

# Impact of Knowledge Economy on the Participation of Women in Labor Market

Abeer Mohamed Ali Abd Elkhalek

College of Management & Technology

Arab Academy for Science, Technology and Maritime Transport

Alexandria, Egypt

## Keywords

Knowledge economy, Women's participation, Labor market, Information and Communication Technology (ICT).

## Abstract

**Purpose:** To examine the influence and participation of women in the labor market by the knowledge economy; in negative or positive manner.

**Methodology:** Quantitative research technique has been implied to evaluate women's participation in the labor market to minimize negative impacts of knowledge economy.

**Findings:** Within the service and agricultural sectors, the outcomes demonstrated that knowledge economy is found to have a significant impact on the participation of women's labor force. The only drawback that discourages the employment of women is the concept of culture and social norms.

**Practical Implications:** A higher participation of females in computer science, engineering and technology-oriented jobs would spur innovation and economic advances in all countries. **Originality Statement:** The research also depicted procedures to accomplish women's participation as a fundamental requirement for the achievement of developmental goals.

## 1. Introduction

The participation of women in society has been greatly focused in the last few years as compared to early days. In recent past few years, the contribution of women has completely changed the lifestyles with vast improvements. On such basis, the study has aimed to investigate the impact of knowledge economy on the participation of women in labor market in positive as well as negative manner.

The contribution of women in the labor market has been considered as a growing perspective across the globe. Currently, one of the most compelling phenomena has been observed to be the degree to which the women have enhanced their contribution in the labor force. It has been evaluated that the sustainable development of the economy is dependent on women, joining the labor market and using their capabilities and qualifications adequately. During late 1980s and early 1990s, the growth of women labor force increased as compared to men across the globe (Lim, 2002)

The development of knowledge-based economy (KE) is correlated with its four components, which include Innovation, Information & Communication Technology (ICT), Education, and Economic Incentives & Institutional Regime. The number of employed men or women would be decreased as a result of substituting human capital by advanced technological tools. Therefore, this study has contributed to investigate that how women employment is affected by the knowledge economy and how women employment goes up or down in different countries, as a result of activating knowledge economy pillars in the economic activity.

The major proposition for which the study was examined included that Knowledge Economy generates new job opportunities for women and changes the direction of women's participation in labor market towards more knowledge-based activities. Therefore, they can contribute to the economic development along with a more dependence of the World on the knowledge economy. A data analysis was used for collecting data about Knowledge Economy Index, KE's Pillars, Ratio of force

participation rate with male to female, and female employee rate in main sectors (as a ratio of female employment) in different countries to examine how women's participation in labor market have been affected by moving towards a knowledge-based economy. Finally, it concludes with the mechanisms to maximize positive effects and minimize negative effects of KE on women's opportunities to participate in the labor market (Alam, 1998).

## **2. Literature Review**

Knowledge, innovation, and the advancement of technology constitute the way to achieve the developmental goals of the 21<sup>st</sup> century (Asongu, 2015). The Knowledge Economy (KE) is based on four pillars, which primarily include Education. It depends on creating products and services using intensive knowledge activities, which can easily contribute to scientific as well as technical advancement.

### **2.1 Performance of Social Networks regarding the Outcomes of Employment**

Dante Contreras et al. (2007) investigated the performance of social networks elucidating market participation of labor, amongst the employed Bolivian women. The survey carried out to depict the role of social networks and investigated force participation of women labor and its effectiveness compared with salaried employment in men. The study concluded with having positive impacts on social networks and reduced gender discrimination was observed. Additionally, the researchers have also determined the links among the procedures, which have been used by successful job searchers to find work and a comprehensive system of networks by using the descriptive statistics.

