E-COMMERCE SECURITY IN THE LAND OF THE PHARAOHS: REFINING EGYPT’S ELECTRONIC SIGNATURE LAW

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I. INTRODUCTION

Egypt’s Electronic Signature Law (ESL), enacted in 2004, created the Information Technology Industry Development Authority (ITIDA) to implement, license, and oversee the certification authorities (CA). Under the law, a secure electronic signature attached to an electronic document may comply with statutory signature, writing, and evidentiary admissibility requirements. Licensed CAs issue certificates to verify that the holder of a private key is the party named in the certificate. The ESL is a commendable first step in creating a legal framework for e-commerce law, but this framework can be improved with certain additions.

This Article introduces the reader to Egypt, its economy, and the role of e-commerce in its economic development. Second, this Article discusses the basic aspects of electronic signatures and public key infrastructure technology, as well as the role of certification authorities. This Article also describes and evaluates the electronic signature law of Egypt. Finally, it makes recommendations to improve Egypt’s electronic signature law.

II. EGYPT, ITS ECONOMY, AND ITS E-COMMERCE

Egypt became a unified kingdom around 3200 B.C. giving rise to one of the greatest civilizations in world history during the next three millennia. In 341 B.C., the Persians conquered the last native dynasty. Later, Egypt was successively controlled by the Greeks, Romans, Byzantines, Arabs, Mamluks, the Ottoman Turks, and finally the British. Egypt gained partial

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independence from Britain in 1922. Full independence followed in 1952.²

A period of confrontation with Israel ensued over the next three decades. President Anwar Sadat launched a war with Israel in 1973. That war was unsuccessful, and Israel gained control of the Sinai Peninsula. Later, in an about-face, Sadat visited Israel, leading to the successful Camp David peace talks and a peace treaty with Israel in 1979, which restored the Sinai Peninsula to Egypt. Islamic extremists assassinated Sadat in 1981. His replacement, Hosni Mubarak, was President of Egypt until he was forced out of office due to a popular revolt in early 2011.³

During the administration of President Nasser from 1956 to 1970, Egypt’s economy utilized centralized planning. However, since 1970 the economy has become much more open and marked by free market characteristics. Nevertheless, Egypt has been plagued with high unemployment and insufficient economic growth during much of the past four decades. From 2001 to 2003, foreign direct investment was stagnant and the annual growth rate of the gross domestic product (GDP) was only two to three percent. The Egyptian currency was allowed to float in 2003, which led to a sharp decline in its value and an increase in inflation.

In an attempt to stimulate the economy, the government enacted sweeping economic reforms in 2005, reducing personal and corporate tax rates, customs fees, energy subsidies, and privatizing some publicly-owned businesses. Although the government’s budget deficit increased, the economic reforms had dramatic positive effects, including a stock market boom, GDP growth of six percent per year since 2006, and increased foreign direct investment. One of Egypt’s potential sources of future economic growth is the development of its natural gas reserves.⁴

Additionally, in terms of economic investment, “Egypt has long been the cultural and information center of the Arab world.”⁵ Since 1985, the government has invested in its infrastructure of both communication and information technology.⁶ Although, out of a population of eighty-three


⁵ Background Note: Egypt, supra note 3, at 11.

million, only 8.62 million (slightly more than ten percent) of Egyptians are Internet users, the number of households with access to broadband continues to increase. By 2008, one million Egyptians had access to broadband Internet. Additionally, over twenty-eight percent use Internet cafes as their primary Internet access point. Egyptians have fifty Internet service providers and 175,000 Internet hosts. Despite this growth, business-to-consumer e-commerce in Egypt has been hindered by several factors, including a preference to use cash instead of credit cards; security concerns; lack of instant gratification from e-purchases; limited access to the Internet for many households; the desire for direct conversation with sellers and the opportunity to haggle over the purchase price; poorly designed, bug-infested websites; and inconsistent return policies by web sellers.

Although business-to-consumer e-commerce has lagged, business-to-business e-commerce has grown steadily in Egypt. One aspect of this growing e-commerce in Egypt is the cost-plus based market for electronic signatures (e-signatures). The market for e-signatures is competitive and the market size is small, resulting in a high potential growth rate for e-signatures. Consequentially, large private firms have often outsourced e-signature and public key infrastructure (PKI) services for financial and other operations. Additionally, Egyptian public utilities and other government departments have adopted PKI services and e-signatures. As a result, the demand for PKI and e-signature systems in Egypt is expected to grow markedly.

