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ANALYSIS OF E-COMMERCE FACTORS INFLUENCING ON ECONOMIC DEVELOPMENT

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Abstract

Today e-commerce has become an important part of daily life. Accessibility to e-commerce platforms is not a privilege but rather a necessity for most people. Thus, to grow more and earn higher profit it is highly recommended to have proper structure availability and easy accessibility of online sites, because it does not only determine profit and number of users but also the ranking and position of enterprise of the firm in overall business world. Also, in this paper I will focus about the growth and pattern of e-commerce in developing countries and its sales and impact in them, of all different types of e-commerce.

Key words: e-commerce, R&D, growth of e commerce market, revenue of e commerce, secure internet servers, UNCTAD B2C e-commerce Index, Internet shoppers as a percentage of total population, GDP growth.

IQTISODIYOT RIVOJLANISHIGA TA'SIR ETGAN ELEKTRON SAVDO OMILLARINING TAHLILI

Sodiqova Dilafruz

TDIU, Xalqaro bo'lim, menejer Xalqaro iqtisodiyot va menejment magistri.

Annotatsiya

Bugungi kunda elektron tijorat kundalik hayotning muhim qismiga aylandi. Elektron tijorat platformalariga kirish imtiyoz emas, balki ko'pchilik uchun zaruratdir. Shunday qilib, ko'proq o'sish va yuqori daromad olish uchun onlayn saytlarning to'g'ri tuzilishi va qulayligiga ega bo'lish tavsiya etiladi, chunki bu nafaqat foyda va foydalanuvchilar sonini, balki kompaniyaning umumiy biznesdagi reytingi va mavqeini ham belgilaydi. Bundan tashqari, ushbu maqolada men rivojlanayotgan mamlakatlarda elektron tijoratning o'sishi va modeli, ularning savdosi va elektron tijoratning barcha turlariga ta'siri haqida to'xtalib o'taman.

Kalit so'zlar: elektron tijorat, R&D, elektron tijorat bozorining o'sishi, elektron tijorat daromadi, xavfsiz internet-serverlar, UNCTAD B2C elektron tijorat indeksi, jami aholi ulushi sifatida Internet-do'konlar, YaIM o'sishi.

АНАЛИЗ ФАКТОРОВ ЭЛЕКТРОННОЙ ТОРГОВЛИ, ВЛИЯЮЩИХ НА РАЗВИТИЕ ЭКОНОМИКИ

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Аннотация

Сегодня электронная коммерция стала важной частью повседневной жизни. Доступ к платформам электронной коммерции - это не привилегия, а скорее необходимость для большинства людей. Таким образом, для большего роста и получения более высокой прибыли настоятельно рекомендуется иметь надлежащую структуру и легкую доступность онлайн-сайтов, поскольку это определяет не только прибыль и количество пользователей, но и рейтинг и положение предприятия фирмы в общем деловом мире. Кроме того, в данной работе я сосредоточусь на росте и структуре электронной коммерции в развивающихся странах и влиянии в них, из всех различных видов электронной коммерции.

Ключевые слова: электронная коммерция, НИОКР, рост рынка электронной коммерции, доходы электронной коммерции, защищенные интернет-серверы, индекс электронной коммерции UNCTAD B2C, доля интернет-покупателей в общей численности населения, рост ВВП.

Introduction

These days, information and communications technology is the focus of most countries in the world. In the past two decades, the ongoing application and diffusion of the Internet and e-commerce as well as advances in information technology (IT) have radically altered global economic activity. From the firm perspective, the ability to effectively apply Internet and electronic technology has become both a major opportunity and a big challenge. The advancement of technology has assisted international business. It is undeniable that millions of people worldwide use the Internet to do everything, from conducting research to purchasing products online. The Internet is profoundly affecting almost all businesses. Specifically, the multiple uses of the Internet by business entities include the ability to advertise, generate, or otherwise perform regular business functions. Therefore, many firms are embracing the Internet for many of their activities. One impact for e-commerce is to intensify competition and produce benefits for consumers, with lower prices and more choices.¹ In other words, the Internet and e-commerce lead to efficiency improvements, better asset utilization, faster time to market, reduction in total order fulfillment times, and enhanced customer service.

Literature review.