### **2.2 Advantages of technology to Educational Organization**

Educational organizations usually take a significant number of benefits from technology by promoting learning efficiency. However, women confronted many obstacles and barriers in contributing to the knowledge economy in the developing countries. Besides this, it can be assumed that women are more technophobic; therefore, technology does not meet their requirements more likely in developing countries (Antonio and Tuffley, 2014). The direction of women's employment to a virtual environment based on information and communication technologies have been changed through helping females in joining new business careers and get more opportunities in the labor market (Arslan, 2012).

### **2.3 Technological Innovations for Self-employment**

An increase of 1% in women wage leads to an increased probability to participate in the labor market by 5% (Addabbo et al., 2013). In a majority of the low-income countries, females are less likely than males of the same age to be in paid for work, education, and training. The data, demonstrated that for the developing countries, more than two-thirds of working women are in vulnerable jobs or unpaid family workers, or work as seasonal laborers in the agricultural sector (OECD, 2014).

The knowledge economy can help the Arab World in accomplishment of the economic developmental goals and to remain competitive in the global economy of the 21<sup>st</sup> century. In the Arab World, the number of persons having access to the internet was observed to be ascended by more than 600%. Moreover, some Arab countries have turned out the initiatives as a matter to bring some advancement in their education sector as well as the infrastructure of their Information and Communication Technology (Orient Planet, 2014).

### **2.4 Knowledge Economy and Women**

Several studies, conducted for the economic evaluation, have stated that the contribution of educated women is highly essential for the development of domestic and global market (Kearney et al., 2017). According to the United Nations Entity for Gender Equality and the Empowerment of Women, women seem to participate in labor markets on the basis of their qualifications and skills. In fact, the employment of men to the ratio of the population represented 72.2%, while for women this ratio was just 47.1% in 2013 (UN Woman, 2014).

Globally, females are less paid for the job in contrast with males. Moreover, just a range of 60% to 75% of men's wages is observed to be earned by women in a majority of the countries, throughout the entire globe (UN Woman, 2014). With increased contribution in the labor market, institutional, national, and international policies must ensue to provide the system with gender parity. Such figures play a significant role in promoting the economy and expanding the market. Women already hold a stable position in the areas of education, and their leadership skills are making them even stronger in the areas of politics and business (Kearney et al., 2017). Even though, socioeconomic factors are difficult to be assessed among the genders, but it has been observed that involvement of qualified women in labor market is a beneficial factor. It has not only contributed to the business in the long run, but has also displayed stability in the days of recession as the family with both working genders appeared to have a negative economic shock (Gorbachev, 2016). It has been declared with time that the association of women's contribution in the society and economic development is strongly positive (Doepke and Tertilt, 2014).

### 3. Methodology

This study aimed to explore the mechanisms for minimizing the negative impacts of knowledge economy on the contribution of women in the labor market and maximizing its positive impacts. Therefore, an analytical approach has been employed through the application of regression analysis. Moreover, the secondary data collection regarding Knowledge Economy Index (KEI) and women participation in the labor market in the Arab countries has been carried out through the World Bank reports (2012 and 2014) and IMF sources. The Knowledge Economy Index (KEI) reflects the degree to which the environment is conducive to efficiently use the knowledge in the process of an economic development. It is calculated as a cumulative index, which indicates the developmental stage of a specific region or country towards the knowledge economy. This index is computed on the basis of the average of the normalized performance scores of a country on all the pillars of the knowledge economy. In order to compute the KEI, there are three fundamental variables, which represent each pillar. These variables are mentioned as follows:

- The institutional regime and economic incentive pillar are computed by the constraints of tariff & non-tariff, the legislation standards, and the regulatory quality.
- The human resources and education pillar is calculated by average years schooling, secondary enrolment, and tertiary enrolment.
- The structure of innovation pillar is calculated by the receipts and payments of royalty and license fees, applications of the patent acknowledged by the US Patent & Trademark Office, and scientific and technical journal articles.
- The pillar of Information and Communication Technology (ICT) is calculated by telephones per 1,000 people, computers per 1,000 people, and internet users per 10,000 people.