III. ELECTRONIC SIGNATURES

Contract law worldwide has traditionally required contracting parties to use handwritten signatures to authenticate their agreements. In the digital age, however, electronic signatures (e-signatures) have become a viable alternative to handwritten signatures. An e-signature is a digital representation of a handwritten signature that is used to authenticate electronic documents. E-signatures are widely used in business-to-business transactions, as they provide a secure and efficient way to sign and authenticate documents. In Egypt, the market for e-signatures is competitive and the market size is small, resulting in a high potential growth rate for e-signatures. As a result, large private firms have often outsourced e-signature and public key infrastructure (PKI) services for financial and other operations.
to affix their signatures to a document. With the onset of the electronic age, the e-signature made its appearance. The e-signature has been defined as "any letters, characters, or symbols manifested by electronic or similar means and executed or adopted by a party with the intent to authenticate a writing." Alternatively, e-signatures have been described as "data in electronic form which are attached to or logically associated with other electronic data and which serve as a method of authentication." An e-signature may take a number of forms, like a digital signature, a digitized fingerprint, a retinal scan, a pin number, a digitized image of a handwritten signature that is attached to an electronic message, or merely a name typed at the end of an e-mail message.

A. Online Contracts: Four Levels of Security

When entering into a contract online, four degrees of security are possible. The first level of security merely requires a party to click an "I Agree" button on a computer screen in order to accept the offer. The second level of security is invoked through the use of a password or credit card number to verify a party's intention to purchase goods or services. The third level requires the use of biometrics. Biometric methods involve a unique physical attribute of the contracting party. These are inherently extremely difficult to replicate by a would-be cyber thief. Examples include a voice pattern, facial recognition, a scan of the retina or the iris, a digital reproduction of a fingerprint, or a digitized image of a handwritten signature that is attached to an electronic message. In all of these, a sample is taken from the person in advance and is stored for later comparison with a person purporting to have the same identity. For example, if a person's

19. Id.
20. With the highly successful Hong Kong identity card, two thumb prints are used as a biometric identifier. See Rina C.Y. Chung, Hong Kong's "Smart" Identity Card: Data Privacy Issues and Implications for a Post-September 11th America, 4 Asian-Pac. L. & Pol'y J. 442, 446, 459 (2003).
handwriting is the biometric identifier, the “shape, speed, stroke order, off-tablet motion, pen pressure and timing information” during signing is recorded. This information is almost impossible for an imposter to duplicate.\textsuperscript{22}

The fourth level of security utilizes digital signatures. The digital signature is considered the ultimate level of security because it is more complex and provides more security than biometrics. Many laypersons erroneously assume that the digital signature is merely a digitized version of a handwritten signature. This is not the case; the digital signature refers to the entire document.\textsuperscript{23} It is “the sequence of bits that is created by running an electronic message through a one-way hash function and then encrypting the resulting message digest with the sender’s private key.”\textsuperscript{24} A digital signature has two major advantages over other forms of electronic signatures. First, it verifies authenticity that the communication came from a designated sender. Second, it verifies the integrity of the content of the message, giving the recipient assurance that the message was not altered.\textsuperscript{25}

Digital signatures have at least two advantages over biometrics as a form of electronic signature. First, for biometrics, the attachment of a person’s biological traits to a document does not ensure that the document has not been altered. That is, it “does not freeze the contents of the document.”\textsuperscript{26} Second, the recipient of the document must have a database of biological traits of all signatories dealt with in order to verify that a particular person sent the document.\textsuperscript{27} The digital signature does not have these two weaknesses. Most seem to view the digital signature as preferable to biometric identifiers.\textsuperscript{28} Many also recommend the use of both

\begin{itemize}
\item \textsuperscript{22} Id.
\item \textsuperscript{23} The Hong Kong e-commerce law is typical in that it defines a digital signature as: [A]n electronic signature of the signer generated by the transformation of the electronic record using an asymmetric cryptosystem and a hash function such that a person having the initial untransformed electronic record and the signer’s public key can determine: (a) whether the transformation was generated using the private key that corresponds to the signer’s public key; and (b) whether the initial electronic record has been altered since the transformation was generated.
\item \textsuperscript{24} Smedinghoff, supra note 15, at 146.
\item \textsuperscript{27} Id. at 257.
\item \textsuperscript{28} Id. However, one expert in computer law and technology, Benjamin Wright, is a notable exception. Wright contends that biometrics is a preferable authentication method in the case of the general public. He concedes that digital signatures using PKI are preferable
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methods. The Hong Kong government took the course of using both methods in designing its identity card.29

B. Digital Signature Technology: Public Key Infrastructure

The technology used with digital signatures is public key infrastructure (PKI).30 PKI consists of four steps:

1. The first step in utilizing PKI is to create a public-private key pair. The private key will be kept in confidence by the sender, but the public key will be available online.

2. The second step is for the sender to digitally sign the message by creating a unique digest of the message and encrypting it. A hash value is created by applying a hash function—a standard mathematical function—to the contents of the electronic document. The hash value, ordinarily consisting of a sequence of 160 bits, is a digest of the document’s contents. Once processed, the hash function is encrypted, or scrambled, by the signatory using his private key. The encrypted hash function is the digital signature for the document.31

3. Once encrypted, the sender attaches the digital signature to the message and sends both to the recipient.

4. Finally, the recipient decrypts the digital signature by using the sender’s public key. If decryption is possible, the recipient knows the message is authentic, that it came from the purported sender. Finally, the recipient will create “a second message digest of the communication and compare it to the decrypted message digest. If they match, the recipient knows the message has not been altered.”32

IV. THREE GENERATIONS OF ELECTRONIC SIGNATURE LAW

A. The First Wave: Technological Exclusivity

In 1995, Utah became the first jurisdiction in the world to enact an for complex financial deals carried out by sophisticated persons. In PKI, control of the person’s “private key” becomes all-important. The person must protect the private key; all of the eggs are placed in that basket, and the person carries a great deal of responsibility and risk. With biometric methods, the member of the general public shares the risk with other parties involved in the transaction, and the need to protect the private key is not so compelling. See Benjamin Wright, Eggs in Baskets: Distributing the Risks of Electronic Signatures, 32 UWLA L. Rev. 215, 225–26 (2001).

