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Distribution of ICT and Analysis of the Digital Components of the Quality of Life

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Abstract

Purpose: Based on the author's adapted invariant choice, this study is to present the methodology and the calculation of the integral index of the digital component of the quality of life. By analyzing the digital indexes, the study is also to discuss distribution of ICT and the digital quality of life of the population of Kazakhstan and its regions. **Research design, data, methodology**: In this research, the method of calculation of integral assessment of the indicator was used, which indicates index constructs. The study analyzed objective secondary data for the period 2017-2019, which was the database from official websites of the Committee on Statistics of the Republic of Kazakhstan. **Results**: The study produced an integral code for assessing digital components of living standards of the population, consisting of five groups sub-indexes. **Conclusions:** Based on the provided analyses, we can confirm the existence of a significant difference of all the indicators of digital living standards of the population between the two leading cities: Almaty city and Nur-Sultan city. Furthermore we can deduce the differences of the examined indexes for other regions of Kazakhstan. Despite the rapid adoption of digital technologies, Kazakhstan still has significant digital gaps among cities indicating regional differences in the speed of implementation and distribution of digital technologies.

Keywords : Distribution, ICT, Digital Potential, Digital Component, Quality of Life.

JEL Classification Code: J24, H52, O30

1. Introduction

The transition of many enterprises and organizations to digital technologies of design, production and management is becoming the most important task in the context of COVID-19 impact. However, the business operates in the certain infrastructure environment, which can facilitate or, conversely, hinder the processes of digitalization. ICT environment and activities can occur all the time. Many people can communicate via email or other online media. In particular, in relation to evaluation, ICT used to support definitions practices in various ways. Computers can used as a work environment and as a tool for performing evaluation tasks.

Several studies have confirmed the great productivity potential that comes from ICT, but all of these studies highlight other factors that influence the benefits of ICT, such as skilled and rich human resources, low costs, and a favorable environment for ICT firms (Okazaki, 2006;

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Mathur, 2007). Some studies have shown that the distribution of ICT stimulates economic growth, especially in developing countries (Jorgenson & Vu, 2005; Kireyeva, Abilkayir & Tsoy, 2018). The issues of well-being and positive consequences of digitalization for living standards of the society, and provided its movement toward sustainable development were considered in the works by Ajvazjan (2012), Hatefi and Estelaji (2015), and Choi and Lee (2018). Inequality and security issues in the digital era studied in the works of scientists as Eubanks (2018), Salminen & Hossain (2018).

Therewith for a modern human it is hard if not impossible to go back from benefits provided by digital technologies. Toffler (1990) applied to such benefits mobile service, internet-based personal computer, digital television, navigation and satellite systems, representing them as integral features of lifestyle and indicators of new opportunities.

In this dimension, the life of a person in general becomes more information-intensive, when digital technologies turn into the tools for achieving of more comfortable conditions for living, work and communication. It is predicted that on a short-term horizon that informative part of quality of living standards of the population will undergo the transformation process based on the level of the demand of digital products and services, also the availability of consumer attributes. From this point of view, the living standards of the population can already be defined by new standards or indices, collectively determine the ability of society to provide the population with the necessary digital products and services. Under these conditions, there rises the need in the development of updated approaches to the measurement of quality of living of the population, taking into account its digital component. The purpose of this article is to analyze the digital quality of life of the population of Kazakhstan and its regions based on the author's adapted invariant choice methodology, which based on the calculation of the integral index of the digital component of the quality of life. The methodology involves the calculation of the integral index for assessing the digital component of the quality of life. This methodology can used by governmental agencies in the course of comparative assessment of digital quality of life not only in the regions of Kazakhstan. Nevertheless, in other countries, where there are monitored indicators of digitalization.

The section 2 presented the current empirical literature about integration of ICT and digital components into quality of life focusing on concepts, differences in methodologies and sample periods. The section 3 described the methodology for developing an integral index of digital quality of life. In the section 4 presented the calculation results of the index (and sub-indexes) of digital quality of living of the population of Kazakhstan. The section 5 is the conclusion part.