This study is dependent on the combination of inductive and deductive approach by using the collected data and analyzing how the knowledge economy affects the number and the direction of job opportunities available for women. The inductive approach has been employed to process the broad data into the general model that can represent the part of our interest. The deductive approach further helps in determining if more data or themes are required from the previous set for the evaluation of the established set (Creswell, 2013). In such manner, the mechanisms of increasing the role of KE in activating women's participation in the labor market have been developed. On the basis of four pillars of knowledge economy, the factor is calculated in numeric as the Knowledge Economy Index (KEI). The inductive data is then compared with the additional parameters including particularly the participation of women in the labor market. The data about KE pillars in Arab countries were collected from IMF & MRD/Orient Planet, Arab Knowledge Economy Report. The data regarding the participation of women in the labor market have been collected through the World Bank, International Labor Organization, and Key Indicators of the labor market database 2014, Women's Bu-

reau (WB) Occupations, Gender shares of employment, and Computer and Information Technology Occupations 2013- 2014.

#### 4. Results

The relationship among the Knowledge economy and the participation of women in the labor market has been analyzed by taking into consideration the available data regarding the two variables in some countries. In order to perform the analysis, those countries have been classified into two categories, i.e., the Arab Countries and non- Arab Countries, which can be observed in Table 1.

Country	Global Rank	KEI	Economic Incentive Regime	Education	Innovation	ICT
UAE	42	6.94	6.50	5.8	6.60	8.88
Bahrain	43	6.90	6.69	6.78	4.61	9.54
Oman	47	6.14	6.99	5.23	5.88	6.49
KSA	50	5.96	5.68	5.65	4.14	8.36
Qatar	54	5.84	6.87	3.41	6.42	6.65
Kuwait	64	5.33	5.86	3.70	5.22	6.53
Jordan	75	4.95	5.65	5.55	4.05	4.54
Tunisia	80	4.56	3.83	4.55	4.97	4.89
Lebanon	81	4.56	4.28	5.51	4.86	3.58
Algeria	96	3.79	2.33	5.27	3.54	4.04
Egypt	97	3.78	4.50	3.35	4.11	-
Morocco	102	3.61	4.66	2.07	3.67	4.02
Syria	112	2.77	-	2.40	3.07	3.75
Yemen	122	1.92	2.91	-	-	-

**Table 1:** Knowledge Economy Index (KEI) and its Pillars Score in the Arab Countries, 2014 (**Source**): Columns 1&2: World Bank, KEI 2014. Columns 3- 6: IMF & MRD/Orient Planet, Arab Knowledge Economy Report 2014.

It can be observed through the outcomes, that among the countries of Arab World, the UAE ranked 1<sup>st</sup> in the KEI during the time span of 2014. However, it has been ranked 42<sup>nd</sup> worldwide, with 6.94 scores. With a score of 6.9 and 6.14 on the index, the Bahrain and Oman ranked on a second and third number on the index respectively. Saudi Arabia ranked fourth in the region and 50<sup>th</sup> worldwide. On the other hand, women's participation for the labor market in UAE, Bahrain, Oman and the above-mentioned other countries in the same period have been illustrated in Table 2.

Country	Ratio (%)
Qatar	53%
Kuwait	52%
UAE	51%
Bahrain	45%
Oman	35%
Tunisia	35%
Morocco	35%
Lebanon	33%
Egypt	32%
KSA	26%
Algeria	21%
Syria	19%

**Table 2:** Ratio of Female to Male Labor Force Participation Rate in Arab Countries, 2014 (**Source**): International Labor Organization, key indicators of the labor market database, 2014.

The cultural restrictions, which are likely to be faced by women in most of the Arab countries are although changing, women are still less free in contrast with men to participate in the formal economy. In the labor market, the participation of women can be enhanced by focusing on the barriers and constraints, adapted by them in accessing their work. Some other issues must be taken into account because if the knowledge economy provides more job opportunities for Arab women, this may have a small impact on their participation in the labor market.