29. Chung, supra note 20, at 482.


31. Pun et. al., supra note 26, at 249.

electronic signature law. The Utah statute recognized digital signatures but not other types of electronic signatures. The authors of the Utah statute believed, with some justification, that digital signatures provide the greatest degree of security for e-transactions. Utah was not alone in this belief; other jurisdictions grant exclusive recognition to the digital signature, including Argentina, Bangladesh, India, Malaysia, Nepal, New Zealand, and Russia.

Unfortunately, these jurisdictions’ decisions to allow only one form of technology are burdensome and overly restrictive. Forcing users to employ digital signatures provides greater security, but this benefit may be outweighed by the digital signature’s possible disadvantages. Digital signatures are more expensive than other types of e-signatures because of the fee paid to the certification authority. Digital signatures are less convenient because the use of a certification authority is required. Additionally, users are forced to use one type of technology to the exclusion of others when another type of technology might be better suited to a particular type of transaction. They are also forced to use a more complicated technology that may be less adaptable to technologies used in

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34. Id.
other nations or by other people within the same nation. Further, with the use of this technology, there is an inappropriate risk allocation between users if fraud occurs. Ultimately, the decision to allow only one technology creates a potential disincentive to invest in the development of alternative technologies.42

B. The Second Wave: Technological Neutrality

Jurisdictions in the second wave overcompensated when they reversed the first wave. They did not include any technological restrictions in their statutes. They did not insist upon the utilization of digital signatures or any other form of technology to the exclusion of other types of e-signatures. These jurisdictions have been called "permissive" because they take an open-minded, liberal perspective on e-signatures and do not contend that any one of them is necessarily better than the others. In other words, they are technologically neutral. The United States43 is a member of the second wave. The overriding majority of U.S. jurisdictions (forty-five states, the District of Columbia, Puerto Rico, and Virgin Islands) have enacted the Uniform Electronic Transactions Act, either in its entirety or with minor amendments; that statute is a permissive second-generation model law.44 Australia has also enacted a second-generation statute.45

The permissive perspective, however, does not take into account that some types of electronic signatures are better than others. A PIN number and a person's name typed at the end of an e-mail message are both forms of electronic signatures, but neither is able to provide the degree of security provided by the digital signature.


C. The Third Wave: A Hybrid

Singapore was in the vanguard of the third wave. In 1998, Singapore adopted a middle-of-the-road position on the various types of electronic signatures. Singapore's lawmakers were influenced by the UNCITRAL Model Law on Electronic Commerce. In terms of technological neutrality, Singapore adopted a hybrid model—a preference for the digital signature in terms of greater legal presumption of reliability and security, but not to the exclusion of other forms of electronic signatures. Singapore did not want to become hamstrung by tying itself to one form of technology. Singaporean legislators realized that technology is continually evolving and that it would be unwise to require one form of technology to the exclusion of others. The digital signature is given more respect under the Singapore statute, but it is not granted a monopoly, as it was in Utah. Singapore allows employment of other types of electronic signatures. This technological open mindedness is commensurate with a global perspective and allows parties to more easily consummate electronic transactions with parties from other nations.

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46. See infra note 53 and accompanying text.
48. Fischer, supra note 30.
49. Id.
51. Id.
52. Id.
53. Electronic Transactions Act (Act No. 16/2010) (Sing.), available at http://statutes.agc.gov.sg/non_version/cgi-bin/cgi_legdisp.pl?actno=2010-ACT-16-N&doctitle=ELECTRONIC%20TRANSACTIONS%20ACT%202010%0a&date=latest&method=part&sl=1 [hereinafter ETA]. Although the original Singapore statute of 1998 granted legal recognition to most types of electronic signatures, it made a strong suggestion to users—in two ways—that they should use the digital signature because it is more reliable and more secure than the other types of electronic signatures: (1) Digital signatures were given more respect under rules of evidence in a court of law than other forms of electronic signatures. Electronic documents signed with them carried a legal presumption of reliability and security. These presumptions were not given to other forms of electronic signatures. (2) Although all forms of electronic signatures were allowed in Singapore, its electronic signature law established comprehensive rules for the licensing and regulation of certification authorities, whose critical role is to verify the of authenticity and integrity of electronic messages affixed to electronic signatures. See Singapore Computer Law, supra note 50. The ETA was amended in 2010 pertaining to application and consent, electronic originals, time and place of dispatch and receipt, invitation to make offers, automated message systems, and e-government. Another amendment opens up the possibility of technological neutrality, for example that the ETA may eventually become applicable to other security procedures like biometrics. Differences Between Electronic Transactions Act
Recently, more and more nations have joined the third wave. These nations recognize the security advantages afforded by the digital signature and indicate a preference for the digital signature over other forms of electronic signatures. They exhibit this preference by requiring a digital signature using a PKI system. They require these signatures for (1) authenticating an electronic record; (2) showing that an electronic record complies with any statutory requirement that a record be in paper form; and (3) indicating that an electronic signature complies with a statutory requirement that a pen-and-paper signature be affixed. Nevertheless, third wave jurisdictions do not appear to be as technologically restrictive as first wave jurisdictions.