2. Literature Review

Imbalances and discomfort in the development of society, caused by deepening of social and economic problems, disparity of living conditions of various social groups have defined the emergence of the concept of “quality of living”. More in general quality of living reflects both material and spiritual state of people, predominantly under the conditions of intense anthropogenic impact on the environment, economic, political crisis and other preventatives.

High priority to achieve the goals of current research has given to the works, which direct at formation of modern understanding of quality of living. Visionaries of postindustrial society Rostov (1959) and Bell (1967) believed that meeting the needs of people and goods and service consumers is the primary aim of postindustrial society. In the later studies, there are concepts of quality of living, which differ from each other depending on the evolution of human environment and the growth of human needs (Crafts, 1997; Campbell, 1981).

The works study the importance of mental activity using ICT, the epochal significance of the emergence and distribution of information technologies for the history of humanity (Bell, 1980; Toffler, 1990; Castells, 1999; Jorgenson & Vu, 2005). Some studies have described the process of digitalization of society, especially the disciplinary and educational characteristics leading to addictive people to use information and computer technology and the penetration of information technologies in all spheres of human existence (Okazaki, 2006; Mathur, 2007; Kireyeva, Abilkayir & Tsoy, 2018; Kusuma, Muafi, Aji & Pamungkas, 2020).

Therefore, due to the change in human life, there is a change in the quality of living in the new society. Such approach applies by many scientists who investigated the impact of digitalization on changing the quality of life of the population and its value orientations (Cruz-Jesus, Oliveira & Bacao, 2012; Mordini, 2014). Singh considered the issues of well-being and positive consequences for the life activity of the society (Singh, 2013). Some scientists in their works study the issues of inequality and problems of safety in digital era and have become the target of research among other scientists (Taipale, 2013; Eubanks, 2018; Salminen & Hossain, 2018).

Further, Popov and Semyachkov (2018) emphasized the following negative consequences of digitalization,

deteriorating quality of living of the population: the change in the labor market, release of unqualified specialists and specialists in declining traditional professions: digital inequality, which limits meeting the needs of certain groups of the population for education, public services, health services, etc. In addition, an increase in cyber threats affecting the financial security of the population and the protection of personal data, etc. Digital technologies are already in use in many state bodies, nevertheless there is needed the understanding of how the implication and distribution of digital projects is going to increase the efficiency of such structures activity (Avgerou, 2008; Grimsley & Meehan, 2007; Alibekova et al., 2020).

Justification of the focus of our study on digital components of quality of living has confirmed by the increase of the number of works, considering the influence of information-oriented society on quality of living. Such works include the works of Atkinson and Castro (2008), Jung (2020). In a number of scientific papers, the impact of ICTs and digital technologies on specific aspects of life studied in depth and thoroughly, taking into account their specifics (Wang & Feeney, 2016; Kozina & Bole, 2018; Gomes, Bustinza, Tarba, Khan, & Ahammad, 2019). All these studies allow having deeper understanding of digital technologies part in meeting the needs of modern people. It is allow forming the essence of quality of life transformation due to the ingression of digital technologies in all spheres of life. The listed works have made a significant contribution in identifying digital components of quality of living. However, the issue of objective measurement of quality of living under the conditions of digitalization remains important.

The critical analysis of abovementioned works helps to make a conclusion that digitalization creates both opportunities and risks for population life activity, thus , its impact on quality of living can be positive and negative as well. According to the provided review, following aspects of digital transformation positive impact on quality of living of the population have emphasized.

First, incurring of digital well-being of the population, which manifested in the opportunity of digital technologies application to facilitate life and other work, as well as to meet other human needs.

Second, changes in competencies, skills of the population, lifestyle traditions (for instance, online-education, online shopping).

Third, transformation of labor conditions, implication of digital technologies in production and business.

Fourth, the usage of ICT advantages for adding security of living and living standards of the population.

Thus wise, the impact of above-mentioned aspects on quality of life of the population is becoming obvious. Therefore, the traditional system of indicators of quality of life, which describe the measurement with digitalization conditions, i.e. digital components of quality of life.

