



The role of the knowledge economy in the development of banking services in Libya

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ABSTRACT

The study focuses on the basic variables of the knowledge economy, where aims to know the role of the knowledge economy in the banking sector and solving the problems facing Libyan commercial banks in the development of banking services. In order to achieve the main purpose of the study, we used the descriptive-analytical method, by using the questionnaire. Where we surveyed a total of 320 employees at six commercial banks operating in the eastern region of Libya. Through incoming questionnaires, we have analyzed 299 questionnaires. The results of the analysis showed a positive relationship between the knowledge economy and the development of banking services and that the knowledge economy plays an active role in the development of banking services, as the sub-variables of the knowledge economy are knowledge, skills, education, IT infrastructure, speed, access to service, research and development, Innovation, institutional regime, economic incentives as well as the sub-dimensions of the developing of banking services that represented in online banking, data transfer services, the use of technology, and customer relations. all of them show a high positive relationship among them. Also, the study includes information on whether there are differences between the knowledge economy and the development of banking services in the banks included in the research. The results of the study showed that knowledge, skills, training, economic incentives, and institutional regime vary according to banks.

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Introduction

The knowledge economy is the main driver of economic growth, where the common use of information technology, communication, and knowledge represents the new factors of production and the measurement of growth (Al-Ghazawi, 2012). Thus, the knowledge economy depends on the availability of information and communication technologies and the use of technological innovation. With regard to the role of the knowledge economy in the development of banking services, its role is represented in transforming services from traditional to electronic, as the interest in research and development and innovation banking in addition to the introduction of technology in the service Banking is the most important factor in the development of banking services (Naji, 2015). Therefore, The Libyan economy, like other developing economies, seeks to improve the level of banking services and products to cope with the rapid developments in this field, especially after the emergence of the knowledge economy, which has become the main engine for growth of the economies of world countries. Where commercial banks are seeking to develop their services in line with the new economy. Moreover, banks have had to find a new vision to improve their banking services according to the knowledge economy. Hence, this study sought to identify the role of the knowledge economy as an input to solve the problems facing Libyan commercial banks in terms of developing their banking services, that through focusing on the main pillars of the knowledge economy. Then, the importance of the study is to determine the role of the knowledge economy in the development of the Libyan banking sector, to make it more flexible and capable of meeting the requirements of its customers. where pillars of the knowledge economy that represented in HR investment, ICT, innovation in R & D, economic incentives and the institutional regime have been used as key inputs in representing the independent variable, in addition, to know their role in influencing the dependent variable that represented in developing services banking. Also, the survey questions (the main axes of study) were extracted from the literature and similar

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surveys in Europe and the Arab countries, Where the study sample was biased and confined to only one sector of the service sector, which the Libyan commercial banks, specifically in the eastern region in Libya. Furthermore, this study will provide the basis for the development of banking services in Libya. Where this study will attempt to identify the role of the knowledge economy in the development of banking services in Libya and will try to make some suggestions to avoid obstacles to the application of the knowledge economy in the field of banking. Based on above the problem of the study can be clarified in the following question: *What is the role of the knowledge economy in developing and improving banking services in Libya?*

Through the main question of the study problem, we can find some sub-questions:

- i. *Does the investment in human capital contribute to the development and improvement of banking services?*
- ii. *Does innovation in the banking system contribute to the development of banking services?*
- iii. *What is the impact of information and communication technology in the development of banking services?*
- iv. *What is the impact of economic incentives and the institutional regime in the development of banking services?*

Literature Review

Theoretical background

The term knowledge economy refers to an economy that is based on the production and management of knowledge within certain economic determinants. It differs from the knowledge-based economy, which symbolizes the economy that uses knowledge technologies such as cognitive engineering and knowledge management. The knowledge is a product in a knowledge economy, unlike a knowledge-based economy, the knowledge is the tool. In general, the knowledge economy refers to the global economic transformation resulting from the information society and the success of the industrial economy in reworking its foundations and rules within a globalized and sustainable economy. We will now address some definitions related to the knowledge economy. There are many definitions of the knowledge economy, according to Powell and Snellman (2004), defined Knowledge economy as products and services through the use of knowledge-intensive activities that contribute to accelerating the wheel of technological progress. Therefore, the basic ingredients of the knowledge economy involve increased reliance on physical inputs and natural resources, as well as efforts in research and development that seek to achieve improvements Continuous at each stage of production. Najm (2008) also defined it as the economy that creates wealth through knowledge processes and its services that represented in (the creation, improvement, sharing, learning, and use of knowledge in its forms) in different sectors through reliance on human assets and according to new characteristics and rules.

Furthermore, OECD (1996) has defined the knowledge economy as "the economy based primarily on the production, dissemination, and use of knowledge and information. As for the World Bank Institute ([WBI], 2007) is defined as the economy that achieves the optimizes use of knowledge in order to achieve economic and social development, this involves bringing foreign knowledge in addition to intensifying and formation knowledge in order to meet his own needs. Shahid (2009) was defined as an emerging economy that relies on achieving its economic success on the growing and effective use of intangible assets knowledge that represented in skills, innovative potentials through which to achieve the competitive advantage of these resources. Chen and Dahlman (2006) define the knowledge economy is seen as the key driver for sustainable growth because knowledge creation is the focus of the economic process. As well as Knowledge acquisition, dissemination and use that lead to promote economic development. The key element of the knowledge economy as mentioned by the world bank is the ability to innovate in education through long-term investments that lead to the successful transition of a knowledge economy. With regard to the term "banking service" we will try to present some definitions about the banking service and trying to link them together.