The Internet is also dramatically expanding opportunities for business-to-business and business-to consumer e-commerce transactions across borders. For business to consumer transactions, the internet specifically sets up a potential revolution in global commerce: the individualization of trade. Technology has expanded the consumer marketplace to an unprecedented degree. The adoption of information technology similarly exhibits network externality brought about by more users, with the resulting benefits for the users, e.g., fax machine (Economides & Himmelberg, 1995)² and cellular phone (Jha & Majumdar, 1999).³ Over the past few decades, numerous studies have considered R&D as a proxy variable for knowledge capital when examining the relationship between knowledge capital and productivity. Along with the substantial and rapid

1 Malkawi B. H. E-commerce in light of international trade agreements: The WTO and the United States-Jordan Free Trade Agreement //International Journal of Law and Information Technology. – 2007. – Т. 15. – №. 2. – С. 153-169.

2 Economides N., Himmelberg C. P. Critical mass and network size with application to the US fax market //NYU Stern School of Business EC-95-11. – 1995.

3 Jha R., Majumdar S. K. A matter of connections: OECD telecommunications sector productivity and the role of cellular technology diffusion //Information Economics and Policy. – 1999. – Т. 11. – №. 3. – С. 243-269.

development of ICT, e-commerce technologies have emerged as an important type of knowledge capital for operating a business.

On the other hand, the growing size of governments during the twentieth century, and especially since the 1960s, has captured the attention of many economists. They have tried to present different theories to explain this phenomenon. According to many theories of growth in the size of governments, with the development of countries, the structure and economic needs change and as a result, the size of government is affected too (Tanzi & Schuknecht, 2000).⁴

In our empiric analysis we learnt five main explanatory variables: growth of e commerce market (annual %,2022), revenue of e commerce (annual mln US \$,2022), secure Internet servers (per 1 million people), UNCTAD B2C E-commerce Index*, Internet shoppers as a percentage of total population and share of individuals using the Internet. (Table 1)⁵

Table 1

Literature analysis on determinants affecting economic growth⁶

Determinants	Positive impact	Negative impact	No impact
Growth of e commerce market (GE)	Ang (2008), Demirhan and Masca (2008), Rogmans and Ebberts (2013), Zhang and He (2014), Apaydin (2009),	Quazi (2007)	
Revenue of e commerce (RE)	Gastanaga et al. (1998), Cevis and Çamurdan (2007), Demirhan and Masca (2008)	Apaydin (2009), Rogmans and Ebberts (2013)	Schmitz and Bieri (1972), Wheeler and Mody (1992)
Secure Internet servers (SIS)	Demirhan and Masca (2008), Hoang and Goujon (2014), Na and Lightfoot (2006), Quazi (2007)	Hubler and Keller (2010), Liu et al. (2014)	
Share of individuals using the Internet (SII)	Cevis and Çamurdan (2007)		
Internet shoppers as a percentage of total population (IShP)	Na and Lightfoot (2006), Rodriguez and Pallas (2008), Fosfuri et al. (2001), Glass and Saggi (2002)	Quazi (2007)	⁷
UNCTAD B2C E-commerce Index* (B2Ci) ⁸	In our Research work		

⁴ Tanzi, V., & Schuknecht, L. (2000). *Public spending in the 20th century: A global perspective*. Cambridge University Press.

⁵ The factors were taken from the articles given in the table.

⁶ The table was organized with the articles given in the table.

⁷ Literature analysis on determinants affecting economic growth

⁸ UNCTAD B2C E-commerce Index* (B2Ci) is analysed in our research work as a novelty.

Research and methodology.

In our study, the data is taken from the World Bank (2021) indicator. UNCTAD (2020), Classification of Developing Countries Based on the World E-commerce Report, provides a list of countries and codes included in the analysis. Our work represents the annual flow of GDP growth in developing countries; growth of e-commerce market (annual %,2022), revenue of e-commerce (annual mln US \$,2022), secure Internet servers (per 1 million people), UNCTAD B2C E-commerce Index*, Internet shoppers as a percentage of total population and share of individuals using the Internet.