The moderate position adopted by Singapore has become the progressive trend in international e-signature law. The hybrid approach has been taken by the European Union, Armenia, Azerbaijan, Barbados, and South Africa. However, because the attainment of technological neutrality remains to be seen, the author declines to reclassify Singapore as a member of the second wave at this point.

54. See generally Zaremba, supra note 32.
55. Id.
56. Id.
57. Id.
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of Known Interviews with Samuel Langhorne Clemens (SLC) aka Mark Twain, TWAINQUOTES.COM, available at http://www.twainquotes.com/interviews/interviewindex2006b.html. The digital signature appears to have a bright future because, presently at least, it provides the epitome of security.


Finland, Hong Kong, Hungary, Iceland, Iran, Jamaica, Japan, Jordan, Lithuania, Pakistan, Peru, Slovenia, South Korea.


Taiwan,\textsuperscript{82} Tunisia,\textsuperscript{83} Turkey,\textsuperscript{84} United Arab Emirates,\textsuperscript{85} Vanuatu,\textsuperscript{86} and in
the proposed statute of Uganda. Many other nations are either currently using the hybrid approach or are considering its adoption, including Egypt.

V. EGYPT’S ELECTRONIC SIGNATURE LAW

Egypt enacted its Electronic Signature Law (ESL) in 2004. The statute is remarkable because it is one of the few in the world that does not contain exclusions. The ESL created the Information Technology Industry Development Authority (ITIDA). ITDIA is a public corporation affiliated with the Ministry of Communications and Information.

A. Goals

ITIDA was established to work toward the following goals: (1) promote the development and transfer of information technology (IT); (2) increase the value of exports of IT products and services; (3) encourage investment in IT firms and advise small and medium sized IT firms on how to be successful; (4) promote research and development in IT and the
implementation of the knowledge gained; and (5) regulate certification authorities, the verifiers of electronic signatures.\footnote{Id. art. 3.}

B. Authority

ITIDA is empowered by the ESL to establish technical standards for e-signatures. In regulating these standards, ITIDA issues certification authority (CA) licenses to qualified applicants. ITIDA conduct audits of CAs and determines what services CAs are qualified to perform. ITIDA helps to settle disputes involving CAs by serving as a sounding board for customer complaints regarding CA services. ITIDA also provides technical advice pertinent to disputes between CAs, subscribers, and relying third parties.

In addition to regulating CAs and e-signature standards, the ITIDA provides technical advice to IT firms and training advice for their personnel. In its support role to IT firms, the ITIDA sponsors IT trade fairs, inside and outside of Egypt, and works with firms interested in the development of the IT industry. ITIDA also helps developers of original software and databases to protect their work through “depositing, recording, and registration.”\footnote{Id. art. 4.}

C. Revenue and Budget

The ITIDA derives its revenue from various sources. First, a one percent business tax of business firms\footnote{The ITIDA board of directors decides which firms are to be taxed. Id. art. 5.} revenues participating in the IT industry is deposited in an account, which is used for development of the IT industry. Second, fees are charged\footnote{The amount of the license fee and the procedure governing its application are to be determined by the ITIDA board of directors. Id. art. 5.} for issuance and renewal of CA licenses.\footnote{Id.} Additionally, the federal government makes a budgetary allocation; fees are charged to third parties for services rendered by ITIDA; gifts and donations are made; loans and grants are received; and returns on investment of ITIDA funds are received.\footnote{Id.}

ITIDA independently develops its budget based upon rules adopted for economic authorities. It has the same fiscal year as the federal government.\footnote{Id. art. 6.} ITIDA is required to maintain a bank account for deposit of its revenues at the Central Bank of Egypt; accounts at other banks are

\footnote{Id. art. 7.}
subject to the approval of the minister of finance. Any budgetary surpluses incurred are carried forward to the following fiscal year. After consultation with the minister of finance, part of a budget surplus may be deposited within the state treasury.

D. Board of Directors

The Prime Minister of Egypt is authorized to appoint ITIDA’s board of directors. The board of directors is responsible for the management of ITIDA. The minister of communications and information technology serves as chairman of the board of directors and has policy jurisdiction over the entity. Board membership consists of the following: (1) executive head; (2) advisor from the State Council; (3) representative from the Ministry of Defense; (4) representative from the Ministry of Interior; (5) representative from the Ministry of Finance; (6) representative from the Presidential Authority, and (6) seven other persons with relevant expertise.

