The Dynamics of Digitalization and Women's Empowerment in the MENA Region

ديناميكيات الرقمنة وتمكين المرأة في منطقة الشرق الأوسط وشمال أفريقيا

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Abstract

This paper examines the link between digitalization and women's empowerment in the Middle East and North Africa (MENA) region using panel data from 21 countries between 1992 and 2019. The study employs the autoregressive distributed lag (ARDL) technique to analyze the impact of information and communication technology (ICT), specifically mobile phone subscriptions and internet use, on women's empowerment as measured by the female labour force participation rate.

The findings show that mobile phone subscriptions have a positive and significant short-term effect but become insignificant in the long run. In contrast, internet use does not show significant impacts in either the short or long term. However, when considering the interaction term, mobile phone subscriptions have a positive and significant impact on women's empowerment in the long run, although the interaction term itself is negatively significant in the long run. Internet use remains insignificant in both the short and long term, but the interaction term displays a positive and significant relationship with women's empowerment in the long run. These results suggest that laws and regulations supporting women's rights enhance the effectiveness of digitalization, particularly internet use, in promoting women's empowerment. In conclusion, this study deepens our understanding of the relationship between digitalization and women's empowerment in the MENA region. By considering ICT variables and the moderating role of women-supportive laws, the research underscores the importance of mobile phone subscriptions for long-term women's empowerment and highlights the positive influence of legal frameworks in facilitating the impact of digitalization, especially internet use, on women's empowerment.

Keywords: Female Empowerment, ICT, Mobile Cellular Subscription, Individuals Using the Internet, Unit Root Tests, Fixed Effect, ARDL.

Jel codes: J16, O33

خلاصة

تبحث هذه الورقة في العلاقة بين الرقمنة وتمكين المرأة في منطقة الشرق الأوسط وشمال أفريقيا باستخدام بيانات جماعية من ٢١ دولة بين عامي ١٩٩٢ و٢٠١٩. وتستخدم الدراسة تقنية الانحدار الذاتي الموزع (ARDL) لتحليل تأثير المعلومات وتأثير تكنولوجيا الاتصالات، وتحديداً اشتراكات الهاتف المحمول واستخدام الإنترنت، على تمكين المرأة مقاساً بمعدل مشاركة المرأة في القوى العاملة.

وأظهرت النتائج أن اشتراكات الهاتف المحمول لها تأثير إيجابي وهام على المدى القصير، ولكنها تصبح غير ذات أهمية على المدى الطويل. وفي المقابل، لا يُظهر استخدام الإنترنت تأثيرات كبيرة على المدى القصير أو الطويل. ومع ذلك، عند النظر في مصطلح التفاعل، فإن اشتراكات الهاتف المحمول لها تأثير إيجابي وكبير على تمكين المرأة على المدى الطويل، على الرغم من أن مصطلح التفاعل نفسه له دلالة سلبية على المدى الطويل. ويظل استخدام الإنترنت ضئيلاً على المدى القصير والطويل، ولكن مصطلح التفاعل يظهر علاقة إيجابية وهامة مع تمكين المرأة على المدى الطويل. وتشير هذه النتائج إلى أن القوانين واللوائح الداعمة لحقوق المرأة تعزز فعالية الرقمنة، وخاصة استخدام الإنترنت، في تعزيز تمكين المرأة. في الختام، تعمل هذه الدراسة على تعميق فهمنا للعلاقة بين الرقمنة وتمكين المرأة في منطقة الشرق الأوسط وشمال أفريقيا. من خلال النظر في متغيرات تكنولوجيا المعلومات والاتصالات والدور المعتدل للقوانين الداعمة للمرأة، يؤكد البحث على أهمية اشتراكات الهاتف المحمول لتمكين المرأة على المدى الطويل ويسلط الضوء على التأثير الإيجابي للأطر القانونية في تسهيل تأثير الرقمنة، وخاصة استخدام الإنترنت، على حقوق المرأة. التمكين.

الكلمات المفتاحية : تمكين المرأة، تكنولوجيا المعلومات والاتصالات، اشتراكات الهاتف المحمول، الأفراد الذين يستخدمون الإنترنت، اختبارات جذر الوحدة، التأثير الثابت، ARDL.

1-Introduction:

Although female academic achievement is rapidly increasing and the educational gender gap is closing, if not reversing, the Middle East and North Africa (MENA) region shows primarily a constant female labour force participation rate (FLFPR). It has been said that this is the "MENA paradox." Even when increases in involvement are recorded, they typically manifest as rising unemployment rather than rising occupation. In the context of the digitalization of economies, the paper emphasizes the expanding business opportunities and the impact on female labour force participation. It recognizes that economic growth alone is insufficient for meaningful advancement in women's empowerment. The study aims to analyse the relationship between ICT access indicators, such as mobile subscriptions and internet usage, and women's empowerment as measured by labour force participation.

Overall, the introduction sets the stage for the research by highlighting the importance of women's empowerment, the role of digitalization, and the specific focus on the MENA region. There is significant empirical evidence that higher social status and empowerment of women within a society correlate positively with greater economic growth both between countries and over time. Based on these findings, policymakers have posited a causal link between female empowerment and development outcomes. If valid, strengthening women's empowerment and agency would not only be an objective on moral and equality grounds but could also accelerate economic progress at the national level. Indeed, women's empowerment has increasingly been recognized as a critical component of broader eco-

nomic development strategies. For example, the World Bank's 2006 Gender Action Plan Progress Report specifically highlighted the impacts of increasing women's power on economic growth (Doepke & Tertilt, 2019).

Digitalization is also an important modern factor influencing life and economic activity globally, as technological innovation continues to advance in most sectors. Women's empowerment, as a key determinant of development and innovation potential, could be significantly aided by greater access to information and communication technologies (ICTs). ICT skills are considered instrumental for achieving broader development goals. Therefore, to raise female labour force participation rates, women must have opportunities to develop technological capabilities. Examining the impact of ICT access indicators like mobile subscriptions and internet usage on women's empowerment, as measured by labour participation, could provide insights into these relationships.

The paper acknowledges the empirical evidence that links women's empowerment to greater economic growth and development outcomes. Policymakers recognize the importance of women's empowerment as a critical component of broader economic development strategies. Additionally, digitalization has become a significant factor influencing life and economic activity globally, with ICT playing a vital role in achieving development goals. The following section provides a review of the literature review followed by the statistical model then results followed by results and conclusions.

2-Literature review:

Economists have studied labour force participation based on factors such as age, gender, race, and income. According to neoclassical theory, individuals work to earn money because work is preferable to leisure. The model separates working hours from unpaid leisure time, known as the income-leisure model. This model examines labour supply and wages but ignores endogenous preferences that are non-financial. As such, wages, non-labour income, and preferences impact whether and how long one works. Higher pay makes work more attractive. First, rising earnings may encourage unemployed individuals to join the workforce. Second, higher incomes make work a more desirable option than leisure for currently employed individuals. However, more hours of work become less desirable as less labour is needed to earn the same amount, so the effect of increased compensation on work duration is mixed and depends on tastes.

Business opportunities are growing as a result of the so-called "cloud revolution," which has prompted the digitalization of economies. Salman et al. (2021). Analysing the factors that influence women's labour force participation in impoverished countries reveals push factors, as opposed to pull factors that attract women to the labour market in rich countries. The participation of women in the labour force is influenced by many factors. As FLFPR varies from a developed country to a developing one, the empirical will be divided into two regions: developing and developed countries. In 60 different developing nations between 2000 and 2014, Nikulin (2017) used these variables—ICTs, female labour force participation, and income inequality—by employing GLS and a panel data regression model. The direct cor-

relation demonstrates that any improvement in digital abilities will affect employment rates in terms of earnings, income, production, and consumption for both sexes. Economic inequality, birth rates, and GNP per capita all affect how much women participate in the labour force. These results held up in the face of a variety of control variables and ICT indicators. The study's conclusions state that "The outcomes point out the existence of a positive significant impact by the EG on the EFLFP and a fluctuating relation between fertility rates and the EFLFP" (Salman, D., 2021). The report also highlights the difficulties, pointing out that the EFLFP is frequently understated as a result of the growth of the informal sector and the omission of non-monetarist activities like household maintenance.