Dissertation work provides the definition and data source of variables with expected signs used in the study. In recent years, some scholars have investigated the relationship between ICT and economic growth and productivity growth. Many of these studies have concluded that there is a positive relationship between Internet use, ICT, and productivity growth. In addition, most of the studies in the level of firms show that ICT can help to increase efficiency. Recent studies have confirmed this positive relationship can be strengthened (Sichel, 2001⁹; E Brynjolfsson, S Yang, 1996¹⁰). Lund and McGuire (2005)¹¹ focused on inputs and development of electronic commerce and economic growth, declaring that e-commerce increased profits for firms and led to the development of countries. Their findings showed that e-commerce was a key force in the integration of LDCs (low development countries) in the multilateral trading system. In this paper, the emphasis has been placed on the issue of whether social and economic reforms can encourage e-commerce. The results showed that practically, no presence of the government in the field of e-commerce could lead to economic growth and increase the share of e-commerce tools in e-commerce. Liu (2013)¹² investigated the impact of e-commerce on productivity, using a unique panel dataset obtained from Taiwanese manufacturing firms for the period of 1999 to 2002. They found that both e-commerce capital had a positive influence on productivity. Over the past four decades, the role of e-commerce in productivity growth has been well recognized as a large number of economic research centers have been developed, showing the importance of public investment in the public politics. To further understand this, the research by scholars such as Coa & Moghadam, 1993; Griliches 1998¹³, can be viewed.

Analysis and results.

In economic literature, there are numerous studies regarding the impact of IT with GDP growth and trade as macroeconomic variables, but the studies addressing e-commerce and development are not many and most discussion has been centered on statistical expression and discretion. In our study, we look at secondary financial data for 2019-2022 for 20 developing countries in South, East and Southeast Asia and South America and Africa. The data is taken mostly from the World Bank (2021) indicator, and the analyzes were conducted in 20 countries. UNCTAD (2020), This Classification of 20

⁹ Sichel D. E. The computer revolution: An economic perspective. – Brookings Institution Press, 2001.

¹⁰ Yang S., Brynjolfsson E. Intangible assets and growth accounting: evidence from computer investments //Unpublished paper. MIT. – 2001. – T. 85. – №. 61. – C. 28.

¹¹ Lund M. J. F., McGuire S. Institutions and development: Electronic commerce and economic growth //Organization Studies. – 2005. – T. 26. – №. 12. – C. 1743-1763.

¹² Liu T. K. et al. E-commerce, R&D, and productivity: Firm-level evidence from Taiwan //Information Economics and Policy. – 2013. – T. 25. – №. 4. – C. 272-283.

¹³ Griliches Z. Introduction to "R&D and Productivity: The Econometric Evidence" //R&D and productivity: The econometric evidence. – University of Chicago Press, 1998. – C. 1-14.

Developing Countries Based on the World Investment Report, provides a table listing the 20 developing countries and the codes included in the analysis. GDP growth was considered as the dependent variable in this study and the explanatory variables were carefully selected based on the literature review. Our model includes five explanatory variables: growth of e commerce market (annual %,2022), revenue of e commerce (annual mln US \$,2022), secure Internet servers (per 1 million people), UNCTAD B2C E-commerce Index*, Internet shoppers as a percentage of total population and share of individuals using the Internet. (Table 2)

Table 2

A summary of sample countries¹⁴

	Country	Country code
	Bangladesh	BGD
	Bhutan	BTN
	Cambodia	KHM
	China	CHN
	India	IND
	Indonesia	IDN
	Malaysia	MYS
	Mongolia	MNG
	Nepal	NPL
0	Pakistan	PAK
1	Singapore	SGP
2	Sri Lanka	LKA
3	Thailand	THA
4	Vietnam	VNM
5	Philippines	PHL
6	Republic of Korea	KR15
7	Brazil	BR
8	Mexico	ME
9	Nigeria	NG
0	Saudi Arabia	SA

Source: <http://data.worldbank.org/indicator>, World Development Index

Our study is based on panel data estimation, which analyzes the dynamic behavior of the parameter and can clearly account for heterogeneity by allowing for subject-specific variables such as firm, company, states, and individuals. Panel data regression is used

¹⁴ The table was organized with the information given in <http://data.worldbank.org/indicator>, World Development Index

¹⁵ A summary of sample countries

because of its superiority over cross-sectional and time-series data in using all available evidence that cannot be measured in pure cross-sectional and time-series data (Baltagi and Kao, 2000).¹⁶

The relationship between GDP growth in developing countries and its influencing e-commerce variables is modeled as follows:

$$GG = f(GE, RE, SIS, B2Ci, IShP, SII) \quad (1)$$

where represents GG - the annual flow of GDP growth in developing countries; GE - growth of e commerce market (annual %,2022), RE - revenue of e commerce (annual mln US \$,2022), SIS - secure Internet servers (per 1 million people), $B2Ci$ -UNCTAD B2C E-commerce Index*, $IShP$ - Internet shoppers as a percentage of total population and SII - share of individuals using the Internet.