The members of the board of directors serve for a renewable term of three years. The prime minister issues an executive order pertinent to the compensation of the board members. The board is authorized to form committees consisting of various members assigned to work on specific tasks. Some of the duties may also be assigned to the chairperson or to the ITIDA executive head.

The board of directors is charged with developing the technical rules and procedures pertinent to e-signatures and electronic commerce (e-commerce). The board of directors determines the services that ITIDA is authorized to perform for third parties and the fees that should be charged for those services. In addition to determining these fees, the board must

98. Id.
99. Id.
100. Id.
101. Id. art. 8.
102. Id.
103. Id.
104. The head of the State Council will choose the incumbent of this position. Id.
105. The minister of defense will choose the incumbent of this position. Id.
106. The minister of the interior will choose the incumbent of this position. Id.
107. The minister of finance will choose the incumbent of this position. Id.
108. The head of the Presidential Department (Diwan) will choose the incumbent of this position. Id.
109. The minister of information and communications will choose these seven persons. Id.
110. Id.
111. Id.
112. Id.
113. Id.
consider ITIDA's budgetary requests each year and approve its annual budget. A part of these budgetary considerations is drafting personnel regulations. ITIDA must adhere to these regulations as it carries out its compensation and employee evaluation functions, though ITIDA is an independent agency and not subject to the constraints imposed by the federal government. Beyond compensation, the board also drafts the essential training programs to be implemented for ITIDA employees.\textsuperscript{114} Aside from determining the services provided by ITIDA and its budget for providing those services, the board drafts standard operating procedures to serve as corporate policy of ITIDA as it carries out its "technical, financial and administrative affairs." They also develop qualifications for issuance of CA licenses as well as a code of conduct for entities and persons participating in the IT and CA industries.

The board of directors meets at least once a month and whenever its chairperson decides to convene.\textsuperscript{115} A quorum exists if a majority of its members are in attendance. Motions are passed by a majority of the board members' votes. If there is a tie in the voting, the chairperson is empowered to break the tie. The board is authorized to invite whoever it pleases in order to attain the specific expertise it needs for decision making, but the invitee will not have the right to vote.\textsuperscript{116}

E. ITIDA Management

On a daily basis, ITIDA is led by its executive head.\textsuperscript{117} The executive head represents ITIDA before the courts and in its interactions with external parties. She has general accountability to the board of directors for the management of ITIDA and for the execution of its "technical, administrative and financial activities."\textsuperscript{118} Specifically, the executive head executes the board's decisions, carries out special tasks delegated by the board, and supervises the work of ITIDA. The executive head also prepares periodic evaluations of the authority's activities, highlighting performance failures, and developing action plans for rectifying the failures. The executive head must also engage in other duties specified in the organizational regulations,\textsuperscript{119} such as filling in for the chairperson in her

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\textsuperscript{114} Id. art. 9. The minister of communications and information technology will issue an executive order to implement this article. \textit{Id.}
\textsuperscript{115} Id. art. 10.
\textsuperscript{116} Id.
\textsuperscript{117} Id. art. 11. The executive head will be appointed by the prime minister. The amount of the executive head's compensation will be publicized in an executive order of the prime minister "based on the recommendation of the Minister with policy jurisdiction." \textit{Id.}
\textsuperscript{118} Id.
\textsuperscript{119} Id.
\end{flushleft}
absence, and reviewing and acting on "reports, statistics or information" that are received from IT firms, firms with e-commerce activities, and CAs.

F. Electronic Signatures: Compliance with Signing Requirement

E-signatures have the same legal force and admissibility as traditional written signatures if they follow stringent technological requirements and are considered secure. Furthermore, if a statute mandates that an ink signature must be executed on a paper document to incur a legal right in a transaction, that requirement is deemed to be met with the attachment of a secure e-signature to an electronic document. To be admissible as evidence, e-signatures must (1) have only one signatory; (2) ensure the signatory has sole control over the e-signature’s private key; and (3) ensure any changes to the data pertinent to the e-signature or to the document to which it is attached can be detected.

G. Digital Signatures and Certification Authorities

The purpose of a certificate is to identify the holder of a private key used to create a digital signature. Certificates can only be issued by licensed CAs after verification of information pertinent to the prospective subscribers. ITIDA licenses CAs if they meet the qualifications and have paid the license fee. The number of CAs will be