Kotler and Armstrong (2008) defined the banking service as activities or benefits provided by the seller to the buyer, which is of an intangible nature. The sale of the service does not entail the transfer of ownership, but its production may be linked to tangible products, also banking and financial services represent the set of services provided by banks to their customers, and these services are linked to the basic functions of banks such as deposit, credit and investment services. According to Kotler (2001), the service as any activity or performance subject to exchange, where such exchange is intangible, so ownership is not transferred, also it may be linked to or independent of the material product. As for Sweidan (2009) defined the service according to the American Association to Marketing as that intangible product that is exchanged directly from the product to the user.

Empirical studies

Researcher reviewed several previous studies that were available to him through scientific journals, periodicals, and published databases. These studies dealt with the subject of the knowledge economy in its various aspects, and other studies related to the development of banking services. Among these studies we mention the following:

Crisculio and Martin (2004) focused on the role that the knowledge economy plays in influencing the growth of all economic sectors. The study concluded that the importance of the role played by the knowledge economy in influencing the growth of all economic sectors by focusing on increasing spending on research and development. This study is consistent with the current study in principle, where increased spending on research and development will contribute to the growth of the banking sector as one of the main economic sectors. Albarodi (2005), relied on determining the standards of the knowledge economy and how to take advantage of the

developments of information and communication technology to facilitate the work of electronic banks, Where the study pointed out that the existence of a suitable technological environment will facilitate the work of electronic banks, therefore this study agree with the current study in terms of the success of banks in development of their services requires a suitable technological environment. Irina (2009), aimed to identify the most important services provided by electronic banks in the knowledge-based economy. Where this study concluded that technological innovation helps electronic banks in the provision of many banking services. Therefore, the result of this study is consistent with Albarodi's study (2005) , and is also consistent with the result of the current study which showed a positive relationship between innovation and development of banking services. Mohamed's study (2011), tried to link the concept of the knowledge economy and innovation in financial services, which its results have shown a relationship between the growth of the financial services sector and the knowledge economy. This result is similar to the result of the current study. Bashir's study (2012) aimed to determine the contribution of the knowledge economy in achieving the competitive advantage of banks and improving the quality of their services, where this study followed a different approach to the current study. Which it concluded that commercial banks are unable to achieve competitive advantage due to lack of financial efficiency and lack of technology, so this study is not compatible with the current study. Al-Salaymeh (2013), focused on banking innovation and creativity as one of the dimensions of the knowledge economy. Where it concluded the existence of a certain level of creativity and innovation in commercial banks has an impact on the level of banking services, therefore this result is consistent with the result of the current study. Achimba et al (2014) were focused on one of the dimensions of the knowledge economy, which is technology, and tried to determine its impact on innovation in commercial banks, where their study concluded that technology has an important role in providing fast and distinct services, therefore this result is consistent with the result of the current study.

Simplice (2014), used four dimensions of the knowledge economy to determine their impact on the financial sector. The study showed that education and innovation have a negative impact on the development of the financial sector. Therefore, this result does not correspond to the result of the current study. Also, the results of this study showed that information technology, economic incentives, and institutional system have a positive impact on the development of the financial sector, therefore this result corresponds to the results of the current study. Joana et al (2014) conducted an analysis of the main effects of technological innovation on banking services. Where the results showed that information technology is an important means of modernizing and developing the banking sector. Therefore, the result of this study is consistent with the results of the current study in terms of the dimension of innovation and its impact on the development of banking services, also is consistent with the result of Al-Salaymeh (2013).

Murad (2015), aimed to determine the impact of the use of information technology on the quality of banking services and found that the information technology contributed to the development of the quality of banking services. This result corresponds to the result of the current study and the study of Achimba et al (2014). Munjuri et al (2015), showed that there is a positive impact of investment in human capital on the performance of commercial banks, and this investment will contribute to the development of banking services. Accordingly, this result was consistent with the result of the current study and Mohamed's study (2016). Mohamed's study (2016), tried to identify the most important indicators of the knowledge economy and its impact on the growth of all economic sectors. The study concluded that investment in human capital and innovation has a positive impact on the growth of economic sectors and this is consistent with the result of the current study. As for the information technology index, the study revealed that this index has negatively affected the growth of economic sectors and this is not compatible with the results of the current study and simplices' study (2014). Abu-Tahia & Alawaj (2017), focused to identify the impact of investment in human capital on improving the quality of banking services. The results of this study showed that investment in human capital has a positive impact on improving the quality of banking services, therefore this result corresponds to the result of the current study and the result of Munjuri et al (2015).

The important difference between our current study and previous studies can be limited to the fact that this study is the first study applied in Libya. Also, most of the previous studies dealt with the dimensions of the knowledge economy separately and study its impact either on the growth of the financial sector or the growth of economic sectors, or improve the quality of banking service. Our current study dealt with the four dimensions of the knowledge economy (investment in human capital, innovation, ICT, economic incentives and institutional regime) and its role in the development of banking services in Libya. Therefore, it is believed that the results obtained from our current study will provide evidence to identify the weaknesses and shortcomings of the development of banking services in Libya.

