

The Use of Analytical Hierarchy Process (AHP) Technology in the Selection of an Appropriate Punishment for the Electronic Crime

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P: ISSN : 1813-6729
E : ISSN : 2707-1359

<http://doi.org/10.31272/JAE.43.2020.124.14>

مقبول للنشر بتاريخ : 2020/5/11

تاريخ استلام البحث : 2020/1/16

Abstract

This study aims at applying the AHP technology, as one of the most applied mathematical methods in decision making by estimating the weights of the criteria or the alternatives to reach an appropriate decision. The development in the technological fields has contributed significantly to the development of society and the work of institutions on different levels. However, at the same time, it has highlighted many disadvantages through illegal methods in the use of these technologies. So, the study focuses on an important area of legal legislation, which is electronic criminalization. Therefore, in order to establish scientific foundations, there should be an adoption of one of the statistical methods of multi-criteria to determine the appropriate punishments for electronic crimes through the views of legal decision makers. Also, the study has come up with a number of conclusions, the most important ones are the prioritization of electronic crimes as per the seriousness the addition of the prioritization of punishments for each crime, developing and addressing these issues. Finally, the criminal legislator has been able to deal with or demystify through the modification of the laws in force to limit these crimes.

Keywords: Analytical Hierarchy Process (AHP), Decision Making, Electronic Crime



مجلة الإدارة والاقتصاد
العدد 124 / حزيران / 2020
الصفحات : 216-201

(1) Introduction

As known, electronic crimes are transnational crimes, and constitute a major source of concern for the security of the individual and institutions, both governmental and civil. In view of the great acceleration in the development of information systems, computers, software and communication systems, the target of the criminal act, this approach provides decision and estimation solutions in multi-criteria environments. This could be accomplished by setting priority weights for criteria, and alternatives by hierarchically arranging target, criteria and alternatives.

The development of technology and the expansion in the areas of application has become, in many countries in the world in general and developing countries in particular, a major cause of crime and a source of great concern in society because of the growing phenomenon, the security, social risks and financial losses (Alminshaw, 2003).

Computerization with the development of software and surveillance techniques and social communication has also been positive. The last (10) years have shown an increase in cyber-crime through the passive use of these technologies. Electronic crime has been defined by several definitions, may be punishable by any act or omission arising out of the illegal use of information technology aimed at the abuse of material or moral funds which is the direct or indirect result of the interference of electronic technology) (Alafifi, 2013), or it is the use of any type of computer, electronic technology, the Internet or social media to facilitate the commission of the crime or any act that is contrary to the law or that is located on the networks themselves by penetrating them with the intention of storing or disrupting them, distorting or erasing data and programs, (Al-Ajami, 2014).

That electronic crime emerged in the early seventies through the manipulation of stored data and the destruction of computer systems. In the eighties, it began to take the form of other crimes through the penetration of systems and the planting of viruses that destroy the files stored information, and expressed these breakthroughs "Hackers" aimed at breaking systems. For many reasons, it may be security, economic, political, and the seizure of funds and bank accounts, which made these totals are a criminal tool led by institutions with a high risk (Baraa, 2016). At the end of the twentieth century, the breadth of dealing with the Internet and the emergence of social communication programs abolished the geographical boundaries between states, as the electronic crimes were committed but as a criminal act has been achieved in another country (Altai, 2015).

The electronic crime is one of the crimes committed on the Iraqi street, especially after 2003, as the revolution of informatics and openness to the public through various means has cast a shadow on the Iraqi society, which resulted in this revolution many legal negatives, some of which threaten the national security (Mekhlif, 2017).

There is no doubt that Electronic Crimes are considered one of the most serious crimes against the security of information and communities alike, as it is possible to reach as many subscribers or citizens as possible and to harm them. In other words, the criminal acts that occur through electronic means are many and varied including the use of an e-mail to transmit shaded information, the exploitation of

communication programs to spread terrorism, sectarian strife and the threat of national security, illegal access (piracy) through the dissemination of viruses, theft of copyright and infringement of copyright in its scientific, artistic and literary forms (Almulah, 2009).