3. Research Methods and Materials

The methodological basis of this research is the achievements of economic science, other related branches of scientific knowledge and the results of scientific publications. In particular, the methodological justification will based on the complex of systematic review of scientific articles from bibliometric databases: Web of Science, Scopus, and Science Direct. In general, we see the world after the COVID-19 outbreak, conditions social distancing and continue activities in a remote format are required active distribution of ICT. It is becoming clear that the pandemic and digital technologies represent two revolutionary phenomena leading to radical changes. Therefore, all the scientific literature in the databases was searched for topics related to the sustainable development of various territories with a digital component (“digital technologies”; “digital potential of the region”; “quality of life”, etc.). In order to find a link between the differentiation of various territories and distribution of their digital infrastructure.

An analytical review of various scientific studies on this issue shows many different indicators, but the reasons for choosing different multi-factor indicators are not particularly clear and obvious. It may seem that in many cases these indicators have chosen intuitively. Some authors used only 15 evaluation indicators, while others used up to 100. In addition, the number of indicators related to digital measurements in different studies is diverse and descriptive. Thus, it has found that different index systems differ from each other in the calculation methodology, structure, and the used ratio of quantitative and qualitative indicators (Kireyeva, Lakhonin & Kalymbekova, 2019). Some scientists used data analysis methods based on binary regression (Hand & Henley, 1997; Robertson, Llewellyn, Mandel, Lawes, Bramley, Swift, Metz & O’Callaghan, 2012). Ajvazjan emphasized that having formalized methodology for measuring of living standards, developed based on corresponding statistical indicators, and specific properties of this category (Ajvazjan, 2012).

Alongside this, there is no statistical category, the value of which would cover the level of living standards. It can promote only by compiling integral index living standard. There are some quality of live indexes to consider, which used for a considerably long period and which are most common (see Table 1).

Table 1: International rankings for quality of life measuring

Description of rating	Indicators and indexes	Coverage
Human Development Index, (UNDP)	Life expectancy, level of education and GDP.	189 countries
World ranking of Quality of Living (International Living)	Living wage, culture, economy, environment, freedom, health, infrastructure, safety and risk, climate	192 countries
Index of Quality of Live Measurement (OECD)	living conditions, income, employment, education, ecology, health, management efficiency, social life, safety, satisfaction with living conditions, balance between working time and leisure	34 countries
Quality of Life Index (Economist Intelligence Unit)	Health; family life; public life; material well-being; political stability and security; climate and geography; employment rate; political and civil liberties; gender equality.	111 countries
Cities ranking with the highest quality of living (Mercer)	39 criteria characterizing the political and social environment, economic indicators, the presence of certain restrictions, the quality of the health care system, education, the affordability and cost of housing, cultural life, climate and the likelihood of natural disasters.	231 cities of the world

At the same time, on the one hand, the objectivity of the resulting data has ensured, and on the other hand, there is a problem associated with the complexity of evaluating and reducing indicators to a single index. The disadvantage of some evaluation indexes is that they may show less negative effects (Shiu & Lam, 2008). Further, some studies use correlation and factor analysis, expert statistical regression models, cluster analysis, and other econometric methods (Holtz-eakin, Newey & Rosen, 1988; Oulton, 2002). An important task is to develop a methodology for evaluating performance indicators that allows distinguishing between positive and negative factors. In other words, it is important to show the current situation or the real picture in different types of regions. For these purposes, we propose methodology for measuring the level of Kazakhstani regions development with a digital component.

Our methodology based on indexes used for calculation, which associated with distribution of ICT. Based on available indices have been developed other sub-indexes. Other sub-indices have been developed that are based on available indicators, such as ICT infrastructure, digital activity of the population, digital demand for physical goods and services, digital demand for intangible goods and services, and digital activity of organizations. The methodology of current research keeps the general regional approach and methodology of indexes construction. In addition, due to the small number of observations, the correlation coefficients of some indices were not calculated. The method of constructing the index of the digital quality of life of the population includes several stages.

At the first stage of calculation there was used the procedure of minimax standardization. Standardized values of indices were identified for every region (r = 1, …, R) and for every year of considered period (t = 1, …, T). Minimal and maximum values of current indices have identified in all regions for the three years of the observed period:

$$X_{iM}^{r} = \frac{x_i^r - X_i^{min}}{X_i^{max} - X_i^{min}} \quad (1)$$

The purpose of such standardization is to create opportunities for comparing indicators that measured in disparate units, but have common characteristics or describe similar events.