Research and Methodology

To achieve the objectives of the study and answer the study's problem, we will use a methodology consistent with the nature of the study in order to describe the phenomenon an accurate description, that methodology called descriptive-analytical method, which is based on gathering the theoretical and applied information on the problem of study, then analyzed them to reach the desired results. In addition, this study will rely on many sources to obtain the information represented in Arabic and foreign references, periodicals, articles, reports that dealt with the subject of the study, as well research on different Internet sites. Regarding the sample of the study, it consists of a group of Libyan commercial banks, their number is six of the total Libyan banks. In this study, the variables were the knowledge economy represented in the investment in human Capital, information and communication technology, innovation in (R&D), economic incentives and institutional regime. Where all these variables represent independent variables. As for the dependent variable is Development of banking Services. We can clarify them by the following figure:

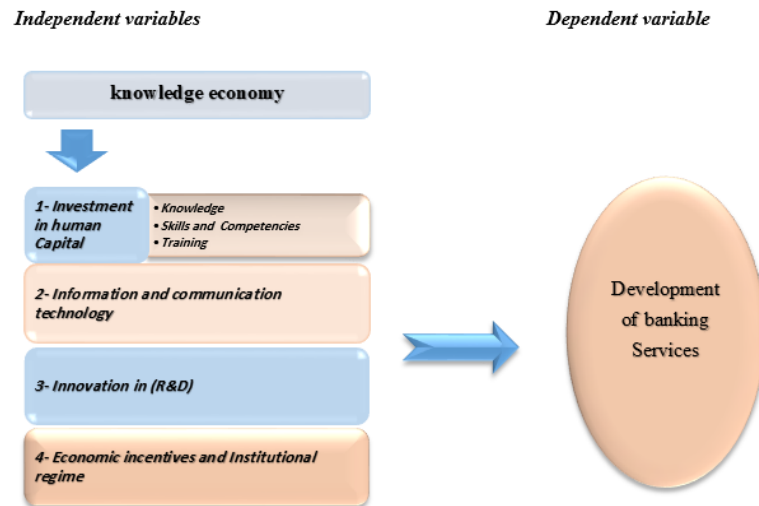


Figure 1: Model of variables

Also, we relied on the questionnaire as the main tool to collect data on the sample of the study, where the questionnaire will include accurate and sufficient questions on the subject. With respect to the data obtained from the questionnaire will be analyzed by using the program of the statistical packages for social sciences, that symbolized by (SPSS). According to SPSS program, we tested the hypotheses of the study to find out the relationship between independent variables and the dependent variable by selecting the appropriate tests. The following is a set of statistical methods to be used in this study:

Factor analysis was used as a technique for reducing and summarizing data using a smaller set of factors or components. Through it, we can confirm from the validity of the scale used in the study by the Kaiser-Meyer-Olkin scale that measures verified the sampling adequacy for the analysis. The researcher used the Alpha Cronbach test to make sure the reliability of the questionnaire. Pearson Correlation is used to test the relationship between variables of knowledge economy and the development of banking services. Regression analysis is used to test the impact of four variables of knowledge economy on the development of banking services. A one-way ANOVA was conducted to compare variability in the knowledge economy and in the development of banking services between the banks. To measure the statistical significance of the differences between banks, we used the Post-hoc tests.

As for, the sample of the study was represented in the general administrations of the following banks: National Commercial Bank, Wahda Bank, Jumhouria Bank- Management of branches of the Eastern Region, Bank of Commerce and Development, Al ejmaa Alarabi Bank, the Mediterranean Bank. Where the study population was determined by (1900) workers, and based on the table presented by (Krejcie and Morgan,1970), the sample size was determined by 320 workers according to the table as following.

Table 1: Main Study Sample

Name of Bank	Number of Workers	Percentage of workers number %
Wahda Bank	1000	53%
National Commercial Bank	400	21%
Jumhouria Bank- Management of branches of the Eastern Region	118	6%
Bank of Commerce and Development	140	7%
Al ejmaa Alarabi Bank	192	10%
Mediterranean Bank	50	3%
Total	1900	100%

Now, we will clarify the Validity and Reliability of Scales that represented in (Investment in Human Capital, Information and Communication Technology, Innovation in R & D, Economic Incentives and Institutional Regime, Development of Banking Services) by used factor analysis, as follows:

Investment in Human Capital Scale

This scale contained 20 items, which was divided into three dimensions: knowledge, skills, and training. After applying the factor analysis, it was reduced to 14 items, where 6 items were deleted because they are not important. Aprincipal components factor analysis (Varimax with Kaiser Normalization) was conducted on the 14 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, KMO = 0,887. Two factors in combination explained 56,180% of the variance. Factor one is named; *Knowledge and Skills* and factor two is named; *Training*. Results indicate that the scale is valid. Reliability Analysis for

Investment in Human Capital Scale. The scale had a good reliability, Cronbach’s $\alpha = 0,914$. Results indicate that the scale can be used in measurement of the indicated variable.

Information and Communication Technology Scale

This scale contained 20 items, after applying the factor analysis, it was reduced to 9 items, where 11 items were deleted because they are not important. A principal components factor analysis (Varimax with Kaiser Normalization) was conducted on the 9 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, $KMO = 0,777$. Three factors in combination explained 65,055% of the variance. Factor one is named; **IT Infrastructure**, factor two is named; **Response Speed** and factor three is named; **Access to Services**. the factor loadings after rotation. Results indicate that the scale is valid. Reliability Analysis for Information and Communication Technology Scale. The scale had a good reliability, Cronbach’s $\alpha = 0,816$. Results indicate that the scale can be used in measurement of the indicated variable.