The Iraqi criminal law has adopted the principle of universality of criminal law based on Article 13, but the application of the text of this article requires the availability of a number of conditions. Such conditions include the occurrence of a crime outside Iraq, and that the criminal exists in Iraq after the commission of the offense and the doer of the action is a non-Iraqi citizen. This article does not deal with Electronic Crimes inside and outside Iraq (Alshokree, 2008). Therefore, due to the statute of limitations in the Iraqi Penal Code No. (111) of 1969, there was a need to develop and amend some laws one of which is the Anti-Terrorism Law No. 13 of 2005 (Hayawi, 2016), Anti-Human Trafficking Law No. (28) of 2012 (Anti-Human Trafficking Act, 2012), Law against money-laundering and terrorist financing No. (39) for the year 2015 (Hayawi, 2015) and the Narcotic Drugs and Psychotropic Substances Law, No. 50 of 2017 (The Narcotic Drugs and Psychotropic Substances Law, 2017).

(2) Literature Review:

Number of studies have targeted electronic crimes, and measured the risks of information security which presented by prioritizing appropriate alternatives or penalties towards the goal. However, **Alfurhood (2007)^[3]** has addressed the cybercrime and how to determine penalties for these crimes. **Eren-Dogu & et al (2012)^[10]** have present a comparison between AHP-GDM and BPP in the decision-making process and prioritization in measuring the risk of information security in the subject of risk management. **Shamsuddin & et al (2012)^[20]**, found that there is a link between AHP and the Geographic Information System analysis (GIS), as a part of the study analyzed the Malaysian electronic crime analysis by selecting the crime of the potential crime area. **Fan; & et al (2013)^[11]** have found that the method of hierarchical analysis was used to illustrate the importance of the tourism security factor as the most important factor in the development of the tourism sector. The researchers proposed a three levels model for first, travel security. The second represents the middle class that integrates the seven elements of safety (traffic safety, Health, political law and social security, Housing security, medical security, safety of tourist sites and weather security). The third level included 16 elements. **Galvez & et al;(2015)^[12]** have brought to light that a systematic approach is proposed through the integration of the Mixed Linear Programming Process (MILP) and the Analytical Hierarchy Analysis. Project managers will be allowed to assess potential scenarios for the implementation of an aeronautical economic logistics network in order to facilitate the integration of preferences of stakeholders involved in the project. The proposed approach was illustrated by the design of the municipal biogas facility in Nancy, France. **Otair & et al, (2015)^[17]** have showed how to determine the readiness of the organization to combat cybercrime and identify the critical factors affecting this prepared, this study applied to Jordanian Airlines IT department. It requires increasing the complexity of the use of risk management techniques easier to measure information security risks. Adapting complex risk analysis tools in information systems today is a very difficult task due to lack of reliable data . In

their study, **Wu & et al, (2016)**^[24] aimed at evaluating the information security policy of commercial banks by assessing the risks of the Internet according to the characteristics of the interdependence between the indicators of the assessment of information security using the method of AHP. **Huang & et al, (2017)**^[15] analyzed the growing electronic crime business and its causes of growth. The value chain model was proposed and used to describe (25) major value added activities that could be provided on the dark web as a service, namely "cyber crime as a service", which contributes to understanding services in electronic attacks on the expectation of emerging electronic attack services. The paper concluded that this framework enables systematic understanding of infiltration methodologies, including the development of cybercrime services, the development of e-threat and the addition of many strategic Anti-cyber attacks, more effectively.

The literature review discloses that the subject of electronic crimes was not that much addressed, in particular the crimes of electronic terrorism and the design of sites for the purpose of drug trafficking, money laundering and trafficking in human beings, with the addition of some crimes as will be reflected in the study and how to determine the appropriate punishment for each crime. The appropriate punishment for each crime is in accordance with its gravity to limit such crimes.

(3) Methodology

The technological development and the global openness has led to a great positive impact on societies and the work of institutions all over the world. In contrast, this technology has caused great problems through the illegal use of these technologies and their exploitation in a manner that leads to the expansion of electronic criminal operations.