These factors affect the GDP growth and the model, which can be expressed as a regression equation after transforming the *Revenue of e commerce* into logarithmic form constitutes a part. Logarithmic transformation of RE reduces the initial data of the variables and creates better estimation results:

$$GG_{it} = \beta_{1i} + \beta_{2i}GE_{it} + \beta_{3i}LnRE_{it} + \beta_{4i}SIS_{it} + \beta_{5i}IShP_{it} + \beta_{6i}SII_{it} + \beta_{7i}B2Ci_{it} + u_{it} \quad (2)$$

Where ($i = 1 \dots N$, where N is the number of cross-sectional units, $t = 1 \dots T$, where T is the time period) represents the GDP growth in developing countries; growth of e commerce market (annual %,2022), revenue of e commerce (annual mln US \$,2022), secure Internet servers (per 1 million people), UNCTAD B2C E-commerce Index*, Internet shoppers as a percentage of total population and share of individuals using the Internet. Table 5 provides the definition and data source of variables with expected signs used in the study (Table 3).

Table 3

The analysis of the determinants influencing Economic growth.¹⁷

Determinant	Definition and source of information	Sign	Expected result
GDP growth	The annual average rate of change of the gross domestic product (GDP) at market prices based on constant local currency, for a given national economy, during a specified period of time. Source: http://data.worldbank.org/indicator , World Development Index	GG	
Growth of e commerce market	The process of increasing revenue, expanding your customer base, entering new markets, earning a bigger market share. Source: http://data.worldbank.org/indicator , World Development Index	GE	+
Revenue of e commerce	The total amount of money that is being received by the company after trading its products or service with its customers. Source: http://data.worldbank.org/indicator , World Development Index	RC	+
Secure Internet servers	Those servers that use the secure sockets layer protocol to protect communication from unintended recipients. Source: http://data.worldbank.org/indicator , World Development Index	SIS	+

¹⁶ Choi, I. (2006). Nonstationary panels. *Econometric theory*, 1, 511-539.

¹⁷ The table was organized with the information given in <http://data.worldbank.org/indicator>, World Development Index

UNCTAD B2C E-commerce Index	Developed by the UNCTAD, the B2C E-commerce Index is based on the following indicators: Percentage of individuals using Internet. Credit card (% of age 15+). Secure Internet servers (per 1 million people). Percentage of the population having mail delivered at home. Source: The UNCTAD B2C E-commerce Index measures an economy's preparedness to support online shopping. https://unctad.org/system/files/official-document/tn_unctad_ict4d17_en.pdf	B2Ci	+
Internet shoppers as a percentage of total population	Consumers who purchase from the internet. Source: The UNCTAD B2C E-commerce Index measures an economy's preparedness to support online shopping. https://unctad.org/system/files/official-document/tn_unctad_ict4d17_en.pdf	IShP	+
Share of individuals using the Internet	Individuals using the Internet (% of population) Internet users are individuals who have used the Internet (from any location) in the last 3 months. Source: http://data.worldbank.org/indicator , World Development Index	SII	+

The study analyzes selected determinants affecting GDP growth in developing countries. Panel data were used for the analyses, as they provide useful information, consistency, less linearity between variables, efficiency, and greater degrees of freedom. Furthermore, effects that cannot be measured in panel data or pure time series data can be identified and measured. The most important advantage of panel data is that it minimizes bias in the results. Ordinary least squares (fixed and random effects) methods were used because they provide reliable and competent estimates of α and β . For this study, balanced panel data from 20 developing countries were obtained. In our study, Equation (3) initiates the regression analysis. Instead of treating β_1 as a constant, we assume it is a random variable with mean β_1 . Hence, the volatility of an individual developing country represents the intercept as follows:

$$\beta_{1i} + \beta_i + \epsilon_i \quad (3)$$

Here ϵ_i is a random error term with zero mean and variance s_2 .

For the 20 developing countries studied, the overall average value for the intercept is 1. The individual deviation in the intercept values of each country is reflected in the error term ϵ_i .

