

Firms Digitalization in the MENA Region: A Comparative Study between Egypt and Jordan

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What we do?

- Digitalization refers to the transition from an industrial age characterized by traditional technologies to a new era in which commerce, innovation, and other dimensions are driven by digital technologies.
- The objective of this paper is twofold:
 - First, to examine the characteristics of the firms who adopt digital technologies by focusing on two emerging markets, which are Egypt and Jordan.
 - Second, this paper examines the determinants and implications of digitalization in the two countries

How Can Digitalization Affect Firms?

- The Schumpeterian growth theory is important to analyze how digital technologies can affect firms. Indeed, innovations result from entrepreneurial investments that are motivated by the prospects of monopoly rents (Aghion, 2002).
 - This will lead to the notion of creative destruction, which shows the process by which new innovations replace older technologies. In this context, only the most productive firms will bear the disruptions caused by technological innovations.
- “General Purpose Technology (GPT) hypothesis” (Richard et al., 2005) refers to technologies that would act as an enabler for further innovations, by which they exhibit an influence on growth and productivity beyond the effect of regular capital goods.
 - This means that several innovation types pertaining to digitalization can generate positive externalities for firms and make them more productive.
 - However, this depends on the type of the firms as the literature distinguishes between firms that are intensive in, dependent on and enhanced by digitalization.
- The skill-biased technical change: is a shift in the production technology that favors skilled over unskilled labor since it will shift demand away from low-skilled activities and raise the relative demand and wages of the better skilled. This makes technology–skill rather complementary (Acemoglu, 2002 and Hornstein et al. 2005).
 - Consequently, the quality of jobs offered by innovating (or digitalized) firms is likely to be higher, which makes them less likely to hire unpaid workers for instance.
 - In addition, the literature shows that the use of digital platforms provides women with a greater access to markets, knowledge and more flexible working arrangements. This makes digitalized firms more likely to hire women.

Outline

- Overview of Digital Measures and Policies
- Data
- Which Firms Are More Digitized?
- Implications of Digitalization
- Potential Explanations
- Conclusion

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Overview of Digital Measures and Policies: Egypt

- ***Visions and Plans:***
 - “Digital Egypt”
 - “2030 Strategy
 - National payment systems
- ***Tools and Portals:***
 - Nafeza
 - Fawry
 - Meeza
 - Network operators (Orange, WE, Vodafone and Etisalat) are now using e-wallets.
- ***Legal framework:***
 - Cybercrime law (law No. 175 of 2018 called Anti-Cyber and Information Technology Crimes Law and its executive regulation)
 - E-commerce law
 - E-signature law
 - Intellectual property law
 - The Personal Data Protection Law

Overview of Digital Measures and Policies: Jordan

- ***Visions and Plans:***
 - REACH 2025
 - e-Government (SMART) program
- ***Tools and Portals:***
 - National Broadband Network Program
 - Single Window Solution
- ***Legal framework:***
 - Cybercrime law
 - E-commerce law
 - E-signature law
 - Intellectual property laws
 - Personal data protection.

Even though both Egypt and Jordan have promulgated several laws from a *de jure* perspective, there are still several progressive reforms needed when it comes to the enforcement, the impartiality, the effectiveness and the transparency (*de facto*) of such laws are still questionable. In addition, such law have to be inclusive of different online platforms and sectors (Saqqaf et al., 2023)