Innovation in R & D Scale

This scale contained 17 items, after applying the factor analysis, it was reduced to 13 items, where 4 items were deleted because they are not important. A principal components factor analysis (Varimax with Kaiser Normalization) was conducted on the 13 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, $KMO = 0,848$. Two factors in combination explained 51,655% of the variance. Factor one is named; **Research and Development** and factor two is named; **Innovation**. Results indicate that the scale is valid. Reliability Analysis for Innovation in R & D Scale. The scale had a good reliability, Cronbach’s $\alpha = 0,880$. Results indicate that the scale can be used in measurement of the indicated variable.

Economic Incentives and Institutional Regime Scale

This scale contained 20 items, after applying the factor analysis, it was reduced to 17 items, where 3 items were deleted because they are not important. A principal components factor analysis (Varimax with Kaiser Normalization) was conducted on the 17 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, $KMO = 0,848$. Two factors in combination explained 46,348% of the variance. Factor one is named; Institutional Regime (Corporate Policy) and factor two is named; Economic Incentives. Results indicate that the scale is valid. Reliability Analysis for Economic incentives and institutional regime Scale. The scale had a good reliability, Cronbach’s $\alpha = 0,882$. Results indicate that the scale can be used in measurement of the indicated variable.

Development of Banking Services Scale

This scale contained 16 items, after applying the factor analysis, it was reduced to 12 items, where 4 questions were deleted because they are not important. A principal components factor analysis (Varimax with Kaiser Normalization) was conducted on the 12 items. The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, $KMO = 0,848$. Four factors in combination explained 65,412% of the variance. Factors are named; Internet Banking, Data Transfer Service, Use of Technology and Customer Relations respectively. Results indicate that the scale is valid. Reliability Analysis for Development of banking services Scale. The scale had a good reliability, Cronbach’s $\alpha = 0,799$. Results indicate that the scale can be used in measurement of the indicated variable.

Results and Discussions

The hypotheses of the study and the analyses used to test the hypotheses are presented in the table below.

Table 2: The Hypotheses of the Study and The Analyses Used

Hypotheses	Utilized Analysis
H1: There is relationship between the knowledge economy and the development of banking services.	Correlation Analysis
H1a: There is relationship between the investment in human Capital and the development of banking services.	
H1b: There is relationship between the information and communication technology and the development of banking services.	
H1c: There is relationship between the innovation in (R&D) and the development of banking services.	
H1d: There is relationship between the economic incentives & institutional regime and the development of banking services.	
H2: There is statistically significant impact of knowledge economy on the development of banking services.	Regression Analysis
H2a: There is statistically significant impact of investment in human Capital on the development of banking services.	
H2b: There is statistically significant impact of information and communication technology on the development of banking services.	
H2c: There is statistically significant impact of innovation in (R&D) on the development of banking services.	

Table Cont'd

H2d: There is statistically significant impact of the economic incentives and institutional regime on the development of banking services.

H3: There are statistically significant differences in the knowledge economy and the development of banking services between the banks.

H3a: There are statistically significant differences in investment in human Capital between the banks.

H3b: There are statistically significant differences in information and communication technology between the banks.

H3c: There are statistically significant differences in innovation in (R&D) between the banks.

H3d: There are statistically significant differences in economic incentives & institutional regime between the banks.

H3e: There are statistically significant differences in development of banking services between the banks.

ANOVA
Scheffe Test

To test these hypotheses (H1), we used Pearson Correlation to test the relationship between variables of knowledge economy and the development of banking services. Results are shown below.

Correlations between sub-variables of knowledge economy and sub-variables of the development of banking services

Table 3: Descriptive Statistics of Sub-variables of The Study

	Mean	Std. Deviation	N
Knowledge and Skills	3,0238	,84567	299
Training	2,9271	,85116	299
IT Infrastructure	2,6176	,88308	299
Response Speed	2,8071	,91489	299
Access to Services	2,7703	,85793	299
Research and Development	2,7425	,78994	299
Innovation	2,9324	,83472	299
Institutional Regime (Corporate Policy)	3,0368	,84755	299
Economic Incentives	2,6708	,71113	299
Internet Banking	2,6343	,90409	299
Data Transfer Service	2,7625	,85165	299
Use of Technology	2,8417	,90869	299
Customer Relations	2,8406	,85935	299

Table 2 shows descriptive statistics of study sub-variables. The highest mean value (M = 3,036, SD = .85) was recorded for Institutional Regime (Corporate Policy) in Economic incentives and institutional regime, while the lowest mean value (M = 2,617, SD = .883) was recorded for IT Infrastructure in Information and Communication Technology.

Table 4: Correlations Between Main Variables of Knowledge Economy and The Development of Banking Services

	1	2	3	4	5	
1-Development of banking services	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	299				
2-Investment in Human Capital	Pearson Correlation	.770**	1			
	Sig. (2-tailed)	.001				
	N	299	299			
3-Information and Communication Technology	Pearson Correlation	.704**	.642**	1		
	Sig. (2-tailed)	.001	.001			
	N	299	299	299		
4-Innovation in R & D	Pearson Correlation	.783**	.768**	.656**	1	
	Sig. (2-tailed)	.001	.001	.001		
	N	299	299	299	299	
5-Economic incentives and institutional regime	Pearson Correlation	.802**	.771**	.680**	.766**	1
	Sig. (2-tailed)	.001	.001	.001	.001	
	N	299	299	299	299	299

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

Table 3 shows Pearson Correlations between variables of the study. All study variables are positively and significantly correlated. Strong Correlations ranged between .642 and .802, n = 299, p < .01. Hypotheses; H1a, H1b, H1c and H1d are all accepted, therefore, H1 is fully accepted.