A goal of the study, the Analytical Hierarchy Process (AHP) will be used in order to set the appropriate punishment for Electronic Crimes. It is an attempt to suggest a treatment for reducing these cases. In addition, the criminal legislator can deal with or demystify the laws in force to deal with these crimes and others. The importance of this study is embodied in linking two important fields; the legal field in the face of Electronic Crimes and the adoption of a multi-standard process research methodology for the purpose of establishing an appropriate mechanism for addressing and amending laws in force to curb such crimes.

(4) AHP Technology

The technique of hierarchical analysis is considered one of multi-criteria applied techniques in decision-making and prioritization in various fields to reach the appropriate decision. This method was developed by Saaty through adopting the matrix (Eigen values) basis and constructing the binary comparison matrix between a number of elements, and determining requirements of the consistency of the decision matrix (Shamsuddin & et al, 2012). The (AHP) process is defined as a technique based on the construction of a binary comparison matrix for a number of criteria or alternatives) (Stirn & et al, 2010), illustrated as follows:

$$C = \begin{pmatrix} 1 & c_{12} & \dots & c_{1n} \\ \frac{1}{c_{12}} & 1 & \dots & c_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{1}{c_{n1}} & \frac{1}{c_{2n}} & \dots & 1 \end{pmatrix} \quad \dots(1)$$

c_{ij} : comparison between elements i and j

(5) Model Estimation

To perform a hierarchical analysis process, the following steps apply :

- (A) Constructing the binary decision matrix for the proposed criteria or alternatives, or both, is a square matrix of $(n \times n)$ depending on the level of preferences (defined by Saaty) as in Figure (1), These levels are identified from (1-9), (Saaty, 1977) and (Saaty & et al,2003) .

Where:

(n): Criteria

(c_{jk}) : The value (Importance) of criterion (j) for criterion (k)

$j=1,2, \dots, n$; $k=1,2,\dots,n$

Table (1) Description The importance of the concept of Saaty

Value of c_{jk}	Interpretation
1	Equally Importance
3	Moderate Importance
5	Strong Importance
7	Very Strong Importance
9	Extreme Importance
2,4,6,8	intermediate value between the two adjacent judgment

Resource: (Saaty& et al, 2003) - (Sik-Wah Fong & et al 2000)

- (B) Calculation of the standard matrix, according to the following formula (Yang, 2011) :

$$c_{Norm} = \left(\frac{c_{jk}}{\sum_{j=1}^n c_{jk}} \right), \quad k = 1, 2, \dots, n \quad \dots(2)$$

- (C) Priority vector calculation $\|W_c\|$, according to the following formula:

$$\|W_c\|^T = \left\| \frac{\sum_{k=1}^n (c_{Norm})_{jk}}{n} \right\|_{1 \times n} \quad \dots(3)$$

$$j = 1, 2, \dots, n$$

- (D) Test the consistency Decision Making matrix C:

To ensure the efficiency of the decision matrix, the following indicators must be calculated (Yang, 2011) :

(CR): Consistency Ratio

(CI): Consistency Index

(RI) :Tabulated values, Tabulated values, as in the Table (2)

λ_{max} : Maximal Eigen values

$$CR = \frac{CI}{RI} \quad \dots(4)$$

$$CI = \frac{\lambda_{max} - n}{n-1} \quad \dots(5)$$

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$$\lambda_{max} = \frac{\sum_{j=1}^n z_j}{n} \quad \dots(6)$$

$$Z^T = \|z_1 \quad z_2 \quad \dots \quad z_j\| \quad \dots(7)$$

$$z_j = \frac{\alpha_j}{w_j} \quad \dots (8)$$

$$\alpha = C * W_c \quad \dots (9)$$

Table (2) Scalable values for matrix consistency testing

Sample Size	1	2	3	4	5
IR	0	0	0.58	0.9	1.12
Sample Size	6	7	8	9	10
IR	1.24	1.32	1.41	1.45	1.49

Resource: (Saaty, 1977)

(6) Practical Application

The data was collected after the organization of the binary comparison among electronic crimes, in addition to the proposed penalties. This form was presented to the criminal judges in Basra Federal Court of Appeal. The study has included (7) types of electronic crimes and (5) punishments, as in table (3) :