Prior research has acknowledged the moderating role of women-supportive laws and policies. For example, Psacharopoulos and Tzannatos (1989) stated that male labour force participation rates are always higher due to social norms but this gender inequality could be reduced by providing women with equal job opportunities that match their qualifications. The theory of social empowerment through digital libraries argues that technology design, implementation, and the surrounding social environment can collectively empower or exclude users. Three strategies are identified: making tools accessible where people work but ignoring social contexts; providing access in shared spaces without proper support; and using knowledge sharing adapted to individual and collective needs. Feminist scholarship identifies four waves of the feminist movement. The first advocated for women's suffrage. The second focused on legal and social equality in the 1960s-70s. The third wave emerging in the 1990s built on the second. The fourth wave starting in 2012 emphasizes female power and challenges social standards marginalizing women like women of color and transgender women. It calls for policies reflecting diverse perspectives and ending gender-based abuse and harassment.

Studies have also examined factors influencing female labour force participation. For example, Nikulin (2017) found a positive relationship between ICT levels and employment rates after controlling for GDP, fertility, and inequality using data from 60 developing countries from 2000-2014. Salman (2021) also identified GDP, fertility, and inequality as determinants while noting potential underestimation due to informal work. More recent research has explored digitalization's relationship with empowerment. For example, Arroyo (2020) found that Spanish government programs effectively targeted digital discrimination but lacked sociological perspectives on how technology influences time usage differently by gender. Camelia (2021) emphasized how cultural attitudes shape the impact of policies and programs to support female entrepreneurship. Isabel (2021) highlighted the potential for remote work and flexible hours to enable work-life balance due to COVID-19 and boost female entrepreneurship starting in 2021.

3- Stylized Facts

MENA region shows mainly a constant female labour force participation rate (FLFPR), although quickly growing female academic achievement as well as the closure, if not revers-

ing, of the educational gender gap, female labour force participation rates in the Middle East and North Africa (MENA) area remained modest & consistent. This is what has been referred to as the "MENA paradox." Even when gains in involvement are documented, they frequently appear in the appearance of growing jobless instead of increased occupation. This was mainly because of a decrease in the chance of working in the government area for qualified women relates to a higher rate of unemployment or a decrease in engagement (Assaad, etal, 2020).

Figure 1: Female labour force participation rate in the MENA region from 1992 to 2019
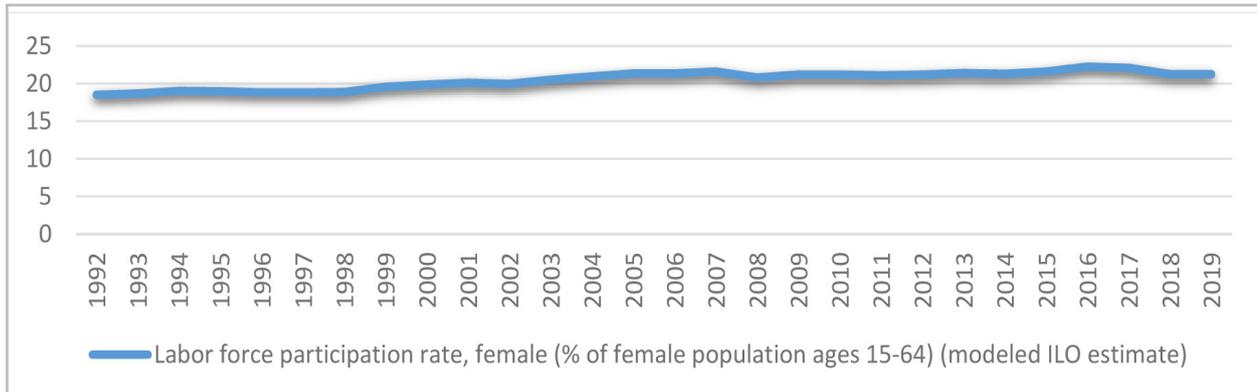
Source: (constructed by the author based on world development indicators and World Bank data)

In Figure 1, Over the past few decades, there has been massive international development in terms of female accessibility to schooling, healthcare, and other elements commonly regarded as leading to empowering women. These elements are expected to enhance female labour-force performance, as well as in terms of labour-force participation and work effectiveness. Nevertheless, recent developments in female labour supply in several emerging nations have fallen short of these expectations, with female labour force participation rates (LFPRs) stagnant or dropping.

Figure 2: Female labour force participation rate in all MENA region countries in 2009 and 2019
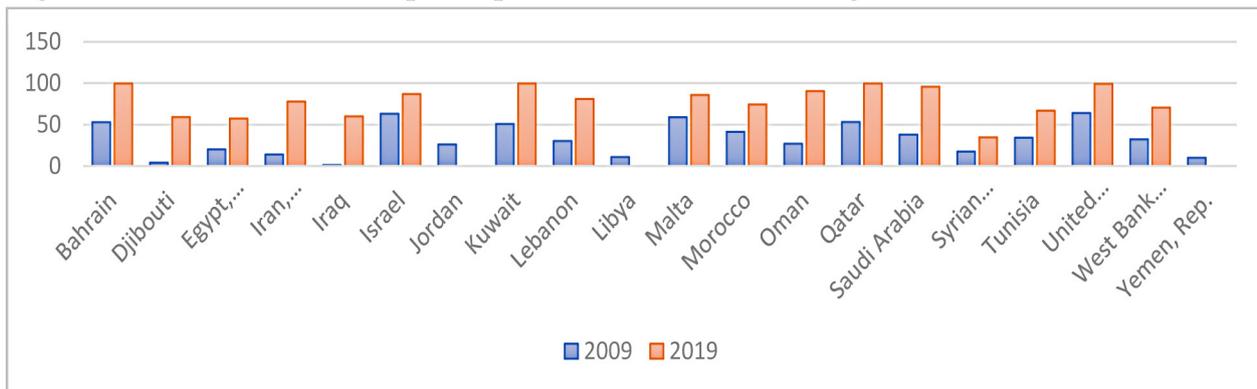
Source: (constructed by the author based on world development indicators and World Bank data)

As shown in the above graph Bahrain and Qatar showed the greatest increase in the FLF-PR from 2009 till 2019. A comprehensive analysis of the Arab Gulf region's globalized labour market environment, which includes Bahrain, Kuwait, Oman, the United Arab Emirates

(UAE), Saudi Arabia, and Qatar, exposes the incredibly quick expansion of the number of migrants. Arab Gulf governments spend significant amounts on managing migrant labourers since they have a significant impact on the economy and petroleum expenditures. The proportion of women in the workforce in the Arab Gulf states is around half that of the global average. The women's rights in labour and public laws in Gulf Arabs (2004) state the women's rights to work in public and private jobs. Which helped increase the FLFPR due to the role of the women's rights law in Bahrain, Qatar and all other Gulf countries (Lari, et al., 2022).

Figure 3: Mobile Cellular subscription in the MENA region from 1992 till 2019
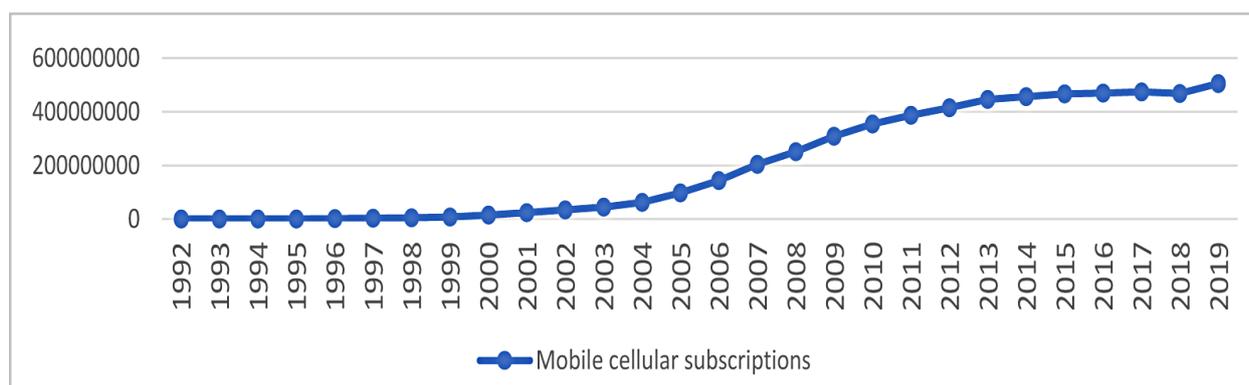
Source: (constructed by the author based on world development indicators and World Bank data)

A great graduate increase in mobile cellular subscriptions in the MENA region from 62 million to 505 million subscriptions from 2009 to 2017 is shown in the figure above due to the new wave of e-banking and e-payment methods as the new apps for shopping instead of the hours lost and physical effort to get to buy anything online is way easier now. Also through a mobile subscription, you can order things from abroad. (Jarrett, 2016). Many Mobiles are now being utilised in numerous regions of the globe to revolutionise the distribution of social goods to consumers and to restructure connections among authorities and their active compounds (Kyem, 2016). As well as the increase in access to the internet we mentioned later would in return increase the mobile cellular subscription.