At the second stage, the values of sub-indexes have calculated as arithmetical average of standardized values of the corresponding set of indicators. In many methods, it is should be note that all indicators in the convolution by sub-indexes are equally. The values of regional indexes and sub-indexes were determined by blocks:

$$I_r^b = \frac{1}{nb} * \sum_{i=1}^{nb} X_{iM}^{r} \quad (2)$$

where:

nb – the number of standard indicators for calculating an index or sub-index for QLP blocks;

b – population quality of life block index (QLP), b ∈ [1; B];

B – the total number of blocks in the characterization of the digital component of the life of population.

The value of the regional index of digital QLP, depending on the values, which make up its sub-indexes have determined as the weighted average of sub-indexes. The value of weight coefficients of sub-indexes taken equal to the proportion of the number of indicators used in the calculation of each sub-index in the total number of selected

indicators. The integral weight of sub-indexes is equal to one. In such a way, the regional index of digital QLP (RQLPr) for each year of the observed period is:

$$RQLP_r = \sum_{b=1}^{B}(\frac{nb}{N} * I_r^b) \quad (3)$$

where, N – the total number of normalized indicators selected for calculating the integral index of digitalization of population life.

Thereat identified methodological approaches are not identical, but they are interrelated between each other. The developed method will allow objectively and realistically assess the problem in different sections, there through obtaining a multidimensional, objective idea of the processes taking place in this area. Thus, by the virtue of the suggested method we will provide the analysis.

4. Analysis and Results

In this research considered 14 regions of Kazakhstan and 3 cities of republican status. Whereupon the data for Shymkent city and Turkestan region have consolidated, as for the past periods, statistics on them collected in the form of the South Kazakhstan region. Time boundaries of the study for 2017–2019, since all the statistical data was available.

The information base of the research made up the data of the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, in particular, the data of analytical system "Taldau". For the development of indexes, there were selected 32 indices, which divided into five groups' sub-indexes in form general digital quality of life index of Kazakhstan. For the ICT infrastructure sub-index, statistical indicators were used such as the percentage of households with Internet access; the number of computers connected to the network; the percentage of households using a mobile phone; the percentage of households using cable television; the percentage of households using Internet protocol television (IPTV). The sub-index of digital activity of the population have calculated based on the fallowing of indicators: the share of computer users (regardless of the place of use; the share of Internet users aged 16-74, computer literacy of the population); the share of Internet users; the share of users who use e-government services for the population via the Internet. The digital demand sub-index for physical goods and services includes the proportion of Internet users who ordered (1) food, (2) medicines, (3) books, journals and newspapers, (4) clothing, footwear and sporting goods, (5) computer goods, (6) electronic equipment, (7) household goods and (8) travel services. The digital demand sub-index for intangible goods and services includes the percentage of Internet users who ordered: (1) movies and music, (2) e-learning materials, (3) computer programs and video games, (4) telecommunications services, (5) financial and insurance services, and (6) entertainment tickets. The sub-index of digital activity of organizations based on the calculation of indicators that reflect the use of ICT in the activities of enterprises. Based on the calculations there was provided the assessment of dynamics of digital components of quality of living standards in RK (see Table 2).

Table 2: : Digital component of the standard of living of the population in Kazakhstan for 2017-2019

Description of the index/sub-index	The value of the index /sub-index			The growth rate of the index/ sub-index			Rating
	2017	2018	2019	2018 to 2017	2019 to 2018	2019 to 2017	2017-2019
Digital quality of life index	0,245	0,311	0,315	126,9	101,3	128,6	
Sub-index ICT infrastructure	0,359	0,420	0,452	117,0	107,6	125,9	1
Sub-index of digital activity of the population	0,367	0,447	0,442	121,8	98,9	120,4	2
Digital demand sub-index for physi cal goods and services	0,272	0,328	0,324	120,6	98,8	119,1	3
Sub-index of digital demand for int angible goods and services	0,186	0,304	0,295	163,4	97,0	158,6	4
Sub-index of digital activity of orga nizations	0,113	0,147	0,155	130,1	105,4	137,2	5

In general, the digital quality of life index and sub-indicators have increased from 2017 until 2019. The greatest increase over the last three years is displayed by the sub-index of digital demand for intangible products and services, which reflect the activity of Internet users in the purchase of goods and services, that are not expressed

in any way physically, for example, videogames or e-learning materials. At the same time, ICT infrastructure sub-index is of great importance, which means the overall coverage and readiness of the ICT infrastructure for use.