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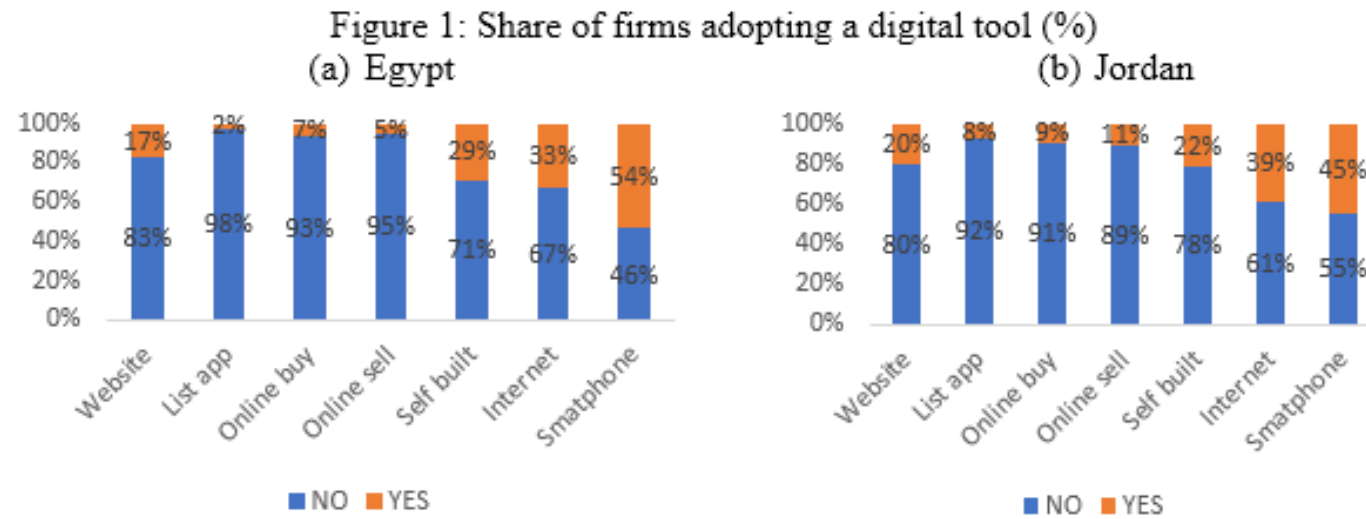
Data

- This paper relies on a newly collected dataset by the Economic Research Forum (Cairo, Egypt) in the framework of the Open the Open Access Micro Data Initiative (OAMDI) for the Arab countries, Iran and Turkey. OAMDI offers researchers several types of micro data that ERF has collected, harmonized and made publicly available for researchers.
- The questionnaire includes several modules as follows:
 - Basic information on the firm (sector of operation size, owner's gender and education, and types of owners).
 - Second, it includes another module on digitalization (whether the firm has a website or not, uses smartphones or not, online selling and buying, the Internet, is listed on an application and self-built sales website that enables online payment).
 - Third, it describes the characteristics labor used (women, digital skills, etc.).
 - Finally, a module analyzes the main challenges faced by firms when it comes to digitalization such as electricity outage, days without Internet connection, and cost of digitalization).
- This survey has been done for three countries (Egypt, Jordan, and Morocco) over two waves for around 1000 observation per country.

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Firms' digitalization



Source: Author's own elaboration using the Firm Digitalization dataset (2022).
Notes: Weights are used.

Owners' Characteristics

- For both Egypt and Jordan, those who have an education level above university are more likely to use a website, to list the firm on an application, to use online buying and selling, to use safe-built website, the Internet, and smartphones.
- Three important remarks are worthy to note:
 - First, in all these dimensions, owners who have studied at universities or above are performing better in Jordan than Egypt except in self-built sites and the use of smartphones.
 - Second, in both of the two countries, the average share of those who adopt any digital measure does not exceed 20% in the two countries (without taking into account the use of Internet and smartpho
 - nes that are widely use given their accessibility). Third, the lowest share in the two countries are those of using applications, online buy and sell, and the use of self-built sites.

Table1: Digitalization and Owner's Education

	Egypt		Jordan		
	Below Website	Above	Below Website	Above	
NO	83%	77%	NO	88%	72%
YES	17%	23%	YES	12%	28%
	List App.		List App.		
NO	98%	100%	NO	95%	89%
YES	2%	0%	YES	5%	11%
	Online Buy		Online Buy		
NO	93%	92%	NO	95%	86%
YES	7%	8%	YES	5%	14%
	Online Sell		Online Sell		
NO	95%	92%	NO	93%	85%
YES	5%	8%	YES	7%	15%
	Self-built		Self-built		
NO	81%	60%	NO	86%	75%
YES	19%	40%	YES	14%	25%
	Internet		Internet		
NO	75%	51%	NO	76%	43%
YES	25%	49%	YES	24%	57%
	Smartphone		Smartphone		
NO	50%	44%	NO	58%	53%
YES	50%	56%	YES	42%	47%

Source: Author's own elaboration using the Firm Digitalization dataset (2022)

Notes: Weights are used.

Owners' Characteristics

- When gender is taken into consideration, Table 2 shows that women are slightly more likely to adopt digital measures than men in some of the dimensions for both Egypt and Jordan.
 - For instance, while 70% of firms owned by women use the Internet in Egypt, only 31% of those owned by men do. This holds for more accessible digital tools such as online buy and sell where women are slightly better performing than men are.
 - Yet, in more advanced tools such as listing the firm on an application or using a self-built website for payments, firms owned by men are more likely to become more digitalized. This confirms the digital divide that is observed in most of developing countries where women often have less access to technology compared and men, which affects earning (additional) income, increase employment opportunities, and access knowledge and education (OECD, 2018).