Figure 4: Mobile cellular subscription in all MENA region countries for 2009 and 2019
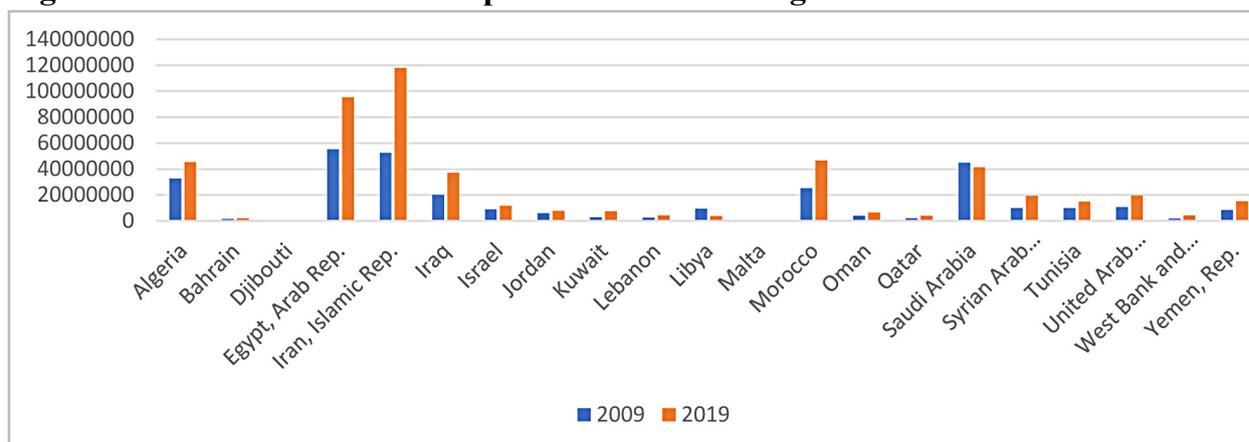
Source: (constructed by the author based on world development indicators and World bank data)

Egypt and Iran are showing the highest mobile subscriptions all over the mina region countries. Egypt showed a great increase in mobile cellular subscription from 2009 to 2019 through the growth of the video streaming sector in Egypt, a nation with a substantial share of young customers and engaged digital news users in the Arab world (Allam, et al, 2021). Also, Iran showed a great increase in mobile cellular subscriptions from 2009 to 2019 by assisting programmers in prioritising difficulties to properly integrate e-learning in Iran. One of the most successful aspects of e-learning acceptability in Iran is its utility. Furthermore, because of Iran's cultural and social framework, technology readiness has little effect on e-learning acceptability. Furthermore, educational aspects influence assessed utility, whereas technical and personal impacts recognise simplicity in usage (Chavoshi, etal, 2019).

Figure 5: Individuals using the Internet in the MENA region from 1992 to 2019
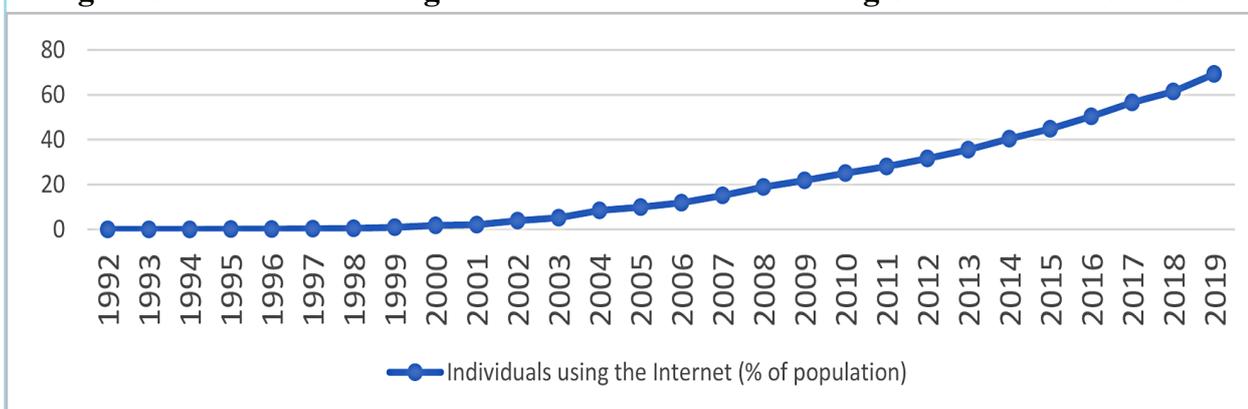
Source: (constructed by the author based on world development indicators and World bank data)

The above figure shows an increase in internet usage in MENA region. As globalization in terms of higher interaction and connection between economies are getting more necessary to help trade . in addition, Digital usage represents an important defining aspect of humanity's growth as the globe becomes more integrated, both financially and politically. In this regard, there has been a notable increase. Also, innovation, internet usage and technology are the main factors of achieving sustainable development goals of SDGs. Also, the internet and e-government would help control corruption and government effectiveness (Dhaoui, 2022).

Figure 6: Individuals using the Internet in all MENA region countries in 2009 and 2019
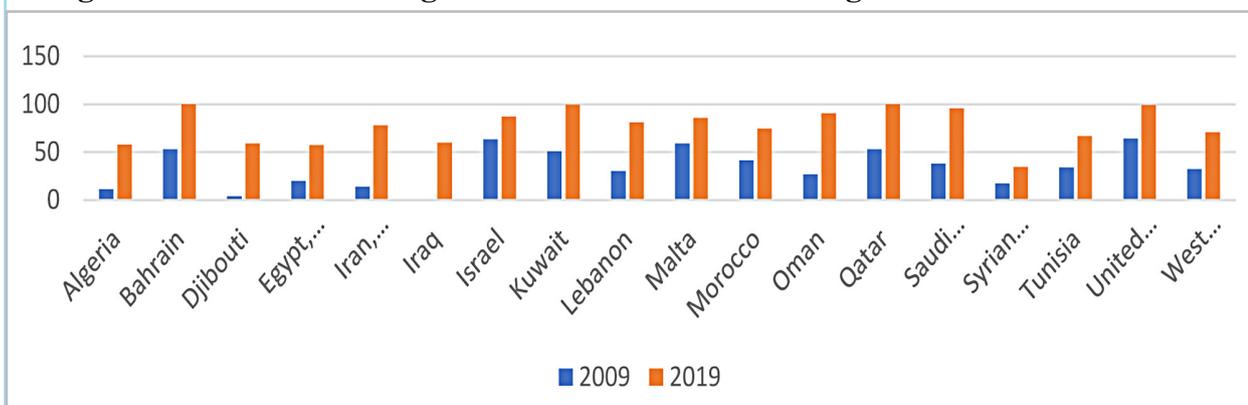
(Source: (constructed by the author based on world development indicators, World Bank data)

A great development in internet usage in Baharian and Qatar from 2009 to 2019 is shown in the figure through E-health represents the latest current medical innovation that individuals in developed nations are adopting to increase healthcare data exchange and to improve quality, efficiency, cost, and communication. E-health facilitates and promotes client participation. It allows clients to establish an open connection with all organizations in e-health systems and instantaneously communicate important data (Zolait, etal, 2019). In Syria specific websites were filtered and banned for ethical or economic concerns. The UAE and Bahrain 2018 to 2019 started the generation of digitalization and more technology due to innovation and development over the years It was so useful and needed in the pandemic lockdown due to online working programs to achieve the required production (Charfeddine, et al, 2021).