The concepts of culture and social norms, which are likely to encourage or discourage the employment of women can be divided into two types of values, which seem to be of significant value in

this respect, and both exist at the individual as well as the societal level. The first category comprises of the concept regarding the conventional role of women. These attitudes and principles may restrict the women substantially, even if the jobs like a teacher of kindergarten, or nurse could be still in correspondence with the concept of women as a caretaker. The second category contains the concept concerning the position of a woman in public domain. The societies where women are presumed to live isolated from men, and where the females are being limited to the private domain, the concept that the women should be active in the labor market may not be considered as desirable.

On the contrary, the women having internalized conventional roles of gender or the concept of gender discrimination being preferable may feel less retrained to enter the labor market. These decisions are generally made at the domestic level, and their husbands and other members of the family have an important voice in that (Joseph and Slyomovics, 2011). If their family or partner does not support to enter them to labor market, they have to resist from doing so (Glass and Nath, 2006). Subsequently, women can decide to stay at home under the pressure of the values and norms of the larger community in which they live (Kandiyoti, 2001). The idea is that in the circumstances with more conditional values, the job opportunities which would be generated by the knowledge economy can relatively make a minor difference for the participation of women in a labor market. Similarly, in non-Arab countries, KE could not increase the job opportunities for women, neither it can modify the way they contribute to the labor market as shown in tables 3 and 4.

Top 5 Scores in KEI		Lowest 5 Scores in KEI	
Country	KEI	Country	KEI
Sweden	9.38	Sierra-leone	0.84
Finland& Netherland	9.22	Angola	0.95
Taiwan & China	9.10	Mozambique	0.99
Denmark	9.00	Burkina-faso	1.06
Norway	8.99	Rwanda	1.14

**Table 3:** Knowledge Economy in some Non-Arab Countries, 2012 (**Source**): World Bank, Knowledge Economy Index (KEI), 2012

In Top 5 Scores in KEI (%)					In Lowest 5 Scores in KEI (%)						
Country	2009	2010	2011	2012	2013	Country	2009	2010	2011	2012	2013
Sweden	47.4	47.4	47.2	46.9	47.4	Sierra-leone	49.9	49.9	49.8	47.7	47.7
Finland	48.2	47.8	47.5	47.7	47.8	Angola	45.9	45.6	46.0	46.0	46.0
China	40.1	44.0	44.0	44.0	43.9	Mozambiqu	53.8	53.6	53.6	53.3	53.3
Denmar	47.1	47.1	47.2	47.3	47.6	e	47.7	47.6	47.6	47.4	47.4
k	47.3	47.0	47.0	47.0	47.1	Burkina-	54.2	54.2	54.1	54.1	54.0
Norway						faso					
						Rwanda					

**Table 4:** Labor Force, Female (Ratio of Total Labor Force) in the same Countries (**Source**): World Bank, <http://databank.worldbank.org/>

Tables 3 & 4 shows that women's participation in the labor market in the above-mentioned countries was still almost the same during the period of 2009-2013, whether in the highest KEI or lowest KEI countries. That means that KE had no effect on women's job opportunities in these countries. Table 5 reveals that the rate of female employees, as a ratio of female employment in different sectors, remains almost the same during the period 2009-2013.