Table 2: Digitalization and Owner's Gender

	Egypt		Jordan	
	Male	Female	Male	Female
Website				
NO	83%	77%	80%	78%
YES	17%	23%	20%	23%
List App.				
NO	98%	100%	92%	93%
YES	2%	0%	8%	7%
Online Buy				
NO	93%	92%	91%	89%
YES	7%	8%	9%	11%
Online Sell				
NO	95%	92%	89%	88%
YES	5%	8%	11%	12%
Self-built				
NO	70%	86%	78%	84%
YES	30%	14%	22%	16%
Internet				
NO	69%	30%	61%	59%
YES	31%	70%	39%	41%
Smartphone				
NO	46%	46%	54%	60%
YES	54%	54%	46%	40%

Source: Author's own elaboration using the Firm Digitalization dataset (2022)

Notes: Weights are used.

Firms' Characteristics: Firm Size

Table 3: Digitalization and Firm Size

	Egypt				Jordan				
	Micro	Small	Medium	Large	Micro	Small	Medium	Large	
Website					Website				
NO	93%	68%	19%	16%	NO	88%	61%	36%	26%
YES	7%	32%	81%	84%	YES	12%	39%	64%	74%
List App.					List App.				
NO	99%	97%	98%	65%	NO	95%	85%	74%	49%
YES	1%	3%	2%	35%	YES	5%	15%	26%	51%
Online Buy					Online Buy				
NO	95%	89%	81%	99%	NO	94%	83%	79%	41%
YES	5%	11%	19%	1%	YES	6%	17%	21%	59%
Online Sell					Online Sell				
NO	96%	90%	99%	96%	NO	93%	80%	65%	62%
YES	4%	10%	1%	4%	YES	7%	20%	35%	38%
Self-built					Self-built				
NO	98%	47%	40%	68%	NO	89%	71%	63%	37%
YES	3%	53%	60%	32%	YES	11%	29%	37%	63%
Internet					Internet				
NO	75%	43%	37%	0%	NO	72%	19%	32%	0%
YES	25%	57%	63%	100%	YES	28%	81%	68%	100%
Smartphone					Smartphone				
NO	52%	40%	38%	67%	NO	57%	52%	45%	54%
YES	48%	60%	62%	33%	YES	43%	48%	55%	46%

Source: Author's own elaboration using the Firm Digitalization dataset (2022)

Notes: Weights are used.

Firms' Characteristics: Innovation

- The more a firm spends on research and development, the more it is likely to adopt and use digital tools.
- Table 3 confirms this finding as 33% of firms that spend on R&D have a website, while this share for those do not is 14% in Egypt. In Jordan, similar figures are observed as (34% and 13%, respectively).
- A similar conclusion is observed but in a more pronounced way for self-built websites, online selling and buying. Moreover, in most of the dimensions (with the exception of self-built websites), Jordan is better performing than Egypt.

Table 3: Digitalization and Innovation

	Egypt		Jordan	
	No RD	RD	No RD	RD
	Website		Website	
NO	86%	67%	NO	87%
YES	14%	33%	YES	13%
	List App.		List App.	
NO	98%	97%	NO	95%
YES	2%	3%	YES	5%
	Online Buy		Online Buy	
NO	96%	83%	NO	95%
YES	4%	18%	YES	5%
	Online Sell		Online Sell	
NO	95%	91%	NO	94%
YES	5%	9%	YES	6%
	Self-built		Self-built	
NO	96%	17%	NO	84%
YES	4%	83%	YES	16%
	Internet		Internet	
NO	70%	49%	NO	66%
YES	30%	51%	YES	34%
	Smartphone		Smartphone	
NO	51%	32%	NO	63%
YES	49%	68%	YES	37%

Source: Author's own elaboration using the Firm Digitalization dataset (202@)

Notes: Weights are used.