Table 5: Correlations Between Sub-variables of Knowledge Economy and Sub-variables of The Development of Banking Services

		1	2	3	4	5	6	7	8	9
1- Knowledge and Skills	Pearson Correlation	1								
	Sig. (2-tailed)									
	N	299								
2- Training	Pearson Correlation	,680**	1							
	Sig. (2-tailed)	,001								
	N	299	299							
3- IT Infrastructure	Pearson Correlation	,493**	,436**	1						
	Sig. (2-tailed)	,001	,001							
	N	299	299	299						
4- Response Speed	Pearson Correlation	,561**	,518**	,444**	1					
	Sig. (2-tailed)	,001	,001	,001						
	N	299	299	299	299					
5- Access to Services	Pearson Correlation	,532**	,530**	,405**	,526**	1				
	Sig. (2-tailed)	,001	,001	,001	,001					
	N	299	299	299	299	299				
6- Research and Development	Pearson Correlation	,658**	,624**	,525**	,536**	,512**	1			
	Sig. (2-tailed)	,001	,001	,001	,001	,001				
	N	299	299	299	299	299	299			
7- Innovation	Pearson Correlation	,686**	,643**	,471**	,537**	,524**	,608**	1		
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001			
	N	299	299	299	299	299	299	299		
8- Institutional Regime (Corporate Policy)	Pearson Correlation	,709**	,677**	,429**	,476**	,538**	,555**	,652**	1	
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001		
	N	299	299	299	299	299	299	299	299	
9- Economic Incentives	Pearson Correlation	,585**	,535**	,522**	,538**	,538**	,627**	,592**	,527**	1
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001	,001	
	N	299	299	299	299	299	299	299	299	299
10- Internet Banking	Pearson Correlation	,546**	,529**	,496**	,458**	,424**	,578**	,466**	,442**	,531**
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001	,001	,001
	N	299	299	299	299	299	299	299	299	299
11- Data Transfer services	Pearson Correlation	,484**	,485**	,382**	,424**	,489**	,503**	,467**	,479**	,513**
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001	,001	,001
	N	299	299	299	299	299	299	299	299	299
12- Use of Technology	Pearson Correlation	,509**	,488**	,279**	,406**	,444**	,492**	,522**	,514**	,539**
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001	,001	,001
	N	299	299	299	299	299	299	299	299	299
13- Customer Relations	Pearson Correlation	,535**	,474**	,411**	,410**	,459**	,462**	,506**	,462**	,511**
	Sig. (2-tailed)	,001	,001	,001	,001	,001	,001	,001	,001	,001
	N	299	299	299	299	299	299	299	299	299

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

Table 4 Pearson Correlations between sub-variables of knowledge economy and sub-variables of the development of banking services. All sub-variables of knowledge economy are positively and significantly correlated with sub-variables of the development of banking services. Correlations ranged between .279 and .709, n = 299, p < .001.

Table 6: Descriptive Statistics of Main Variables of the Study

	Mean	Std. Deviation	N
Development of banking services	2,7698	,62641	299
Investment in Human Capital	3,0070	,78286	299
Information and Communication Technology	2,7826	,70786	299
Innovation in R & D	2,8155	,72746	299
Economic incentives and institutional regime	2,8430	,67745	299

Table 5 shows descriptive statistics of study variables. The highest mean value (M = 3.007, SD = .782) was recorded for Investment in Human Capital while the lowest mean value (M = 2.76, SD = .626) was recorded for Development of banking services.

Table 7: Correlations Between Main Variables of Knowledge Economy and The Development of Banking Services

		1	2	3	4	5
1-Development of banking services	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	299				
2-Investment in Human Capital	Pearson Correlation	.770**	1			
	Sig. (2-tailed)	.001				
	N	299	299			
3-Information and Communication Technology	Pearson Correlation	.704**	.642**	1		
	Sig. (2-tailed)	.001	.001			
	N	299	299	299		
4-Innovation in R & D	Pearson Correlation	.783**	.768**	.656**	1	
	Sig. (2-tailed)	.001	.001	.001		
	N	299	299	299	299	
5-Economic incentives and institutional regime	Pearson Correlation	.802**	.771**	.680**	.766**	1
	Sig. (2-tailed)	.001	.001	.001	.001	
	N	299	299	299	299	299

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

Table 6 shows Pearson Correlations between variables of the study. All study variables are positively and significantly correlated. Strong Correlations ranged between .642 and .802, n = 299, p < .01. Hypotheses; H1a, H1b, H1c and H1d are all accepted, therefore, H1 is fully accepted.

To test these hypotheses (H2), we used Regression analysis to test the impact of four variables of knowledge economy on the development of banking services. Results are shown below.