Figure 7: Women business and law index in MENA region from 1992 till 2019
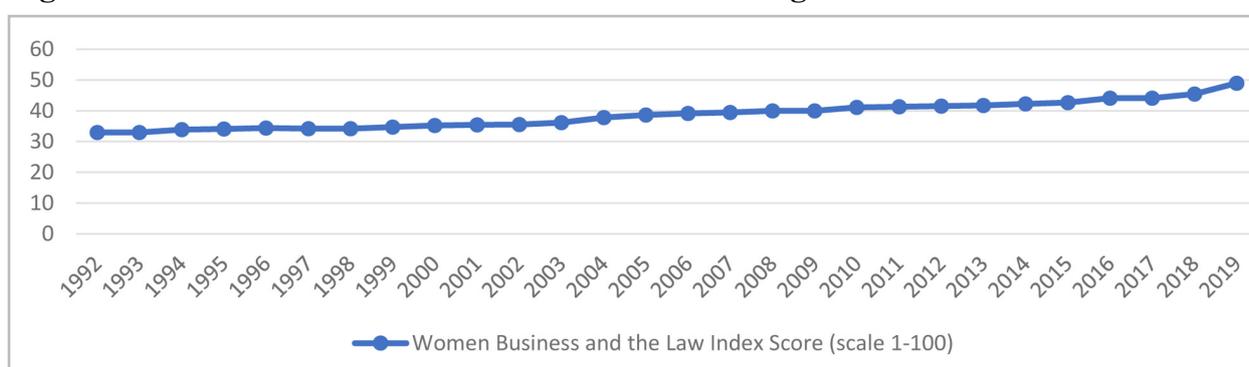
Source: (constructed by the author based on world development indicators and World Bank data)

An overall increase in the women's business and the law index score due to changing laws and breaking barriers for women's Economic Empowerment in some of the Mena region countries. Due to the women's rights in labour and public laws in Gulf Arabs in (2004) that states the women rights to work in public and private jobs. Which helped increase the FLFPR due to the role of the women's rights law Furthermore, with affected nations the risk of a severe depression, it is necessary to remove the last obstacles to female's full economic involvement. Female equality is a significant motivator that policymakers must employ to get their industries back on track and achieve the 2030 Agenda for Sustainable Development. For example, ILO and the International Labour Organization tended to stand for labour force gender equality (OECD/ILO/CAWTAR, 2020).

Figure 8: Women business and law in all MENA region countries for 1992 and 2019
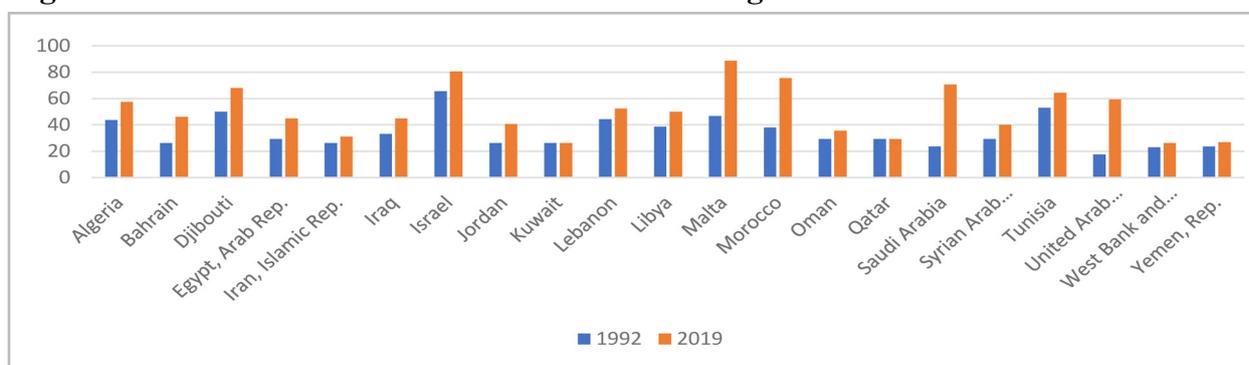
Source: (constructed by the author based on world development indicators and World Bank data)

Malta and Morocco had the most progressive women and business laws in the MENA region in 2019 according to indicators. However, female business ownership remained low in both countries. For example, women-owned only 1.5% of enterprises in Malta. Prior research has found some gender differences that could influence business ownership rates. Specifically, studies show males may be more likely to take risks and act boldly compared to females, who tend to be more hesitant and emotional in decision-making. Additionally, certain business sectors like construction, real estate, and transportation appear less attractive to women. In many cases, women in Malta and Morocco worked informally in family businesses.

Women entrepreneurs in these countries faced challenges such as strong competition, access to financing, and regulations according to past work. While notions of female empowerment have gained traction, restrictions on women's independent property ownership, contracting ability, and access to loans persist as major barriers. In some situations, women entrepreneurs were less familiar with engaging with formal banking. Research by the UN ESCAP found that in Malta and Morocco, 41% of women business owners reported receiving no external funding, relying solely on self-financing. Meanwhile, 29% obtained outside capital, 24% acquired small business loans, and 5% received grants from governments, NGOs or international aid groups according to a 2019 study examining the topic.

Scholar shows that digitalization can hasten the entry of female entrepreneurs into the workforce and enable them to grow their output. As a result, it may contribute to raising their standard of living, reducing poverty, and fostering economic stability. "The epidemic expands rather than narrows the gender gap. A digital divide reduction is urged by such a shock since it is seen as a necessity rather than a luxury. Particularly for women who were required to stay at home with their children during the global shock, such a tool can keep enterprises operating and aid in their recovery.

4- Research methodology:

The current study investigates the impact of digitalization on women's empowerment. The research uses a sample of MENA countries covering the period from 1992 to 2019. The main dependent variable is women empowerment which is measured using the female labour force participation rate as % of the female population ages 15-64. The main variable of interest is the information and communication technology proxied by mobile cellular subscription as a percentage of the population, and individuals using the internet. In addition, the research controls the role of laws in favour of women's economic empowerment which is mainly measured by the Women's Business and Law Index (scale 1-100) where the higher the score the better the situation. In addition, the research controls for women's education measured as gross primary school enrolments, annual percentage population, Fertility rate as total births per woman, women's health measured by adult female mortality rate per 1000 females, and economic growth measured by the GDP growth rate. All the variables are retrieved from the world development indicators from the World Bank data.

Table 1: List of Variables

Variable	Initial	Definition	sources
Mobile cellular subscription	**LMOB**	Mobile cellular telephone subscriptions are subscriptions to a public mobile telephone service that provide access to the PSTN using cellular technology.	
Individuals using internet	**IUI**	Internet users are individuals who have used the Internet (from any location) in the last 3 months. The Internet can be used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc.	
Female labor force participation rate	**FLFPR**	Female labour force as a percentage of the total shows the extent to which women are active in the labour force. The labour force comprises people ages 15 and older who supply labour to produce goods and services during a specified period.	
Secondary school enrolment	**SSE**	The net enrolment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age. Secondary education completes the provision of basic education that begins at the primary level.	**World development indicators, world bank**
GDP growth annual rate	**GDPG**	Annual percentage growth rate of GDP at market prices based on constant local currency.	
Population growth rate	**PG**	The annual population growth rate for year t is the exponential rate of growth of the midyear population from year t-1 to t, expressed as a percentage.	
Female population	**FP**	Female population is the percentage of the population that is female. The population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	
Fertility rate	**FR**	The total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children by age-specific fertility rates of the specified year.	
Women business and law index	**WBLI**	The index measures how laws and regulations affect women's economic opportunities. Overall scores are calculated by taking the average score of each index (Mobility, Workplace, Pay, Marriage, Parenthood, Entrepreneurship, Assets and Pension), with 100 representing the highest possible score.	

Proposed Model: The research aims to study the role of digitalization on women's empowerment following (Nikulin D. 2017), the research uses the widely used panel techniques.