120. Id. art. 12.
121. Id. art. 13. However, such reports are not required of presidential authorities, the armed forces, the minister of interior, the General Intelligence Agency, or the Administration Monitoring Authority. Id. art. 28.
122. Id. art. 14.
123. Id. Electronic signatures created under stringent technological standards comply with the admissibility rules expressed in the Evidence Law. Id. The Evidence Law requirements override the provisions of the ESL in determining the validity of e-documents and e-signatures. Id. art. 17.
124. Id. art. 18.
125. The implementation regulations of the ESL contain the types of information which must be included in the certificate. Id. art. 20.
126. CAs that were already in business at the time of enactment of the ESA were given six months in which to obtain a license and to comply with the other provisions of the ESA and its implementation regulations. Id. art. 27.
127. CAs are legally responsible for ensuring the confidentiality of all information they receive from applicants for certificates, and it must not be disclosed to third parties without the permission of the applicant. Id. art. 21.
128. Unlike most other countries, Egypt does not seem to want to allow an unlimited number of CAs. Instead, the ESL states that CAs are to be "selected under public competition." The amount of the fee will be determined by ITIDA’s board of directors and must comply with the implementation regulations of the ESL but does not have to comply with Law No. 129/1947 on public utilities. Id. art. 19.
limited because they will be "selected under public competition." The validity period of the license will be determined by the board and must not exceed ninety-nine years. ITIDA has responsibility for the establishment of the supervisory, financial, and technical oversight necessary for the licensing process.

Once licensed, CAs are not allowed to cease their activities, merge with another firm or waive their license with respect to a third party without the prior written permission of ITIDA. Foreign entities may be issued a CA license. Thereafter, they may issue certificates if they have complied with all of the requirements determined by ITIDA's board of directors.

H. Computer Crimes

The following crimes may be punished by imprisonment and the payment of a fine in the range of E£10,000 to 100,000: (1) issuance of digital certificates by a person or entity that does not have a CA license; (2) damaging an e-signature, e-document or electronic communication medium, or engaging in fraudulent activity regarding same; (3) violation of ESL articles nineteen and twenty-one; (4) procuring access to an e-signature, e-document or electronic communication medium through deceit; or (5) tampering with or making inoperable an e-signature, e-document or electronic communication medium. The identification of persons committing the above crimes will be published in two daily newspapers with wide circulation at the expense of the offender. The chief administrator of the entity that violated the above crimes will incur the same penalty as the entity if it is proven that she had knowledge of the crimes or her negligence led to the crimes.

129. Id.
130. Id.
131. Id.
132. Id. CAs who violate the licensing conditions or any of the provisions of ESL Article 19 may have their license suspended or revoked. It will not be reinstated until the causes of the violations have been rectified. Additionally, if criminal acts have been committed, the CA may be subject to criminal penalties pursuant to ESL Article 23. Id. art. 26.
133. Id. art. 22.
134. As of November 19, 2009, this corresponds to a range of approximately $1,832 to $18,320, according to http://www.XE.com. The penalty range will be doubled if there are repeat violations. Law No. 15 of 2004 (E-Signature and Establishment of the Information Technology Industry Development Authority), Al-Jarida Al-Rasmiyva, Apr. 21, 2004, art. 23 (Egypt), available at http://www.uneca.org/aisi/NICI/Documents/egypt-e-signature-law.doc. Furthermore, these offenses may result in more stringent punishments pursuant to the penalty code or other laws. Id.
135. Id.
136. Id.
137. Id. art. 24.
A less serious crime occurs if a CA fails to file a required report, statistical data, or other information to ITIDA. Such a violation is punishable with a fine in the range of E£ 5,000 to 50,000.\textsuperscript{138} Additionally, the minister of justice, acting in conjunction with the minister of information and communications, may issue an executive order authorizing ITIDA employees to serve in the capacity of a law enforcement officer in reference to computer crimes which pertain to employees’ professional responsibility.\textsuperscript{139}

VI. RECOMMENDATIONS FOR IMPROVING EGYPT’S E-COMMERCE LAW

With the enactment of its e-signature law, Egypt has taken a commendable first step toward attaining a sound legal framework for e-commerce. However, more needs to be done before that goal is realized. First, Egypt should implement e-commerce contractual rules pertaining to automated contracts; attribution; acknowledgment of receipt; time and place a message is assumed to have been sent and received; and carriage contracts. For automated contracts, the U.S. Uniform Electronic Transactions Act offers a good model.\textsuperscript{140} For attribution, South Korea’s Electronic Commerce Act offers a good model.\textsuperscript{141} For acknowledgement of receipt, look to Singapore’s Electronic Transactions Act.\textsuperscript{142} For time and place, use Holland’s Electronic Commerce Act.\textsuperscript{143} For carriage contracts,