Country	Main Sectors	2009	2010	2011	2012	2013
Sweden	Services	90.5	91.1	91.2	91.1	90.8
	Agriculture	0.9	1.0	1.0	0.9	1.0
	Industry	8.2	7.7	7.6	7.5	7.7
Finland	Services	86.4	86.8	86.8	87.8	88.1
	Agriculture	2.7	2.8	2.8	2.4	2.3
	Industry	10.4	9.9	9.9	9.3	9.0
Denmark	Services	86.7	88.7	89.8	89.6	89.3
	Agriculture	1.1	1.1	0.9	0.9	1.1
	Industry	12.2	10.1	9.2	9.4	9.5
Norway	Services	87.6	91.7	91.9	91.6	91.5
	Agriculture	1.2	1.2	1.0	0.9	0.8
	Industry	7.6	7.1	7.0	7.4	7.5

**Table 5:** Employees Female Rate in Main Sectors (Percentage of Female Employment) (Source): World Bank, <http://databank.worldbank.org/>

Even though the Computer and Information Technology constitutes one of the main pillars of the knowledge economy, women's participation in CIT based job did not increase during the above-mentioned period. As shown in table 6, women's participation ratio in CIT careers as an annual international average is still inconsiderable.

Career	Women's Participation Ratio (%)
Computer and information research scientists	26.1
Computer and information systems managers	28.6
Computer network architects	7.5
Computer occupations, all other	22.8
Computer programmers	23
Computer support specialists	29
Computer systems analysts	34.9
Database Administrators	37.4
Network and computer systems administrators	17.3
Software developers, applications and systems software	19.7
Web developers	39.5

**Table 6:** Computer and Information Technology Occupations (2013 Annual Averages) (Source): Women's Bureau (WB) Occupations -Gender shares of employment; Computer and Information Technology Occupations (2013 annual averages)

It has been indicated through the data analysis, that the Knowledge Economy had no effect whether on women participation in the labor market or on women's distribution in the different sectors within the same country. During the time span of 2012, it has been determined by the Department for Business, Innovation and Skills (2012) that women or a management team were running almost 19% of small and medium-sized enterprises, in which the ratio of women was observed to be more than 50%. Through the survey of ONS Quarterly Labor Force (2013), it has been determined that a higher ratio of women is reported by the industry section, in which the primary jobs of women were social work and health. This section of the industry comprised of 22.8% of the total female workforce. However, in the public sector, an approximate of 33% of women work was found in contrast with the 15% of men. In the second quarter of 2013, 88.4% of men were employed in full-time jobs, while 11.6% had part-time jobs. In the same period, 58.2% of women were employed in full-time jobs, while 41.8% had part-time jobs (Orient Planet, 2014).

Women are less likely to work in the formal employment as compared to men. Women can work in vulnerable, low-paid, or undervalued jobs when compared with men. As of 2013, 49.1% of working women throughout the world were in vulnerable employment without any protection by labor legislation, compared to 46.9% of men (UN Women, 2015). As an annual average, the jobs related to the Computer and Information Technology for women are fewer than men, and women participate in labor markets on an unequal basis with men. For instance, the male employment-to-population ratio in 2013 was 72.2%, while the ratio for females was only 47.1%.

The tools of computer and communication along with more information and communication technologies replace the labor force, which causes the latter to decrease. The employment rate

may also enhance with the emergence of new business opportunities (Arslan et al., 2012) for instance, increased investments in the Hi-Tech industries in China resulted in decreasing the investments in traditional industries; that seems to be conventionally occupied by the women. On the other hand, the innovations of technology have provided new categories of knowledge-based-employment, and also redefined the requirements of the old ones.

The regression analysis has been applied by considering three different sectors, such as industry, services, and agricultural sector to evaluate the impact of knowledge economy on the participation of women. Considering the services as a dependent variable and industry and agricultural sectors as independent variables, it has been examined that the p-value is less than the level of significance (p-value < 0.05). Table 7 shows the regression analysis on employee's female rate in an agricultural and industrial sector.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	60.483	2	30.241	49.209	.000 <sup>b</sup>
	Residual	10.447	17	.615		
	Total	70.930	19			

a. Dependent Variable: Services  
b. Predictors: (Constant), Industry, Agricultural

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	98.560	1.160		84.936	.000
	Agricultural	-1.256	.279	-.472	-4.501	.000
	Industry	-.844	.146	-.605	-5.773	.000

a. Dependent Variable: Services

**Table 7:** Regression Analysis on Employees Female Rate in Agricultural and Industrial Sectors

These findings being are consistent with (Gaddis and Klasen, 2014), it has been determined that higher rates of women's participation in the agricultural sector reflect the expansion of the global economy. Moreover, the rising demand of labor within the industrial and agricultural sector is found to be associated with increasing levels of women's participation.