Table (3): Shows the Electronic Crimes and its Punishments

the electronic crimes	
Crime1	Electronic terrorism includes the promotion of deviant thought or any act of terrorism that threatens national unity and the safety of society, or the weakening of the ability of the security services to defend by armed clash or any form of deviation from the freedom of expression.
Crime2	Establishing or managing a website with the purpose of human trafficking.
Crime3	Establishment or management of a web site with a view to trafficking or promoting drugs.
Crime4	Electronic financial crimes include crimes of financial piracy and money laundering or financial transfer offenses
Crime5	Illegal surveillance of home and government cameras by camera technicians
Crime6	Destruction of a governmental or private electronic information system
Crime7	Illegal use of electronic devices for the purpose of disturbing or threatening.
Punishments	
Pun.1	Execution
Pun.2	Life imprisonment (20 years)
Pun.3	Temporary imprisonment (5 years - 15 years)
Pun.4	Imprisonment
Pun.5	Fine

Source: Prepared by the researcher according to the requirements of the study

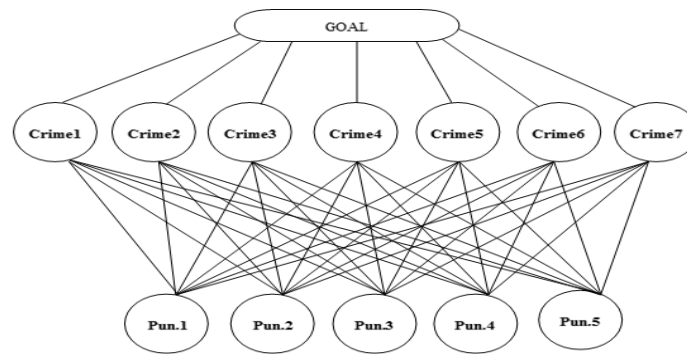


Figure (1) Hierarchical Methodology to Reduce Electronic Crimes

Source: Prepared by the researcher according to the requirements of the study

(6-1) Results Analysis and Discussion

(A) Building a Comparison Matrix for an Electronic Crime

- 1- The structure of comparison of electronic crimes, as in the formula (1), which is determined in accordance with its seriousness, will be discussed, as shown in table (4):

Table (4)
Comparison of electronic crimes according to the seriousness

Weighted	1	2	3	4	5
Description	Equal risk	Poor risk	More risk	Strongly more risk	absolutely more risk

Source: Prepared by the researcher according to the requirements of the study

Figure (2) shows the comparison matrix between the crimes, which is the average of the opinion of the criminal judges, where the matrix was able to determine the risk of each crime as to other crimes.

Matrix	Crime (1)	Crime (2)	Crime (3)	Crime (4)	Crime (5)	Crime (6)	Crime (7)
Crime (1)	1	4.2	4.4	4	4	4.6	5
Crime (2)	0.2381	1	1.8	3.2	3.6	3.6	3.2
Crime (3)	0.2273	0.5556	1	3	2.8	2.6	2.8
Crime (4)	0.2500	0.3125	0.3333	1	2.6	1.4	2.2
Crime (5)	0.2500	0.2778	0.3571	0.3846	1	1.8	1.2
Crime (6)	0.2174	0.2778	0.3846	0.7143	0.5556	1	2.4
Crime (7)	0.2000	0.3125	0.3571	0.4545	0.8333	0.4167	1

Figure (2) Matrix of comparison between electronic crimes

Source: Prepared by the researcher according to the results of the study

2- Testing the Consistency of the Matrix

To ensure the efficiency of the matrix and the accuracy of its results, we test its consistency by adopting the following steps:

- Calculation of c_{Norm} according to formula (2):

$$c_{Norm} = \begin{pmatrix} 0.4197 & 0.6055 & 0.5097 & 0.3136 & 0.2599 & 0.2984 & 0.2809 \\ 0.100 & 0.1442 & 0.2085 & 0.2509 & 0.2339 & 0.2335 & 0.1798 \\ 0.0954 & 0.0801 & 0.1158 & 0.2352 & 0.1819 & 0.1686 & 0.1573 \\ 0.1049 & 0.0451 & 0.0386 & 0.0784 & 0.169 & 0.0908 & 0.1236 \\ 0.1049 & 0.04 & 0.0414 & 0.0302 & 0.065 & 0.1168 & 0.0674 \\ 0.0912 & 0.04 & 0.0446 & 0.056 & 0.0361 & 0.0649 & 0.1348 \\ 0.0839 & 0.0451 & 0.0414 & 0.0356 & 0.0542 & 0.027 & 0.0562 \end{pmatrix}$$

- Calculation of vector elements α , according to formula (9):

$$\begin{pmatrix} 1 & 4.2 & 4.4 & 4 & 4 & 4.6 & 5 \\ 0.2381 & 1 & 1.8 & 3.2 & 3.6 & 3.6 & 3.1 \\ 0.2273 & 0.5556 & 1 & 3 & 2.8 & 2.6 & 2.8 \\ 0.2500 & 0.3125 & 0.3333 & 1 & 2.6 & 1.4 & 2.2 \\ 0.2500 & 0.2778 & 0.3571 & 0.3846 & 1 & 1.8 & 1.2 \\ 0.2174 & 0.2778 & 0.3846 & 0.7143 & 0.5556 & 1 & 2.4 \\ 0.2000 & 0.3125 & 0.3571 & 0.4545 & 0.8333 & 0.4167 & 1 \end{pmatrix} \begin{pmatrix} 0.3840 \\ 0.1930 \\ 0.1478 \\ 0.0929 \\ 0.0665 \\ 0.0668 \\ 0.0491 \end{pmatrix} = \begin{pmatrix} 3.0349 \\ 1.4846 \\ 1.1183 \\ 0.6729 \\ 0.4837 \\ 0.4818 \\ 0.3644 \end{pmatrix} = \alpha$$

- Calculate vector elements Z , according to formula (8)

$$Z = \begin{pmatrix} \frac{3.0349}{0.3840} & \frac{1.4846}{0.1930} & \frac{1.1183}{0.1478} & \frac{0.6729}{0.0929} & \frac{0.4837}{0.0665} & \frac{0.4818}{0.0668} & \frac{0.3644}{0.0491} \end{pmatrix}$$

$$Z = (7.9042 \quad 7.6938 \quad 7.5672 \quad 7.2422 \quad 7.2719 \quad 7.2113 \quad 7.4294)$$

- Calculate of λ_{max} , according to formula (6)

$$\lambda_{max} = \frac{52.32}{7}$$

$$\lambda_{max} = 7.4743$$

- Calculate the value of CI , according to formula (5)

$$CI = \frac{7.4743 - 7}{(7 - 1)}$$

$$CI = 0.0791$$

- Calculate the value of CR , according to formula (4)

$$CR = \frac{0.0791}{1.32}$$

$$CR = 0.0599$$

The result shows that the consistency ratio is less than (0.1), and this indicates the consistency of the matrix and its possible adoption.

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Accordingly, the priority vector for electronic crimes calculated according to the formula (3), as shown in table (5):

Table (5) is a priority for electronic crimes

Crimes	Crime 1	Crime 2	Crime 3	Crime 4	Crime 5	Crime 6	Crime 7
W_c	0.3840	0.1930	0.1478	0.0929	0.0665	0.0668	0.0491
Priority	1	2	3	4	6	5	7

Source: Prepared by the researcher according to the results of the study

B-The Construction of Punishments electronic crime Matrices:

In this paragraph, the binary comparison matrices were discussed for (5) Punishments for each of the proposed crimes by adopting the preferences table (6). The calculations were applied using formulas (1-9):

Table (6) Comparison between Punishments, According to their Preferences

Weighted	1	2	3	4	5
Description	Equal	Poor	Preferred	Strongly preferred	Very strongly preferred

Source: Prepared by the researcher

Crime 1	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	3.8	3.4	3.8	5
Pun.(2)	0.263	1	3.6	4	4.4
Pun.(3)	0.294	0.278	1	2.4	2.2
Pun.(4)	0.263	0.250	0.417	1	2.6
Pun.(5)	0.200	0.227	0.455	0.385	1