Forthwith, the values of sub-indexes and the digital quality of life index of the population have shown in the regional context. The regions were ranked in the decreasing order of the value of sub-indexes/indexes in 2019, moreover, the regions located above the line "Kazakhstan" have values above the average in the republic, and accordingly the regions below the line "Kazakhstan" have values below the average (see table 3).

Table 3: Sub-index ICT infrastructure

Sub-index ICT infrastructure	2017	2018	2019	Growth in 2019 to 2017, %
Almaty city	0,776	0,751	0,806	103,9
Nur-Sultan city	0,663	0,763	0,747	112,7
Atyrau region	0,446	0,577	0,629	141,0
Almaty region	0,465	0,470	0,489	105,1
Aktyube region	0,358	0,420	0,468	130,8
Turkestan region and Shymkent city	0,411	0,445	0,456	110,9
Kazakhstan	0,359	0,420	0,452	126,0
Karaganda region	0,251	0,331	0,445	177,5
Kyzylorda region	0,404	0,414	0,421	104,3
Kostanay region	0,334	0,373	0,421	126,1
Mangistau region	0,332	0,391	0,413	124,3
Zhambyl region	0,307	0,391	0,393	128,2
Pavlodar region	0,227	0,343	0,380	167,6
East Kazakhstan region	0,263	0,318	0,346	131,6
West Kazakhstan region	0,279	0,348	0,334	119,6
Akmolinsk region	0,053	0,140	0,247	466,0
North Kazakhstan region	0,175	0,243	0,240	137,2

The sub-index of ICT infrastructure presents the coverage availability in the region. According to the data, it is apparent that by a large margin, almost twice the average values in the republic, and the leader is Almaty city. Also high sub-index values are in Nur-Sultan city and Atyrau region. Meanwhile, the highest growth rate of this sub-index observed in Akmola region, where the sub-index has increased for more than 4.5 times during last three years.

The sub-index of digital activity of the population reflects the readiness and ICT rate usage by the population as shown in Table 4.

Table 4: Sub-index of digital activity of the population

Sub-index of digital activity of the population	2017	2018	2019	Growth in 2019 to 2017, %
Nur-Sultan city	0,509	0,678	0,641	126,0
Almaty region	0,536	0,572	0,626	116,8
Karaganda region	0,428	0,516	0,556	130,0
Kostanay region	0,417	0,463	0,499	119,7
Kyzylorda region	0,487	0,496	0,477	98,0
West Kazakhstan region	0,533	0,590	0,462	86,7
Akmolinsk region	0,225	0,249	0,449	199,5
Kazakhstan	0,367	0,447	0,442	120,4
Aktyube region	0,340	0,372	0,422	124,3
Almaty city	0,431	0,434	0,411	95,4

Turkestan region and Shymkent city	0,332	0,365	0,396	119,1
North Kazakhstan region	0,313	0,380	0,372	118,6
Pavlodar region	0,412	0,521	0,371	90,1
East Kazakhstan region	0,298	0,435	0,365	122,4
Mangistau region	0,197	0,364	0,362	183,7
Atyrau region	0,209	0,329	0,342	164,0
Zhambyl region	0,202	0,391	0,313	155,0

The data presented includes digital literacy, the percentage of ICT users, and other similar indicators. Based on some indicators, it can seen that the largest share of the digitally active population - Nur-Sultan city, Almaty region and Karaganda region. In addition, in Almaty city (which was the leader for the infrastructure sub-index), the index this sub-index is below average, which is accepted as a significant proportion of the population with low activity in the use of ICT.

Table 5 further shows sub-index of digital activity of organizations.