External Characteristics: Economic Activity

Table 4: Digitalization and Economic Activity

	Egypt			Jordan		
	Prim.	Manuf.	Services	Prim.	Manuf.	Services
	Website			Website		
NO	78%	87%	82%	NO	85%	80%
YES	22%	13%	18%	YES	15%	20%
	List App.			List App.		
NO	100%	97%	98%	NO	89%	92%
YES	0%	3%	2%	YES	11%	8%
	Online Buy			Online Buy		
NO	100%	99%	91%	NO	97%	92%
YES	0%	1%	9%	YES	3%	10%
	Online Sell			Online Sell		
NO	99%	96%	94%	NO	94%	86%
YES	1%	4%	6%	YES	6%	14%
	Self-built			Self-built		
NO	77%	98%	66%	NO	86%	77%
YES	23%	2%	34%	YES	14%	23%
	Internet			Internet		
NO	72%	77%	63%	NO	96%	65%
YES	28%	23%	37%	YES	4%	35%
	Smartphone			Smartphone		
NO	37%	62%	43%	NO	34%	49%
YES	63%	38%	57%	YES	66%	51%

Source: Author's own elaboration using the Firm Digitalization dataset (202@)

Notes: Weights are used.

Determinants of Digitalization

- To examine the determinants of the adoption of different digital variables, a probit model has been used where the dependent variable measures the different digital variables, namely whether the firm has a website or not, uses smartphones or not, online selling and buying, the Internet, is listed on an application and self-built sales website that enables online payment. The independent variables include the size of the firm by taking the natural logarithm of employment, whether the owner has a university degree or above, whether the owner is a female or not, whether the firm is exporting or not, the age of the firm and whether the firm is spending on R&D or not.
- The main findings show that:
 - In Egypt, the larger the firm, the higher the likelihood of adopting and using different digital tools. This result holds for all the dimensions except smartphones and the overall index. In Jordan, all the dimensions are positively affected by the size of the firm.
 - In terms of human capital, the education of the owner matters for firms in Jordan more than Egypt.
 - Gender matters to a certain extent in Egypt for whether the firm is listed on an application or not pointing out the digital divide that can be observed for this variable. Yet, this variable is insignificant in the Jordanian case.
 - Exporting status is positively associated to the overall index of digitalization, the use of self-built websites, and the use of the Internet in Egypt but insignificant for Jordan.
 - Being located in Amman matters for Jordanian firms pointing out the importance of investing in digital infrastructure in other regions. In Egypt, it is obvious that firms that are located in Upper Egypt face more difficulties when it comes to the adoption and use of digital tools given the lack of investments.
 - Among the most significant variables, research and development exerts a statistically significant effect in both Jordan and Egypt for the measures of digitalization.

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How Can Digitalization Affect Firms?

- To examine the implications of digitalization, I regress performance variables (measured by the value sales and exporting status) and labor characteristics (share of female workers, unpaid workers, part-time workers and workers with permanent contract) on different variables that measure digitalization (whether the firm has a website or not, uses smartphones or not, online selling and buying, the Internet, is listed on an application and self-built sales website that enables online payment).
- A vector of control variables is included (size, age, location, share of foreign and government ownership, and sectors fixed effects).
- A Propensity Score Matching is also run.

How Can Digitalization Affect Firms?

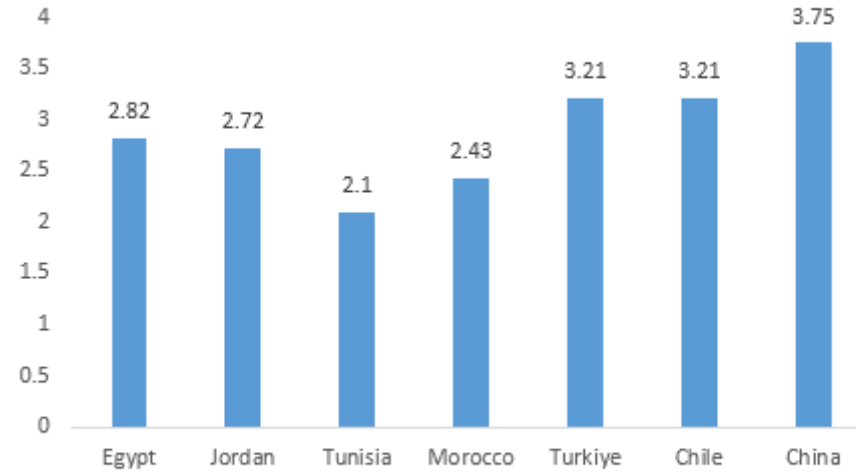
- Our main empirical findings show that:
 - Performance variables:
 - For sales, the use of the Internet is significant in both Egypt and Jordan. In Egypt, listing the firm on an application is positively associated to sales. In terms of exports, self-built websites for payments are significant in Egypt, with the use of the Internet significant in the two countries.
 - Having a website or selling online boost exports in Jordan. The limited effect on sales and exports can be due to the different challenges firms are facing at the legal, infrastructural, and institutional levels when it comes to digitalization.
 - Labor characteristics:
 - In Egypt, several digital tools (website, online buying, online selling, internet, and self-built website) are associated to a higher share of female workers (Ughetto et al., 2020)
 - As per the skills required, adopting such digital measures should increase the demand for skilled workers that are should be formal, paid with indefinite contracts. This is verified in the results as the share of unpaid workers and part-time workers decreases with firms that adopt any digital measure. The share of indefinite workers is also higher for these firms (Grande et al., 2020)