Taking into consideration, the agricultural sector as dependent and services and industry as independent variables, it has been revealed through outcomes that service sector has a significance; whereas, industrial sector has an insignificant impact on women's participation. The value of services sector is less than 0/05, but the industrial sector shows a value of 0.074, i.e. has a greater than the level of significance. Table 8 shows the regression analysis on employee's female rate in industry and services sectors.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.418	2	3.209	15.148	.000 <sup>b</sup>
	Residual	3.602	17	.212		
	Total	10.020	19			

a. Dependent Variable: Agricultural  
b. Predictors: (Constant), Services, Industry.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(Constant)	42.351	9.589		4.417	.000
	Industry	-.255	.134	-.487	-1.904	.074
	Services	-.433	.096	-1.152	-4.501	.000

a. Dependent Variable: Agricultural

**Table 8:** Regression Analysis on Employees Female Rate in Industry and Service Sectors

Majority of women labor force has been observed to participate in full-time employment opportunities. Women labor force is found to present in all sectors in a relatively even pattern, while they tend to be over-presented in some particular sectors of industry, such as construction and mining due to physically demanding nature of these jobs. Throughout the world, many trade regimes

and competitive industries rely on women labor contribution (Moghadam, 2015). Those women employees who did not have the required abilities and working skills and the academic degree were observed not to have the possibility of getting the most appropriate jobs in the knowledge-based economies. The advantages to make investments within the industries of science and high-technology, which includes the industry of Information & Technology, telecommunications, and so on, are never the innovations that would provide or create more appropriate jobs for unqualified women. It has been evidenced that being a part of moving towards the KE, the technological advancement sometimes observed to have a negative influence on the employment opportunities of women.

Men in contrast with women, deals with the complicated processes, which include the financial arrangements as well as very limited knowledge regarding the sources of help, women entrepreneurs often have less experience. It has been observed through the surveys of financial literacy that women have less understanding and confidence in making financial decisions than do men (OECD, 2005). In order to obtain the resources and financial information, women were observed to be underprivileged, due to the reason that they are less likely capable of affording these services and are not linked to mainstream business networks. The range of education and labor market policies are required, which provides a direction for a better reflection of the higher educational attainment of female school graduates in their later careers.

## 5. Discussion and Conclusion

Globally and specifically across the Arab countries, some of the formal and informal constraints have been faced by the women, which are more than those faced by the men in accessing the decent jobs. Around two-thirds of the working women in the Arab countries are in vulnerable jobs, as an own account (self-employed) or unpaid family workers, casual or seasonal agricultural laborers, workers in the urban factories and workshops, or as domestic servants. As evidence, women require the knowledge, confidence, and skills to take advantage of the economic and financial opportunities (OECD, 2015). The different components associated with the Knowledge Economy enhance the participation of women in the labor market by addressing the constraints and barriers they face in almost every aspect of work.

In the developing countries, most of the women entrepreneurs usually face inconsistent obstacles to access and compete in the markets. In comparison with men, it comprises of the women's relative deficiency of capability, mobility, and technical skills (World Bank, 2009). In the Arab countries peculiarly, the hiring and training of female extension workers, where the interaction between males and females has been limited by certain values of culture, can be resulted in enhancement of the participation of women in extension activities, as well as their acceptance of technological innovations.