Table 5: Sub-index of digital activity of organizations

Sub-index of digital activity of organizations	2017	2018	2019	Growth in 2019 to 2017, %
Almaty city	0,693	0,761	0,856	123,6
Nur-Sultan city	0,307	0,562	0,578	188,4
Karaganda region	0,135	0,171	0,179	132,2
Kazakhstan	0,113	0,147	0,155	137,3
Turkestan region and Shymkent city	0,084	0,145	0,136	161,7
East Kazakhstan region	0,100	0,107	0,110	110,6
Atyrau region	0,048	0,082	0,093	194,0
Aktyube region	0,053	0,078	0,092	173,6
Pavlodar region	0,070	0,067	0,079	113,7
Almaty region	0,048	0,060	0,069	142,7
Kostanay region	0,084	0,092	0,065	77,8
Mangistau region	0,044	0,037	0,044	99,6
North Kazakhstan region	0,031	0,038	0,042	138,5
Akmolinskaya region	0,040	0,063	0,042	104,5
Kyzylorda oregion	0,023	0,033	0,040	171,9
West Kazakhstan region	0,036	0,035	0,038	106,1
Zhambyl region	0,014	0,020	0,019	139,1

Thus, the current data of the sub-index combines all indicators of digital activity of organizations in Kazakhstan, including those that actively contact customers via the Internet, who have their own website or any significant share of electronic orders from total costs. The index shows a significant difference between organizations in Almaty and Nur-Sultan cities, and the rest regions of Kazakhstan.

Table 6 presents the total digital quality of life index of the population by regions.

Table 6: Digital index QLP

Digital quality of life index	2017	2018	2019	Growth in 2019 to 2017, %
Nur-Sultan city	0,484	0,703	0,662	136,6
Almaty city	0,526	0,600	0,638	121,3
Atyrau region	0,186	0,413	0,379	203,9
Karaganda region	0,246	0,371	0,360	146,3
Kazakhstan	0,245	0,311	0,315	128,7

Turkestan region and Shymkent city	0,219	0,291	0,300	137,5
Aktyube region.	0,254	0,250	0,297	117,0
Almaty region	0,253	0,270	0,292	115,4
Kyzylorda region	0,256	0,356	0,269	105,1
Mangistau region	0,209	0,205	0,255	121,7
West Kazakhstan region	0,189	0,275	0,252	133,2
Pavlodar region	0,171	0,257	0,251	146,5
Kostanay region	0,233	0,263	0,245	105,3
Akmolinskaya region	0,156	0,155	0,234	150,2
Zhambyl region	0,171	0,208	0,225	131,8
East Kazakhstan region	0,172	0,199	0,206	119,6
North Kazakhstan region	0,187	0,163	0,170	91,0

According to the presented data, it is clear that the general digital index of the quality of life of the population by region shows a large overall gap between the cities of Almaty and Nur-Sultan from other regions of Kazakhstan. These cities are more than twice as large as the average value for the rest of Kazakhstan's regions. In addition, Atyrau region shown high growth rates compared to other regions. North Kazakhstan region is the region where the value of digital quality of life index has decreased over the observed period.

The conclusions on sub-indices and the digital quality of life index by region, we can develop consolidation, as shown in table 7 (comparison analysis).

Table 7: A comparison analysis of the values of sub-indexes and RQLP

Region of Kazakhstan	Frequency of hits on the index position			
	Position above the a verage value, in parts	First third of the rating, in parts	Position below the average value, in parts	Last third of the rating, in parts
Nur-Sultan city	6	6	0	0
Almaty city	5	5	1	0
Atyrau region	4	4	2	1
Karaganda region	4	2	2	0
Almaty region	2	1	4	1
Akmolinsk region	1	0	5	0
Aktobe region	1	0	5	0
West Kazakhstan region	1	0	5	2
Zhambyl region	0	0	6	3
Kostanay region	1	0	5	2
Kyzylorda region	1	0	5	1
Mangystau region	0	0	6	1
Turkestan region and Shymkent city	2	0	4	0
Pavlodar region	1	0	5	0
North Kazakhstan region	0	0	6	4
East Kazakhstan region	0	0	6	2

Obtained results will allow identifying the leader-region - it is Nur-Sultan city, which the most frequently was in the first third of the ranking and in the position of above than average, the outsider in terms of the digital quality of living of the population is North Kazakhstan region. Proceeding from the analysis it is should be conclude that there is a significant difference between two leader-cities: Almaty and Nur-Sultan, and other parts of Kazakhstan almost in all

indicators of digital quality of living of the population.