Figure (3) Comparison Matrix of Punishment Crime 1

Source: Prepared by the researcher according to the results of the study

Table 7 Priorities of Punishments for Crime 1		
Punishments	W_c	Priority
pun.1	0.4438	1
pun.2	0.2702	2
pun.3	0.1320	3
pun.4	0.0959	4
pun.5	0.0580	5

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.390, \quad CI = 0.0975$$

$$n = 5, \quad RI = 1.12, \quad CR = 0.087$$

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It's clear that, the (CR =0.087) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix for crime1, and therefore the vector of punishments priorities can be adopted in table (7).

Crime 2	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun. (1)	1	1.6	1.84	2.45	3
Pun.(2)	0.625	1	2.6	4.2	4.4
Pun.(3)	0.543	0.385	1	3.5	3.4
Pun.(4)	0.408	0.238	0.286	1	3.6
Pun.(5)	0.333	0.227	0.294	0.278	1

Figure (4) Comparison Matrix of Punishment for Crime 2

Source: Prepared by the researcher according to the results of the study

Table 8 Priorities of Punishments for Crime 2		
Punishments	W _c	Priority
pun.1	0.3045	2
pun.2	0.3180	1
pun.3	0.1983	3
pun.4	0.1156	4
pun.5	0.0637	5

The results of the matrix consistency were as follows:

$\lambda_{\max} = 5.3981$, $CI = 0.0995$, $n = 5$, $RI = 1.12$, $CR = 0.089$
 It's clear that, the (CR =0.089) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime 2, and therefore the vector of punishments priorities can be adopted in Table (8) .

Crime3	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	1.8	3.4	3.4	3.4
Pun.(2)	0.5556	1	3.4	3.8	3.8
Pun.(3)	0.2941	0.2941	1	3.2	3.8
Pun.(4)	0.2941	0.2632	0.3125	1	3
Pun.(5)	0.2941	0.2632	0.2632	0.3333	1

Figure (5) comparison matrix of Punishment for crime 3

Source: Prepared by the researcher according to the results of the study

Table 9 Priorities of Punishments for Crime 3		
Punishments	W_c	Priority
pun.1	0.3659	1
pun.2	0.2974	2
pun.3	0.1695	3
pun.4	0.1032	4
pun.5	0.0640	5

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.4393, \quad CI = 0.1098$$

$$n = 5, \quad RI = 1.12, \quad CR = 0.098$$

It's clear that, the (CR =0.098) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime3, and therefore the vector of punishments priorities can be adopted in Table (9).

Crime 4	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	1.70	0.79	2.27	2.80
Pun.(2)	0.5882	1	1.36	3.80	3.60
Pun.(3)	1.2712	0.7371	1	3.20	3.40
Pun.(4)	0.4412	0.2632	0.3125	1	4
Pun.(5)	0.3571	0.2778	0.2941	0.2500	1

Figure (6) Comparison matrix of Punishment for Crime 4

Source: Prepared by the researcher according to the results of the study

Table 10 Priorities of Punishments for Crime 4		
Punishments	W_c	Priority
pun.1	0.2630	3
pun.2	0.2757	1
pun.3	0.2667	2
pun.4	0.1271	4
pun.5	0.0674	5

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.3448, \quad CI = 0.0862$$

$$n = 5, \quad RI = 1.12, \quad CR = 0.077$$

It's clear that, the (CR =0.077) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime 4, and therefore the vector of punishments priorities can be adopted in Table (10).

Crime 5	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	0.93	0.76	0.98	2.12
Pun.(2)	1.0753	1	1.89	3.8	4.4
Pun.(3)	1.3158	0.5291	1	3.6	2.6
Pun.(4)	1.0204	0.2632	0.2778	1	3.6
Pun.(5)	0.4717	0.2273	0.3846	0.2778	1

Figure (7) Comparison Matrix of Punishment for Crime 5

Source: Prepared by the researcher according to the results of the study

Table 11 Priorities of Punishments for Crime 5		
Punishments	W _c	Priority
pun.1	0.1905	3
pun.2	0.3423	1
pun.3	0.2486	2
pun.4	0.1457	4
pun.5	0.0729	5

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.3505, \quad n = 5 \quad CI = 0.0876, \quad RI = 1.12 \quad CR = 0.078$$

It's clear that, the (CR =0.078) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime 5, and therefore the vector of punishments priorities can be adopted in Table (11).