In the knowledge-based economies of today's era, women workers with the background of Science & Technology (S&T) serve as a fundamental resource, with reference to the dimension of education. Nevertheless, in the studies of S&T, women immensely remain underrepresented at the secondary as well as tertiary educational levels, and in the overall technical workforce (OECD, 2007). Knowledge Economy, which places an emphasis on the significance of the market economy and knowledge capital, brings about the competition, ambiguity, and risks which may be inconsistent with the intrinsic personal preferences of most laid-off females, who favor routine work and job security over career risks.

KE can diminish the costs to the economy of losing the skills and talents of majority of the women from working life by changing the culture of workplace, as well as to improve the good practice in working arrangements to give better management of the talent pipeline, specifically within the domains, where the values of culture restrict the communication of males and females, where men dominate the community-level. It is usually believed that men are more appropriate for important work tasks. It sets discriminatory expectations regarding the appropriate sex roles as well as their

professional capability. On the contrary, in the fields of women they were considered to be less creative in science and technology, and their actual performance is evaluated in the darker light of the negative expectations of people. Thus, there is an increasing need for fighting this kind of culture.

An investment in the futures of young women and girls through KE results in maximizing their economic potential, providing the greatest return and increasing the country's competitiveness in a global market. Hence, the females should be encouraged to end up by placing an emphasis on the traditional sectors, which require limited qualifications and offer narrower scope for reward and benefit from the areas of high skills and high potential, such as Science, Technology, Engineering and Mathematics (STEM). KE must relate with encouraging girls joining STEM subjects and STEM careers.

## 6. Research Limitations and Future Research

The productivity of women, their power of making economic decisions is likely to be enhanced by the Knowledge Economy. Furthermore, being a pillar of KE, the institutional regime must encourage more women to establish their personal business and to be essential in generating a strong entrepreneurial economy and supporting growth still further. The diversity of people brings a diversification of the experience, skills and abilities, which in turn can deliver richer creativity, better problem solving and greater flexibility to environmental changes.

The programs, which facilitate the accessibility of women towards the formal and informal education, are required to be designed. Moreover, the policies regarding labor market should be developed to bring an improvement in job-related circumstances. Equivalently, making an investment in infrastructure and labor-saving technologies, peculiarly in rural areas, can be helpful to bring a reduction in the time-consuming aspects of women's and girls' unpaid domestic work. Thus, it has been determined that this investment enables the girls to attend school and women to participate in the labor market, or take up the opportunities of self-employment. Besides this, the governments should assist in the advancement of micro-enterprise and self-employment by making continuous improvements in the productivity and working conditions. Woman workers with Science and Technology (S&T) background are the primary resource in the knowledge-based economies of today's era. An enhanced participation of females in the jobs of computer science, engineering and technology, would stimulate the advancements of economy and innovation in all countries. The governments are likely to provide monetary as well as non-monetary incentives to motivate the females to choose the domains of Science and Technology as their careers. In almost all countries, it is very challenging to attract young women towards the domain of Science and Technology. The female teachers, who belong to the field of Science & Technology, should be hired at the secondary level to serve as role models, as they were observed to be much underrepresented on school faculties. Therefore, it can be concluded that the knowledge economy has a positive impact on the participation of women in the labor market.

## 7. References

- Addabbo, T., Rodríguez Modroño, P. and Gálvez-Muñoz, L., 2013. Gender and the Great Recession: Changes in labor supply in Spain. *Università di Modena Reggio Emilia, DEMB Working Paper Series*, 10.
- Alam, S.I., 1998. Role of Women in Decision Making and Economic Contribution at Household Level. *Journal of International Affairs*, 4(1), p.13.
- Antonio, A. and Tuffley, D., 2014. The gender digital divide in developing countries. *Future Internet*, 6(4), pp.673-687. Doi: 10.3390/fi6040673
- Arslan, İ., 2012. Knowledge Economy And Effect On Women'S Employment In Turkey.
- Asongu, S.A., 2015. Knowledge Economy Gaps, Policy Syndromes, and Catch-Up Strategies: Fresh South Korean Lessons to Africa. *Journal of the Knowledge Economy*, pp.1-43. DOI: 10.1007/s13132-015-0321-0