Subtracting equation (3) from equation (2), we get:

$$GG_{it} = \beta_{1i} + \beta_{2i} GE_{it} + \beta_{3i} LnRE_{it} + \beta_{4i} SIS_{it} + \beta_{5i} IShP_{it} + \beta_{6i} SII_{it} + \beta_{7i} B2Ci_{it} + \epsilon_i + \mu_{it} \quad (4)$$

After that, it is transformed into another equation:

$$GG_{it} = \beta_{1i} + \beta_{2i} GE_{it} + \beta_{3i} LnRE_{it} + \beta_{4i} SIS_{it} + \beta_{5i} IShP_{it} + \beta_{6i} SII_{it} + \beta_{7i} B2Ci_{it} + \beta w_{it} \quad (5)$$

where:

$$w_{it} = \epsilon_i + u_{it} \quad (6)$$

Table 4

Regression analysis with 5 factors.¹⁸

lm(formula = y ~ x1 + x2 + x3 + x4 + x5)

Residuals:

Min 1Q Median 3Q Max
-1.7665 -0.8801 -0.1990 0.6483 3.6084

```

Coefficients:
      Estimate Std. Error t value Pr(>|t|)
(Intercept) 6.212e+00 2.063e+00 3.011 0.00934 **
x1(GE)      5.694e-02 1.543e-01 0.369 0.71772
x2(RE)      1.664e-06 1.575e-06 1.057 0.30838
x3(SIS)     2.167e-05 1.887e-05 1.148 0.27018
x4(SII)     -6.597e-02 2.709e-02 -2.435 0.02884 *
x5(IShP)    6.312e-02 5.076e-02 1.243 0.23414
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.625 on 14 degrees of freedom
Multiple R-squared: 0.5446, Adjusted R-squared: 0.382
F-statistic: 3.349 on 5 and 14 DF, p-value: 0.03382
    
```

$$Y = 6.212e + 00 + 5.694e - 02x1 + 1.664e - 06x2 + 2.166e - 05x3 - 6.597e - 02x4 + 6.312e - 02x5$$

In the given model we can see only one of the predictors show some impact on GDP growth, as it is visible from our t-test, which can be checked by p-value compared with $\alpha=0,05$. As if p-value is bigger than α then the predictor will be accepted as a significant, and vice versa if it is smaller. In our situation all of the variables except SII will be accepted as insignificant. But, we will omit some of the variables with bigger p-value and check with the rest. So, I decided to omit 2 predictors, which are RE and IShP (Table 4).

Table 5

Regression analysis with 3 factors.¹⁹

```

Call:
lm(formula = y ~ x1 + x3 + x4)

Residuals:
   Min    1Q  Median    3Q   Max
-2.5106 -1.4530 -0.1852  0.9471  3.9137

Coefficients:
      Estimate Std. Error t value Pr(>|t|)
(Intercept) 7.101e+00 2.373e+00 2.993 0.00861 **
x1(GE)      -6.170e-02 1.520e-01 -0.406 0.04909 *
x3(SIS)      3.410e-05 1.652e-05 2.064 0.04561 *
x4(SII)     -3.561e-02 1.903e-02 -1.871 0.04978 *
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.927 on 16 degrees of freedom
Multiple R-squared: 0.2676, Adjusted R-squared: 0.1303
F-statistic: 1.949 on 3 and 16 DF, p-value: 0.1625
    
```

On the next level, we have a new model with 3 predictors which are GE, SIP, SII. As we can see all of the 3 variables are counted as a significant because of their p-values getting successfully accepted according to the t-test.

$$y = (9.764e - 01) + (-6.348e - 02)GE + (1.671e - 05)SIP - (1.411e - 01)SII$$

As it is seen from the table, Standard Error for the model is 0.9539 which is high though. Adjusted R-squared: 0.787. And according to F-test p-value²⁰ is 3.28e-06 < *alfa*(0.05). Which means the model itself is significant (Table 5).

Regression analysis with new predictor. We decided to add new indicator as a news in our Dissertation work. Which is called UNCTAD B2C E-commerce Index*. We discussed a lot of articles on the topic and none of them added this indicator as it is relatively new compared to other predictors. Small European countries top the ranking of 130 economies according to their readiness for business-to-consumer (B2C) e-commerce, a new UNCTAD study shows.²¹

The Index allows countries to identify their relative strengths and weaknesses. For example, in Latin America and the Caribbean and in Asia and Oceania, extending postal home delivery is particularly important. In Africa, e-commerce readiness is hampered especially by low Internet penetration levels.