\begin{footnotesize}
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\item\textsuperscript{138} Id. art. 23. As of November 19, 2009, this corresponds to a range of approximately U.S.D. $916 to $9,160 according to http://www.XE.com. The penalty range will be doubled if there are repeat violations. Law No. 15 of 2004 (E-Signature and Establishment of the Information Technology Industry Development Authority), \textit{Al-Jarida Al-Rasmiyva}, Apr. 21, 2004, art. 24 (Egypt), \textit{available at} http://www.uneca.org/aisi/NICI/Documents/egypt-e-signature-law.doc.
\item\textsuperscript{139} Id. art. 25.
\item\textsuperscript{140} Unif. Elec. Transaction Act, § 14 (2009).
\item\textsuperscript{141} Framework Act on Electronic Commerce, Act No. 5834, 1999 (S. Kor.) \textit{available at} http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN025692.pdf. The Korean Legislative Research Institute (KLRi) is an independent non-profit organization funded by the Republic of South Korea. The KLRi’s charge is to translate all Korean federal statutes into English. They do an admirable job of this. The statutes’ twenty volumes, in loose-leaf form, are continually updated. This is one of the Korean government’s globalization thrusts. Of course, the official statutes are the ones in Korean as originally enacted. However, given that the Korean government finances the KLRi’s work, the English language versions of the statutes used in research for this article could be described as “quasi-official.” \textit{See} Blythe, \textit{supra} note 71.
\item\textsuperscript{142} Electronic Transactions Act (Act No. 16/2010), § 13 (Sing.), \textit{available at} http://statutes.agc.gov.sg/non_version/cgi-bin/cgi_legdisp.pl?actno=2010-ACT-16-N&doctype=ELECTRONIC%20TRANSACTIONS%20ACT%202010%0a&date=latest&method=part&sl=1.
\item\textsuperscript{143} Information Society Services Act, April 14, 2004, art. 11 (Neth.). \textit{See} Blythe, \textit{supra} note 43.
\end{enumerate}
\end{footnotesize}
Colombia’s Electronic Trade Law has a commendable paradigm. After creating additional e-commerce contractual rules, Egypt should seek to comply with additional requirements from other jurisdictions. The Egyptian statute is less thorough than other nations’ e-commerce laws, as it only mentions the statutory requirements pertaining to writing and signing. In contrast, the New Zealand statute states that the electronic form may be sufficient to meet statutory requirements for several types of requirements that are not covered in Egypt’s statute. For example, in New Zealand (1) an e-signature may be used to satisfy a statutory requirement that a signature or a seal be witnessed if the e-signature is reliable given the circumstances, it identifies the witness, and it indicates the signature or seal has been witnessed; (2) an e-document may be used to satisfy a statutory requirement to store a paper document; (3) if a statute mandates that information be retained in electronic form, the electronic form chosen must be reliable and must be easily accessible for reference at a later time; (4) if a statute requires that a comparison be made with an original paper document, that mandate may be met by comparison with a digital copy of the original document if the integrity of the original paper document is maintained by the e-document; and (5) in all instances mentioned here, neither the generation of a digital copy nor transmission of information in an electronic communication shall be held to be in violation of copyright law. These rules, which are pertinent to compliance with other statutory requirements, should be added to the Egyptian statute. Specifically, regarding the statutory language from other jurisdictions that Egypt should adopt, two important provisions are included in the Jordanian statute. First, Egypt should allow for the transferability of electronic notes. Second, Egypt should enable the electronic transfer of funds.

A further flaw in the ESL is that it fails to include consumer protections for e-commerce buyers. As a model, Egypt can look to Tunisia for an example of a nation with good consumer protections for e-commerce buyers. All of Tunisia’s e-commerce consumer protections are commendable. Tunisia provides buyers with a last chance to review the order before entering into it. Buyers have a ten-day window to withdraw from the agreement after it has been made. If the goods are late or if they do not conform to the specifications, buyers are entitled to a refund.

Additionally, Tunisia has required sellers to provide buyers with a ten day trial period after the goods have been received; during this window the risk remains with the seller.\textsuperscript{148}

Beyond these consumer protections, Egypt should expand the list of computer crimes in the ESL. The following computer crimes, with appropriate penalties, should be recognized: (1) unauthorized tampering with computer information; (2) unauthorized use of a computer service; (3) unauthorized interference in the operation of a computer; (4) unauthorized dissemination of computer access codes or passwords; and (5) injection of a virus into a computer. The Singapore Computer Misuse Act can be used as a model for such additions.\textsuperscript{149}

In order to make these regulations stronger, e-government provisions within the ESL should be strengthened. These provisions are relatively weak because they are permissive; they should be mandatory. If financial resources are available, Egypt should purchase state-of-the-art computer information systems for their governmental departments. Over the long run, the investment should pay for itself in reduced cost of government services.\textsuperscript{150} Additionally, as Egyptians rely more and more on the Internet, this will make government services more convenient and accessible to Egyptian citizens. Accordingly, governmental departments should begin to provide services online. Hong Kong is an excellent example of a jurisdiction that has successfully implemented e-government. In Hong Kong, a substantial number of government services may now be accessed online, including scheduling an interview for a visa or scheduling a wedding before a public official.\textsuperscript{151}

In order to properly enforce these new regulations, Egypt should create information technology (IT) courts. Because of the specialized knowledge often required in the adjudication of e-commerce disputes, information technology courts should be established as a court of first instance for e-commerce disputes. These IT courts should be tribunals

\textsuperscript{148} South Korea is one of the few nations that may offer better consumer protections than Tunisia. South Korea has enacted a separate statute focusing exclusively on e-commerce consumer protections. See Consumer Protection in Electronic Commerce Act, Law No. 6687, Mar. 30, 2002 \textit{amended by Act No. 7315, Dec. 31, 2004, amended by Act No. 7344, Jan. 27, 2005 (S. Kor.).} Furthermore, the CPA recently underwent a major overhaul with substantial amendments in Act No. 7487 of March 31, 2005, which became effective on April 1, 2006. For a thorough analysis of the CPA, see Blythe, \textit{supra} note 71. Iran also provides good consumer protections, including a window of opportunity to withdraw from an e-transaction previously entered into. However, the window in Iran is only seven days, as opposed to Tunisia's ten days. See Blythe, \textit{supra} note 63.