It utilizes a fixed effects model, pooled OLS, and ARDL for a panel of 21 MENA countries.

$$EMPOWER_{it} = \alpha + \beta_1 DIGIT_{it} + \beta_2 FP_{it} + \beta_3 GDPG_{it} + \beta_4 PGR_{it} + \beta_5 GDPC_{it} + \beta_6 SSE_{it} - \beta_7 FR_{it} + \varepsilon_{it}$$

EMPOWER is the dependent variable that measures women's empowerment measured as the female labour force participation rate, a is the constant term. The main independent variable is digitalization measured with ICT in terms of mobile cellular subscriptions and individuals using the internet. FP, GDPG, PGR, GDPC, SSE, and FR are the control variables that include women's education measured as gross secondary school enrolment, annual percentage population, female population, Fertility rate as total births per woman, & economic growth measured by the GDP growth rate and GDP constant. Finally adding an error term all with the MENA countries from 1992 to 2019. The research adds to the existing literature by contributing to the role of women business & law index and its impact on the empowerment, hence the research adds an interaction term between DIGIT & women business and law index.

$$EMPOWER_{it} = \alpha + \beta_1 DIGIT_{it} + \beta_2 WBLI_{it} + \beta_3 ICT_{it} \times WBLI_{it} + \beta_4 FP_{it} + \beta_5 GDPG_{it} + \beta_6 PGR_{it} + \beta_7 GDPC_{it} + \beta_8 SSE_{it} - \beta_9 FR_{it} + \varepsilon_{it}$$

Individuals using the internet as a percentage of usage have a maximum of 100% and minimum of 0%, reaching an average in the Mena region of 26% which is less than 50% which shows a low knowledge of internet usage. The female labour force participation rate as a percentage rate of the total labour force is the maximum of 48% and the minimum is 8%. In the Mena region, the average reached 21.5% of the total labour force participation rate. The fertility rate total as a total birth per woman is an average of 3 kids the maximum birth per woman is 8 kids and the minimum is 1 kid. The population of the female is a percentage of the total population so the maximum percentage is the percentage of females from the total population which is 51% the minimum is 23% so the average female population percentage in the Mena region is 46%. Population growth as a % of total population as a maximum % is 19% and the minimum is -28% which shows a high death rate due to the increase in the spread of diseases and low health development index in the countries of the Mena region and the average reached 2.5% which means the fertility rate is more than the death rate, see table 2

Table 2: Descriptive Statistics

Variable	Obs	Mean	.Std. Dev	Min	Max
IUI	672	26.484	30.848	0	100
FLFPR	672	21.511	8.322	8.128	47.779
FR	651	3.29	1.257	1.13	8.606
PF	672	46.121	6.447	23.394	51.481
PGR	672	2.533	2.923	-27.722	19.36
SSE	672	68.263	22.802	9.372	100
WBLI	672	40.83	16.783	17.5	88.75
GDPG	672	3.917	9.494	-103.162	86.827
LGDP	672	24.771	1.25	21.468	27.244
LMOB	672	13.872	2.978	4.7	18.727

School secondary enrolment for females as a percentage its maximum is 100% and its minimum is 9% In the Mena region female school enrolment reached an average of 68%. Women Business and Law Index has a maximum rate of 89 and a minimum rate of 17.5 The average rate reached in the Mena region is 41 which is relatively low, so this means that law supporting women are relatively low. GDP growth annual % The maximum % of growth rate in the GDP is 87% and the minimum growth rate is -103% which means that this shows a decline of 103% while the average of the Mena region GDP growth annual percentage is 4%. LGDP is the GDP constant with a maximum of 27 million dollars and a minimum of 21.5 million dollars the average reached in the Mena region is 25 million dollars. LMOB measures mobile cellular subscriptions with a maximum of 19 million subscribers and a minimum of 5 million subscribers, so the average is 14 million subscribers in the Mena region.

Table 3: Correlation Analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
IUI (1)	1.000									
FLFPR (2)	*0.198	1.000								
FR (3)	*-0.522	*-0.343	1.000							
PF (4)	*-0.322	*0.366	*0.231	1.000						
PGR (5)	0.005	*-0.221	*0.100	*-0.357	1.000					
SSE (6)	*0.267	*0.308	*-0.177	*-0.143	0.041	1.000				
WBLI (7)	*0.314	*0.718	*-0.408	*0.372	*-0.247	*0.134	1.000			
lGDPG (8)	*0.229	*-0.141	*-0.160	*-0.265	*0.078	-0.042	-0.071	1.000		
LMOB (9)	*0.529	0.023	*-0.343	-0.007	-0.037	*0.098	*0.136	*0.416	1.000	
GDPC (10)	*0.278	*-0.122	*-0.186	*-0.233	0.012	0.057	-0.041	*0.840	*0.383	1.000

Source: based on author's own calculations, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Individuals using the internet have a weak positive relation with most of the other variables and a strong positive relation with mobile cellular subscriptions except for the fertility rate strong negative and population female weak negative relations. The labour force participation rate shows a weak negative significant relation with the fertility rate, population growth, GDP growth and the GDP constant and a weak positive significant relation with the population of female and school secondary enrolment, the only strong positive relation is with women business and the law index. The fertility rate has a weak negative yet significant relation with almost all the variables except for two weak yet positive relations with the population female and the population growth rates. The population of females has a weak negative relation with all variables except the women's business and law index which has a weak but positive relation. Population growth has only two weak significant relations a positive weak with GDP growth and a weak negative with the women's business and law index. Secondary school enrolment has only two weak positive significant relations with both women's business and law index and mobile cellular subscriptions. Women's Business and Law index has only one weak positive significant relation with mobile cellular

subscriptions. GDP growth has a strong and a weak positive relation with GDP constant and mobile cellular subscriptions. Mobile cellular subscriptions have a weak positive relation with the GDP constant. All significant relations are at a 99% confidence level as their p-values are less than 0.1.

Among our 6 tests for stationarity - Levin-Lin-Chu, Harris-Tzavalis, Breitung, Im-Pesaran-Shin, Fisher-type, and Hadri LM - the variables showed differing levels of stationarity. The labour force participation rate was mostly significant across the tests, indicating it is stationary in both level and first difference. The fertility rate was also largely significant, suggesting stationarity. Half of the tests showed female population share to be significant, while the other half indicated non-stationarity, necessitating first differencing. The women's business and law index was mostly significant, implying stationarity.

Mobile cellular subscriptions and secondary school enrolment were about 90% significant, indicating general stationarity. GDP annual growth was also largely significant and stationary, see table 4 in the appendix. However, individuals using the internet were mostly insignificant, signalling non-stationarity. The population growth rate was mostly significant and stationary. GDP constant was also largely significant and stationary.In summary, the variables exhibited differing levels of integration. Hence, the study applies the ARDL model in the econometric analysis to accommodate this mix of I(0) and I(1) variables. The ARDL bounds testing approach does not require the variables to be purely I(0) or I(1), making it appropriate given the stationarity test results.

5- Results

Results show that in the long run of the first model secondary school enrolment increases by 1-unit FLFPR decreases by 0.020 units by a confidence level of 99% holding everything else constant. GDP growth rates increase by 1% FLFPR increases by 1.82% with a confidence level of 95% holding everything else constant. fertility rate has a negative relation with FLFPR, so it increases by 1 unit decreasing in return the FLFPR by 1.426 units by a confidence level of 99% holding everything else constant. increases by 1-unit leading FLFPR to increase by 0.898 units by a confidence level of 99% holding everything else constant.

Table 5: The Impact of Digitalization on female labour force participation using ARDL

__ec	LMOB	0.049	
		(1.52)	
	IUI		0.033
			(5.97)**
	FR	-1.426	-0.004
		(12.41)**	(0.02)
	FP	0.898	0.062
		(10.11)**	(0.39)

	SSE	-0.020	0.000
		(2.82)**	(0.07)
	LGDPG	0.182	1.908
		(2.19)*	(4.37)**
SR	__ec	0.124	0.175
		(3.79)**	(4.24)**
	D.LMOB	0.105	
		(2.21)*	
	D.IUI		0.003
			(0.14)
	D.FR	-0.814	-0.478
		(1.78)*	(0.92)
	D.FP	5.001	2.299
		(1.87)*	(1.50)
	D.SSE	0.0004	0.001
		(0.11)	(0.14)
	D.LGDPG	0.945	1.213
		(1.89)	(1.83)*
	_cons	2.785	5.452
		(3.78)**	(3.91)**
N		630	603
Log Likelihood		-37.65241	-17.79413

(Based on the author's calculations) * p<0.05; ** p<0.01

In the short run of the first model, mobile subscription has a positive and significant relation with FLFPR so as FLFPR increases by 1 % mobile cellular subscriptions increase by 1.05% by a confidence level of 95% holding everything else constant. Whenever the fertility rate has a negative relation with FLFPR, it increases by 1-unit decreasing in return the FLFPR by 0.814 units by a confidence level of 99% holding everything else constant. When the female population increases by 1-unit it leads FLFPR to increase by 5.001 units by a confidence level of 95% holding everything else constant.