Table 6

Regression analysis with B2Ci.²²

```
Call:
lm(formula = y ~ x3 + x4 + x1 + x6)

Residuals:
    Min       1Q   Median       3Q      Max
-0.89224 -0.52044 -0.03178  0.23225  2.08758

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.127e+00  1.056e+00   2.014  0.06236 .
x3(SIS)      2.764e-05  8.360e-06   3.307  0.00479 **
x4(SII)      1.527e-01  1.649e-02   9.260  1.36e-07 ***
x1(GE)      -1.461e-01  7.503e-02  -1.947  0.04055 *
x6(B2Ci)     -3.221e-02  1.398e-02  -2.304  0.03593 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.8467 on 15 degrees of freedom
Multiple R-squared:  0.8675, Adjusted R-squared:  0.8322
F-statistic: 24.56 on 4 and 15 DF, p-value: 1.957e-06
```

$$GG = (2.127e + 00) * (-1.461e - 01)GE + (2.764e - 05) * SIP + (1.527e - 01) * B2Ci + (-3.221e - 02) * SII \tag{7}$$

In the given model we can clearly see that the Index shows the highest impact of GDP Growth in t- test, which means the predictor is surely significant. Apart from this all of the other indicators also stay significant, which means it is highly correlated positively with other predictors too. The model itself passes from F-test with 1.957e-06 exactly lower than *alpha*=0.05. Another noteworthy fact is that, even Residual standard error decreases from the previous model with 0.8467 (Table 6).

²⁰ Liang J. J., Pan W. S. Testing the mean for business data: should one use the z-test, t-test, F-test, the chi-square test, or the p-value method?. – 2011.

²¹ UNCTAD. (2020). The UNCTAD B2C e-commerce index 2020: spotlight on Latin America and the Caribbean. UNCTAD Technical Notes on ICT for Development.

²² Table was prepared with the help of R Studio from the given data above

x3(SIP) x4(SII) x1(GE) x6(B2Ci)
 1.498161 1.125759 1.308729 1.940753

In the VIF test, all values should be less than 5. If it is large, there will be a problem of multicollinearity. In our case, all of the variables passed from VIF test with: 1.498161 1.125759 1.308729 1.940753 numbers. So they don't have any multicollinearity problem.

Table 7

Test for homoscedasticity²³

```

jarqueberaTest(res)
Title:
Jarque - Bera Normalality Test

Test Results:
STATISTIC:
X-squared: 7.6639
P VALUE:
Asymptotic p Value: 0.02167
library(lmtest)
dwtest(myre) # If p-value < alpha=0,05, residuals are correlated. If it > 0,05, not correlated. In our situation p-value = 0.817, which means p-value < alpha=0,05, residuals are not correlated.

Durbin-Watson test

data: myre
DW = 1.6093, p-value = 0.1644
alternative hypothesis: true autocorrelation is greater than 0
    
```

In testing for homoscedasticity, we work with residuals. In this we need to determine 2 things, namely “Are the residuals normally distributed?” and “Are the residuals correlated?” we will answer the questions. For this we use JarqueberaTest and Durbin Watson Tests²⁴. In Jarquebera Test²⁵, if the p-value < alpha=0.05, the residuals are not normally distributed, otherwise, they are normally distributed. In our case p Value: 0.07167, which is bigger than 0.05. This means that the residuals are normally distributed. That is, the condition of homoscedasticity is fully fulfilled. In the Durbin Watson test, if the p-value < alpha=0.05, the residuals are autocorrelated, otherwise, they are not autocorrelated. In our case, p-value = 0.01644 > alpha=0.05, which means that the residuals are autocorrelated (Table 7).

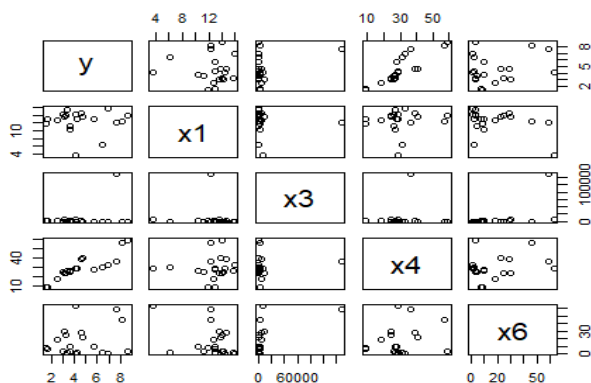


Figure 1 Pairs of linear graphs of indicators.²⁶

²³ Table was prepared with the help of R Studio from the given data above

²⁴ White K. J. The Durbin-Watson test for autocorrelation in nonlinear models //The Review of Economics and Statistics. – 1992. – C. 370-373.