Table 8: Regression Analysis of the Main Study Variables

Dependent Variable	Independent Variables	R ₂	F	β	t	p	DW
Development of banking services	Investment in Human Capital	.748	218.245***	.206	4.002	.000	1.847
	Information and Communication Technology			.184	4.368	.000	
	Innovation in R & D			.260	5.033	.000	
	Economic incentives and institutional regime			.320	6.041	.000	

***p<0.001

Table 7 shows a summary of regression analysis. Investment in Human Capital, Information and Communication Technology, Innovation in R & D and Economic incentives and institutional regime are all statistically significant predictors of Development of banking services, beta values (beta = .184, .206, .260 and .320 respectively, p < .001). The total variance explained by the model as a whole was 74.8%, F (4, 294) = 218.245, p < .001. Results lead support to hypotheses H2a, H2b, H2c and H2d, therefore, H2 is fully supported.

To test these hypotheses (H3), we used ANOVA test to analyzed the banks' group variances, to find the differences in the knowledge economy and the development of banking services between the banks.

Table 9: Descriptive Statistics for Banks' Groups in The Five Study Variables

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Investment in Human Capital	Mediterranean	10	3.3286	.56565	.17887	2.9239	3.7332	2.36	4.07
	Al ejmaa Alarabi	32	2.8125	.69838	.12346	2.5607	3.0643	1.79	4.07
	Jumhouria	19	3.4699	.38119	.08745	3.2862	3.6537	2.64	4.00
	National Commercial	68	2.8015	.84153	.10205	2.5978	3.0052	1.43	4.21
	Commerce and Development	21	3.2789	.44944	.09807	3.0743	3.4835	2.00	4.00
	Al Wahda	149	2.9880	.82130	.06728	2.8551	3.1210	1.36	4.21
	Total	299	2.9892	.78286	.04527	2.9002	3.0783	1.36	4.21
Information and Communication	Mediterranean	10	2.7889	.68584	.21688	2.2983	3.2795	2.00	4.00
	Al ejmaa Alarabi	32	2.6528	.70936	.12540	2.3970	2.9085	1.44	4.44
	Jumhouria	19	3.1228	.51172	.11740	2.8762	3.3694	2.44	4.44

Table Cont'd

Innovation in R & D	National Commercial	68	2.7239	.87647	.10629	2.5117	2.9360	1.33	4.67	
	Commerce and Development	21	2.6984	.52014	.11350	2.4616	2.9352	1.89	4.11	
	Al Wahda	149	2.7032	.66069	.05413	2.5962	2.8102	1.33	4.11	
	Total	299	2.7317	.70786	.04094	2.6511	2.8123	1.33	4.67	
	Mediterranean	10	3.3692	.43181	.13655	3.0603	3.6781	2.46	3.85	
	Al ejmaa Alarabi	32	2.8029	.71468	.12634	2.5452	3.0606	1.69	4.23	
	Jumhouria	19	3.1012	.51986	.11926	2.8507	3.3518	2.31	4.15	
	National Commercial	68	2.7342	.81293	.09858	2.5374	2.9309	1.31	4.38	
	Commerce and Development	21	2.9121	.59945	.13081	2.6392	3.1850	2.08	4.23	
	Al Wahda	149	2.7682	.72718	.05957	2.6505	2.8859	1.38	4.23	
Total	299	2.8155	.72746	.04207	2.7327	2.8983	1.31	4.38		
Economic incentives and institutional regime	Mediterranean	10	3.0647	.56316	.17809	2.6618	3.4676	2.06	4.00	
	Al ejmaa Alarabi	32	2.6342	.65567	.11591	2.3978	2.8706	1.88	4.18	
	Jumhouria	19	3.1517	.48281	.11076	2.9190	3.3844	2.41	4.18	
	National Commercial	68	2.7578	.76612	.09291	2.5723	2.9432	1.35	4.24	
	Commerce and Development	21	3.1961	.48340	.10549	2.9760	3.4161	2.12	4.00	
	Al Wahda	149	2.8227	.66534	.05451	2.7150	2.9305	1.53	4.35	
	Total	299	2.8430	.67745	.03918	2.7659	2.9201	1.35	4.35	
	Development of banking services	Mediterranean	10	3.0667	.52234	.16518	2.6930	3.4403	2.42	3.67
		Al ejmaa Alarabi	32	2.6849	.56350	.09961	2.4817	2.8881	1.92	4.00
		Jumhouria	19	3.0439	.46512	.10671	2.8197	3.2680	2.42	4.00
National Commercial		68	2.7304	.72163	.08751	2.5557	2.9051	1.50	4.17	
Commerce and Development		21	2.9683	.47688	.10406	2.7512	3.1853	1.67	4.08	
Al Wahda		149	2.7232	.62333	.05107	2.6222	2.8241	1.33	4.25	
Total		299	2.7698	.62641	.03623	2.6985	2.8411	1.33	4.25	

Table 8 shows descriptive statistics for Banks' groups in the five study variables. The highest mean value was observed in Jumhouria Bank group in Investment in Human Capital (3.47) while the lowest mean value was observed in Al ejmaa Alarabi Bank group in Economic incentives and institutional regime (2.63).

Table 10: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Investment in Human Capital	Between Groups	10.701	5	2.140	3.647	.003
	Within Groups	171.933	293	.587		
	Total	182.634	298			
Information and Communication Technology	Between Groups	3.287	5	.657	1.319	.256
	Within Groups	146.029	293	.498		
	Total	149.316	298			
Innovation in R & D	Between Groups	5.601	5	1.120	2.158	.059
	Within Groups	152.101	293	.519		
	Total	157.702	298			
Economic incentives and institutional regime	Between Groups	6.870	5	1.374	3.100	.010
	Within Groups	129.892	293	.443		
	Total	136.762	298			
Development of banking services	Between Groups	3.796	5	.759	1.966	.084
	Within Groups	113.136	293	.386		
	Total	116.932	298			

A one-way ANOVA was conducted to compare variability in the knowledge economy and the development of banking services between the banks. There was statistically significant mean difference in Investment in Human Capital between banks, $F(5, 293) = 3.647, p = .003, \eta^2 = .06$ indicating a medium effect (Cohen's (1988, pp. 284–7). H3a hypothesis was accepted.