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Infrastructure

Figure 1: Logistics Performance Index - 2018



Source: World Development Indicators.

Notes: Quality of trade and transport-related infrastructure (1=low to 5=high)

Figure 2: Time to get and obtain electricity connection - 2018

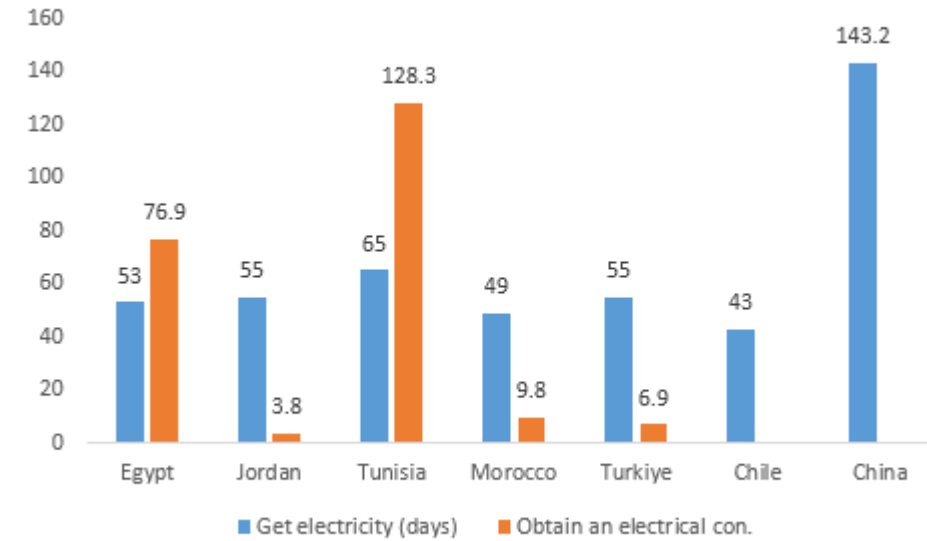
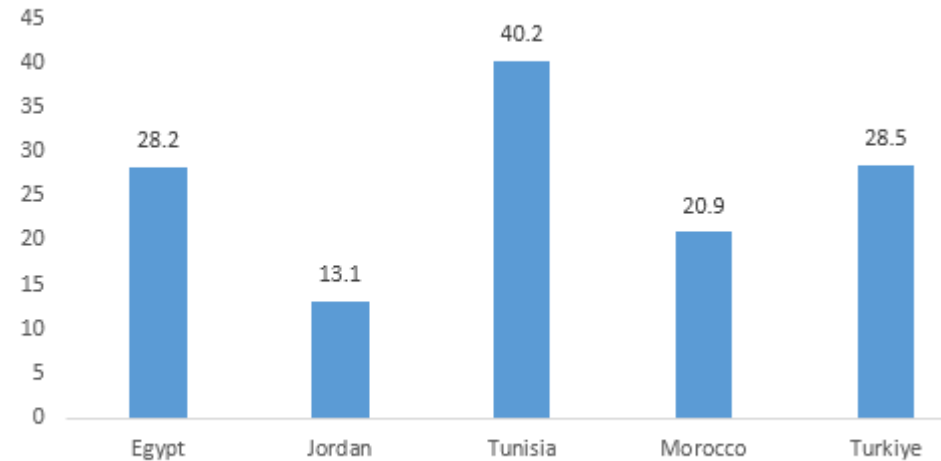


Figure 3: Firms experiencing electrical outages (% of firms)



Source: World Development Indicators.