Crime 6	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	0.90	0.78	1.00	0.39
Pun.(2)	1.1111	1	1.13	1.17	1.77
Pun.(3)	1.2821	0.8850	1	1.49	1.8
Pun.(4)	1.0033	0.8523	0.6711	1	1.8
Pun.(5)	2.5641	0.5660	0.5556	0.5556	1

Figure (8) comparison matrix of Punishment for crime 6

Source: Prepared by the researcher according to the results of the study

Table 12 Priorities of Punishments for Crime 6		
Punishments	W _c	Priority
pun.1	0.1590	5
pun.2	0.2314	2
pun.3	0.2377	1
pun.4	0.1935	3
pun.5	0.1784	4

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.2734, \quad n = 5 \quad CI = 0.0683 \quad RI = 1.12 \quad CR = 0.0610$$

It's clear that, the (CR =0.061) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime6, and therefore the vector of punishments priorities can be adopted in Table (12).

Crime 7	Pun.(1)	Pun.(2)	Pun.(3)	Pun.(4)	Pun.(5)
Pun.(1)	1	1.20	0.36	0.41	0.21
Pun.(2)	0.8333	1	0.457	0.787	1.180
Pun.(3)	2.8037	2.1898	1	0.96	1.48
Pun.(4)	2.4590	1.2712	1.0453	1	2.20
Pun.(5)	4.7619	0.8475	0.6757	0.4545	1

Figure (9) Comparison Matrix of Punishment for Crime 7

Source: Prepared by the researcher according to the results of the study

Table 13 Priorities of Punishments for Crime 7		
Punishments	W _c	Priority
pun.1	0.1034	5
pun.2	0.1532	4
pun.3	0.2730	1
pun.4	0.2677	2
pun.5	0.2028	3

The results of the matrix consistency were as follows:

$$\lambda_{\max} = 5.3626 \quad n = 5 \quad CI = 0.0907 \quad RI = 1.12 \quad CR = 0.081$$

It's clear that, the (CR =0.081) of the matrix is less than (0.1) indicating the consistency of the Punishments matrix For crime 7, and therefore the vector of punishments priorities can be adopted in Table (13).

(6-2) Concluding remarks:

The study, through a practical application and adoption of one of the multi-Criteria decision making methods, was able to prioritize electronic crimes and its punishments according to its riskiness to the society and national security. Therefore, it allows a criminal legislator and a judicial decision maker to amend the laws to the extent possible. The conclusions are as follows:

The study was able to prioritize electronic crimes according to their riskiness. The study concluded that the crime of electronic terrorism and its dimensions occupied the first ranking by (0.3840), the establishment or management of a website for the purpose of trafficking in human beings achieved the second ranking by (0.1930), the establishment or management of a website for the purpose of trafficking or the promotion of drugs the third ranking of (0.1478), the electronic financial crimes, includes crimes of financial piracy, money laundering or financial transfer, the fourth ranking by (0.0929), destruction or sabotaging of the governmental or national electronic information system (0.0668), the illegal surveillance of domestic and government cameras by the camera technician, the

sixth ranking by (0.0665), and the illegal use of electronic devices for the purpose of disturbance or threat of the seventh ranking (0.0491).

The results showed an appropriate punishment for the crime of electronic terrorism and its dimensions and criminal motives through the prioritization of punishments. The execution punishment achieved the first rank among the punishments with a preference rate of (0.4438), As explained in table (7) .

The punishment for life imprisonment was the first of the punishments with a preference of (0.3180) for the crime of establishing or managing a website for the purpose of human trafficking, while the punishment for the financial punishment achieved the last order between the sentences by (0.0637), as explained in table (8) .

The results showed that the execution ranked first with a preference rate of 0.3659 among the punishments for the crime of establishing or managing a website for the purpose of trafficking or promoting drugs and its criminal dimensions and prioritizing the punishments for this crime according to their motives. The punishment of the financial fine ranked last with a preference rate (0.0640), as explained in table (9).