There was no statistically significant mean difference in Information and Communication Technology between banks, $F(5, 293) = 1.319, p = .256, \eta^2 = .02$ indicating a small effect (Cohen's (1988, pp. 284–7). H3b hypothesis was rejected.

There was no statistically significant mean difference in Innovation in R & D between banks, $F(5, 293) = 1.966$, $p = .084$, eta squared = .03 indicating a small effect (Cohen's (1988, pp. 284–7). H3c hypothesis was rejected.

There was statistically significant mean difference in Economic incentives and institutional regime between banks, $F(5, 293) = 3.100$, $p = .010$, eta squared = .05 indicating a small effect (Cohen's (1988, pp. 284–7). H3d hypothesis was accepted.

There was no statistically significant mean difference in Development of banking services between banks, $F(5, 293) = 2.158$, $p = .059$, eta squared = .04 indicating a small effect (Cohen's (1988, pp. 284–7). H3e hypothesis was rejected. On the basis of this section results H3 is partially accepted.

Since the ANOVA test showed statistically significant differences in investment in human Capital between the banks, as well as, there are statistically significant differences in economic incentives & institutional regime between the banks, so we must be identified the banks where these differences. Therefore, we used multiple comparisons and we conducted a Post-hoc test to determine exactly where the differences among the groups of banks.

Table 11: Multiple Comparisons (Scheffe Test)

Dependent Variable	(I) name of the bank	(J) name of the bank	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval		
						Lower Bound	Upper Bound	
Investment in Human Capital	Mediterranean	Al ejmaa Alarabi	.51607	.27752	.630	-.4137-	1.4458	
		Jumhouria	-.14135-	.29927	.999	-1.1440-	.8613	
		National Commercial	.52710	.25944	.532	-.3421-	1.3963	
		Commerce and Development	.04966	.29432	1.000	-.9364-	1.0357	
	Al ejmaa Alarabi	Al Wahda	.34056	.25024	.869	-.4978-	1.1789	
		Mediterranean	-.51607-	.27752	.630	-1.4458-	.4137	
		Jumhouria	-.65742-	.22186	.122	-1.4007-	.859	
		National Commercial	.01103	.16422	1.000	-.5391-	.5612	
	Commerce and Development	Al Wahda	-.46641-	.21513	.455	-1.1871-	.2543	
		Mediterranean	-.17552-	.14925	.926	-.6755-	.3245	
		Jumhouria	.14135	.29927	.999	-.8613-	1.1440	
		National Commercial	.65742	.22186	.122	-.0859-	1.4007	
	National Commercial	Al Wahda	.66845*	.19878	.048	.0025	1.3344	
		Commerce and Development	.19101	.24254	.987	-.6216-	1.0036	
		Mediterranean	.48191	.18661	.250	-.1433-	1.1071	
		Al ejmaa Alarabi	-.52710-	.25944	.532	-1.3963-	.3421	
	Commerce and Development	Jumhouria	-.01103-	.16422	1.000	-.5612-	.5391	
		National Commercial	-.66845-*	.19878	.048	-1.3344-	-.0025-	
		Commerce and Development	-.47744-	.19124	.287	-1.1181-	.1633	
		Al Wahda	-.18654-	.11211	.735	-.5621-	.1890	
	Al Wahda	Mediterranean	-.04966-	.29432	1.000	-1.0357-	.9364	
		Al ejmaa Alarabi	.46641	.21513	.455	-.2543-	1.1871	
		Jumhouria	-.19101-	.24254	.987	-1.0036-	.6216	
		National Commercial	.47744	.19124	.287	-.1633-	1.1181	
	Economic incentives and institutional regime	Mediterranean	Al Wahda	.29090	.17855	.753	-.3073-	.8891
			Mediterranean	-.34056-	.25024	.869	-1.1789-	.4978
			Al ejmaa Alarabi	.17552	.14925	.926	-.3245-	.6755
			Jumhouria	-.48191-	.18661	.250	-1.1071-	.1433
National Commercial			.18654	.11211	.735	-.1890-	.5621	
Commerce and Development			-.29090-	.17855	.753	-.8891-	.3073	
Economic incentives and institutional regime	Mediterranean	Al ejmaa Alarabi	.43051	.24122	.672	-.3776-	1.2386	
		Jumhouria	-.08700-	.26012	1.000	-.9585-	.7845	
		National Commercial	.30692	.22550	.869	-.4486-	1.0624	
		Commerce and Development	-.13137-	.25582	.998	-.9884-	.7257	
		Al Wahda	.24197	.21750	.941	-.4867-	.9706	