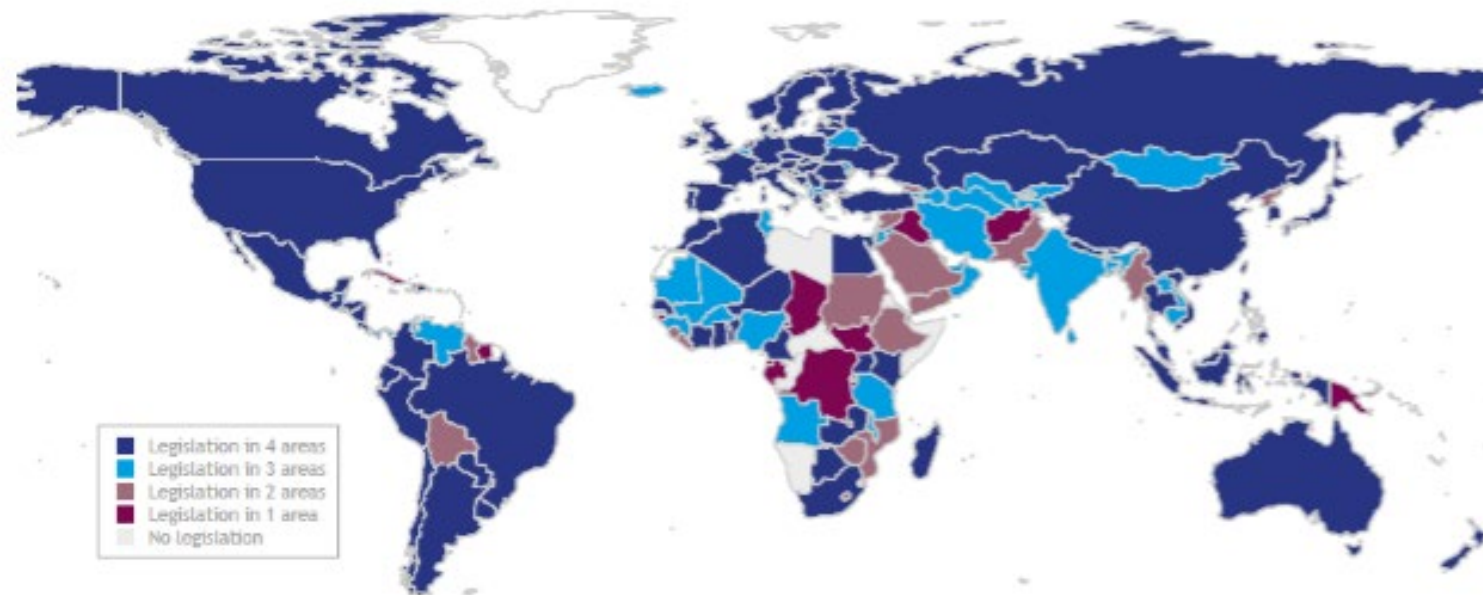
Firms' obstacles

- Table 1 compares three obstacles: power outage measured the number of power outage in (last month) 2022, the number of days with no internet access (interruption) in last month and the number of days with no online services (interruption) in last month.
- Problems are less frequent in Jordan than in Egypt as the number of outage, the number of days without internet and without online services are lower.
- In addition, when different tools are compared, it is important to note that more advanced tools are generally associated to more barriers (whether power outages or the number of days without internet or online services). This applies to firms that have a website, listed application, and self-built website (Zaki, 2023a).

Egypt						
	Power outage		No. days w/o internet		No. days w/o online ser.	
	NO	YES	NO	YES	NO	YES
Website	2.14	3.81	0.54	1.12	7.91	6.52
List app.	2.24	9.87	0.93	0.32	7.85	1.21
Online buy	5.02	2.50	0.83	0.88	3.07	8.34
Online sell	2.20	3.62	1.60	0.41	10.87	4.80
Self-built	3.82	3.13	0.42	0.39	5.58	2.89
Internet		2.21		1.39		6.40
Smartphone	1.88	3.31	3.34	0.39	7.15	7.12
Jordan						
	Power outage		No. days w/o internet		No. days w/o online ser.	
	NO	YES	NO	YES	NO	YES
Website	0.48	0.64	0.70	0.71	0.24	0.38
List app.	0.57	0.53	0.63	0.95	0.34	0.21
Online buy	0.65	0.50	0.77	0.66	0.40	0.25
Online sell	0.61	0.54	0.62	0.74	0.28	0.33
Self-built	0.43	0.92	0.59	1.28	0.23	0.66
Internet	0.44	0.50	0.07	0.66	0.92	0.28
Smartphone	0.64	0.52	0.80	0.65	0.27	0.34