In the long run of the second model, individuals using the internet have a positive and significant relation with FLDPR so as FLFPR increases by 1-unit individuals using the internet increase by 0.033 units by a confidence level of 99% holding everything else constant. As GDP growth rates increase by 1% FLFPR increases by 0.019% by a confidence level of 99% holding everything else constant. While, in the short run of the second model, GDP growth rates increase by 1% FLFPR increases by 0.0545% by

confidence level of 95% holding everything else constant. The constant is 2.785 which means if all independent variables are zero and have no effect the dependent FLFPR is equal to 2.785 The constant is 5.452. which means if all independent variables are zero and have no effect the dependent FLFPR is equal to 5.452. Both models are significant by 99%, see Table 5.

5.1 ARDL model with the role of law

In the previous Table 6, we have two models with two different main independents log mobile subscriptions and individuals using the internet they both affect the dependent variable female labour force participation rate in the long run and the short run. The constant is 5.318 which means if all independent variables are zero and have no effect the dependent FLFPR is equal to 5.318. The constant is 2.954. which means if all independent variables are zero and have no effect the dependent FLFPR is equal to 2.954. Both models are significant by 99%.

In the long run of the first model GDP growth rates increase by 1% FLFPR increases by 0.105% by a confidence level of 99% holding everything else constant. fertility rate has a negative relation with FLFPR, so it increases by 1-unit decreasing in return the FLFPR by 0.814 units by a confidence level of 95% holding everything else constant. female population increases by 1-unit leading FLFPR to increase by 0.605 units by a confidence level of 99% holding everything else constant. Women Business and Law index has a positive and significant relation with FLFPR where WBLI increases by 1-unit increasing FLFPR by 0.557 units in return. by a confidence level of 95% holding everything else constant. As shown the mobile effect solely is positive, yet the interaction term is shown to be negative and significant so whenever WBLI increases the effect of the mobile subscriptions on the FLFPR decreases. So, in the first model, by introducing the interaction term the effect of mobile on FLFPR depends on the WBLI. Hence, we need to interpret it as a partial effect where the equation is 0.862-0.031WBLI, to be able to interpret it we will use the two extreme cases of the WBLI in our data. For the maximum value of WBLI which is (88.75), it is found that when mob increases by 1-unit FLFPR decreases in return by 1.88925 units, while for the minimum value which is (17.5) when MOB increases by 1 unit, FLFPR decreases by 0.3195 units, holding everything else constant by confidence level of 95%. For the short run, the female population increases by 1-unit leading FLFPR to increase by 4.170 units by a confidence level of 95% holding everything else constant. GDP growth rates increase by 1% FLFPR increases by 0.01144% by confidence level of 95% holding everything else constant.

Table 6: The Impact of Digitalization of female labour force participation with the role of law using ARDL.

__ec		LMOB	0.862	
			(2.22)*	
		WBLI	0.557	0.326
			(2.39)*	(5.29)**
		MOBWBL	-0.031	
			(2.26)*	
		IUI		0.022
				(0.59)
		INTWBL		0.002
				(1.69)*
		FR	-0.814	0.106
			(2.40)*	(0.49)
		FP	0.605	1.163
			(8.11)**	(14.10)**
		SSE	-0.011	-0.018
			(1.46)	(3.36)**
		LGDPG	1.058	-0.718
			(3.08)**	(2.68)**
SR		__ec	0.109	0.095
			(3.51)**	(3.29)**
		D.LMOB	0.838	
			(1.11)	
		D.WBLI	0.558	-0.034
			(1.23)	(0.51)
		D.MOBWBL	-0.034	
			(1.23)	
		D.IUI		-0.077
				(1.35)
		D.INTWBL		0.002
				(1.01)
		D.FR	-0.645	-0.735
			(1.63)	(1.47)
		D.FP	4.170	4.058
			(1.76)*	(2.34)*
		D.SSE	-0.002	-0.004
			(1.08)	(0.83)
		D.LGDPG	1.144	0.250
			(2.10)*	(0.51)
		_cons	5.318	2.954
			(3.50)**	(3.58)**
N			630	603
Log-likelihood			-23.45185	62.86723

(Based on the author's calculations) * p<0.05; ** p<0.01.

For the second model, In the long run, GDP growth rates increase by 1% FLFPR decreases by 7.18% by confidence level of 99% holding everything else constant. female population increases by 1-unit leading FLFPR to increase by 1.163 units by a confidence level of 99% holding everything else constant. Women Business and Law index has a positive and significant relation with FLFPR where WBLI increases by 1-unit increasing FLFPR by 0.326 units in return by a confidence level of 99% holding everything else constant. Secondary school enrollment has a negative and significant relation with FLFPR as secondary school enrollment increases by 1 unit FLFPR decrease by 0.018 unit. As shown the internet effect solely is insignificant, yet the Interaction term is shown to be positive and significant so whenever WBLI increases the effect of the mobile subscriptions on the FLFPR increases.

So, in the second model, by introducing the interaction term the effect of mobile on FLFPR depends on the WBLI. Hence, we need to interpret it as a partial effect where the equation is0.022+0.002 IUI, to be able to interpret it we will use the two extreme cases of the WBLI in our data. For the maximum value of WBLI which is (88.75), it is found that when mob increases by 1 unit FLFPR increases in return by 0.1995 units, while for the minimum value which is (17.5) when MOB increases by 1 unit, FLFPR increases by 0.057 units, holding everything else constant by confidence level of 95%. Yet, in the short run of the second model, the female population increases by 1 unit leading FLFPR to increase by 4.058 units by a confidence level of 95% holding everything else constant.

The results showed 7 significant countries 6 (Algeria, Egypt, Iraq, Jordan, Saudi Arabia, and Tunisia) of them at 95% confidence level and a 90% significance level is Lebanon. The rest of the 14 countries are insignificant. Algeria, Iraq, Saudi Arabia, and Tunisia are negatively significant which means that individuals using the internet have a negative impact on FLFPR. While in Egypt, Jordan and Lebanon individuals using the internet have a positive impact on FLFPR.

Table 7: Impact of introducing laws on mobile subscriptions on female labour force participation, short-run effect by country

	LR	Algeria	Bahrain	Djibouti	Egypt	Iran	Iraq	Israel
ec__		-0.017	0.020	-0.003	0.270	0.170	0.048	0.004
		(0.96)	(0.57)	(0.19)	**(3.00)	(1.18)	(0.52)	(0.10)
LMOB	0.862	-1.549	1.189	-1.018	0.601	12.778	2.987	-1.782
	*(2.22)	*(2.05)	**(2.66)	(1.19)	(0.55)	(1.21)	(0.14)	(1.52)
WBLI	0.557	-0.568	0.281	-0.209	0.098	8.279	1.566	-0.348
	*(2.39)	*(2.00)	(1.39)	(1.06)	(0.21)	(1.15)	(0.14)	(1.39)
MOBWBL	-0.031	0.034	-0.022	0.019	-0.000	-0.487	-0.088	0.025
	*(2.26)	*(1.98)	(1.56)	(1.18)	(0.01)	(1.19)	(0.13)	(1.49)
FR	-0.814	0.530	-0.391	-0.436	2.650	-1.547	1.601	-0.522
	*(2.40)	(0.90)	(0.70)	(0.36)	(1.08)	(0.88)	(0.72)	(0.61)
FP	0.605	3.766	0.678	-2.974	3.044	9.624	-4.679	8.275
	**(8.11)	(1.42)	**(4.85)	(0.41)	(0.17)	(1.02)	(0.66)	(1.23)
cons_		0.004	-0.006	0.000	0.003	0.005	-0.006	-0.003

