983	-0.68	0.496	-0.5176969	0.2519133

Manova Regression Analysis Results

Ecoimpact = -0.3437 + 0.1915 envirofactor + 0.0816 readifactor + 0.6925 usagefactor + e_1 (1)

Socioimpact = -0.1329 + 0.3104 envirofactor + 0.1674 readifactor + 0.5322 usagefactor + e_2 (2)

In the **first equation** (ecoimpact model), the constant is statistically significant at 5% level, while envirofactor & usagefactor are statistically significant at 1% levels and finally the readifactor is statistically significant at 10% level. Therefore, if the envirofactor value increases by 1%, then the ecoimpact factor will also increase by 0.192%.

The *envirofactor* is an independent variable, it has two pillars and they are (1) Political & regulatory environment, (2) Business & innovation environment. If the political & regulatory environment in favors ICT (Information and Communication Technology) and the Business & innovation environment is also increased then the envirofactor affects the economic growth positively.

If we look at the *readifactor*, we found that this factor affects economic growth positively. If the readifactor value increases by 1%, then the ecoimpact variable will also increase by 0.082%. As I have explained already the readiness factor has three pillars: (1) Infrastructure & digital content, (2) Affordability, and (3) Skills. This means, when the information and communication technology's infrastructure & digital content investment is increased, the

usage cost of this technology is low, the ICT knowledge and skills also increased then the readifactor contributes to the economic growth positively.

Finally, the *usagefactor* has three pillars: (1) Individual usage, (2) Business usage, and (3) Government usage. we have interpreted the usage factor in this way when individuals use ICT, they acquire knowledge and skills. On the other hand, when the business and government institutions adopt ICT into their businesses and daily activities they are able to reduce cost and increase efficiency. For this reason, the usage factor affects the economic growth positively.

On the other hand, in the **second equation** (socioimpact model), except the constant, all the independent variables (envirofactor, readifactor, and usagefacor) were found to be significant statistically at 1%. So from this result, we conclude that all independent variables affect the dependent variable positively.

According to the second equation (socioimpact) in table 8, the predicted manova regression results, if the *envirofactor* value increases by 1%, then the socioimpact variable value also increases by 0.3104%. The envirofactor as we have mentioned above consists of two pillars: (1) Political & regulatory environment and (2) Business & innovation environment. Therefore, this factor affects the well being of society. As we know ICT (Information and Communication Technology) improves the life of the society in many ways including improvement of education, energy consumption efficiency, health progress, production with economic scale, knowledge & expert sharing, and ease of communication among the society. All these elements contribute to the well being of society.

If we look at the *readifactor* which is the second independent factor, if this factor is increased by 1% the socioimpact variable will also increase by 0.1674%. The readiness factor with its three pillars are: the infrastructure & digital content, affordability, and skills also contribute to the well being of the society.

The third independent factor is the *usagefactor*, therefore, if the usage factor increases by 1% the socioimpact variable will also increase by 0.5322%. The usage factor with its three pillars: individual usage, business usage, and government usage also contributes to the well being of the society positively while the e_1 and e_2 are error terms.

CONCLUSIONS

The objective of the study was to analyze, how ICT affects the economy and society. We have conducted three independent variables (environmental factor, readiness factor, and usage factor) and two dependent variables (economic impact and social impact). A panel data collected from 60 countries in Global Information Technology Reports from 2014 to 2016 periods was used in the study. Manova test analysis were used in the research because the data has two continuous dependent variables. Stata version 13 program was carried out for the analysis. According to the results presented in table 7, the manova model was statistically significant in all four different statistical tests. On the other hand, if we glimpse the predicted manova regression results in table 8 we found that all the independent variables in both the equations were significant statistically either 1%, 5%, and 10% levels.

The study found that the first and most important factor in both equation models is the usage factor. In the economic impact equation model, it has a coefficient of 0.6925 and in the social impact equation model, it has a coefficient of 0.5322 and both of the coefficients are positive and statistically significant at less than 1% significance level. The usage factor gauges ICT penetration and diffusion at the individual, business, and government levels. Therefore, policy makers must encourage and facilitate ICT and internet abundance in the country to the user because it contributes positively to the economy and the wellbeings of the society.