The study was able to select the appropriate punishment for the crime of electronic financial crimes and its criminal dimensions and to prioritize the punishments for this crime according to their motives. The punishment of life imprisonment was the first ranked by (0.2630), while the fine punishment of the financial punishment has achieved the last ranking by a very small (0.0674), as explained in table (10).

The punishment of life imprisonment was the first ranked with a preference rate of (0.3423) among the proposed punishments for the crime of illegal surveillance of domestic and government cameras by camera technicians, and the criminal dimensions thereof and prioritizing the punishment for this crime according to their criminal motives and riskiness, as explained in table (11) .

The study was able to choose the appropriate penalty for the crime of destruction of a governmental or private electronic information system and its criminal dimensions and prioritizing the punishments for this crime according to its motives. The Temporary imprisonment was the first ranked at a preference rate (0.2377), while the execution achieved the last rank (0.1784), as explained in table (12).

The study was able to choose the appropriate punishment for the crime of the illegal use of electronic devices for the purpose of disturbing or threatening, and its criminal dimensions and to prioritize the punishments for this crime according to its motives. The temporary imprisonment ranked first among the punishments at a preferential rate (0.2730), while the execution achieved the last rank (0.1034), as explained in table (13).

Finally, the study found there is a space to enable the criminal legislator to deal with the laws, and amend them, in line with the requirements of the age and the subsequent technical development. In addition, the criminal judge will have priorities in determining the punishment of electronic crime depending on the elements and motives of crime and the objectives of the criminal act.

(6-3) Recommendations:

The study recommended that there is a dire need to adopt modern statistical methods, parametric and nonparametric multi - criteria in addressing the problems facing the community, thus contributing to its development.

Developing the Iraqi Penal Code No. (111) of the year 1969, and dealing with its materials in relation to electronic crimes, as these crimes pose risks to the internal and external national security.

Developing the criminal justice system with regard to electronic crimes through the preparation of specialized judicial cadres capable of dealing with this type of crime and the evidence of its perpetrators.

The study recommends that the subject at the hand to be followed up by specialists in the criminal aspect, and the preparation of studies, thus contributing to the establishment of the legal scientific bases in dealing with the innovations of the crimes and the consequent punishments.

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استخدام تقنية عمليات التحليل الهرمي (AHP) في اختيار العقوبة المناسبة للجريمة الالكترونية

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المستخلص

تهدف الدراسة الى اعتماد تقنية التحليل الهرمي (AHP) Analytical Hierarchy Process التي تُعد احدى الاساليب الرياضية التطبيقية متعددة المعايير في اتخاذ القرار من خلال تقدير الاوزان (الاهميات) للمعايير والبدائل للوصول الى القرار المناسب، اذ ان التطور الحاصل في المجالات التكنولوجية أسهمت بشكل كبير في تطوير المجتمع وعمل المؤسسات على مختلف اتجاهاتها ولكن في الوقت نفسه أبرزت هذه التكنولوجيا الكثير من السلبيات من خلال الاساليب غير القانونية في استخدامها، لذا استهدف البحث التطرق الى مجال مهم من المجالات التشريعية القانونية الا وهو التجريم الالكتروني، واستعمل احدى الاساليب الاحصائية متعددة المعايير في اختيار العقوبات المناسبة للجرائم الالكترونية باعتماد اراء متخذي القرارات القانونية (القضاة)، واخيراً توصلت الدراسة الى جملة من الاستنتاجات والتوصيات اهمها تحديد الاولويات للجرائم الالكترونية حسب خطورتها اضافة الى تحديد اولويات العقوبات لكل جريمة من الجرائم مما يسهم ذلك في معالجة هذا النوع من الجرائم اضافة الى تمكين المشرع الجنائي من معالجة وازالة الغموض من خلال تعديل القوانين النافذة للحد من هذه الجرائم .

الكلمات المفتاحية: عمليات التحليل الهرمي، اتخاذ القرار متعدد المعايير، الجرائم الالكترونية