Table Cont'd

Al Alarabi	ejmaa	Mediterranean	-.43051-	.24122	.672	-1.2386-	.3776
		Jumhouria	-.51751-	.19284	.210	-1.1636-	.1285
		National Commercial	-.12359-	.14273	.980	-.6018-	.3546
		Commerce and Development	-.56189-	.18699	.112	-1.1883-	.0646
		Al Wahda	-.18855-	.12973	.833	-.6232-	.2461
		Jumhouria	.08700	.26012	1.000	-.7845-	.9585
		Al ejmaa Alarabi	.51751	.19284	.210	-.1285-	1.1636
		National Commercial	.39392	.17278	.394	-.1849-	.9728
		Commerce and Development	-.04438-	.21081	1.000	-.7507-	.6619
		Al Wahda	.32896	.16220	.534	-.2144-	.8724
National Commercial		Mediterranean	-.30692-	.22550	.869	-1.0624-	.4486
		Al ejmaa Alarabi	.12359	.14273	.980	-.3546-	.6018
		Jumhouria	-.39392-	.17278	.394	-.9728-	.1849
		Commerce and Development	-.43829-	.16622	.228	-.9952-	.1186
		Al Wahda	-.06495-	.09744	.994	-.3914-	.2615
		Commerce and Development	.13137	.25582	.998	-.7257-	.9884
		Al ejmaa Alarabi	.56189	.18699	.112	-.0646-	1.1883
		Jumhouria	.04438	.21081	1.000	-.6619-	.7507
		National Commercial	.43829	.16622	.228	-.1186-	.9952
		Al Wahda	.37334	.15520	.330	-.1466-	.8933
Al Wahda		Mediterranean	-.24197-	.21750	.941	-.9706-	.4867
		Al ejmaa Alarabi	.18855	.12973	.833	-.2461-	.6232
		Jumhouria	-.32896-	.16220	.534	-.8724-	.2144
		National Commercial	.06495	.09744	.994	-.2615-	.3914
		Commerce and Development	-.37334-	.15520	.330	-.8933-	.1466

*. *The mean difference is significant at the 0.05 level.*

Post-hoc comparisons using the Scheffe test, table 10 indicated that in Investment in Human Capital the mean score for the Jumhouria Bank group (M = 3.47, SD = .38) was significantly different from National Commercial Bank group (M = 2.80, SD = .84), p < 0.05.

Although when one-way ANOVA was conducted statistically significant mean difference in Economic incentives and institutional regime between banks was found, post-hoc comparisons using the Scheffe test, the table indicated that there was no statistically significant mean difference in Economic incentives and institutional regime between banks. Therefore, H3d hypothesis is partially accepted.

Conclusions

The study confines the role of the knowledge economy in the development of banking services, with focusing on investment in human capital and ICT, innovation in research and development, economic incentives and the institutional regime as considered them the most important pillars of the knowledge economy, and how they can contribute to the development of Libyan Commercial Banks. This study was applied to a group of commercial banks in the eastern region of Libya. Where the study showed a positive correlation with a strong relationship between investment in human capital and the development of banking services. Where more investment in human capital will lead to developing banking services. Where the existence of a positive correlation relationship between ICTs and the development of banking services will contribute to the development of banking services. In addition, there is a positive correlation relationship between innovation in operations of Research and development, and the development of banking services, meaning that increased the operations of the research and development in the field of banking services lead to the creation of new ideas that contribute to the development of banking services. Also, there is a positive correlation relationship between economic incentives and the institutional regime and the development of banking services, in the sense of increasing economic incentives and making the institutional system of banks more flexible in dealing with new ideas all that will lead to the development of banking services. Furthermore, the study showed that there is a strong impact of the knowledge economy on the development of banking services, that means that every variable of the knowledge economy will have a major impact on the development of banking services in Libya. Regarding differences in the knowledge economy and the development of banking services between the banks. The results of study showed that there was statistically significant mean difference in Investment in Human Capital, and economic incentives and

institutional regime between banks. As for, the difference in Information and Communication Technology & also Innovation in R & D, the result of analyzing indicated to there was no statistically significant difference between banks, that means that the level of technology and innovation is no different between banks. Based on

Based on the results of the study, many recommendations were reached, as following:

1. The study showed that investment in human capital has an effective role in developing banking services, hence it needs more attention through focusing on its main dimensions that represented in knowledge, skills, competencies, and training. In order to achieve this, Libyan banks must do that:

Banks should pay attention to provide the necessary environment to develop the knowledge of employees because it will contribute to the creation and innovation of new ideas that help in developing banking services.

Banks should maintain a staff that has high knowledge and support them to generate new banking services.

Banks should be keen to train their employees to provide them with the necessary skills, through the provision of effective programs according to the requirements of work and future plans.

Subjecting workers to training courses in order to contribute to the creation of new ideas to help develop banking services.

The bank should also find the appropriate mechanisms to follow up and implement the training activity of the employees to ensure that it is suitable for banking requirements.

The bank's management must allocate a budget to finance the training programs needed by the staff.

2. Libyan banks should focus on information and communication technologies for the development of banking services. through pay attention to ICT infrastructure within banks to keep abreast of developments in banking services. In addition to the need to adopt long-term plans to keep pace with the introduction of information technology in banking, as well as the use of the Internet as a means to announce about the new banking services that provided by commercial banks, that through the development of awareness to customers and encourage them to use the tools of information technology in the banking fields.

The innovation in R & D contributes to the development of banking services. Therefore, Libyan banks should encourage innovation in banking services and spend on these operations. It should also organize research seminars to exchange information and experiences among employees, as well as establish research relations with institutions with experience in banking services to benefit from them to develop their banking services.

Libyan banks should focus on this side by providing incentives to employees when they provide new ideas that contribute to the development of banking services, in addition to making banks provide incentives on the basis of merit and perseverance at work.

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