The second and most important factor in both equation models is the environmental factor. In the economic impact equation model, it has a coefficient of 0.1915 and in the social impact equation model, it has a coefficient of 0.3104 and both of the coefficients are positive and statistically significant at 1% significance level. The environmental factor is composed of the country's policy, regulatory, business competition, entrepreneurship, protects property rights, and investments. Therefore, the policy and regulation of the country must be in favor of the ICT facilitate implementations in the country, encourage fair business competition and entrepreneurship, in this way the environmental factor contributes positively to the economy and the well being of the society.

The last factor we analyze in the study is the readiness factor. In the economic impact equation model, it has a coefficient of 0.0816 and in the social impact equation model, it has a coefficient of 0.1674 and both of the coefficients are positive and statistically significant at 10% and 1% significance levels respectively. The readiness factor which consists of the infrastructure & digital content, affordability, and skills should be given a high priority to make ICT ready in the country. The government should give special considerations to ICT infrastructure & digital content investment, the usage cost should be low to be affordable to use this technology and make sure the population majority have the skill and literacy of the usage of ICT and internet.

REFERENCES

Aladdın, D. and Valdimir, C. (2016). *The Development Dimension of E-Commerce in Asia: Opportunities and Challanges - Asian Development Bank İnstitute*. ADBInstitute, Policy Brief, No. 2016-2: 1-8.

Ashok, K., and Tony, S. (2012). *Impact of ICT on Society- Higher Education Students in South-East Asia*. IEEE Symposium on Business, Engineering and Industrial Applications. DOI: 10.1109/ISBEIA.2012.6422872

Banco Bilbao Vizcaya Argentaria (2021). *The Importance of ICT in Society's Needs: An Empirical Approach Through Maslow's Lens*. https://www.bbvaresearch.com

Commission on Science and Technology for Development (2010). *Measuring the İmpact of ICT for Development*. CSTD 2010 - 2011 inter-sessional panel, Prepared by the UNCTAD Secretariat: 2-34.

Ecommerce Foundation (2016). *Global B2C E-Commerce Report 2016*. Facts, Figures, İnfographic & Trends of 2015 and the 2016 Forcast of the Global B2C E-CommerceMarket of Goods and Services: 10 -11.

INSEAD (2014). *The Global Information Technology Report 2014*. Rewards and Risks of Big Data.http://www3.weforum.org/docs/WEF_GlobalInformationTechnology_Report_2014.pdf

Jelassi, T., and Enders, A. (2004). *Strategies for E-business.* Creating Value through Electronic and Mobile Commerce, Concepts and Cases: 4-15.

JRC European Commission (2007). *The Role of ICT in the Economic Growth and Productivity of Andalucia.* JRC Scientific and Technical Reports: 42-46.

Kartik, K., Paul, A., and Rajiv, D. (2013). *Can Information and Communication Technology Lead to Well being?*. An Empirical analysis. Thirty Fourth International Conference on International Systems, Milan 2013: 10-12.

Soon, K. (2011). *The role and Impact of ICT on Economy Growth*. Management and Science University (MSU): 2-6. file:///C:/Users/Abdullahi/Downloads/SSRN-id1766282.pdf

Kundishora, M., Phil, M., and Fzie, F. (2017). *The Role of Information and Communication Technology (ICT) in Enhancing Local Economic Development & Poverty Reduction.* Zimbabwe Academic and Research Network: 1-6.

Maditrios, D., Chatzoudes, D. and Sarigiannidis, L. (2014). *Factors affecting e-business successful implementation*. International Journal of Commerce and Management: 300-306.

Rami, H., Mansoor, M. and Smutka, L. (2016). *The Effect of Information and Communication Technology on Economic Growth: Arab World Case*. International Journal of Economics and Financial Issues: 765-766.

Sabu, M., and Shaijumon, C. (2014). *Socio-economic Impact of Information and Communication Technology: A case study of Kerala Marine Fisheries Sector*. International Journal of Information Dissemination and Technology: 1-2.

Shahriari, S., Shahriari, M., and Gheiji, S. (2015). *E-commerce and it's impacts on global trend and market*. International Journal of Research- Granthaalayah. V. 3. No. 4:1- 4.

UNCTAD (2010). *Measuring the impact of ICT for Development, Commission on Science and Technology for Development*. UNCTAD Current Studies on Science, Technology and Innovation: 1-23.