Institutions and Legal Framework

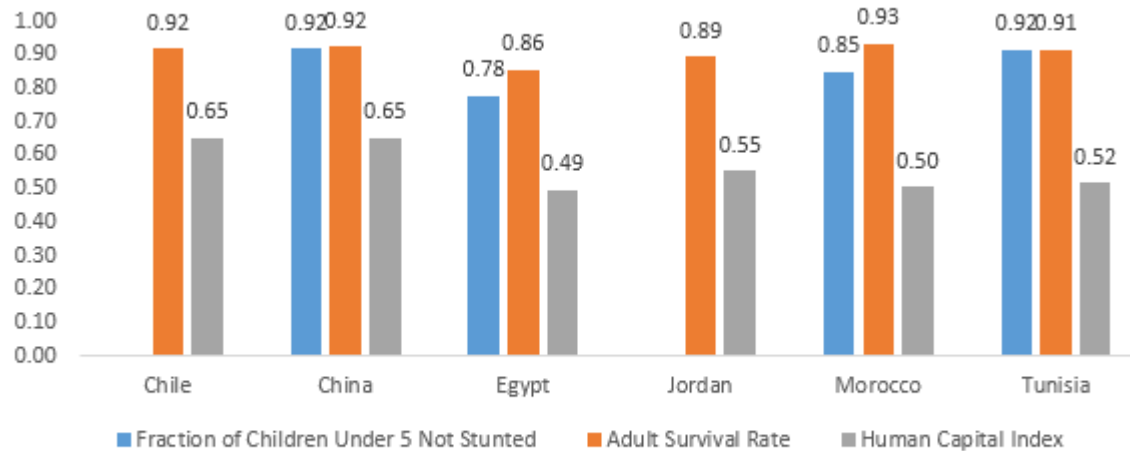
Figure 4: Summary of E-commerce Legislation



Source: UNCTAD Online Dataset

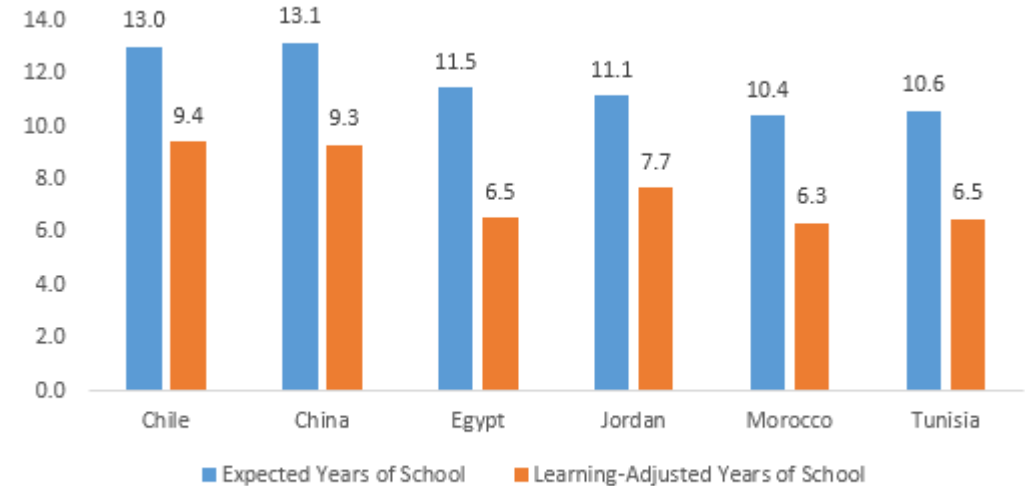
Education and Human Capital

Figure 6a: Education and Human Capital



Source: Human Capital Index online dataset.