		Jordan	Kuwait	Lebanon	Libya	Malta	Morocco	Oman	Qatar
		(0.95)	(1.80)	(0.03)	(0.57)	(0.53)	(0.90)	(0.03)	
ec__		0.382	0.094	0.039	-0.033	0.215	-0.104	0.116	0.047
		**(3.86)	*(2.26)	(0.86)	**(2.80)	**(2.74)	(1.33)	(1.77)	(1.45)
LMOB		3.270	2.171	-1.240	-0.495	1.175	-0.305	-0.521	3.440
		(1.14)	(1.80)	(0.92)	*(1.97)	(1.26)	(0.80)	(1.55)	(0.80)
WBLI		2.023	1.238	-0.392	-0.202	0.265	-0.195	-0.279	1.689
		(1.18)	(1.72)	(0.94)	(1.92)	(1.26)	(1.50)	*(2.23)	(0.85)
MOBWBL		-0.122	-0.082	0.028	0.013	-0.025	0.012	0.024	-0.120
		(1.13)	(1.78)	(0.93)	(1.95)	(1.25)	(1.54)	*(2.38)	(0.82)
FR		-0.561	-1.807	-0.925	-0.418	2.422	1.149	-0.489	-0.464
		(0.42)	**(3.54)	(0.91)	**(3.66)	(1.79)	(0.88)	(1.33)	(0.98)
FP		0.342	0.718	0.941	1.193	6.306	2.050	0.531	0.589
		(0.63)	**(20.11)	*(2.45)	**(13.77)	*(2.19)	(0.39)	**(12.26)	**(20.22)
cons_		-0.004	-0.003	0.003	0.001	-0.037	0.001	0.001	0.001
		(0.88)	*(2.48)	(1.27)	(0.73)	(0.63)	(0.39)	(0.68)	(0.49)
		Saudi Arabia	Syrian	Tunisia	UAE	West bank Gaza	Yemen		
ec__		0.476	0.153	0.043	0.019	0.242	0.116		
		**(3.69)	(1.65)	(1.49)	(0.50)	*(2.26)	**(2.75)		
LMOB		-0.252	-5.956	0.482	0.110	0.342	2.170		
		(0.09)	(0.99)	(0.81)	(0.41)	(0.52)	(0.18)		
WBLI		-0.086	-3.150	0.087	-0.026	0.208	1.430		
		(0.04)	(0.94)	(0.52)	(0.25)	(0.50)	(0.18)		
MOBWBL		0.007	0.199	-0.007	0.001	-0.017	-0.097		
		(0.06)	(0.97)	(0.69)	(0.09)	(0.62)	(0.19)		
FR		-3.143	-2.116	-1.435	0.437	-4.335	-3.746		
		(1.85)	(0.65)	(1.28)	(1.29)	(1.53)	*(2.41)		
FP		1.786	1.934	-4.255	0.455	8.519	48.722		
		*(2.25)	(0.18)	(1.03)	**(4.51)	*(2.36)	**(3.17)		
cons_		-0.000	0.001	-0.003	0.006	0.001	-0.009		
		(0.04)	(0.07)	(1.40)	**(2.73)	(0.09)	(1.95)		

(Based on the author's calculations) * $p<0.05$; ** $p<0.01$.

After introducing the interaction term significance of the countries decreased to only 2 Significant countries at 90% in the interaction term (Algeria, Oman). All other 18 countries are insignificant. And the other 3 countries in the mob are all at 90% (Algeria, Bahrain, Libya).

Algeria is negatively significant in the mobile cellular subscription effect on female labour force participation rate while it is positively significant in the interaction term effect on the relation between MOB and FLFPR, Bahrain's MOB is positively significant on female labour force participation rate, this shows a negatively significant mobile cellular subscription impact on the female labour force participation rate. On the other hand, Oman has a positive

interaction term effect on the relation between mobile cellular subscriptions and the female labour force participation rate.

6- Discussion

The impact of mobile cellular subscriptions (MCS) on the female labour force participation rate (FLFPR) has been examined in both the short and long run. In the short run, MCS is found to have a positive and significant effect on FLFPR, which aligns with the theory of social empowerment in digital libraries (Amber, et al., 2023). This theory suggests that increased digitalization skills and knowledge lead to a higher labour force participation rate. However, in the long run, MCS becomes insignificant concerning FLFPR (Guldi & Herbst, 2017).The introduction of the interaction term between MCS and laws supporting digital techniques (MOBWBL) reveals important insights. In the first model, MCS becomes positively significant in the long run and insignificant in the short run when laws supporting digital techniques are introduced. This indicates that the application of laws and regulations supporting the use of digital technologies in the labour market takes time to be efficiently implemented and positively affects FLFPR in the long run. However, the interaction term itself (MOBWBL) is negatively significant in the long run, indicating that the enforcement of laws promoting female labour force participation may take time, leading individuals to prefer offline work opportunities (Pimkina, et al., 2020).

The study also highlights the role of internet usage (IUI) in female labour force participation. In the long run, individuals using the internet have a positive and significant impact on FLFPR, indicating that as ICT skills and knowledge related to internet usage increase over time, online working becomes more effective in promoting labour force participation (Hohnhold, et al., 2015). However, in the short run, the relationship between IUI and FLFPR is insignificant, suggesting that individuals need time to practice and develop their ICT skills for online jobs (Kohavi, et al., 2013). Similarly, the introduction of the interaction term between internet usage and laws supporting digital techniques (IUIWBL) shows interesting results. In the second model, individuals using the internet become insignificant in both the short and long run, while the interaction term (IUIWBL) is positively significant in the long run. This indicates that the implementation of laws and regulations supporting internet usage in the labour market takes time to become effective in promoting FLFPR. The positive and significant relationship between IUIWBL and FLFPR, in the long run, emphasizes the importance of laws in efficiently utilizing the internet for female labour force participation (Young, 2010).

Other factors such as the fertility rate, female population, secondary school enrolment, GDP growth rate, and the Women Business and Law Index also show significant relationships with FLFPR. The fertility rate is negatively significant, indicating that motherhood responsibilities may lead to lower labour force participation among women (Agüero, et al., 2008). The female population is positively significant, suggesting that an increase in

the number of females is associated with higher FLFPR, especially when supported by laws aiming to reduce gender discrimination (Stack, 1998). Secondary school enrolment is negatively significant, implying that longer education periods delay entry into the labour force (Gillies, 2015). The GDP growth rate is always positive, indicating that an increase in FLFPR contributes to higher productivity and economic growth (Lechman et al., 2015). The Women Business and Law Index is positively significant in the long run, highlighting the importance of effective implementation of laws promoting female labour force participation (Pimkina, et al., 2020).

7- Conclusion:

This research aims to examine the impact of information communication technology, specifically measured through mobile cellular subscription and internet usage, on women's empowerment in the MENA region over the past three decades. The study seeks to explore how digitalization can support female empowerment in this particular context. The research objectives include analyzing the relationship between internet usage and female empowerment, assessing the influence of mobile usage on female labour force participation rates, and investigating the connection between ICT skills, as measured by the Women Business and Law Index, and female labour force participation.

Importance of Mobile Cellular Subscriptions: The study highlights the positive and significant impact of mobile cellular subscriptions on women's empowerment in the long run. This implies that increasing access to mobile technology can contribute to enhancing women's empowerment in the MENA region. Policymakers and organizations can focus on improving mobile connectivity and affordability to promote gender equality and women's participation in the labour force. Role of Internet Usage: While internet usage does not exhibit significant effects on women's empowerment in the short or long term, the interaction term between internet usage and women's rights laws shows a positive and significant relationship in the long run. This suggests that legal frameworks supporting women's rights can enhance the effectiveness of internet usage in promoting women's empowerment. Policymakers should consider implementing laws and regulations that protect and promote women's rights in the digital sphere.

Women-Supportive Laws: The study emphasizes the importance of legal frameworks that support women's rights in facilitating the impact of digitalization on women's empowerment. It suggests that laws and regulations promoting gender equality and women's rights can enhance the effectiveness of digital technologies in empowering women. Policymakers should focus on enacting and enforcing laws that protect women's rights and address gender inequalities.

Understanding the Relationship: The research enhances our understanding of the relationship between digitalization and women's empowerment in the MENA region. By analyzing panel data and employing econometric techniques, the study provides insights into the specific impact of ICT variables on women's labour force participation. This understanding

can guide policymakers, organizations, and researchers in designing effective strategies and interventions to promote gender equality and women's empowerment in the digital era.

Overall, the research implications emphasize the importance of mobile cellular subscriptions, the role of internet usage in conjunction with women-supportive laws, and the need for a comprehensive understanding of the relationship between digitalization and women's empowerment. These insights can inform policy decisions, initiatives, and future research endeavours aimed at promoting gender equality and women's empowerment in the MENA region and beyond.

8- Limitations:

This research faced some problems throughout the research of missing data in some countries like Djibouti and missing data in some variables like primary school enrolment ending up by omitting it. Some other variables had missing data we solved this problem by interpolating the data and getting the averages.

9- Recommendation for future researchers:

For future researchers, I would advise controlling for the access of ICT, female entrepreneurship, and ease of doing business in the countries as these are important variables that may impact female labour force participation rate and women empowerment. After the unit root tests set up the diagnostic tests to know what the problems are facing your research and try solving them as early as possible to be able to complete your research with the best efficient results. Future researchers should use dummy variables to test for age and marriage status.