The closest to achieve high indicators for analyzed Atyrau and Karaganda regions, which received index values above average. Overall, this can interpreted as a great readiness of the regions to the improvement of digital quality of living of population. The worst evolution digital quality of living index are in North Kazakhstan and West Kazakhstan regions.

Reviewing the dynamics and the value of digital quality of living index of population for the enlarged economic and geographical regions we can observe that the best indicator belongs to South Kazakhstan invariably throughout period, the worst values shared between Central and East (see Figure 1).

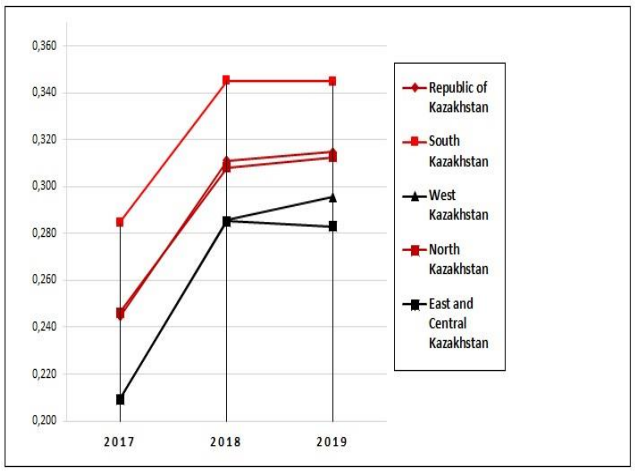

Figure 1: Dynamics of the digital index value QLP

It should concluded that one of the main issues in the sphere of digitalization of life in Kazakhstan would be regional differentiation, as well as gaps between sub-indexes of reading. Since the sustainable development of digitalization requires an even distribution of all its components. For example, even with availability of digital infrastructure without corresponding digital literacy the indexes of digitalization will be still low.

Analysis of the practical differentiation of the regions of Kazakhstan by the digital index QLP denotes strong differences in the purpose of regions development, directions and mechanisms of state regulation, which proves the necessity of distribution of ICT and implementation of regional programs of population quality of life improvement.

5. Conclusions

This research marks a starting point for further research in the field the emergence of digital well-being of the population, which manifests in the opportunity of digital technologies implication. Following the literature review, it is apparent that the role of digital technologies in meeting the needs of modern people makes it possible to develop the understanding of the essence of transformation of quality of living due to the ingression of digital technologies in all fields of life. The analysis of studies has shown that some studies have made a significant contribution in identifying digital components of quality of living. However, the problem of objective measuring of quality of living is still relevant. This research is in the process of solving the issue of detection of development level of territories of Kazakhstan before digitalization and contribute to the number of similar studies. Critical analysis of the works allows making a conclusion that digitalization creates both opportunities and risks for living standards of the population, consequently its influence on the quality of living can be positive or negative.

According to the provided review, there can be defined the following aspects of positive influence of digital transformation on quality of living of population:

First, the emergence of digital well-being, which manifests in the opportunity of digital technologies application for facilitating everyday life and carrying out other work, as well as to meet other human needs. Moreover, the influence of considered aspects on the quality of living is becoming obvious due the traditional system of indicators of quality of living measurement must supplemented by the conditions of digitalization, which can be nominally called digital components of quality of living.

Second, the developed method will help to provide objective and realistic assessment of the issue in different contexts, thereby achieving multidimensional, fair presentation about occurring processes in this field. Foremost other indicators used for calculations, related to the informational communicative technologies (ICT). In the study there are considered 14 regions of the Republic of Kazakhstan and 3 cities of republican status, herewith, the data focused on the time boundaries of the study during the period 2017-2019, which due to the availability of all data.

Third, obtained data will allow us to identify the leader-region – it is Nur-Sultan city, which the most frequently was in the first third of the ranking and in the position of above than average, the outsider in terms of the digital quality of living of the population is North Kazakhstan region. Based on the analysis provided we can conclude that there is a significant difference between two leader-cities - Almaty and Nur-Sultan, and other parts of Kazakhstan almost in all indicators of digital quality of living of the population. At the same time disregard of the rapid adoption of digital technologies, Kazakhstan still has significant digital gaps – there are differences in the speed of implementation and distribution of ICT.

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