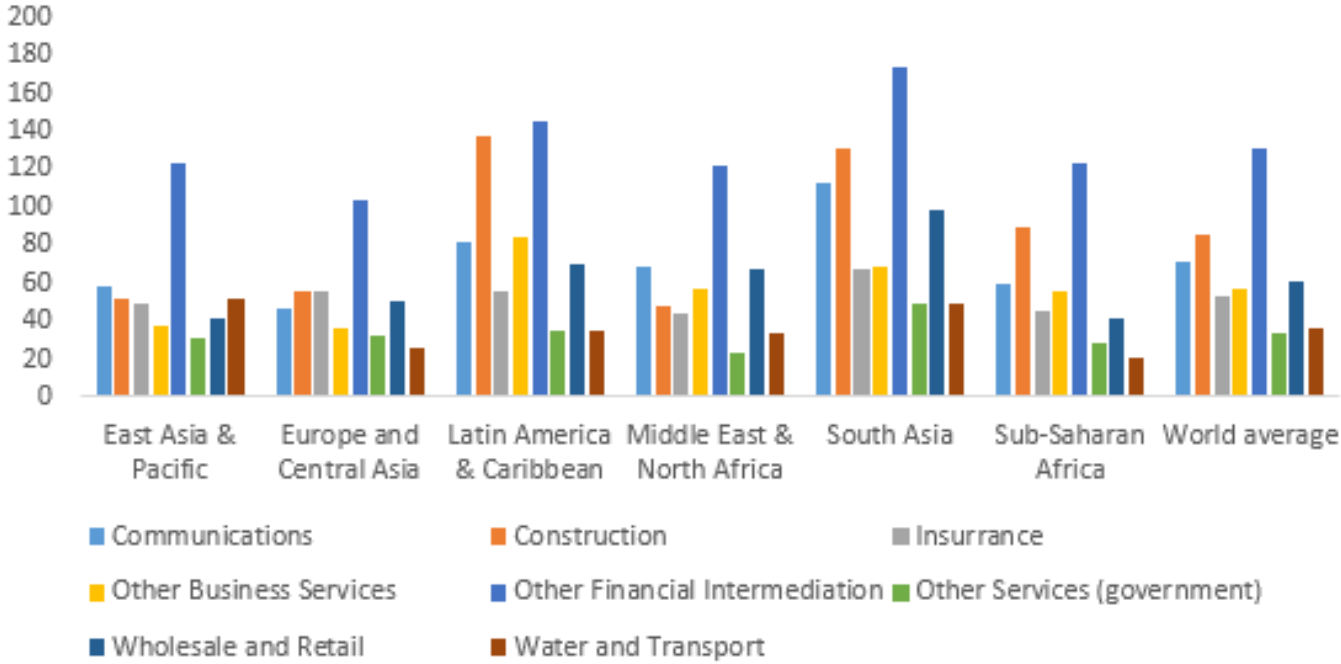
Figure 6b: Education and Human Capital



Source: Human Capital Index online dataset.

Trade Policy

Figure 7: Ad-valorem Equivalent of Service Trade Restrictiveness Index by sector



Source: CEPII dataset.

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Conclusion and Policy Implications

- More efforts are needed in order to make small and medium firms better digitized (UNCTAD, 2019) given that larger firms are more likely to adopt more sophisticated digital tools.
 - A larger (and more available) access to finance can help SMEs to bear the fixed cost required to adopt new digital tools.
 - If such reforms are taken into account, digital technologies can have the potential to help “democratize entrepreneurship” as they help small and medium firms to have a wider access to international markets and knowledge diffusion. A key issue in this regard would be the use social media and big data that should play a core role in the business models of SMEs.
- Second, more policies are needed to improve the quality of labor and human capital, as digitalization requires skilled labor, especially blue collar workers who primarily work in the manufacturing sector.
 - While the service sector is performing relatively well, government policies need to focus on the digitalization of the manufacturing sector.
 - This is of particular importance given the servicification of the manufacturing sector where the latter increasingly depends on services (Karam and Zaki, 2020).
 - This should help MENA countries implement SDGs: Goal 9 on industry and innovation, Goal 8 on decent employment as it is associated to lower the share of unpaid workers in more digitalized firms, and Goal 5 on gender equality as it increases the share of female workers.

Conclusion and Policy Implications

- Inclusion of remote areas should be a priority in order to increase the use of digitalization measures.
 - Our results show that digitalization remains a characteristic of the core (main cities), whereas the periphery is left behind. Thus, during the last decades, digitalization exacerbated rural-urban disparities, while it should have reduced them.
 - To overcome such a divide, investments in the digital infrastructure are needed in remote areas to make the benefits of digitalization more equitable, available, and inclusive.
- Improving the quality of institutions is key in order to improve the digitalization of firms in the MENA region given that most of the digital measures are highly sensitive to the quality of institutions (including the enforcement of related laws).
 - This also includes service restrictions that hinder the competitiveness of the ICT sector.
 - Further efforts towards service liberalization are necessary to increase the competitiveness of local service sectors, and therefore help attract foreign firms in the MENA region and increase technological spillovers.

Thank you for your attention