- Contreras, D., Kruger, D., Ochoa, J. and Zapata, D. 2007. The role of social networks in employment outcomes of Bolivian women. University of Chile, Department of Economics...
- Creswell, J.W., 2013. Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.
- Doepke, M. and Tertilt, M., 2014. Does female empowerment promote economic development? (No. w19888). National Bureau of Economic Research.
- Gaddis, I. and Klasen, S. 2014. Economic development, structural change, and women's labor force participation. *Journal of Population Economics*, 27(3), pp.639-681. DOI: 10.1007/s00148-013-0488-2
- Glass, J. and Nath, L.E. 2006. Religious conservatism and women's market behavior following marriage and childbirth. *Journal of Marriage and Family*, 68(3), pp.611-629. DOI: 10.1111/j.1741-3737.2006.00278.x
- Gorbachev, O., 2016. Has the Increased Attachment of Women to the Labor Market Changed a Family's Ability to Smooth Income Shocks?. *The American Economic Review*, 106(5), pp.247-251. <https://doi.org/10.1257/aer.p20161119>
- Joseph, S. and Slyomovics, S. eds., 2011. Women and power in the Middle East. University of Pennsylvania Press...
- Kandiyoti, D. 2001. The politics of gender and the conundrums of citizenship. In: Joseph, S and Slyomovics, S, (eds.), *Women and Power in the Middle East*, University of Pennsylvania Press (USA), 52-58
- Kearney, M.L., 2017. Whither Women Graduates in the Knowledge Economy?. In *The Changing Role of Women in Higher Education* (pp. 3-30). Springer International Publishing. DOI 10.1007/978-3-319-42436-1\_1
- Lim, L.L. 2002. Female Labor-force Participation. Retrieved from: <http://www.un.org/esa/population/publications/completingfertility/RevisedLIMpaper.PDF>.
- Moghadam, V. 2015. Gender and globalization: Female labor and women's mobilization. *Journal of world-systems research*, 5(2), pp.366-389. DOI: <http://dx.doi.org/10.5195/jwsr.1999.139>
- OECD, 2007. Gender and Sustainable Development: Maximizing the Economic, Social and Environmental Role of Women. Retrieved from: <http://www.oecd.org/social/40881538.pdf>.
- OECD, 2014. Gender Equality and Women's Rights in the Post 2015 Agenda: A Foundation for Sustainable Development. Retrieved from: <http://www.oecd.org/>.
- OECD, 2015. Fostering Equity in Higher Education: A Compendium of Practical Case Studies: Promoting Female Participation in STEM, OECD Higher Education Program. Retrieved from: <http://www.oecd.org/edu/imhe/Promoting-female-participation-in-STEM.pdf>.
- Office for National Statistics ONS 2012, 2013. Annual Survey of Hours and Earnings Provisional Result. Retrieved from: <http://www.ons.gov.uk/>.
- Organisation for Economic Co-operation and Development. (2005). OECD SME and entrepreneurship outlook. OECD.
- Orient Planet. 2014. Arab Knowledge Economy Report. Retrieved from: <http://www.orientplanet.com>.
- The Department For Business, Innovation And Skills. (2012). Small Business Survey: Businesses led by Women and Ethnic Minorities. Retrieved from: <http://www.gov.uk>.
- United Nations. 2014. UN Woman, Annual Report, 2014-2015. Retrieved from: [www.unwomen.org](http://www.unwomen.org).
- United Nations. 2014. United Nations entity for gender equality and the empowerment of women. Retrieved from: [www.unwomen.org](http://www.unwomen.org).
- World Bank. 2009. The Status & Progress of Women in the Middle East & North Africa. World Bank, Middle East and North Africa Social and Economic Development Group. Washington.