²⁵ Thadewald T., Büning H. Jarque–Bera test and its competitors for testing normality—a power comparison //Journal of applied statistics. – 2007. – T. 34. – №. 1. – C. 87-105.

²⁶ Figure was prepared with the help of R Studio from the given data above

From our plot, we can see that there is a strong, positive, linear relationship between the predictors x4 and y. There is also a positive, linear relationship between predictors x1, x3 and x6 (Figure 1). Before building the polynomial model, I chose y and x4 for my simple linear model (they have the largest correlation of 72%) and for this reason I also build the models with the x4 predictor.

Table 8

Regression analysis of B2Ci.

Coefficients:
 Estimate Std. Error t value Pr(>|t|)
 (Intercept) 0.22887 0.62187 0.368 0.717
 x6(B2Ci) 0.14396 0.01918 7.507 5.99e-07 ***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.045 on 18 degrees of freedom
 Multiple R-squared: 0.7579, Adjusted R-squared: 0.7445
 F-statistic: 56.36 on 1 and 18 DF, p-value: 5.985e-07

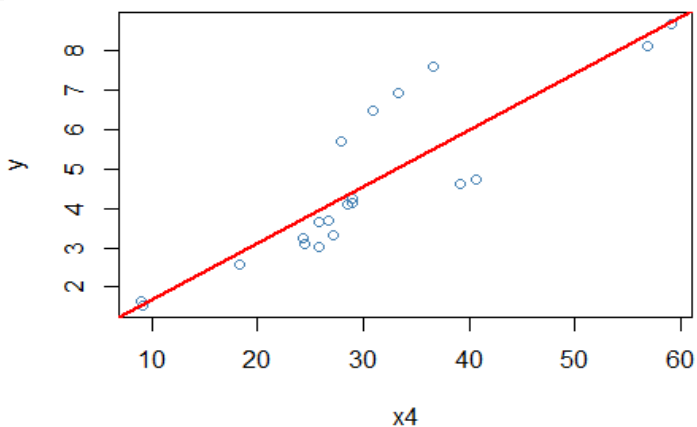


Figure 2 Linear graph of indicators²⁷

```
cor(y, x6)
[1] 0.92241837
```

$$y = (0.22887) + (0.14396)x2$$

We can see from the model that the p-value is 5.99e-07 < alpha (0.05), that is, the model is significant and valid. The correlation coefficient is 0.8705962. The closer the correlation coefficient is to -1 or +1, the stronger the correlation between the indicators. The closer to 0, the weaker the linear relationship (Figure 2). The correlation coefficient indicates the degree of linear association rather than the desired degree of association. We have 0.8705962 which is close to +1, meaning we have a strong linear relationship. Standard error of the model 1.045 Adjusted R Sq: 0.7445 (Table 8).

Table 9

Matrix of correlations (with B2Ci)

	y	x1(GE)	x3(SIS)	x4(SII)	x6(B2Ci)
y	1.00000000	0.02961117	0.02961117	0.32740164	0.87059616
x1(GE)	0.02961117	1.00000000	-0.04491156	0.08401928	0.7950722
x3(SIP)	0.02961117	-0.04491156	1.00000000	0.10953717	0.5420114
x4(SII)	0.32740164	0.08401928	0.10953717	1.00000000	0.7547623
x6(B2Ci)	0.87059616	0.79507219	0.54201136	0.75476230	1.0000000

Analyzing the correlation matrix, we can see that GE and B2Ci are almost 80% correlated (0.795%). Correlation of B2Ci with SII is also high 75,47% (Table 9). After adding B2Ci to the model, we also see that the indicators have changed slightly (Table 9).

Conclusion

In conclusion, we can say that as a new indicator UNCTAD B2C E-commerce index should be applied in all developing countries targeting in the development of e-commerce. As, as a factor of digital economy influencing highly UNCTAD B2C E-commerce index plays one of the main roles in the development of economy of the country. Since, the UNCTAD B2C E-commerce Index 2016 is composed of four indicators: Internet use penetration, secure servers per 1 million inhabitants, credit card penetration and a postal reliability score. Therefore, applying the index can easily bring clear analysis of how powerfully e-commerce of the country influences on economic growth. So, as a developing country Uzbekistan should also apply the index and analyse the growth share of digital economy in overall economic growth.

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