\textsuperscript{150} Chung, \textit{supra} note 20.

\textsuperscript{151} See Blythe, \textit{supra} note 70, at 3.
consisting of three experts. The chairperson would be an attorney versed in e-commerce law, and the other two people would be an IT expert and a business management expert. The attorney would be required to hold a law degree and be a member of the bar with relevant legal experience; the IT expert would be required to hold a graduate degree in an IT related field and have experience in that field; and the business management expert would be required to hold a graduate degree in business administration and have managerial experience. The e-commerce law of Nepal can be used as a model. 152

In order to give these regulations full weight, Egypt should consider the fact that many e-transactions will occur between Egyptian citizens and residents and parties outside the borders of Egypt. Thus, it would be prudent for Egypt to formally state its claim to long-arm jurisdiction against any party who is a resident or citizen of a foreign country, so long as that party has established minimum contacts with Egypt. 153 Minimum contacts will exist, for example, if a cyber seller outside Egypt makes a sale to a party living within Egypt. The ESL should be applicable to the foreign person or entity outside of Egypt because that person or firm has had an effect on Egypt through the transmission of an electronic message received in Egypt. The foreign party should not be allowed to evade the Egyptian courts’ jurisdiction merely because that party is not physically present in the country. After all, e-commerce is an inherently international phenomenon, unlimited by national borders.

Beyond the need to create effective regulations is the need to promote the utilization of e-signatures among the general public and to make them cheaper and more accessible. In order to accomplish this goal, Egypt’s post office should be designated as a licensed CA. Several nations have successfully experimented with this idea, including Belgium. In Belgium, a national ID card contains a computer chip, which can be activated at the post office to become an e-signature of the cardholder. The Belgian post office has also implemented a promotional campaign to educate the general public about e-signatures and their availability through the post office. 154


153. The Republic of Tonga is an example of a nation that has claimed long-arm jurisdiction over e-commerce parties. Its statute may be used as a model. See Blythe, supra note 86, at 14.

154. Wet Houdende Vaststelling van Bepaalde Regels in Verband met het Juridisch Kader voor Elektronische Handtekeningen en Certificatiediensten [Legal Framework for Electronic Signatures and Certification Services] of July 9, 2001, MONITEUR BELGE [M.B.] [Official Gazette of Belgium], Sept. 29, 2001, 33070. This statute was supplemented by the Royal Decree Organizing the Supervision and Accreditation of Certification Service Providers Issuing Qualified Certificates. Koninklijk Besluit Houdende Organisatie van de
Finally, to increase the number of locations offering CA services throughout Egypt, the Office of Registration Agents (RA) should be created. An RA is employed by a CA and works under the authority granted in the CA’s license; an RA does not need a separate license. The RA is able to operate branch locations of the CA. The RA’s responsibilities should include processing applications for certificates and confirming the identification documents those applicants submit. Several nations have experimented with RAs, including Peru and the Slovak Republic.

VII. SUMMARY AND CONCLUSIONS

Because of its stagnant rate of economic growth, the Egyptian government implemented sweeping reforms of its economic policies in 2005, including reductions in tax rates, energy subsidies and customs fees, and the privatization of some industries previously operated by the government. Those changes seem to have paid off. Since 2006, the rate of growth in GDP has significantly increased.

Currently, only ten percent of Egyptians have Internet access, but that percentage continues to grow as the country moves toward broadband and away from the much slower dial-up connections. Business-to-consumer e-commerce has lagged because of limited Internet access, a preference to use cash in business transactions, and an aversion to credit cards. However, business-to-business e-commerce is flourishing. Additionally, more and more bureaucratic departments are switching to e-government, this should reduce the cost of government services and make them more accessible and convenient for Egyptians as the percentage of Internet penetration increases. In 2004, Egypt demonstrated significant investment into e-commerce by passing the ESL.

The ESL was a commendable first step in the creation of a legal framework for e-commerce law. This framework can be improved by


158. Introduction to E-Commerce, supra note 10.

159. Egypt: Overview of E-Commerce, supra note 11.

adding e-contract rules that recognize the electronic form as a means of compliance with virtually all types of requirements contained in other statutes. These e-contract rules relate to attribution, acknowledgement of receipt, time and place of transmission and reception, automated contracts and carriage contracts. Further, there should be additional provisions relating to transferability of electronic notes and electronic funds, consumer protections, several new computer crimes, and mandatory e-government. In order to enforce these provisions, information technology courts should be created and given explicit long-arm jurisdiction. Additionally, in order to promote access to e-commerce, Egypt’s post office should be made a certification authority, and registration agents should be granted the authority to accept and process applications for certificates on behalf of a certification authority.