List of abbreviations

FLFPR: Female Labour Force Participation Rate

MOB: Mobile Cellular Subscriptions

IUI: Individuals Using the Internet.

SSE: Secondary School Enrolment

GDPG: Gross Domestic Product Growth Rate

GDPC: Gross Domestic Product Constant

FP: Female Population

PGR: Population Growth Rate

FR: Fertility Rate

WBLI: Women Business and Law Index

Lfprs: Labour Force Participation Rates

MENA Region: Middle East North Africa

ICT: Information Communication Technology

ARDL: Autoregressive Distributed Lag

OLS: Ordinary Least Square

GLS: Generalized Least Square.

UAE: United Arab Emirates

ILO: International Labour Organization

ESCAP: Economic and Social Commission for Asia and The Pacific

LLC: Levin-Lin- And Chu

ADF: Augmented Dickey Fuller

GNP: Gross National Product

OECD: Organization for Economic Co-Operation and Development

COVID-19: Corona Virus

IPS: Im-Pesaran and Shin

LSDV: Least Squares Dummy Variables

VIF: Variance Inflation Factor

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Appendix

Table 1: Hausman (1978) specification test

	Coef.
Chi-square test value	**17.457**
P-value	**.008**

Table 3: Variance inflation factor

	VIF	**VIF/1**
IUI	**1.991**	**502.**
LMOB	**1.786**	**56.**
FR	**1.4**	**714.**
LGDPG	**1.349**	**741.**
FP	**1.321**	**757.**
SSE	**1.103**	**906.**
Mean VIF	**1.492**	**.**
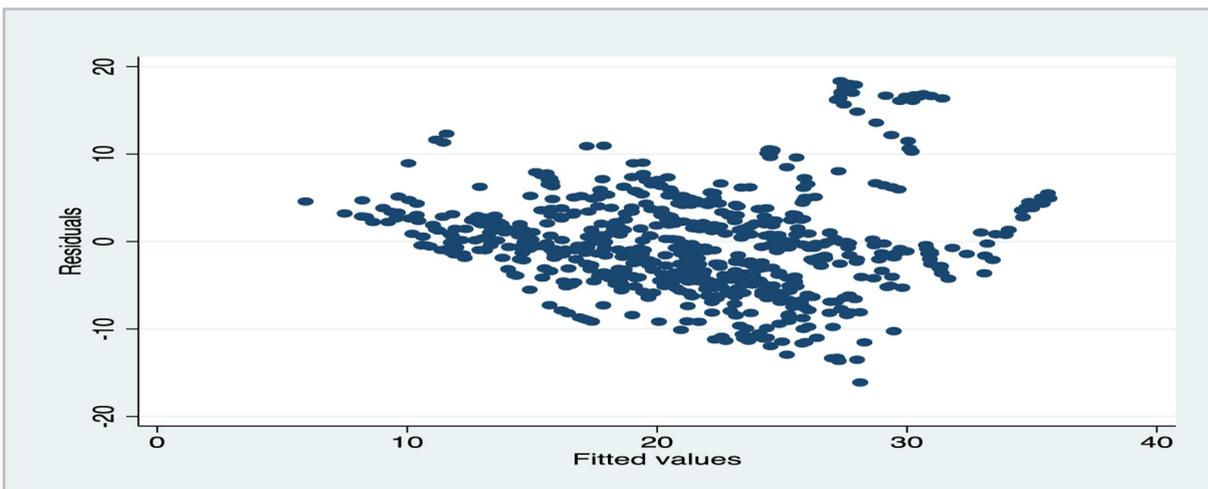
Figures

Figure 1: Residuals versus fitted plot:

Table 2: Jarque-Bera Normality test

jb resid

Jarque-Bera normality test: 3.345 Chi(2) .1878

Jarque-Bera test for Ho: normality:

Table 4: Panel Unit Root Test

Variables	LLC		HT		Breitung		IM		Fisher-type		Hadri LM stationarity	
	Level	1st Diff	Level	1st Diff	Level	1st Diff	Level	1st Diff	Level	1st Diff	Level	1st Diff
Labour force female of total												
Intercept	***-6.2009	***-11.0631	0.9754	***0.2888	7.0608	***-7.9830	-1.2069	***-3.6185	50.1288	***264.1696	***36.4585	***3.4797
Inter & Trend	***-8.4448	***-13.0765	0.8919	***0.3516	5.4380	***-4.6712	-1.1204	***-3.8915	8.1731	***237.7300	***42.7113	***6.8811
Fertility rate total births per woman												
Intercept	***-10.1824	***-8.7877	0.9338	***0.7041	11.4823	***-1.9116	***-5.0386	***-2.5964	***546.6843	***138.3350	***76.1517	***41.1725
Inter & Trend	***-10.9272	***-11.2821	0.9092	0.7505	9.4201	***-2.1721	-2.1353	***-3.0062	***94.8200	***154.9152	*61.6580	***24.0318
Population female of total population												
Intercept	***-7.0219	***-9.1863	0.9613	***0.7668	8.8073	-0.5005	-0.1715	-1.5859	***66.9409	47.3710	***64.7487	***4.7421
Inter & Trend	***-13.8125	***-12.6048	0.9464	0.7750	10.3008	2.4960	-0.6631	-1.6705	*54.0559	17.4663	***34.4095	***20.9497
Woman business and the law index												
Intercept	-2.6962	***-17.0503	1.0219	***0.2389	4.1809	***-10.5262	-0.1265	***-4.8309	18.9719	***455.9380	***60.5747	***5.8172
Inter & Trend	-8.9209	***-18.3525	0.9382	***0.2701	5.0258	***-3.9304	**-1.5207	***-4.9142	36.4585	***371.9098	***28.6037	***4.4587
Mobile cellular subscription												
Intercept	***-10.3059	-12.1967	*0.8827	***-0.2872	6.6942	***-4.3728	***-3.0289	***-6.5283	***193.7448	***623.3045	***69.6834	-0.9722
Inter & Trend	-4.3395	-18.4710	***0.6634	*** -0.2760	7.1457	***-6.4773	-1.9197	***-7.3578	***134.5202	***619.9147	***38.3930	-0.9810
Secondary school enrollment												
Intercept	***-11.1154	***-23.7786	***0.4820	***-0.3252	***-2.6153	***-13.2066	***-3.2680	***-7.3633	***195.2068	***968.7784	***19.4970	-3.6001
Inter & Trend	***-14.8746	***-24.3976	***0.3557	***-0.3252	***-4.6222	***-12.1413	***-3.6933	***-7.3666	***183.5600	***847.9396	***12.9269	-4.5794
GDP growth annual												
Intercept	***-5.3271	***-27.5470	***0.7469	***-0.5284	9.4407	***-10.0438	**-2.0959	***-8.3960	***100.6778	***1122.5074	***46.8643	-3.4861
Inter & Trend	***-14.1930	***-27.5571	***0.5322	***-0.5285	4.8536	***-4.1490	**-1.9433	***-8.3131	**64.3427	***1014.8928	***28.3140	-4.5776
Individuals using internet												
Intercept	-0.2748	-10.8900	0.9790	***-0.1655	8.6967	***-8.8746	0.2359	***-3.4004	10.4777	***271.0840	***79.9031	**2.0301
Inter & Trend	-6.3628	-12.0715	0.8075	***-0.1433	8.7981	8.0701	-1.5889	***-3.3779	23.4018	***255.2288	***38.6369	***6.9192
Population growth rate												
Intercept	***-11.9091	***-28.1905	***0.5631	***-0.0099	2.1436	***-8.1094	***-2.2619	***-4.0568	***114.0805	***314.5754	***8.8102	-0.0346
Inter & Trend	***-14.4058	***-28.3612	***0.5622	***-0.0025	1.1653	***-7.2842	***-2.3038	***-4.1130	***71.5122	***252.7061	***19.1324	-1.3504
GDP constant												
Intercept	***-5.3271	***-80.0937	***0.8004	***-0.1780	10.1610	***-7.7020	-0.9749	***-4.9153	***77.1754	***476.5475	***62.7008	-4.0047
Inter & Trend	***-14.1930	***-73.8644	***0.3932	***-0.1655	4.8307	***-4.0189	-1.8603	***-5.0635	***67.7193	***404.7377	***13.0817	-4.3396

Source: based on author's own calculations, *** $p<0.01$, ** $p<0.05$, * $p<0.1$